



**REPORT OF THE  
AD HOC MEETING OF THE COORDINATORS OF THE  
1991 STOMACH SAMPLING DATABASE**

IJmuiden, The Netherlands

18–23 April 1996

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## 1. TERMS OF REFERENCE

The Terms of Reference for the meeting (C.Res. 1995/2:36) were:

- a) To prepare the data needed for an update of the North Sea Multispecies VPA with particular reference to the mean weights at age of prey species in the stomachs in the 1981 and 1991 data.
- b) To report to the Multispecies Assessment Working Group and to the Advisory Committee on Fishery Management.

## 2. PARTICIPANTS

The meeting of the Coordinators of the stomach sampling project in the North Sea in 1991 took place in IJmuiden, from 18 to 23 April 1996. The participants were:

|              |                          |
|--------------|--------------------------|
| S Adlerstein | Germany                  |
| N Daan       | The Netherlands          |
| J Hislop     | UK (Scotland) (Chairman) |
| N Mergardt   | Germany                  |
| A Robb       | UK (Scotland)            |
| K Stokes     | UK (England)             |
| D Skagen     | Norway                   |
| A Temming    | Germany                  |
| H Welleman   | The Netherlands          |

## 3. A HISTORY OF THE STOMACH CONTENTS DATA SETS, WITH REFERENCE TO MSVPA

Since 1984, when the first trial runs of the North Sea MSVPA were conducted (Anonymous, 1994), using feeding data from the stomachs sampled in 1981, various changes have been made to the input data. Corrections have been made to the original stomach contents data and to the auxiliary data (age length keys, survey data), additional stomachs have been sampled and there have been changes in the methods used to process the stomach data into the form required as input to MSVPA. Because these changes affect the results of the MSVPA in various ways, it is important that they should be documented.

### 3.1 Feeding Data Collected in 1981

1981 was the first "Year of the Stomach" in the North Sea. A full description of this project is given in Daan, 1989, but some of the same ground must be covered again here.

The stomachs of cod, haddock, whiting, saithe and mackerel were sampled in each quarter of the year. A coordinator was appointed for each species. The coordinators were responsible for analysing the stomach contents of individual species, to ensure homogeneity within data sets, and assembling the data in the form required by MSVPA, namely arrays containing the average weights and numbers, as well as the weights at ingestion, of each prey age class in the stomach of each predator age class, averaged over the whole North Sea.

Although the 1981 stomach sampling project had a clearly defined goal, there was no predetermined agreement between the species coordinators as to how this goal was to be achieved, and four independent methods were applied to the five species:

Cod and haddock: the stomach data were processed using a suite of PASCAL programs developed by N Daan at RIVO (the ISR programs).

Whiting: a program was written in BASIC by D Armstrong at Aberdeen. The final outputs from this program were identical in format to those from the ISR programs, but different pathways were followed to reach them. Unfortunately the computerised data were held in virtual files which could not be accessed when the Marine Laboratory adopted a new operating system.

Cod, haddock and whiting are widely distributed throughout the North Sea, and they are sampled effectively by bottom trawl surveys. For these three species, it was possible to work up the data using age length keys based on Roundfish Reporting Areas and to use trawl survey data to weight the mean stomach contents within each statistical rectangle by indices of local abundance (trawl catch rates).

Saithe: the data collected in 1981 were rather sparse and were supplemented by additional material collected in 1980 and 1982. The data were processed using programs written by H Gislason in Copenhagen (Gislason, 1983).

Mackerel: as for saithe, a rather small number of stomachs was sampled in 1981 and these were supplemented with material from 1980, 1982 and 1983. The data were processed using FORTRAN programs developed in Bergen by Westgard (Westgard, 1982).

The methods used to process the saithe and mackerel data differed from those applied to cod haddock and whiting. It was necessary to use age length keys for much larger areas, and survey catch rates could not be used as sample weighting factors.

The 1981 feeding data for cod, whiting, saithe and mackerel were used for the first trials of the North Sea MSVPA in 1984 (Anonymous, 1984). The haddock data became available in 1985 (Anonymous, 1986).

These original input data have been used in all key runs of MSVPA up to and including 1995 (Anonymous, 1996). To the best of our knowledge, the only alterations are undocumented *ad hoc* changes to the assumed mean weights of prey at the time of ingestion and changes to some of the age length keys used to determine the age composition of the prey which were made by the MSVPA WG for various reasons (see Section 3).

However, since the 1995 meeting of the MSVPA WG, the 1981 input data for whiting have been altered. As mentioned previously, the original computerised whiting stomach contents data for 1981 could not be retrieved and the only records of the processed data, as supplied to the MSVPA WG, are the summary tables given in an *ICES Cooperative Research Report* (Daan, 1989). In order to make the complete set of whiting data generally available it was necessary to go back to the original paper records, which were still held in Aberdeen, and to re-enter all the basic stomach contents data into the computer. In the interests of conformity, it was decided that the data should be computerised and processed using the (current) version of the ISR programs. Because there are some fundamental differences between these programs and those originally used to process the data in Aberdeen, the

"new" 1981 whiting MSVPA input data are by no means identical to those used in previous runs of MSVPA.

The 1981 mackerel data were originally processed rather differently from the other species. Because this is a migratory species, a partition of the North Sea into three areas was used instead of the roundfish sampling areas. Due to the coarse length sampling strata used in 1981, most of the adult mackerel are included in the 30-39 cm length class and the remainder in the 40+ length class. When the data were processed, only three age groups were used (ages 0, 1-2, and 3+). All stomach samples were given equal weight, since the catch rate with a demersal trawl is a rather poor indicator of the abundance of this species, and some of the mackerel were sampled with other gears, mostly from the commercial fishery. The data were stored in a database in Bergen. A set of the data, in the exchange tape format, was provided for the present meeting, in the hope that the mackerel data could be brought into the ISR fold. However, the data could not be processed during the meeting. This was partly because it was not clear which age length keys had been and should be applied, and partly because the data set contains stomachs collected outside the North Sea, notably north of 62°N. It is not clear how these data were used in previous data compilations, and the value of using data from this area to represent the North Sea is questionable. The mackerel data will be examined in Bergen.

### **3.2 Feeding Data Collected in 1985-1987**

Stomachs of cod and whiting were sampled during the first and third quarters of 1985, 1986 and 1987. Saithe stomachs were sampled in the third quarter of 1986 and the first and third quarters of 1987 (Anonymous, 1988a). All these stomach contents data were processed using the ISR programs. These ISR programs were virtually identical to as those used to process the 1981 cod and haddock data. The only significant modification was that some extra predator and prey size classes had been introduced to allow a more precise conversion of size classes to age classes. The new stomach contents data entered MSVPA in piecemeal manner, as they became available. Thus the cod and saithe data, together with the whiting data for 1985, were used during the 1988 meeting of the MSVPA WG (Anonymous, 1988b) whereas the complete set of whiting data was not available until 1990 (Anonymous, 1991).

No modifications have been made to the basic input data since they were first included in MSVPA in 1985, apart from adjustments made by the MSVPA WG to some of the mean weights at ingestion.

### **3.3 Feeding Data Collected in 1991**

1991 was the second "Year of the Stomach". Cod, haddock, whiting, saithe and mackerel were sampled in each quarter of the year.

All the 1991 data were processed using the ISR programs. A number of modifications had been made to these programs since they were used to process the 1985-87 data, including provision for yet more predator and prey size classes.

The 1991 stomach contents data were used for the first time during the 1993 meeting of the MSVPA WG (Anonymous, 1994), when they were included in new key runs of MSVPA. However, after that meeting it became obvious that there was a bug in the modified ISR programs and some of the input data used during the 1993 meeting were incorrect. The programs were modified and revised input data (still based on the original 1991 stomach

contents data files) were made available to the 1995 meeting of the MSVPA WG (Anonymous, 1996). A comparison of the outputs generated from the "old" and "new" 1991 input data revealed that they differed, but not sufficiently to invalidate the conclusions reached in 1993.

Since 1995 there have been further developments. In the first place, the 1991 stomach contents data base has been thoroughly checked and a small number of data entry errors have been corrected.

In the second place, an error was found in one of the sets of trawl survey data for the second quarter of 1991. The catch rates as originally submitted to ICES had not been standardised to numbers per hour fishing. Trawl surveys provide information on abundance and predator size compositions which plays a key role in processing the stomach contents data and the inclusion of incorrect data will have introduced errors into the MSVPA input data for cod, haddock, whiting and mackerel in that quarter. The survey data were corrected during the present meeting.

In the third place, a shortcoming in all former versions of the ISR programs was identified in 1995. This concerns the way in which partly identified MSVPA prey are handled. During the analysis of stomach contents, it is not unusual to encounter prey which are digested to such an extent that identification to species level is impossible. In such cases, the analyst may make an on-the-spot decision to assign the item to a species, using cues such as the contents of other stomachs from the same haul, or the composition of trawl hauls. Alternatively, the item can be assigned to a family (Clupeidae, Gadidae etc.), or recorded as "unidentified fish". The stomach contents data sets contain a number of such records of partially identified/unidentified fish. However, the ISR programs used between 1981 and 1995 did not make use of these records when calculating the contribution made by each MSVPA species to the total stomach contents. Only those prey which had been identified to species level were included in the analysis. Although this procedure may be academically sound, a more pragmatic approach is needed to make the best estimate of the relative importance of each prey species to the diet of each predator for the purpose of MSVPA. Accordingly, algorithms have been developed to distribute fish which had been identified to family level over MSVPA species. The details of this procedure are given in Section 4.

It should be noted that this modification has produced some changes in all the input data to MSVPA which were originally processed with the ISR programs. The changes are trivial in the case of cod, because the stomach analysts assigned virtually all fish prey to a species, but less so for some of the other MSVPA predators, such as whiting.

An improvement has been made to the procedure for transferring feeding data to the customer. Programs now exist to read the output files generated by the ISR programs and to convert them to MSVPA input files. Previously, these data had to be entered manually. This process was very laborious and provided ample opportunity for transcription errors.

#### 4. ALLOCATING PARTIALLY IDENTIFIED PREY TO SPECIES

As mentioned in Section 3.3, the stomach data sets include a number of prey items which are identified only to family level. The ISR programs did not make use of these records. In order to obtain a more precise estimate of the contribution of MSVPA species, and four

important flatfish species, to the total stomach contents, prey identified as Clupeidae, Gadidae, Pleuronectidae and Soleidae were redistributed within their family as follows:

|                  |                                                                              |
|------------------|------------------------------------------------------------------------------|
| Gadidae -        | cod, haddock, Norway pout, saithe, whiting, non-commercial Gadidae (grouped) |
| Clupeidae -      | herring, sprat, non-commercial Clupeidae (grouped)                           |
| Pleuronectidae - | plaice, dab, lemon sole, non-commercial Pleuronectidae (grouped)             |
| Soleidae -       | sole, non-commercial Soleidae (usually only solenette)                       |

If the prey item (eg Clupeidae) had been measured and assigned to a particular size class (I), the redistribution was made over all family members in this size class (eg Herring [i], Sprat[i]), for weights and numbers separately:

$$\text{Her}[i] = \text{Her}[i] + \{\text{Clu} * (\text{Her}[i] / (\text{Her}[i] + \text{Spr}[i]))\}$$

If the prey item was well digested and the size classified as unknown (u), it was distributed over all recorded size classes of the species in the family:

$$\text{for } I = 1 \text{ to } n: \quad \text{Her}[i] = \text{Her}[i] + \{\text{Clu} * (\text{Her}[i..n] / (\text{Her}[i..n] + \text{Spr}[i..n]))\}$$

The redistribution is done for predator size classes. Prey are redistributed first at statistical rectangle level. The algorithm is then deployed at roundfish sampling area level to distribute prey which could not be distributed at rectangle level.

The algorithms have allocated to species level a large proportion of the prey which had originally been identified only to family level. It may be possible to allocate most of any remaining "Gadidae" and "Clupeidae" to species on the basis of their size, and when and where they were eaten, in relation to the corresponding survey catches. This should be done at the haul level, rather than on the basis of a sophisticated algorithm. No attempt was made to redistribute prey in the category "unidentified fish". However, it should be noted that the exclusion of these items does not influence the outcome of MSVPA, which is dependent on the proportional contribution to the diet made by each MSVPA prey. The only logical method of handling unidentified fish is to distribute them *pro rata* over all identified species. This procedure would increase the weights of each MSVPA species in the stomach contents but it would not alter the proportions.

## 5. THE MEAN WEIGHTS AT AGE OF MSVPA PREY SPECIES

### 5.1 Background

In the MSVPA it is necessary to convert the weights (of each prey age class) consumed by each predator age class into the numbers of prey consumed. This is done by dividing the weights of each age class of each prey species consumed by their estimated mean "live" weights. These weights are often referred to as the mean weights at the time of ingestion.

The weights at the time of ingestion have a direct bearing on the outcome of MSVPA and must therefore be reliable. The use of unrealistically low mean weights results in an overestimation of the numbers of prey consumed, and predation will be overestimated. Conversely, if the weights are fixed at too high a level, consumption and predation mortality

will be underestimated. The effects of changing mean weights on estimated stock sizes and predation mortality are almost *pro rata*.

However, it is difficult to determine the appropriate prey weights-at-age in each predator/prey age class combination. In general, it is not realistic to use the mean weights of each prey age class in the sea (stock weights at age), because each prey cohort tends to be exploited more or less selectively by each predator age class. Thus although an old (large) predator might prey on the entire length range of a prey cohort, in which case it would be appropriate to assume that the mean weight of the prey ingested corresponded to the stock weight, a younger (smaller) individual may only be capable of eating the smaller individuals of the cohort.

In theory, the necessary information on prey weight can be obtained directly from the stomach contents, by measuring and weighing intact prey. However, most prey are digested to the extent that their weights are substantially reduced. An alternative approach is to measure the prey and to apply weight/length relationships. Again, the advanced state of digestion of many of the prey makes it impossible to measure them with sufficient accuracy. Furthermore, the fact that prey were grouped by size classes during the analysis of the stomach contents makes it difficult to make full use of such information.

## 5.2 The Current Method

The information on mean weight at age currently used as input to MSVPA is initially derived directly from the stomach contents. The stomach data processing programs provide estimates of the weight and the number of each age class of each MSVPA species in the stomach of an average predator in each age class. Dividing the weights by the numbers gives the mean weight of each prey species in the stomach. Up to now, it has been assumed that, on average, all prey were "half digested" and the mean weight at ingestion, as supplied to the MSVPA WG, has been estimated by multiplying the mean weight in the stomach by a factor of two.

This method is not ideal. It may be appropriate for prey species/age classes which occur frequently in the stomachs, when the mean weights are based on large samples. However, the estimated mean weights at ingestion are sometimes based on small numbers of prey, or even individual fish. In cases where these scarce prey chance to be almost completely digested, or hardly digested at all, doubling the weight in the stomach can give misleading answers.

Ever since the 1981 stomach contents data were used for the first trials of North Sea MSVPA, it has been apparent that the mean weights derived from the stomach contents are not entirely satisfactory and it proved necessary to smooth obvious outliers. For example, on one occasion MSVPA failed to converge because the very small weights at age of some of the 0-group MSVPA prey in the stomachs of whiting generated extremely high numbers, and the mean weights had to be adjusted. A checking routine was developed which gave a warning message if the weights in the stomach were less than an arbitrary value (1/100 of the stock weight) and in such cases the stomach value is set to 1/100 of the stock weight (Anonymous, 1986). In some cases, problems were resolved by adjusting the ALKs used to distribute the prey across age classes, so that outliers were assigned to another age class. In consequence, the mean weights at ingestion now used by MSVPA often differ considerably from the original data. However, no detailed record has been kept of what was

done, when it was done and why it was done. The criteria were based more on expert judgement than on reproducible algorithms.

During the present meeting considerable attention was paid to the problem of mean weights at age, with a view to determining whether more reliable information on prey weights could be derived from the stomach contents.

### 5.3 Refining the Current Method

In 1991, the prey items in stomach samples were assigned to digestion stages 0, 1 and 2, where 0 indicates "pristine" prey (completely undigested items), 1 indicates partially digested (readily assignable to size class) and 2 indicates identifiable parts. The pristine prey data are the only source of information on actual weights of prey at ingestion.

The algorithm applied by the ISR program is such that the easiest option for raising observed mean weights in the stomach lies at the final processing stage. This is after age length conversions and area aggregations have taken place. For this reason, a simple approach to calculating raising factors, based on mean weights at age at different digestion stages, has been adopted. It is important to realise that any factors applied at this stage of processing will not necessarily relate directly to the expected level of digestion being one half. Rather, the factors are pragmatic scalings, accounting for sampling, analysis and processing biases.

For each predator species, the mean weight at age of all digestion stages (following processing by the ISR program) was divided into the mean weight at age for all pristine items in stomachs (also following processing by the ISR program). The average ratio for each predator, across all MSVPA fish prey and quarters was calculated (QALL UNWTD). The averages were also calculated with prey-specific ratios weighted by their inverse variance (QALL WTD), as well as the unweighted average for each quarter (Q\* UNWTD). The results are given in the following text table:

| PREDATOR   |      |      |      |      |      |
|------------|------|------|------|------|------|
|            | COD  | WHI  | SAI  | MAC  | HAD  |
| Q1 UNWTD   | 1.73 | 1.77 | 1.48 | 1.65 | 1.22 |
| Q2 UNWTD   | 1.68 | 4.25 | 1.48 | 0.64 | 1.36 |
| Q3 UNWTD   | 1.50 | 1.31 | 5.55 | 1.26 | 0.67 |
| Q4 UNWTD   | 1.51 | 3.27 | 1.80 | 1.19 | 1.44 |
| QALL UNWTD | 1.62 | 2.04 | 1.55 | 0.83 | 1.07 |
| QALL WTD   | 1.38 | 1.53 | 1.29 | 0.99 | 0.95 |

In addition to the simple age based calculations (based on processed data), size based statistical analyses (based on raw stomach data) were conducted. The results from these analyses would need to be implemented at an early stage in the data processing and have implications for the complete processing algorithm. They have been conducted, therefore, primarily as a first step in a fuller analysis and to provide a basis for comparison with the age based results. Generalised linear models were fitted. It is clear that further, detailed statistical analyses of the raw, size based data would be worthwhile.

If the size and age based analyses result in similar raising factors, confidence is built in the age based approach. The detailed size based analyses also reveal the dependencies of the raising factor calculations on particular data (or lack thereof, particularly of pristine digestion records). Raising factors derived from the size based analyses are shown in the text table below, which can be compared to the last two rows of the previous text table. Results were not obtained for all species as predators, due to time constraints.

|            | COD  | WHI  | SAI  | HAD   |
|------------|------|------|------|-------|
| QALL UNWTD | 1.59 | 1.13 | 1.16 |       |
| QALL WTD   | 1.38 | 1.12 | 1.31 | 1.05* |

\*This figure is for haddock preying on sandeel only. There are no significant differences between digestion stages (see Fig. 5.3.1). The equivalent figure based on the age based calculation is 0.95.

The summary plots (Figs 5.3.1-5.3.4) show, for each predator, the influence of the factors; average prey length, predator length, quarter, MSVPA fish prey species and digestion stage (always the bottom panel) on the average prey weight. In each plot, the effects are seen with all other factors accounted for. A detailed description of all plots is beyond the scope of this discussion. A number of clear features are, however, important.

Figure 5.3.1 (haddock preying on sandeel) reveals that there is little information regarding pristine prey, or digestion stage 2 prey. There are no significant differences between digestion stages and the calculated raising factor is therefore unity. The raising factor for haddock, calculated in the age based analysis is heavily dependent on the sandeel (and similar Norway pout) result. The herring-specific ratio is close to 1.7 but is weighted out. Figure 5.3.2 (saithe preying on MSVPA fish species) reveals clear digestion stage differences. Figure 5.3.3 (whiting preying on MSVPA fish species) reveals that there are significant differences between digestion stages. Figure 5.3.4 (cod preying on MSVPA fish species) reveals that there are significant digestion stages differences and sufficient data for each digestion level to support the raising factor derived. The results for the roundfish species suggest that it may be appropriate to investigate not just predator raising factors, but prey specific raising factors.

With respect to mean weights of prey, across predators ( haddock, cod, whiting and saithe), there is no systematic significant difference in mean prey weight at length with predator length, which implies that each prey length class is not exploited selectively by each predator length class. In other words, a 5-6 cm prey in the stomach of a 40 cm cod weighs the same as a prey in the same length class in the stomach of a 70 cm cod, when digestion stage, quarter and species differences have been taken into account. Such results warrant further analysis.

In all of the plots, the majority of samples are coded as digestion stage 1. Usually, the mean weight of stage 1 prey is lower than stage 0 prey. The unweighted raising factors based on size based analyses are lower than those from the age based approach. Nevertheless the weighted estimates, except for the whiting factor, are similar. The differences are presumably caused by the assumptions made in the processing leading to the age based estimates. This reinforces the statement at the beginning of this section - that the raising

factors should not be interpreted as having a clear biological relationship to the average stage of digestion observed in stomach samples.

#### **5.4 New Raising Factors Used to Prepare MSVPA Input Files**

The raising factors for cod are consistent across quarters and prey types. The overall, unweighted mean of 1.62 is supported both by age and size based analyses. The factors for saithe and whiting vary from quarter to quarter (and from prey to prey type) but the unweighted, age based estimates are higher than their size based equivalents. The calculated raising factors for haddock are very dependent on prey and quarter. The calculated raising factors for mackerel vary considerably from quarter to quarter. They are also very prey specific (varying between just under 1 to almost 2). In the absence of a good estimate, the parsimonious approach is to assume that the raising factor is the same as for the roundfish species (1.6). The coordinators decided, therefore, to adopt a single raising factor based on that calculated for cod, namely, 1.6 for all prey types in all quarters.

A complete set of revised MSVPA input data, in which weights of prey now include previously unallocated unidentified prey and mean weights at ingestion are based on the revised raising factor, are given in Appendices I and II.

The common raising factor of 1.6 is clearly something that might be examined further at a later stage. The effect of this change on the MSVPA output was examined by running MSVPA with the input files as used by the Multispecies Assessment WG in 1995, but with the mean digested weights raised by a factor of 1.6 instead of the "old" factor of 2. The results are presented in Figure 5.4 in which the effects on F, N, numbers eaten and M2 are expressed as changes relative to the baseline (ie with the original factor of 2).

The overall result is a general increase in M2 which is roughly inversely proportional to the change in scaling factor.

#### **5.5 Averaging Over Years**

The stomach contents data can be smoothed by averaging the quarterly data over years. It might be argued that data from different years should be kept separate, because there may be year-to-year changes in mean weights at age in the sea. However, in the context of the North Sea ecosystem such changes are likely to be small.

Tables 5.4.1-5.4.4 give the average quarterly estimates of the mean weights of prey at the time of ingestion by cod, haddock, whiting and saithe (the mackerel data cannot be averaged until the revised 1981 data are available). These averages were calculated by summing the annual weights of prey in the stomachs observed in 1981 and 1991 and, in some cases, in 1985, 1986 and 1987, multiplying the total by 1.6 and dividing the product by the sum of the annual numbers of prey in the stomachs.

### **6. CONSUMPTION RATES**

The consumption rates (rations) of the individual predators are "plugged in" to the MSVPA model. Even though rations have a direct bearing on the outcome of the analysis, the responsibility for ensuring that realistic consumption rates are adopted seems to lie midway between the MSVPA WG and the coordinators of the stomach sampling programme.

Advice on consumption rates was outwith the terms of reference of the present meeting. However, an alternative approach to estimating the composition of the diet of the MSVPA predators, using prey-specific and size- and temperature-dependent evacuation rates, was evaluated.

In the MSVPA model it is assumed that all prey are evacuated at the same rate. This implies that the relative stomach content distributions reflect the relative consumption of the different prey. However, recent work on gastric evacuation in cod (Andersen *et al.*, 1995; dos Santos and Jobling, 1995) has revealed that the evacuation rates of different prey do vary. For example, Norway pout is evacuated on average 1.8 times faster than sprat. The present version of MSVPA cannot, however, deal with prey-specific consumption rates.

During the meeting an attempt was made to evaluate the impact of differential evacuation rates of prey, outside the MSVPA model. For this purpose the basic stomach contents data were modified to take into account the relative differences in evacuation rates of the nine MSVPA species. The prey weights of these species were simply scaled up or down according to the relative difference in evacuation rates, so that the relationship between prey weights reflects the relative consumption of these species. Rapidly evacuated prey were scaled up, slowly evacuated prey were scaled down. The scaling factors are listed in the table below.

| Species/Species group | Scaling factor |
|-----------------------|----------------|
| Cod                   | 1.18           |
| Haddock               | 1.18           |
| Whiting               | 1.18           |
| Norway pout           | 1.30           |
| Mixed gadoids         | 1.24           |
| Herring               | 0.83           |
| Sprat                 | 0.74           |
| Mixed clupeoids       | 0.79           |
| Sandeels              | 0.87           |

It is known from work on other species that very small items like copepods or mysids are evacuated much faster from fish stomachs than prey items of the size of, say, a 4 cm *Crangon*. This may lead to a rather biased picture of the food composition for the smaller predator size classes. This effect was accounted for by applying a scaling function that scales up the contribution of small prey. Based on gastric evacuation data in Temming (1995) for herring feeding on copepods and whiting feeding on *Crangon*, an arbitrary range for the scaling factors was derived by comparing the evacuation rates at 12°C of 100 g predators with a mean stomach content weight of 0.5 g (which is typical of herring of that size feeding on copepods). It turns out that the evacuation rate of copepods is faster by a factor of 4 compared with the evacuation of *Crangon* (0.21 g/g v 0.05 g/h). The scaling function was adjusted to produce a factor of 1 for a prey size of 40 mm (*Crangon*) and a factor of four for a prey size of 1 mm:

$$\text{size scaling factor} = 3.4 * \exp(-0.09 * \text{prey length}) + 1.0$$

The scaling factor was applied to all prey sizes of all prey species. However, measurable changes will only occur for size classes <40 mm.

Evacuation rates are exponentially related to temperature (eg dos Santos and Jobling, 1995). This effect is presently accounted for in MSVPA in the consumption rates (by predator age class) which are calculated for the four quarters independently, using a predator-specific mean temperature ( $T_{\text{mean}}$ ) for the whole North Sea. This mean temperature is a guesstimate that tries to take into account the distributions of both the temperature and the predator in that quarter.

However, temperature may also bias the relationship between the observed prey composition in the stomachs and the real composition of the food. If some species (X) is eaten mainly in an area warmer than average (eg the southern North Sea in Quarter 3) and another prey (Y) is mainly eaten in a colder part of the North Sea (eg northern North Sea in Quarter 3) then the consumption of species X is under- and that of species Y overestimated from the aggregated North Sea stomach contents data. In order to test the importance of this effect another scaling factor was applied to the prey weights (by statistical rectangle) that accounts for the difference between the mean temperature (by predator and quarter) and the actual temperature in the respective rectangle.

$$\text{temperature scaling factor} = \exp(0.1 \cdot (T_{\text{rectangle}} - T_{\text{mean}}))$$

The exponential coefficient (0.1) is identical to the one that was used to account for temperature effects on consumption for the preparation of the input data presently used in MSVPA (0.096) and is also in line with the results for cod given by dos Santos and Jobling (1992). The temperatures used were the averages by rectangle in the respective years and quarters, as provided by the ICES Hydrographic Service.

This modified data set (with all three weighting factors applied to prey weights and prey numbers) was then fed into the ISR program to produce a revised estimate of the total prey composition of MSVPA species by predator and prey age class. These data files were then compared with the equivalent ISR output files which were based on the standard stomach data files.

### 6.1 Comparing Original and Modified Prey Compositions by Predator Age Class

Figures 6.1-6.4 summarise the relative species composition based on original and modified stomach content data for selected predator age classes (1, 3 and 6) and quarters (1 and 3) in whiting and cod. One set of results was produced assuming that the gastric evacuation rate is the same for all prey (original), the other set was derived on the assumption that evacuation rates vary with species, temperature and size. Correction factors have been applied to the prey weights and prey numbers in the disaggregated data which are input to the ISR programs. It is, however, difficult to predict the effects of these modifications on the prey composition of the different predator age classes, since the ISR program combines the spatially disaggregated data to estimate diet over the total North Sea using catch rates as weighting factors.

The overall impression from the pie charts (Figs 6.1-6.4) is that the original data and the modified data give similar patterns of the species composition. In most cases the effects of the species factors are still visible in the ISR output data, eg the sprat share is usually slightly decreased, while the Norway pout share is raised in the modified data. However,

the interpretation of the pie charts may be misleading in some situations, because they represent relative compositions. If in a particular age class, for instance, all important prey fractions are raised (or lowered) by some factor, the change would not be visible. Furthermore there is a number of exceptions from the overall impression of similarity and the important ones are listed in Table 6.1. The factors presented in the table are based on a comparison of the total prey weights (modified/original). Changes in the expected range of less than approximately 20% are not listed. These would mainly correspond to a typical species effect.

In 28 cases the factors are larger than 1.2. Most of these cases refer to the prey categories Norway pout, whiting and other food. In these cases the effect of the species factors are reinforced by the temperature factor. An overall factor of 1.5 results for example, if the species factor for Norway pout is combined with the effect of a temperature difference of 2°. This would reflect a situation where the majority of Norway pout were taken by this particular predator age class from rectangles with above average temperatures. The strong effects in the other food component are most likely a combination of the size effect and the temperature effect, since no species factors were applied to other food species. A significant size effect implies that food items were very small, with a prey length well below 4 cm. It is therefore not surprising, that large changes in the share of other food are mainly observed in age class 1.

A result that could not be explained during the meeting, refers to the large increase (factor 4) of the Norway pout share in the diet of whiting, age 6 in quarter 1, 1991. An inspection of the size distribution of the combined factors (temperature x species x size), that were applied to the disaggregated data revealed that these combined factors were below 1.8. It is therefore not immediately obvious, how the share of Norway pout could have been raised by a factor of 4.

## 7. NEW KEY RUNS OF MSVPA

It had been hoped to make a new key during the meeting and to compare the outputs obtained using the "definitive" stomach contents data with those obtained previously. However, this was not possible. Although the revised ISR programs were run on the corrected stomach contents data to generate new MSVPA input data, there was still a problem with the mean weights at age of the MSVPA prey. The new MSVPA input files include revised data on weights at age that were obtained by applying a different raising factor to the observed stomach contents data (Section 5.4). It was therefore possible to compare outputs obtained using the new factor (1.6) with those using the old one (2.0) (Fig. 5.4). However, past experience has shown that using unsmoothed weights at age, derived directly from the stomach contents, can result in some unlikely outputs from MSVPA. It therefore seemed unwise to make the definitive key run before the raw data had been smoothed, but this could not be done during the meeting. It would have been possible to use the revised data on the percentage contribution of each MSVPA species to the diet of each predator together with the old data on mean weights at age. However, it was felt that such a compromise might only serve to confuse the issue.

## 8. SUMMARY AND DISCUSSION

There has been substantial progress in improving the quality of the North Sea feeding data available to the MSVPA WG. All major errors in the basic data, and in the ancillary data needed to process them, have been rectified. Making the 1981 whiting data available in the standard exchange tape format has been a major step forward. The methods used to process the data for MSVPA have been improved by including in the ISR programs algorithms to distribute partially identified MSVPA prey to species and by automating the process by which outputs from the ISR programs are transferred to the MSVPA input files.

Some problems remain. For example, at some stage the 1981 mackerel data should be standardised, although this cannot be done until the data set held in Bergen has been examined carefully to ensure that stomachs collected from outside the North Sea are excluded.

Another outstanding problem is the provision of reliable mean weights at ingestion for each prey age class/predator age class combination. This was one of the terms of reference of the meeting. The mean weights at ingestion used in MSVPA are based on the stomach contents data. The analyses performed during the meeting indicate that the raising factor of 2.0 which has hitherto been used to convert mean weights at age in the stomach contents to mean weights at the time of ingestion is too high. A raising factor of 1.6 is recommended. The effect of this change is to increase the estimated numbers of prey eaten by the MSVPA predators, which in turn leads to an increase in stock size and a decrease in fishing mortality (Fig. 5.4).

However, adjusting the overall raising factor does not in itself overcome all difficulties. There are still outliers in the "raw" prey weights at age derived from the stomach contents, even when the data have been averaged over years (Tables 5.4.1-5.4.4), but the coordinators were unable to devise a satisfactory way of smoothing the predator age/prey age matrices.

In MSVPA the proportional contribution of each prey to the diet of each predator is based on the composition of the stomach contents, averaged over the whole North Sea. However, it is known that predators digest different kinds of prey at different rates, and therefore the composition of the stomach contents may not represent the rates at which individual prey are consumed. During the meeting a first attempt was made to evaluate the effects of applying prey-specific and temperature-dependent evacuation rates to the stomach contents to estimate the relative quantities of different prey consumed by the predators, on a North Sea basis. The results of these trials suggest that this approach warrants further study.

## 9. REFERENCES

- Andersen, N.G., Riis Vestergard, C., Hammer, C., Herrman, J.P. and Temming, A. 1995. Food consumption rate of whiting and cod for use in multispecies assessment. Final report for EU Project FAR/MA-2-529 (confidential).
- Anonymous. 1984. Report of the ad hoc Multispecies Assessment Working Group, Copenhagen, 18-22 June 1984. ICES CM 1984/Assess:20.
- Anonymous. 1986. Report of the ad hoc Multispecies Assessment Working Group, Copenhagen, 13-19 November 1985. ICES CM 1986/Assess:9.

- Anonymous. 1988a. Report of the meeting of the coordinators of the stomach sampling project 1985 to 1987. ICES CM 1988/G:27.
- Anonymous. 1988b. Report of the ad hoc Multispecies Assessment Working Group, Copenhagen, 1-8 June, 1988. ICES CM 1988/Assess:23.
- Anonymous. 1991. Report of the Multispecies Assessment Working Group, Woods Hole, 4-13 December, 1990. ICES CM 1991/Assess:7.
- Anonymous. 1994. Report of the Multispecies Assessment Working Group, Copenhagen, 23 November-2 December, 1993. ICES CM 1994/Assess:9.
- Anonymous. 1996. Report of the Multispecies Assessment Working Group, Bergen, 21-28 June, 1995. ICES CM 1996/Assess:3.
- Daan, N. (Ed.). 1989. Data base report on the stomach sampling project in 1981. *ICES Cooperative Research Report*, **164**.
- Gislason, H. 1983. A preliminary estimate of the yearly intake of fish by saithe in the North Sea. ICES CM 1983/G:63.
- dos Santos, J. and Jobling, M. 1992. A model to describe gastric evacuation on cod (*Gadus morhua* L.) fed natural prey. *ICES Journal of Marine Science*, **49**, 145-154.
- dos Santos, J. and Jobling, M. 1995. Test of a food consumption model for the Atlantic cod. *ICES Journal of Marine Science*, **52**, 209-219.
- Temming, A. 1995. Die quantitative Bestimmung der Konsumtion von Fischen. Experimentelle, methodische und theoretische Aspekte. Habilitationsschrift. Fachbereich Biologie, Universität Hamburg.
- Westgard, T. 1982. Programs for handling and analysis of stomach content data. ICES CM 1982/H:21.

**Table 5.4.1a.** Cod - mean weights of prey at ingestion of Quarter 1. Averages of feeding data collected in 1981, 1985, 1986, 1987 and 1991

|                                              | Age class |       |        |        |        |        |        |
|----------------------------------------------|-----------|-------|--------|--------|--------|--------|--------|
|                                              | 0         | 1     | 2      | 3      | 4      | 5      | 6+     |
| <b>Prey: All species</b><br>All size classes | 0.00      | 0.67  | 2.90   | 8.70   | 20.16  | 26.17  | 31.50  |
| <b><i>Gadus morhua</i></b>                   |           |       |        |        |        |        |        |
| 1                                            | 0.00      | 24.62 | 35.19  | 49.33  | 44.61  | 60.96  | 64.63  |
| 2                                            | 0.00      | 0.00  | 248.00 | 129.47 | 146.32 | 128.99 | 128.16 |
| 3                                            | 0.00      | 0.00  | 0.00   | 426.67 | 261.05 | 334.18 | 185.11 |
| Total                                        | 0.00      | 24.62 | 37.65  | 58.06  | 98.18  | 98.45  | 108.12 |
| <b><i>Melanogrammus aeglefinus</i></b>       |           |       |        |        |        |        |        |
| 1                                            | 0.00      | 7.99  | 18.90  | 21.20  | 27.02  | 32.57  | 33.94  |
| 2                                            | 0.00      | 0.00  | 86.49  | 90.65  | 125.35 | 126.79 | 128.15 |
| 3                                            | 0.00      | 0.00  | 160.00 | 101.89 | 135.29 | 139.82 | 173.36 |
| 4                                            | 0.00      | 0.00  | 0.00   | 146.67 | 180.92 | 290.37 | 309.61 |
| 5                                            | 0.00      | 0.00  | 0.00   | 0.00   | 377.14 | 424.93 | 457.50 |
| 6                                            | 0.00      | 0.00  | 0.00   | 0.00   | 373.33 | 426.67 | 459.02 |
| Total                                        | 0.00      | 7.99  | 19.55  | 26.62  | 56.59  | 69.37  | 67.03  |
| <b><i>Merlangius merlangus</i></b>           |           |       |        |        |        |        |        |
| 1                                            | 0.00      | 4.51  | 18.16  | 30.84  | 33.70  | 29.04  | 25.63  |
| 2                                            | 0.00      | 0.00  | 62.11  | 77.52  | 97.70  | 96.06  | 64.67  |
| 3                                            | 0.00      | 0.00  | 99.78  | 109.37 | 125.15 | 122.01 | 120.83 |
| 4                                            | 0.00      | 0.00  | 168.42 | 173.86 | 163.37 | 147.64 | 170.11 |
| 5                                            | 0.00      | 0.00  | 480.00 | 175.48 | 179.62 | 172.29 | 190.79 |
| 6                                            | 0.00      | 0.00  | 0.00   | 200.85 | 188.04 | 170.82 | 185.64 |
| Total                                        | 0.00      | 4.44  | 20.92  | 46.38  | 69.91  | 66.30  | 55.77  |
| <b><i>Trisopterus esmarki</i></b>            |           |       |        |        |        |        |        |
| 0                                            | 0.00      | 0.00  | 0.00   | 0.00   | 0.00   | 0.00   | 0.00   |
| 1                                            | 0.00      | 8.65  | 9.07   | 10.09  | 12.16  | 12.77  | 12.31  |
| 2                                            | 0.00      | 0.00  | 19.13  | 23.29  | 24.67  | 24.68  | 24.17  |
| 3                                            | 0.00      | 0.00  | 38.84  | 35.79  | 33.73  | 35.61  | 45.77  |
| 4                                            | 0.00      | 0.00  | 40.00  | 44.34  | 36.63  | 39.21  | 63.78  |
| 5                                            | 0.00      | 0.00  | 0.00   | 0.00   | 118.71 | 119.30 | 119.60 |
| Total                                        | 0.00      | 2.97  | 9.97   | 12.94  | 16.28  | 16.53  | 14.95  |
| <b><i>Clupea harengus</i></b>                |           |       |        |        |        |        |        |
| 1                                            | 0.00      | 1.30  | 5.50   | 17.23  | 34.53  | 22.60  | 25.25  |
| 2                                            | 0.00      | 3.70  | 8.89   | 21.02  | 30.80  | 30.40  | 20.39  |
| 3                                            | 0.00      | 0.00  | 31.76  | 53.46  | 54.05  | 59.86  | 60.96  |
| 4                                            | 0.00      | 0.00  | 50.71  | 66.13  | 74.17  | 82.58  | 75.13  |
| 5                                            | 0.00      | 0.00  | 73.19  | 97.91  | 102.88 | 113.74 | 99.10  |
| 6                                            | 0.00      | 0.00  | 64.00  | 88.63  | 108.54 | 117.12 | 84.49  |
| Total                                        | 0.00      | 3.50  | 9.17   | 31.58  | 45.22  | 49.85  | 35.73  |
| <b><i>Sprattus sprattus</i></b>              |           |       |        |        |        |        |        |
| 1                                            | 0.00      | 3.47  | 3.19   | 2.03   | 2.41   | 4.77   | 6.17   |
| 2                                            | 0.00      | 4.69  | 8.03   | 8.48   | 9.96   | 9.90   | 8.37   |
| 3                                            | 0.00      | 3.29  | 10.17  | 11.08  | 11.23  | 13.54  | 12.61  |
| 4                                            | 0.00      | 3.64  | 9.54   | 12.29  | 11.43  | 15.19  | 17.01  |
| 5                                            | 0.00      | 0.00  | 10.91  | 10.16  | 11.71  | 13.06  | 18.82  |
| 6                                            | 0.00      | 0.00  | 0.00   | 8.00   | 20.00  | 0.00   | 0.00   |
| Total                                        | 0.00      | 3.65  | 6.58   | 6.56   | 5.95   | 9.19   | 8.12   |
| <b><i>Ammodytidae</i></b>                    |           |       |        |        |        |        |        |
| 0                                            | 0.00      | 0.00  | 0.00   | 0.00   | 0.00   | 0.00   | 0.00   |
| 1                                            | 0.00      | 1.70  | 2.71   | 3.04   | 4.24   | 4.83   | 3.26   |
| 2                                            | 0.00      | 6.23  | 4.81   | 7.78   | 10.42  | 10.12  | 8.46   |
| 3                                            | 0.00      | 10.00 | 13.18  | 22.71  | 18.02  | 14.42  | 11.45  |
| 4                                            | 0.00      | 17.78 | 21.18  | 26.18  | 24.52  | 22.46  | 8.42   |
| 5                                            | 0.00      | 0.00  | 28.24  | 26.28  | 24.40  | 20.20  | 9.41   |
| 6                                            | 0.00      | 0.00  | 32.34  | 35.82  | 40.58  | 35.93  | 73.92  |
| Total                                        | 0.00      | 1.90  | 3.27   | 4.97   | 6.91   | 7.43   | 4.95   |
| <b>Other</b><br>All size classes             | 0.00      | 0.57  | 1.85   | 4.76   | 12.30  | 17.21  | 28.24  |

**Table 5.4.1b. Cod - mean weights of prey at ingestion of Quarter 2. Averages of feeding data collected in 1981 and 1991**

|                                        | Age class |       |        |        |        |         |         |
|----------------------------------------|-----------|-------|--------|--------|--------|---------|---------|
|                                        | 0         | 1     | 2      | 3      | 4      | 5       | 6+      |
| <b>Prey: All species</b>               |           |       |        |        |        |         |         |
| All size classes                       | 0.04      | 0.37  | 1.31   | 3.17   | 4.00   | 4.93    | 11.58   |
| <b><i>Gadus morhua</i></b>             |           |       |        |        |        |         |         |
| 0                                      | 0.00      | 0.72  | 1.14   | 1.87   | 2.11   | 0.46    | 0.00    |
| 1                                      | 0.00      | 4.64  | 31.62  | 42.44  | 43.56  | 50.56   | 44.22   |
| 2                                      | 0.00      | 0.00  | 160.00 | 124.67 | 143.86 | 518.86  | 998.11  |
| 3                                      | 0.00      | 0.00  | 0.00   | 185.88 | 258.77 | 861.20  | 1380.52 |
| 4                                      | 0.00      | 0.00  | 0.00   | 0.00   | 53.33  | 1470.97 | 1662.86 |
| Total                                  | 0.00      | 0.81  | 2.34   | 17.47  | 55.64  | 148.23  | 413.08  |
| <b><i>Melanogrammus aeglefinus</i></b> |           |       |        |        |        |         |         |
| 0                                      | 0.00      | 1.63  | 4.99   | 9.23   | 8.11   | 8.10    | 8.05    |
| 1                                      | 0.00      | 18.32 | 27.26  | 57.20  | 91.13  | 116.82  | 104.46  |
| 2                                      | 0.00      | 0.00  | 52.13  | 83.70  | 122.32 | 128.87  | 95.03   |
| 3                                      | 0.00      | 0.00  | 0.00   | 240.00 | 270.70 | 292.54  | 289.27  |
| 4                                      | 0.00      | 0.00  | 0.00   | 160.00 | 320.00 | 305.64  | 306.55  |
| 5                                      | 0.00      | 0.00  | 0.00   | 320.00 | 311.11 | 307.05  | 305.56  |
| 6                                      | 0.00      | 0.00  | 0.00   | 0.00   | 280.00 | 310.59  | 307.69  |
| Total                                  | 0.00      | 6.78  | 23.46  | 60.01  | 87.93  | 117.26  | 105.04  |
| <b><i>Merlangius merlangus</i></b>     |           |       |        |        |        |         |         |
| 0                                      | 0.00      | 0.41  | 1.76   | 1.71   | 4.14   | 4.43    | 4.47    |
| 1                                      | 0.00      | 27.08 | 29.28  | 27.39  | 60.55  | 84.71   | 106.62  |
| 2                                      | 0.00      | 0.00  | 78.46  | 68.75  | 89.72  | 91.64   | 128.97  |
| 3                                      | 0.00      | 0.00  | 86.67  | 91.46  | 135.97 | 159.04  | 158.28  |
| 4                                      | 0.00      | 0.00  | 91.43  | 123.24 | 192.99 | 192.99  | 173.93  |
| 5                                      | 0.00      | 0.00  | 80.00  | 164.95 | 222.77 | 258.56  | 210.40  |
| 6                                      | 0.00      | 0.00  | 160.00 | 148.84 | 182.07 | 241.63  | 178.67  |
| Total                                  | 0.00      | 4.26  | 29.32  | 40.70  | 78.81  | 93.25   | 131.60  |
| <b><i>Trisopterus esmarki</i></b>      |           |       |        |        |        |         |         |
| 0                                      | 0.00      | 0.00  | 1.44   | 1.06   | 1.69   | 2.83    | 1.79    |
| 1                                      | 0.00      | 15.46 | 17.51  | 23.27  | 26.45  | 28.14   | 28.84   |
| 2                                      | 0.00      | 20.00 | 22.15  | 38.53  | 42.18  | 45.85   | 42.82   |
| 3                                      | 0.00      | 0.00  | 53.85  | 55.07  | 52.21  | 48.52   | 48.51   |
| 4                                      | 0.00      | 0.00  | 40.44  | 48.75  | 46.67  | 48.32   | 48.89   |
| Total                                  | 0.00      | 15.59 | 18.91  | 21.44  | 27.05  | 32.31   | 28.42   |
| <b><i>Clupea harengus</i></b>          |           |       |        |        |        |         |         |
| 0                                      | 0.00      | 2.91  | 3.62   | 19.69  | 24.27  | 23.87   | 23.95   |
| 1                                      | 0.00      | 0.53  | 22.28  | 26.38  | 39.92  | 59.04   | 55.40   |
| 2                                      | 0.00      | 32.00 | 60.00  | 75.50  | 88.50  | 125.22  | 126.13  |
| 3                                      | 0.00      | 0.00  | 150.24 | 101.32 | 113.61 | 103.23  | 122.97  |
| 4                                      | 0.00      | 0.00  | 210.91 | 139.21 | 134.70 | 94.37   | 126.01  |
| 5                                      | 0.00      | 0.00  | 224.00 | 164.91 | 142.00 | 92.86   | 129.82  |
| Total                                  | 0.00      | 0.74  | 27.95  | 69.13  | 79.33  | 105.61  | 107.04  |
| <b><i>Sprattus sprattus</i></b>        |           |       |        |        |        |         |         |
| 0                                      | 0.00      | 0.68  | 5.45   | 1.55   | 10.16  | 12.87   | 12.06   |
| 1                                      | 0.00      | 5.17  | 12.66  | 14.76  | 16.10  | 12.37   | 15.15   |
| 2                                      | 0.00      | 14.30 | 19.44  | 22.87  | 24.61  | 22.83   | 20.58   |
| 3                                      | 0.00      | 17.78 | 22.76  | 25.67  | 27.12  | 26.82   | 21.78   |
| 4                                      | 0.00      | 0.00  | 0.00   | 0.00   | 22.86  | 0.00    | 0.00    |
| 5                                      | 0.00      | 0.00  | 0.00   | 0.00   | 22.86  | 0.00    | 0.00    |
| Total                                  | 0.00      | 2.25  | 14.16  | 19.81  | 21.39  | 17.02   | 17.47   |
| <b><i>Ammodytidae</i></b>              |           |       |        |        |        |         |         |
| 0                                      | 0.07      | 0.64  | 0.71   | 0.68   | 0.71   | 0.87    | 1.07    |
| 1                                      | 0.00      | 4.04  | 2.98   | 3.31   | 2.34   | 2.86    | 3.51    |
| 2                                      | 0.00      | 6.88  | 11.97  | 12.81  | 5.20   | 22.26   | 4.03    |
| 3                                      | 0.00      | 9.59  | 19.40  | 20.76  | 9.53   | 33.47   | 8.40    |
| 4                                      | 0.00      | 9.34  | 19.71  | 21.34  | 9.08   | 30.03   | 5.11    |
| 5                                      | 0.00      | 10.49 | 22.71  | 25.28  | 14.84  | 38.39   | 13.63   |
| 6                                      | 0.00      | 11.43 | 23.46  | 25.75  | 20.33  | 38.02   | 20.32   |
| Total                                  | 0.07      | 2.08  | 1.63   | 1.85   | 2.00   | 3.11    | 3.95    |
| <b>Other</b>                           |           |       |        |        |        |         |         |
| All size classes                       | 0.04      | 0.31  | 0.96   | 2.24   | 2.53   | 2.96    | 7.33    |

**Table 5.4.1c.** Cod - mean weights of prey at ingestion of Quarter 3. Averages of feeding data collected in 1981, 1985, 1986, 1987 and 1991

|                                        | Age class |       |        |        |        |         |         |
|----------------------------------------|-----------|-------|--------|--------|--------|---------|---------|
|                                        | 0         | 1     | 2      | 3      | 4      | 5       | 6+      |
| <b>Prey: All species</b>               |           |       |        |        |        |         |         |
| All size classes                       | 0.10      | 1.18  | 4.27   | 7.41   | 17.81  | 23.63   | 40.24   |
| <b><i>Gadus morhua</i></b>             |           |       |        |        |        |         |         |
| 0                                      | 1.23      | 5.33  | 6.96   | 9.61   | 12.28  | 11.85   | 11.91   |
| 1                                      | 0.00      | 0.00  | 26.15  | 84.73  | 154.83 | 194.59  | 99.66   |
| 2                                      | 0.00      | 0.00  | 0.00   | 123.82 | 141.19 | 101.32  | 290.02  |
| 3                                      | 0.00      | 0.00  | 0.00   | 0.59   | 0.94   | 0.22    | 3.60    |
| 4                                      | 0.00      | 0.00  | 0.00   | 0.00   | 0.00   | 0.00    | 41.85   |
| 5                                      | 0.00      | 0.00  | 0.00   | 0.00   | 0.00   | 0.00    | 0.00    |
| 6                                      | 0.00      | 0.00  | 0.00   | 0.00   | 0.00   | 0.00    | 0.00    |
| Total                                  | 1.23      | 7.66  | 12.73  | 21.95  | 101.03 | 163.54  | 149.59  |
| <b><i>Melanogrammus aeglefinus</i></b> |           |       |        |        |        |         |         |
| 0                                      | 0.00      | 5.91  | 12.16  | 15.21  | 14.16  | 21.30   | 19.41   |
| 1                                      | 0.00      | 17.78 | 66.74  | 83.15  | 120.83 | 135.14  | 148.60  |
| 2                                      | 0.00      | 0.00  | 2.03   | 19.37  | 63.68  | 75.44   | 239.60  |
| 3                                      | 0.00      | 0.00  | 160.00 | 473.60 | 494.74 | 1091.76 | 771.64  |
| 4                                      | 0.00      | 0.00  | 0.00   | 0.15   | 54.31  | 440.00  | 1724.57 |
| 5                                      | 0.00      | 0.00  | 0.00   | 0.00   | 0.00   | 0.00    | 114.19  |
| 6                                      | 0.00      | 0.00  | 0.00   | 0.00   | 0.00   | 0.00    | 0.00    |
| Total                                  | 0.00      | 5.95  | 15.39  | 35.41  | 83.21  | 133.92  | 464.35  |
| <b><i>Merlangius merlangus</i></b>     |           |       |        |        |        |         |         |
| 0                                      | 1.37      | 15.19 | 13.33  | 10.57  | 12.36  | 29.15   | 16.48   |
| 1                                      | 0.00      | 36.17 | 89.94  | 71.43  | 66.21  | 80.63   | 84.37   |
| 2                                      | 0.00      | 0.00  | 2.78   | 59.62  | 139.81 | 145.54  | 169.84  |
| 3                                      | 0.00      | 0.00  | 171.03 | 143.46 | 210.17 | 210.10  | 233.15  |
| 4                                      | 0.00      | 0.00  | 0.03   | 0.34   | 1.14   | 1.28    | 0.97    |
| 5                                      | 0.00      | 0.00  | 0.13   | 0.71   | 3.56   | 5.98    | 2.46    |
| 6                                      | 0.00      | 0.00  | 0.00   | 0.13   | 0.28   | 0.39    | 0.05    |
| Total                                  | 1.37      | 15.08 | 9.76   | 11.60  | 25.92  | 32.22   | 29.36   |
| <b><i>Trisopterus esmarki</i></b>      |           |       |        |        |        |         |         |
| 0                                      | 1.76      | 4.53  | 7.32   | 16.96  | 27.37  | 36.78   | 41.20   |
| 1                                      | 0.00      | 19.48 | 25.59  | 29.57  | 34.48  | 29.08   | 38.09   |
| 2                                      | 0.00      | 28.57 | 54.71  | 108.47 | 107.49 | 145.59  | 297.84  |
| 3                                      | 0.00      | 0.00  | 3.68   | 5.71   | 7.00   | 9.99    | 8.01    |
| 4                                      | 0.00      | 0.00  | 0.00   | 0.00   | 0.00   | 0.00    | 0.00    |
| 5                                      | 0.00      | 0.00  | 0.00   | 0.00   | 0.00   | 0.00    | 0.00    |
| Total                                  | 1.76      | 5.18  | 13.96  | 26.36  | 33.88  | 36.40   | 44.37   |
| <b><i>Clupea harengus</i></b>          |           |       |        |        |        |         |         |
| 0                                      | 0.00      | 4.91  | 71.20  | 26.43  | 30.66  | 640.00  | 0.00    |
| 1                                      | 0.00      | 5.80  | 15.52  | 26.79  | 28.99  | 48.28   | 23.98   |
| 2                                      | 0.00      | 3.63  | 29.73  | 66.97  | 82.19  | 68.23   | 96.00   |
| 3                                      | 0.00      | 32.00 | 153.72 | 178.31 | 181.71 | 123.39  | 151.21  |
| 4                                      | 0.00      | 0.00  | 0.90   | 5.13   | 20.60  | 41.31   | 174.99  |
| 5                                      | 0.00      | 0.00  | 31.89  | 142.14 | 149.35 | 70.33   | 131.29  |
| 6                                      | 0.00      | 0.00  | 0.00   | 0.00   | 211.86 | 323.70  | 323.40  |
| Total                                  | 0.00      | 6.22  | 26.96  | 72.89  | 99.77  | 81.75   | 118.36  |
| <b><i>Sprattus sprattus</i></b>        |           |       |        |        |        |         |         |
| 0                                      | 0.00      | 0.09  | 0.00   | 0.00   | 0.01   | 0.03    | 0.02    |
| 1                                      | 0.00      | 59.78 | 45.00  | 32.18  | 0.00   | 0.00    | 0.00    |
| 2                                      | 0.00      | 0.01  | 0.08   | 0.04   | 0.00   | 0.00    | 0.00    |
| 3                                      | 0.00      | 0.00  | 34.70  | 29.31  | 0.00   | 0.00    | 0.00    |
| 4                                      | 0.00      | 0.00  | 0.00   | 0.00   | 0.00   | 0.00    | 0.00    |
| 5                                      | 0.00      | 0.00  | 0.00   | 0.00   | 0.00   | 0.00    | 0.00    |
| 6                                      | 0.00      | 0.00  | 0.00   | 0.00   | 0.00   | 0.00    | 0.00    |
| Total                                  | 0.00      | 36.04 | 40.57  | 31.24  | 0.00   | 0.00    | 0.00    |
| <b><i>Ammodytidae</i></b>              |           |       |        |        |        |         |         |
| 0                                      | 80.00     | 1.17  | 2.26   | 2.69   | 3.98   | 3.29    | 4.73    |
| 1                                      | 0.00      | 10.05 | 11.53  | 6.99   | 7.28   | 8.16    | 14.57   |
| 2                                      | 0.00      | 11.01 | 14.40  | 12.62  | 7.67   | 8.65    | 22.12   |
| 3                                      | 0.00      | 12.50 | 33.82  | 13.26  | 24.62  | 10.81   | 57.95   |
| 4                                      | 0.00      | 9.73  | 33.64  | 10.91  | 24.22  | 10.83   | 54.66   |
| 5                                      | 0.00      | 8.51  | 35.56  | 9.02   | 24.07  | 10.32   | 20.43   |
| 6                                      | 0.00      | 8.59  | 38.73  | 10.26  | 23.65  | 0.00    | 0.00    |
| Total                                  | 80.00     | 1.51  | 3.15   | 3.19   | 4.53   | 3.97    | 9.12    |
| <b>Other</b>                           |           |       |        |        |        |         |         |
| All size classes                       | 0.12      | 1.30  | 5.44   | 12.81  | 20.65  | 23.91   | 33.20   |

**Table 5.4.1d. Cod - mean weights of prey at ingestion of Quarter 4. Averages of feeding data collected in 1981 and 1991**

|                                        | Age class |        |        |        |        |        |        |
|----------------------------------------|-----------|--------|--------|--------|--------|--------|--------|
|                                        | 0         | 1      | 2      | 3      | 4      | 5      | 6+     |
| <b>Prey: All species</b>               |           |        |        |        |        |        |        |
| All size classes                       | 0.59      | 2.49   | 5.92   | 11.63  | 17.48  | 28.11  | 36.97  |
| <b><i>Gadus morhua</i></b>             |           |        |        |        |        |        |        |
| 0                                      | 20.00     | 3.37   | 8.42   | 21.08  | 39.51  | 53.41  | 64.35  |
| 1                                      | 0.00      | 0.00   | 388.57 | 377.30 | 377.39 | 292.06 | 358.92 |
| 2                                      | 0.00      | 0.00   | 693.33 | 608.69 | 565.15 | 584.70 | 618.25 |
| 3                                      | 0.00      | 0.00   | 0.00   | 627.69 | 589.80 | 599.52 | 612.17 |
| Total                                  | 20.00     | 3.37   | 8.20   | 104.67 | 248.33 | 320.29 | 189.71 |
| <b><i>Melanogrammus aeglefinus</i></b> |           |        |        |        |        |        |        |
| 0                                      | 0.00      | 14.22  | 14.05  | 15.71  | 17.71  | 19.38  | 29.29  |
| 1                                      | 0.00      | 64.00  | 49.81  | 145.55 | 169.91 | 146.96 | 142.44 |
| 2                                      | 0.00      | 0.00   | 373.33 | 304.12 | 257.72 | 262.44 | 271.26 |
| 3                                      | 0.00      | 0.00   | 0.00   | 355.00 | 290.00 | 299.19 | 277.18 |
| 4                                      | 0.00      | 0.00   | 0.00   | 0.00   | 120.00 | 160.00 | 160.00 |
| 5                                      | 0.00      | 0.00   | 0.00   | 0.00   | 160.00 | 160.00 | 0.00   |
| 6                                      | 0.00      | 0.00   | 0.00   | 0.00   | 0.00   | 0.00   | 0.00   |
| Total                                  | 0.00      | 14.14  | 13.87  | 19.38  | 29.90  | 34.33  | 87.03  |
| <b><i>Merlangius merlangus</i></b>     |           |        |        |        |        |        |        |
| 0                                      | 0.00      | 21.83  | 34.52  | 28.53  | 44.05  | 38.25  | 49.66  |
| 1                                      | 0.00      | 51.73  | 84.94  | 108.76 | 115.66 | 120.53 | 117.37 |
| 2                                      | 0.00      | 62.50  | 93.93  | 156.42 | 155.30 | 168.90 | 126.61 |
| 3                                      | 0.00      | 100.34 | 99.67  | 206.20 | 181.10 | 224.39 | 148.86 |
| 4                                      | 0.00      | 100.57 | 99.72  | 228.09 | 204.36 | 291.85 | 338.53 |
| 5                                      | 0.00      | 96.00  | 98.88  | 240.00 | 181.96 | 336.00 | 320.00 |
| 6                                      | 0.00      | 101.82 | 100.30 | 360.00 | 209.84 | 344.62 | 320.00 |
| Total                                  | 0.00      | 32.04  | 59.25  | 98.86  | 126.77 | 134.27 | 118.38 |
| <b><i>Trisopterus esmarki</i></b>      |           |        |        |        |        |        |        |
| 0                                      | 6.61      | 6.62   | 8.20   | 8.80   | 8.64   | 8.80   | 9.17   |
| 1                                      | 0.00      | 13.71  | 21.13  | 27.47  | 30.05  | 30.66  | 40.13  |
| 2                                      | 0.00      | 40.00  | 35.80  | 40.00  | 47.85  | 49.91  | 48.81  |
| 3                                      | 0.00      | 0.00   | 53.33  | 50.00  | 53.33  | 50.29  | 48.00  |
| 4                                      | 0.00      | 0.00   | 0.00   | 0.00   | 0.00   | 0.00   | 0.00   |
| 5                                      | 0.00      | 0.00   | 0.00   | 0.00   | 0.00   | 0.00   | 0.00   |
| Total                                  | 6.61      | 6.40   | 9.47   | 11.57  | 12.18  | 11.07  | 10.70  |
| <b><i>Clupea harengus</i></b>          |           |        |        |        |        |        |        |
| 0                                      | 0.00      | 15.90  | 17.45  | 13.78  | 24.62  | 64.00  | 38.72  |
| 1                                      | 0.00      | 37.33  | 39.23  | 60.97  | 47.92  | 142.61 | 142.77 |
| 2                                      | 0.00      | 40.00  | 50.63  | 66.28  | 45.30  | 96.75  | 115.31 |
| 3                                      | 0.00      | 0.00   | 57.60  | 42.45  | 52.13  | 144.25 | 147.57 |
| 4                                      | 0.00      | 0.00   | 43.64  | 32.82  | 45.13  | 142.22 | 160.00 |
| 5                                      | 0.00      | 0.00   | 53.33  | 28.44  | 41.29  | 152.00 | 133.33 |
| 6                                      | 0.00      | 0.00   | 80.00  | 205.93 | 214.22 | 214.98 | 214.10 |
| Total                                  | 0.00      | 17.94  | 23.95  | 32.11  | 55.84  | 139.46 | 129.73 |
| <b><i>Sprattus sprattus</i></b>        |           |        |        |        |        |        |        |
| 0                                      | 5.52      | 5.65   | 5.55   | 5.19   | 5.99   | 8.29   | 7.33   |
| 1                                      | 0.00      | 9.85   | 6.88   | 12.87  | 16.80  | 15.22  | 11.70  |
| 2                                      | 0.00      | 18.73  | 14.32  | 15.05  | 16.91  | 15.48  | 16.82  |
| 3                                      | 0.00      | 26.33  | 19.20  | 17.25  | 17.07  | 17.78  | 16.30  |
| 4                                      | 0.00      | 0.00   | 20.00  | 18.82  | 16.72  | 17.78  | 17.78  |
| 5                                      | 0.00      | 0.00   | 0.00   | 0.00   | 0.00   | 0.00   | 0.00   |
| 6                                      | 0.00      | 0.00   | 0.00   | 0.00   | 0.00   | 0.00   | 0.00   |
| Total                                  | 4.85      | 9.16   | 7.85   | 9.23   | 16.39  | 13.01  | 8.93   |
| <b><i>Ammodytidae</i></b>              |           |        |        |        |        |        |        |
| 0                                      | 0.85      | 3.16   | 2.31   | 3.54   | 4.49   | 5.33   | 3.79   |
| 1                                      | 0.00      | 8.63   | 12.28  | 12.79  | 14.40  | 14.41  | 19.63  |
| 2                                      | 0.00      | 8.01   | 12.07  | 14.78  | 15.10  | 15.09  | 20.51  |
| 3                                      | 0.00      | 10.99  | 12.56  | 18.14  | 24.55  | 24.55  | 31.82  |
| 4                                      | 0.00      | 10.38  | 16.21  | 30.00  | 30.26  | 30.25  | 37.99  |
| 5                                      | 0.00      | 14.81  | 15.03  | 34.73  | 35.32  | 35.35  | 43.16  |
| 6                                      | 0.00      | 13.56  | 15.33  | 35.68  | 35.59  | 35.96  | 43.27  |
| Total                                  | 1.11      | 4.09   | 3.11   | 5.53   | 6.81   | 11.51  | 11.28  |
| <b>Other</b>                           |           |        |        |        |        |        |        |
| All size classes                       | 0.59      | 1.98   | 4.33   | 8.73   | 11.52  | 18.84  | 30.62  |

**Table 5.4.2a.** Haddock - mean weights of prey at ingestion of Quarter 1. Averages of feeding data collected in 1981 and 1991

|                                 | Age class |      |      |       |      |       |       |
|---------------------------------|-----------|------|------|-------|------|-------|-------|
|                                 | 0         | 1    | 2    | 3     | 4    | 5     | 6+    |
| <b>Prey: All species</b>        |           |      |      |       |      |       |       |
| All size classes                | 0.00      | 0.10 | 0.28 | 0.53  | 0.69 | 0.87  | 0.86  |
| <i>Gadus morhua</i>             |           |      |      |       |      |       |       |
| <i>Melanogrammus aeglefinus</i> |           |      |      |       |      |       |       |
| <i>Merlangius merlangus</i>     |           |      |      |       |      |       |       |
| <i>Trisopterus esmarki</i>      |           |      |      |       |      |       |       |
| 0                               | 0.00      | 0.00 | 0.00 | 0.00  | 1.60 | 1.60  | 1.60  |
| 1                               | 0.00      | 0.00 | 1.70 | 1.71  | 1.77 | 1.72  | 1.74  |
| 2                               | 0.00      | 0.00 | 1.57 | 1.97  | 1.64 | 1.63  | 1.63  |
| Total                           | 0.00      | 0.00 | 1.70 | 1.73  | 1.74 | 1.70  | 1.73  |
| <i>Clupea harengus</i>          |           |      |      |       |      |       |       |
| 1                               | 0.00      | 0.00 | 0.00 | 3.11  | 1.60 | 5.05  | 2.65  |
| 2                               | 0.00      | 0.00 | 0.00 | 67.37 | 1.60 | 34.07 | 21.13 |
| 3                               | 0.00      | 0.00 | 0.00 | 0.00  | 0.00 | 0.00  | 0.00  |
| Total                           | 0.00      | 0.00 | 0.00 | 13.01 | 1.60 | 16.56 | 7.59  |
| <i>Sprattus sprattus</i>        |           |      |      |       |      |       |       |
| 1                               | 0.00      | 1.60 | 1.60 | 1.60  | 1.60 | 1.60  | 1.60  |
| 2                               | 0.00      | 0.00 | 1.60 | 1.60  | 1.60 | 1.60  | 1.60  |
| 3                               | 0.00      | 0.00 | 0.00 | 0.00  | 0.00 | 0.00  | 1.60  |
| 4                               | 0.00      | 0.00 | 0.00 | 0.00  | 0.00 | 0.00  | 0.00  |
| Total                           | 0.00      | 1.60 | 1.60 | 1.60  | 1.60 | 1.60  | 1.60  |
| <i>Ammodytidae</i>              |           |      |      |       |      |       |       |
| 1                               | 0.00      | 1.62 | 1.60 | 1.61  | 1.58 | 1.58  | 1.59  |
| 2                               | 0.00      | 0.00 | 1.60 | 1.60  | 1.60 | 1.60  | 1.60  |
| 3                               | 0.00      | 0.00 | 0.00 | 1.60  | 1.60 | 1.60  | 0.00  |
| 4                               | 0.00      | 0.00 | 0.00 | 1.60  | 1.60 | 1.60  | 0.00  |
| 5                               | 0.00      | 0.00 | 0.00 | 1.60  | 1.60 | 0.00  | 0.00  |
| 6                               | 0.00      | 0.00 | 0.00 | 1.60  | 1.60 | 0.00  | 0.00  |
| Total                           | 0.00      | 1.62 | 1.60 | 1.60  | 1.59 | 1.59  | 1.60  |
| <b>Other</b>                    |           |      |      |       |      |       |       |
| All size classes                | 0.00      | 0.10 | 0.23 | 0.35  | 0.42 | 0.61  | 0.64  |

**Table 5.4.2b.** Haddock - mean weights of prey at ingestion of Quarter 2. Averages of feeding data collected in 1981 and 1991

|                                 | Age class |      |       |       |       |       |       |
|---------------------------------|-----------|------|-------|-------|-------|-------|-------|
|                                 | 0         | 1    | 2     | 3     | 4     | 5     | 6+    |
| <b>Prey: All species</b>        |           |      |       |       |       |       |       |
| All size classes                | 0.04      | 0.02 | 0.02  | 0.06  | 0.11  | 0.14  | 0.24  |
| <i>Gadus morhua</i>             |           |      |       |       |       |       |       |
| <i>Melanogrammus aeglefinus</i> |           |      |       |       |       |       |       |
| <i>Merlangius merlangus</i>     |           |      |       |       |       |       |       |
| <i>Trisopterus esmarki</i>      |           |      |       |       |       |       |       |
| 1                               | 0.00      | 0.00 | 12.31 | 13.49 | 20.03 | 21.04 | 21.60 |
| 2                               | 0.00      | 0.00 | 0.00  | 15.24 | 20.68 | 20.79 | 22.33 |
| Total                           | 0.00      | 0.00 | 2.25  | 13.56 | 20.06 | 21.03 | 21.45 |
| <i>Clupea harengus</i>          | 0.00      | 0.00 | 0.00  | 0.00  | 0.00  | 22.86 | 24.12 |
| <i>Sprattus sprattus</i>        |           |      |       |       |       |       |       |
| 0                               | 0.00      | 0.00 | 0.00  | 0.00  | 0.00  | 0.00  | 0.00  |
| 1                               | 0.00      | 0.00 | 0.00  | 16.00 | 22.86 | 9.41  | 9.70  |
| 2                               | 0.00      | 0.00 | 0.00  | 0.00  | 0.00  | 14.55 | 15.24 |
| Total                           | 0.00      | 0.00 | 0.00  | 9.41  | 13.33 | 11.64 | 11.85 |
| <i>Ammodytidae</i>              |           |      |       |       |       |       |       |
| 0                               | 0.16      | 0.51 | 0.57  | 0.67  | 1.11  | 0.95  | 0.88  |
| 1                               | 0.00      | 1.65 | 4.92  | 7.78  | 7.97  | 7.75  | 8.38  |
| 2                               | 0.00      | 9.41 | 10.51 | 12.05 | 11.81 | 12.19 | 12.15 |
| 3                               | 0.00      | 0.00 | 12.55 | 14.06 | 13.87 | 13.94 | 13.42 |
| 4                               | 0.00      | 0.00 | 11.03 | 13.31 | 13.24 | 13.36 | 13.22 |
| 5                               | 0.00      | 0.00 | 29.09 | 17.36 | 15.61 | 15.44 | 14.36 |
| 6                               | 0.00      | 0.00 | 0.00  | 19.05 | 16.41 | 15.88 | 14.12 |
| Total                           | 0.16      | 0.53 | 1.05  | 2.68  | 4.23  | 2.99  | 4.60  |
| <b>Other</b>                    |           |      |       |       |       |       |       |
| All size classes                | 0.03      | 0.01 | 0.02  | 0.03  | 0.04  | 0.05  | 0.05  |

**Table 5.4.2c. Haddock - mean weights of prey at ingestion of Quarter 3. Averages of feeding data collected in 1981 and 1991**

|                                        | Age class |       |       |       |       |       |       |
|----------------------------------------|-----------|-------|-------|-------|-------|-------|-------|
|                                        | 0         | 1     | 2     | 3     | 4     | 5     | 6+    |
| <b>Prey: All species</b>               |           |       |       |       |       |       |       |
| All size classes                       | 0.02      | 0.07  | 0.15  | 0.51  | 0.69  | 1.27  | 0.83  |
| <b><i>Gadus morhua</i></b>             |           |       |       |       |       |       |       |
| 0                                      | 0.00      | 0.00  | 0.00  | 0.00  | 1.50  | 1.56  | 1.60  |
| Total                                  | 0.00      | 0.00  | 0.00  | 0.00  | 1.50  | 1.56  | 1.60  |
| <b><i>Melanogrammus aeglefinus</i></b> |           |       |       |       |       |       |       |
| 0                                      | 0.00      | 7.06  | 6.37  | 15.48 | 19.45 | 19.92 | 24.89 |
| 1                                      | 0.00      | 0.00  | 0.00  | 26.27 | 25.40 | 24.15 | 25.37 |
| Total                                  | 0.00      | 7.06  | 6.37  | 16.56 | 20.15 | 20.34 | 24.98 |
| <b><i>Merlangius merlangus</i></b>     |           |       |       |       |       |       |       |
| 0                                      | 0.00      | 0.00  | 0.00  | 14.55 | 12.31 | 0.00  | 0.00  |
| Total                                  | 0.00      | 0.00  | 0.00  | 14.55 | 12.31 | 0.00  | 0.00  |
| <b><i>Trisopterus esmarki</i></b>      |           |       |       |       |       |       |       |
| 0                                      | 2.01      | 4.30  | 3.10  | 3.28  | 7.78  | 20.41 | 21.27 |
| 1                                      | 0.00      | 0.00  | 0.00  | 45.71 | 46.92 | 40.13 | 31.70 |
| 2                                      | 0.00      | 0.00  | 0.00  | 58.18 | 57.78 | 51.83 | 0.00  |
| Total                                  | 2.01      | 4.30  | 3.11  | 3.39  | 8.24  | 21.18 | 27.15 |
| <b><i>Clupea harengus</i></b>          |           |       |       |       |       |       |       |
| <b><i>Sprattus sprattus</i></b>        |           |       |       |       |       |       |       |
| 0                                      | 0.00      | 0.00  | 0.00  | 2.91  | 1.74  | 1.68  | 0.00  |
| 1                                      | 0.00      | 40.00 | 22.86 | 24.62 | 19.59 | 0.00  | 0.00  |
| 2                                      | 0.00      | 0.00  | 0.00  | 0.00  | 0.00  | 0.00  | 0.00  |
| Total                                  | 0.00      | 40.00 | 21.33 | 4.64  | 5.47  | 1.68  | 0.00  |
| <b><i>Ammodytidae</i></b>              |           |       |       |       |       |       |       |
| 0                                      | 1.62      | 2.22  | 2.07  | 2.10  | 1.97  | 2.38  | 1.63  |
| 1                                      | 0.00      | 3.39  | 5.47  | 4.41  | 4.28  | 4.34  | 3.56  |
| 2                                      | 0.00      | 2.22  | 2.86  | 3.54  | 5.87  | 7.22  | 3.40  |
| 3                                      | 0.00      | 1.54  | 17.14 | 12.93 | 14.18 | 10.16 | 0.00  |
| 4                                      | 0.00      | 1.70  | 13.91 | 16.55 | 18.11 | 15.48 | 0.00  |
| 5                                      | 0.00      | 2.50  | 21.33 | 18.82 | 19.39 | 18.82 | 0.00  |
| 6                                      | 0.00      | 2.13  | 17.78 | 20.00 | 20.51 | 16.00 | 0.00  |
| Total                                  | 0.04      | 0.21  | 1.02  | 2.14  | 1.99  | 2.40  | 1.63  |
| <b>Other</b>                           |           |       |       |       |       |       |       |
| All size classes                       | 0.02      | 0.05  | 0.09  | 0.24  | 0.33  | 0.64  | 0.42  |

**Table 5.4.2d. Haddock - mean weights of prey at ingestion of Quarter 4. Averages of feeding data collected in 1981 and 1991**

|                                 | Age class |       |       |       |       |       |       |
|---------------------------------|-----------|-------|-------|-------|-------|-------|-------|
|                                 | 0         | 1     | 2     | 3     | 4     | 5     | 6+    |
| <b>Prey: All species</b>        |           |       |       |       |       |       |       |
| All size classes                | 0.04      | 0.22  | 0.28  | 0.49  | 0.72  | 1.11  | 0.86  |
| <i>Gadus morhua</i>             |           |       |       |       |       |       |       |
| <i>Melanogrammus aeglefinus</i> |           |       |       |       |       |       |       |
| 0                               | 0.00      | 16.12 | 16.09 | 35.12 | 35.11 | 35.23 | 35.21 |
| Total                           | 0.00      | 16.12 | 16.09 | 35.12 | 35.11 | 35.23 | 35.21 |
| <i>Merlangius merlangus</i>     |           |       |       |       |       |       |       |
| 0                               | 0.00      | 0.00  | 6.15  | 5.61  | 0.00  | 0.00  | 8.92  |
| Total                           | 0.00      | 0.00  | 6.15  | 5.61  | 0.00  | 0.00  | 8.92  |
| <i>Trisopterus esmarki</i>      |           |       |       |       |       |       |       |
| 0                               | 1.69      | 7.72  | 10.45 | 11.08 | 10.67 | 8.92  | 7.87  |
| 1                               | 0.00      | 13.08 | 14.83 | 20.28 | 18.94 | 18.03 | 23.62 |
| 2                               | 0.00      | 0.00  | 0.00  | 20.00 | 14.55 | 17.78 | 26.67 |
| Total                           | 1.69      | 7.89  | 10.66 | 11.57 | 11.07 | 9.37  | 8.19  |
| <i>Clupea harengus</i>          |           |       |       |       |       |       |       |
| 0                               | 0.00      | 0.00  | 0.00  | 13.82 | 0.00  | 0.00  | 0.00  |
| 1                               | 0.00      | 0.00  | 0.00  | 0.00  | 0.00  | 0.00  | 0.00  |
| Total                           | 0.00      | 0.00  | 0.00  | 27.96 | 65.75 | 65.54 | 65.61 |
| <i>Sprattus sprattus</i>        |           |       |       |       |       |       |       |
| <i>Ammodytidae</i>              |           |       |       |       |       |       |       |
| 0                               | 1.61      | 2.26  | 3.08  | 2.79  | 2.70  | 3.28  | 2.80  |
| 1                               | 0.00      | 4.97  | 4.48  | 3.63  | 3.36  | 3.60  | 3.83  |
| 2                               | 0.00      | 11.43 | 5.08  | 3.40  | 7.62  | 4.44  | 0.00  |
| 3                               | 0.00      | 0.00  | 4.92  | 8.00  | 7.87  | 7.11  | 0.00  |
| 4                               | 0.00      | 0.00  | 0.00  | 0.00  | 0.00  | 0.00  | 0.00  |
| Total                           | 1.61      | 2.35  | 3.13  | 2.80  | 2.71  | 3.29  | 2.79  |
| <b>Other</b>                    |           |       |       |       |       |       |       |
| All size classes                | 0.04      | 0.17  | 0.18  | 0.33  | 0.49  | 0.76  | 0.56  |

**Table 5.4.3a. Whiting - mean weights of prey at ingestion of Quarter 1. Averages of feeding data collected in 1981, 1985, 1986, 1987 and 1991**

|                                        | Age class |       |       |       |       |        |       |
|----------------------------------------|-----------|-------|-------|-------|-------|--------|-------|
|                                        | 0         | 1     | 2     | 3     | 4     | 5      | 6+    |
| <b>Prey: All species</b>               |           |       |       |       |       |        |       |
| All size classes                       | 0.00      | 0.06  | 0.42  | 0.87  | 0.77  | 0.78   | 1.46  |
| <b><i>Gadus morhua</i></b>             |           |       |       |       |       |        |       |
| 1                                      | 0.00      | 2.91  | 13.00 | 7.76  | 6.80  | 9.65   | 32.36 |
| 2                                      | 0.00      | 0.00  | 0.00  | 0.00  | 0.00  | 0.00   | 85.04 |
| Total                                  | 0.00      | 2.91  | 13.00 | 7.76  | 6.80  | 9.65   | 76.88 |
| <b><i>Melanogrammus aeglefinus</i></b> |           |       |       |       |       |        |       |
| 1                                      | 0.00      | 10.20 | 13.51 | 13.31 | 13.71 | 16.40  | 16.92 |
| 2                                      | 0.00      | 0.00  | 0.00  | 14.55 | 12.97 | 11.35  | 9.47  |
| Total                                  | 0.00      | 10.20 | 13.50 | 13.32 | 13.70 | 16.33  | 16.60 |
| <b><i>Merlangius merlangus</i></b>     |           |       |       |       |       |        |       |
| 0                                      | 0.00      | 0.00  | 0.00  | 0.00  | 0.00  | 0.00   | 0.00  |
| 1                                      | 0.00      | 6.20  | 12.14 | 12.46 | 12.00 | 13.70  | 13.44 |
| 2                                      | 0.00      | 0.00  | 53.33 | 21.18 | 23.65 | 54.74  | 61.70 |
| 3                                      | 0.00      | 0.00  | 0.00  | 0.00  | 0.00  | 120.00 | 80.00 |
| Total                                  | 0.00      | 6.20  | 12.18 | 12.59 | 12.46 | 15.28  | 15.83 |
| <b><i>Trisopterus esmarki</i></b>      |           |       |       |       |       |        |       |
| 0                                      | 0.00      | 3.27  | 0.00  | 2.81  | 0.00  | 0.00   | 0.00  |
| 1                                      | 0.00      | 6.61  | 8.66  | 9.96  | 10.30 | 10.61  | 12.02 |
| 2                                      | 0.00      | 6.40  | 13.71 | 14.59 | 15.06 | 15.64  | 16.54 |
| 3                                      | 0.00      | 0.00  | 20.65 | 23.46 | 24.66 | 26.45  | 28.87 |
| 4                                      | 0.00      | 0.00  | 0.00  | 0.00  | 26.67 | 40.00  | 20.00 |
| Total                                  | 0.00      | 6.40  | 8.90  | 10.43 | 10.90 | 11.30  | 12.74 |
| <b><i>Clupea harengus</i></b>          |           |       |       |       |       |        |       |
| 1                                      | 0.00      | 1.97  | 8.34  | 8.18  | 8.10  | 12.35  | 12.50 |
| 2                                      | 0.00      | 4.61  | 6.10  | 11.23 | 14.41 | 16.97  | 19.13 |
| 3                                      | 0.00      | 0.00  | 20.00 | 32.85 | 29.56 | 27.30  | 27.09 |
| 4                                      | 0.00      | 0.00  | 0.00  | 0.00  | 0.00  | 0.00   | 0.00  |
| Total                                  | 0.00      | 3.94  | 6.47  | 10.78 | 13.34 | 17.27  | 19.11 |
| <b><i>Sprattus sprattus</i></b>        |           |       |       |       |       |        |       |
| 1                                      | 0.00      | 1.66  | 3.16  | 4.60  | 4.13  | 4.12   | 2.40  |
| 2                                      | 0.00      | 3.62  | 5.70  | 6.95  | 6.59  | 7.20   | 5.34  |
| 3                                      | 0.00      | 10.87 | 13.97 | 13.73 | 10.98 | 10.87  | 11.76 |
| 4                                      | 0.00      | 16.00 | 14.55 | 15.62 | 13.96 | 14.23  | 11.61 |
| 5                                      | 0.00      | 0.00  | 8.89  | 19.65 | 20.87 | 15.14  | 21.73 |
| 6                                      | 0.00      | 0.00  | 0.00  | 32.00 | 33.68 | 16.00  | 29.09 |
| Total                                  | 0.00      | 2.06  | 4.48  | 6.49  | 6.68  | 6.67   | 5.15  |
| <b><i>Ammodytidae</i></b>              |           |       |       |       |       |        |       |
| 0                                      | 0.00      | 0.00  | 0.00  | 1.40  | 0.00  | 0.00   | 0.00  |
| 1                                      | 0.00      | 1.68  | 2.31  | 2.60  | 2.90  | 3.54   | 3.91  |
| 2                                      | 0.00      | 3.10  | 5.16  | 6.16  | 7.25  | 8.06   | 8.83  |
| 3                                      | 0.00      | 0.00  | 14.72 | 14.76 | 14.57 | 15.38  | 15.55 |
| 4                                      | 0.00      | 0.00  | 20.00 | 26.67 | 29.44 | 31.64  | 27.89 |
| 5                                      | 0.00      | 0.00  | 11.43 | 17.14 | 21.69 | 30.00  | 30.97 |
| 6                                      | 0.00      | 0.00  | 32.00 | 28.80 | 30.42 | 32.36  | 32.82 |
| Total                                  | 0.00      | 1.73  | 2.69  | 3.12  | 3.90  | 4.65   | 4.85  |
| <b>Other</b>                           |           |       |       |       |       |        |       |
| All size classes                       | 0.00      | 0.03  | 0.14  | 0.20  | 0.17  | 0.14   | 0.25  |

**Table 5.4.3b. Whiting - mean weights of prey at ingestion of Quarter 2. Averages of feeding data collected in 1981 and 1991**

|                                        | Age class |       |       |       |       |       |       |
|----------------------------------------|-----------|-------|-------|-------|-------|-------|-------|
|                                        | 0         | 1     | 2     | 3     | 4     | 5     | 6+    |
| <b>Prey: All species</b>               |           |       |       |       |       |       |       |
| All size classes                       | 0.00      | 0.01  | 0.03  | 0.04  | 0.04  | 0.06  | 0.05  |
| <b><i>Gadus morhua</i></b>             |           |       |       |       |       |       |       |
| 0                                      | 0.00      | 0.69  | 0.86  | 1.16  | 0.80  | 1.30  | 1.10  |
| Total                                  | 0.00      | 0.69  | 0.86  | 1.16  | 0.80  | 1.30  | 1.17  |
| <b><i>Melanogrammus aeglefinus</i></b> |           |       |       |       |       |       |       |
| 0                                      | 0.00      | 1.43  | 1.35  | 1.79  | 2.36  | 2.65  | 3.43  |
| 1                                      | 0.00      | 0.00  | 7.89  | 14.98 | 19.06 | 19.06 | 18.05 |
| 2                                      | 0.00      | 0.00  | 9.41  | 17.88 | 32.00 | 28.00 | 25.81 |
| Total                                  | 0.00      | 1.43  | 1.72  | 3.50  | 4.89  | 5.82  | 9.02  |
| <b><i>Merlangius merlangus</i></b>     |           |       |       |       |       |       |       |
| 0                                      | 0.00      | 0.24  | 0.27  | 0.31  | 1.24  | 1.47  | 1.66  |
| 1                                      | 0.00      | 21.33 | 8.96  | 8.26  | 11.51 | 12.83 | 10.60 |
| Total                                  | 0.00      | 0.72  | 4.15  | 6.42  | 8.86  | 8.88  | 7.91  |
| <b><i>Trisopterus esmarki</i></b>      |           |       |       |       |       |       |       |
| 0                                      | 0.00      | 1.17  | 1.28  | 1.35  | 1.39  | 1.95  | 2.94  |
| 1                                      | 0.00      | 4.71  | 7.72  | 8.37  | 8.82  | 9.92  | 10.70 |
| 2                                      | 0.00      | 0.00  | 10.18 | 12.86 | 17.16 | 18.27 | 16.53 |
| 3                                      | 0.00      | 0.00  | 0.00  | 9.41  | 24.62 | 21.33 | 22.86 |
| 4                                      | 0.00      | 0.00  | 0.00  | 0.00  | 0.00  | 0.00  | 0.00  |
| Total                                  | 0.00      | 1.56  | 3.94  | 7.90  | 8.75  | 10.05 | 10.91 |
| <b><i>Clupea harengus</i></b>          |           |       |       |       |       |       |       |
| 0                                      | 0.00      | 7.27  | 7.22  | 7.32  | 7.51  | 7.67  | 11.74 |
| 1                                      | 0.00      | 0.92  | 1.83  | 4.76  | 6.10  | 18.91 | 17.06 |
| 2                                      | 0.00      | 0.00  | 0.00  | 0.00  | 0.00  | 26.67 | 0.00  |
| Total                                  | 0.00      | 0.91  | 2.72  | 6.17  | 6.72  | 14.66 | 16.57 |
| <b><i>Sprattus sprattus</i></b>        |           |       |       |       |       |       |       |
| 0                                      | 0.00      | 2.78  | 5.13  | 5.55  | 6.98  | 7.45  | 6.77  |
| 1                                      | 0.00      | 4.94  | 5.63  | 6.42  | 6.86  | 6.75  | 6.29  |
| 2                                      | 0.00      | 15.24 | 11.69 | 10.59 | 11.41 | 11.76 | 12.86 |
| 3                                      | 0.00      | 17.78 | 14.93 | 13.71 | 15.71 | 16.73 | 18.43 |
| 4                                      | 0.00      | 0.00  | 22.86 | 0.00  | 20.00 | 17.78 | 11.43 |
| 5                                      | 0.00      | 0.00  | 22.86 | 0.00  | 20.00 | 16.00 | 10.67 |
| 6                                      | 0.00      | 0.00  | 0.00  | 0.00  | 0.00  | 0.00  | 0.00  |
| Total                                  | 0.00      | 5.06  | 6.05  | 6.73  | 7.37  | 7.37  | 7.00  |
| <b><i>Ammodytidae</i></b>              |           |       |       |       |       |       |       |
| 0                                      | 0.00      | 0.50  | 0.46  | 0.47  | 0.63  | 0.73  | 0.65  |
| 1                                      | 0.00      | 2.97  | 3.52  | 3.40  | 4.35  | 4.00  | 3.91  |
| 2                                      | 0.00      | 7.28  | 7.73  | 9.72  | 10.99 | 9.72  | 9.51  |
| 3                                      | 0.00      | 11.43 | 12.77 | 15.03 | 16.17 | 15.19 | 15.16 |
| 4                                      | 0.00      | 11.85 | 10.97 | 14.12 | 15.56 | 14.48 | 13.94 |
| 5                                      | 0.00      | 20.00 | 15.06 | 16.67 | 17.78 | 17.14 | 18.33 |
| 6                                      | 0.00      | 22.86 | 18.06 | 17.78 | 19.70 | 19.14 | 18.92 |
| Total                                  | 0.00      | 0.70  | 0.85  | 0.95  | 1.48  | 1.60  | 1.40  |
| <b>Other</b>                           |           |       |       |       |       |       |       |
| All size classes                       | 0.00      | 0.01  | 0.01  | 0.01  | 0.01  | 0.03  | 0.01  |

**Table 5.4.3c. Whiting - mean weights of prey at ingestion of Quarter 3. Averages of feeding data collected in 1981, 1985, 1986, 1987 and 1991**

|                                        | Age class |       |       |       |       |       |       |
|----------------------------------------|-----------|-------|-------|-------|-------|-------|-------|
|                                        | 0         | 1     | 2     | 3     | 4     | 5     | 6+    |
| <b>Prey: All species</b>               |           |       |       |       |       |       |       |
| All size classes                       | 0.02      | 0.10  | 0.35  | 0.53  | 0.59  | 1.26  | 1.14  |
| <b><i>Gadus morhua</i></b>             |           |       |       |       |       |       |       |
| 0                                      | 0.00      | 3.43  | 4.23  | 4.01  | 4.90  | 4.99  | 6.83  |
| Total                                  | 0.00      | 3.27  | 4.21  | 4.00  | 4.90  | 4.99  | 6.83  |
| <b><i>Melanogrammus aeglefinus</i></b> |           |       |       |       |       |       |       |
| 0                                      | 2.17      | 4.47  | 5.48  | 6.12  | 5.73  | 5.95  | 5.75  |
| 1                                      | 0.00      | 0.00  | 33.68 | 46.06 | 59.76 | 54.40 | 11.85 |
| Total                                  | 2.17      | 4.47  | 5.50  | 6.18  | 5.85  | 6.03  | 5.76  |
| <b><i>Merlangius merlangus</i></b>     |           |       |       |       |       |       |       |
| 0                                      | 2.02      | 3.42  | 1.59  | 0.45  | 0.75  | 0.39  | 0.54  |
| 1                                      | 0.00      | 0.00  | 22.86 | 15.00 | 18.46 | 12.55 | 26.67 |
| 2                                      | 0.00      | 0.00  | 0.00  | 0.00  | 0.00  | 0.00  | 0.00  |
| 3                                      | 0.00      | 0.00  | 0.00  | 0.00  | 0.00  | 0.00  | 0.00  |
| 4                                      | 0.00      | 0.00  | 0.00  | 0.00  | 0.00  | 0.00  | 0.00  |
| Total                                  | 2.02      | 3.42  | 1.60  | 0.45  | 0.76  | 0.39  | 0.55  |
| <b><i>Trisopterus esmarki</i></b>      |           |       |       |       |       |       |       |
| 0                                      | 1.86      | 2.67  | 3.86  | 4.74  | 5.31  | 6.01  | 5.94  |
| 1                                      | 0.00      | 4.46  | 16.92 | 22.78 | 22.47 | 23.59 | 23.70 |
| 2                                      | 0.00      | 0.00  | 25.26 | 29.45 | 27.28 | 25.57 | 27.38 |
| 3                                      | 0.00      | 0.00  | 22.86 | 13.33 | 17.30 | 16.49 | 0.00  |
| 4                                      | 0.00      | 0.00  | 0.00  | 0.00  | 0.00  | 0.00  | 0.00  |
| Total                                  | 1.86      | 2.71  | 4.51  | 7.13  | 8.54  | 11.44 | 12.38 |
| <b><i>Clupea harengus</i></b>          |           |       |       |       |       |       |       |
| 0                                      | 0.00      | 5.46  | 11.95 | 13.85 | 14.74 | 18.24 | 15.54 |
| 1                                      | 2.86      | 5.69  | 9.31  | 15.18 | 15.10 | 17.72 | 21.59 |
| 2                                      | 0.00      | 0.00  | 26.23 | 31.34 | 36.60 | 37.65 | 33.72 |
| 3                                      | 0.00      | 0.00  | 0.00  | 0.00  | 0.00  | 0.00  | 0.00  |
| 4                                      | 0.00      | 0.00  | 0.00  | 0.00  | 0.00  | 0.00  | 0.00  |
| Total                                  | 2.86      | 5.63  | 11.03 | 15.19 | 16.77 | 20.52 | 21.71 |
| <b><i>Sprattus sprattus</i></b>        |           |       |       |       |       |       |       |
| 0                                      | 3.02      | 5.10  | 4.46  | 4.97  | 5.21  | 6.10  | 5.75  |
| 1                                      | 0.00      | 5.91  | 9.38  | 10.95 | 13.46 | 12.98 | 15.95 |
| 2                                      | 0.00      | 6.09  | 10.65 | 13.79 | 15.12 | 17.51 | 16.19 |
| 3                                      | 0.00      | 5.61  | 12.47 | 15.42 | 16.19 | 18.72 | 16.68 |
| 4                                      | 0.00      | 0.00  | 0.00  | 13.33 | 22.86 | 16.00 | 13.33 |
| 5                                      | 0.00      | 0.00  | 0.00  | 13.33 | 22.86 | 16.00 | 12.31 |
| Total                                  | 3.02      | 5.59  | 6.99  | 8.51  | 10.53 | 10.28 | 10.56 |
| <b><i>Ammodytidae</i></b>              |           |       |       |       |       |       |       |
| 0                                      | 0.74      | 2.03  | 2.69  | 2.83  | 2.40  | 2.21  | 2.43  |
| 1                                      | 0.00      | 8.98  | 10.39 | 11.36 | 12.02 | 13.63 | 16.14 |
| 2                                      | 0.00      | 8.19  | 10.24 | 11.05 | 10.81 | 11.23 | 13.25 |
| 3                                      | 0.00      | 12.48 | 15.17 | 14.64 | 17.04 | 15.55 | 17.80 |
| 4                                      | 0.00      | 18.82 | 17.86 | 17.18 | 19.41 | 17.32 | 17.58 |
| 5                                      | 0.00      | 0.00  | 14.55 | 17.27 | 19.70 | 17.56 | 19.34 |
| 6                                      | 0.00      | 22.86 | 21.17 | 20.91 | 21.24 | 19.33 | 18.72 |
| Total                                  | 0.74      | 2.51  | 3.77  | 4.31  | 4.01  | 4.03  | 3.57  |
| <b>Other</b>                           |           |       |       |       |       |       |       |
| All size classes                       | 0.01      | 0.04  | 0.11  | 0.14  | 0.15  | 0.25  | 0.17  |

**Table 5.4.3d. Whiting - mean weights of prey at ingestion of Quarter 4. Averages of feeding data collected in 1981 and 1991**

|                                        | Age class |       |       |       |       |       |       |
|----------------------------------------|-----------|-------|-------|-------|-------|-------|-------|
|                                        | 0         | 1     | 2     | 3     | 4     | 5     | 6+    |
| <b>Prey: All species</b>               |           |       |       |       |       |       |       |
| All size classes                       | 0.06      | 0.14  | 0.20  | 0.37  | 0.47  | 0.61  | 0.53  |
| <b><i>Gadus morhua</i></b>             |           |       |       |       |       |       |       |
| 0                                      | 0.00      | 6.25  | 7.53  | 7.82  | 7.17  | 7.60  | 8.39  |
| Total                                  | 0.00      | 6.25  | 7.53  | 7.82  | 7.17  | 7.60  | 8.39  |
| <b><i>Melanogrammus aeglefinus</i></b> |           |       |       |       |       |       |       |
| 0                                      | 9.55      | 10.40 | 11.07 | 11.24 | 10.31 | 12.40 | 12.06 |
| 1                                      | 0.00      | 10.67 | 12.80 | 19.05 | 28.72 | 26.67 | 27.83 |
| Total                                  | 9.55      | 10.40 | 11.12 | 11.31 | 10.53 | 12.70 | 12.41 |
| <b><i>Merlangius merlangus</i></b>     |           |       |       |       |       |       |       |
| 0                                      | 1.27      | 8.44  | 11.26 | 11.57 | 11.48 | 13.12 | 13.90 |
| Total                                  | 1.08      | 8.44  | 11.25 | 11.57 | 11.47 | 13.12 | 13.90 |
| <b><i>Trisopterus esmarki</i></b>      |           |       |       |       |       |       |       |
| 0                                      | 3.72      | 5.56  | 5.84  | 6.04  | 6.24  | 6.12  | 6.07  |
| 1                                      | 0.00      | 11.21 | 18.02 | 16.42 | 20.91 | 21.88 | 23.27 |
| 2                                      | 0.00      | 0.00  | 35.16 | 34.78 | 45.71 | 14.55 | 13.66 |
| 3                                      | 0.00      | 0.00  | 0.00  | 0.00  | 0.00  | 0.00  | 0.00  |
| Total                                  | 3.72      | 5.65  | 6.22  | 6.43  | 7.23  | 6.85  | 7.39  |
| <b><i>Clupea harengus</i></b>          |           |       |       |       |       |       |       |
| 0                                      | 6.34      | 8.08  | 9.28  | 10.17 | 12.86 | 14.85 | 35.91 |
| 1                                      | 0.00      | 25.26 | 25.81 | 30.00 | 50.45 | 54.51 | 59.89 |
|                                        | 0.00      | 0.00  | 0.00  | 0.00  | 53.33 | 53.33 | 60.95 |
| Total                                  | 6.34      | 8.34  | 9.55  | 10.28 | 14.42 | 17.40 | 41.04 |
| <b><i>Sprattus sprattus</i></b>        |           |       |       |       |       |       |       |
| 0                                      | 2.57      | 3.52  | 4.38  | 5.14  | 4.58  | 4.69  | 4.42  |
| 1                                      | 4.37      | 6.52  | 6.49  | 8.59  | 8.97  | 9.21  | 9.90  |
| 2                                      | 4.42      | 7.23  | 5.70  | 7.98  | 8.52  | 13.38 | 14.21 |
| 3                                      | 0.00      | 6.58  | 5.30  | 9.20  | 10.07 | 17.45 | 16.20 |
| 4                                      | 0.00      | 6.67  | 5.42  | 5.93  | 7.44  | 11.43 | 16.00 |
| Total                                  | 3.11      | 5.31  | 5.41  | 6.98  | 6.32  | 6.54  | 6.33  |
| <b><i>Ammodytidae</i></b>              |           |       |       |       |       |       |       |
| 0                                      | 1.47      | 2.69  | 2.66  | 1.98  | 2.61  | 3.02  | 2.50  |
| 1                                      | 5.13      | 15.86 | 19.06 | 24.41 | 20.33 | 15.11 | 21.21 |
| 2                                      | 6.67      | 23.70 | 23.98 | 21.99 | 22.98 | 15.52 | 21.59 |
| 3                                      | 12.31     | 19.20 | 17.05 | 19.95 | 16.20 | 15.19 | 21.23 |
| 4                                      | 0.00      | 25.95 | 25.69 | 30.38 | 24.62 | 17.94 | 26.07 |
| 5                                      | 0.00      | 29.71 | 28.41 | 34.95 | 28.37 | 24.62 | 32.73 |
| 6                                      | 0.00      | 31.02 | 30.48 | 34.85 | 29.02 | 26.15 | 33.02 |
| Total                                  | 1.69      | 3.37  | 4.50  | 5.23  | 6.00  | 6.45  | 6.14  |
| <b>Other</b>                           |           |       |       |       |       |       |       |
| All size classes                       | 0.05      | 0.05  | 0.06  | 0.08  | 0.15  | 0.23  | 0.21  |

**Table 5.4.4a. Saithe - mean weights of prey at ingestion of Quarter 1. Averages of feeding data collected in 1981 and 1991**

|                                 | Age class |       |        |        |        |        |        |
|---------------------------------|-----------|-------|--------|--------|--------|--------|--------|
|                                 | 0         | 1     | 2      | 3      | 4      | 5      | 6+     |
| <b>Prey: All species</b>        |           |       |        |        |        |        |        |
| All size classes                | 0.26      | 1.31  | 3.15   | 4.29   | 5.27   | 6.09   | 17.28  |
| <i>Gadus morhua</i>             |           |       |        |        |        |        |        |
| <i>Melanogrammus aeglefinus</i> |           |       |        |        |        |        |        |
| 1                               | 0.00      | 0.82  | 0.96   | 1.85   | 36.01  | 28.45  | 27.44  |
| 2                               | 0.00      | 0.00  | 26.67  | 40.00  | 59.47  | 105.37 | 118.71 |
| 3                               | 0.00      | 0.00  | 0.00   | 0.00   | 0.00   | 160.00 | 160.00 |
| 4                               | 0.00      | 0.00  | 0.00   | 0.00   | 0.00   | 0.00   | 0.00   |
| Total                           | 0.00      | 0.82  | 0.98   | 1.93   | 37.12  | 30.41  | 29.49  |
| <i>Merlangius merlangus</i>     |           |       |        |        |        |        |        |
| 1                               | 0.00      | 0.00  | 0.00   | 0.00   | 53.33  | 46.73  | 46.74  |
| 2                               | 0.00      | 0.00  | 0.00   | 0.00   | 114.29 | 112.27 | 112.94 |
| 3                               | 0.00      | 0.00  | 0.00   | 0.00   | 160.00 | 115.20 | 113.68 |
| 4                               | 0.00      | 0.00  | 0.00   | 0.00   | 0.00   | 0.00   | 80.00  |
| 5                               | 0.00      | 0.00  | 0.00   | 0.00   | 0.00   | 0.00   | 0.00   |
| Total                           | 0.00      | 0.00  | 0.00   | 0.00   | 75.29  | 77.78  | 79.02  |
| <i>Trisopterus esmarki</i>      |           |       |        |        |        |        |        |
| 0                               | 0.00      | 0.00  | 0.00   | 0.00   | 0.00   | 1.34   | 1.55   |
| 1                               | 6.29      | 7.03  | 6.75   | 9.89   | 11.58  | 13.60  | 14.34  |
| 2                               | 9.57      | 15.40 | 22.40  | 26.21  | 25.19  | 22.63  | 21.41  |
| 3                               | 7.30      | 16.81 | 30.38  | 39.42  | 53.54  | 68.97  | 71.01  |
| 4                               | 0.00      | 0.00  | 37.70  | 36.83  | 38.20  | 42.24  | 47.13  |
| Total                           | 6.98      | 8.93  | 15.24  | 21.75  | 20.21  | 19.34  | 18.16  |
| <i>Clupea harengus</i>          |           |       |        |        |        |        |        |
| 1                               | 2.81      | 2.25  | 2.70   | 3.71   | 5.25   | 13.59  | 56.79  |
| 2                               | 60.69     | 51.42 | 45.95  | 36.28  | 34.59  | 32.46  | 70.69  |
| 3                               | 62.86     | 53.59 | 53.38  | 46.08  | 54.58  | 65.95  | 76.72  |
| 4                               | 53.33     | 53.93 | 56.98  | 58.14  | 70.73  | 79.04  | 98.06  |
| 5                               | 0.00      | 53.33 | 114.29 | 124.77 | 115.89 | 95.64  | 116.36 |
| Total                           | 24.41     | 43.44 | 34.21  | 26.58  | 32.82  | 38.22  | 81.70  |
| <i>Sprattus sprattus</i>        |           |       |        |        |        |        |        |
| 1                               | 0.00      | 0.00  | 13.33  | 14.00  | 17.78  | 0.00   | 0.00   |
| 2                               | 0.00      | 0.00  | 14.40  | 14.41  | 14.49  | 19.68  | 19.50  |
| 3                               | 0.00      | 0.00  | 14.39  | 14.41  | 14.78  | 18.82  | 20.36  |
| 4                               | 0.00      | 0.00  | 20.00  | 11.85  | 0.00   | 0.00   | 0.00   |
| Total                           | 0.00      | 0.00  | 14.40  | 14.40  | 14.52  | 19.65  | 19.70  |
| <i>Ammodytidae</i>              |           |       |        |        |        |        |        |
| 1                               | 1.38      | 2.41  | 2.36   | 2.51   | 1.91   | 3.09   | 3.09   |
| 2                               | 0.00      | 5.00  | 5.42   | 5.82   | 6.53   | 4.00   | 3.90   |
| 3                               | 0.00      | 0.00  | 0.00   | 0.00   | 0.00   | 0.00   | 4.10   |
| 4                               | 0.00      | 0.00  | 0.00   | 0.00   | 0.00   | 0.00   | 0.00   |
| Total                           | 1.37      | 2.53  | 2.51   | 2.72   | 2.20   | 3.12   | 3.11   |
| <b>Other</b>                    |           |       |        |        |        |        |        |
| All size classes                | 0.10      | 0.73  | 1.22   | 1.39   | 1.14   | 1.40   | 2.01   |

**Table 5.4.4b. Saithe - mean weights of prey at ingestion of Quarter 2. Averages of feeding data collected in 1981 and 1991**

|                                              | Age class |       |        |        |        |        |        |
|----------------------------------------------|-----------|-------|--------|--------|--------|--------|--------|
|                                              | 0         | 1     | 2      | 3      | 4      | 5      | 6+     |
| <b>Prey: All species</b><br>All size classes | 0.26      | 0.39  | 0.69   | 0.93   | 1.18   | 1.39   | 2.17   |
| <b><i>Gadus morhua</i></b><br>0              | 0.00      | 2.43  | 2.22   | 1.06   | 0.83   | 0.86   | 0.93   |
| Total                                        | 0.00      | 2.43  | 2.22   | 1.06   | 0.83   | 0.86   | 0.93   |
| <b><i>Melanogrammus aeglefinus</i></b><br>0  | 0.00      | 0.00  | 3.05   | 2.76   | 2.47   | 1.18   | 0.94   |
| 1                                            | 35.56     | 31.04 | 30.85  | 39.21  | 132.97 | 139.04 | 97.39  |
| 2                                            | 0.00      | 0.00  | 0.00   | 0.00   | 253.11 | 253.23 | 240.09 |
| 3                                            | 0.00      | 0.00  | 0.00   | 0.00   | 256.84 | 258.82 | 256.47 |
| Total                                        | 35.56     | 31.04 | 25.51  | 9.18   | 33.32  | 12.11  | 19.48  |
| <b><i>Merlangius merlangus</i></b><br>1      | 0.00      | 0.00  | 0.00   | 0.00   | 80.44  | 80.54  | 130.10 |
| 2                                            | 0.00      | 0.00  | 17.78  | 16.18  | 115.55 | 119.72 | 127.42 |
| 3                                            | 0.00      | 0.00  | 14.55  | 17.43  | 91.12  | 94.33  | 116.72 |
| 4                                            | 0.00      | 0.00  | 0.00   | 14.55  | 69.97  | 71.11  | 100.00 |
| 5                                            | 0.00      | 0.00  | 0.00   | 0.00   | 47.92  | 48.09  | 75.68  |
| 6                                            | 0.00      | 0.00  | 0.00   | 0.00   | 55.00  | 54.98  | 93.31  |
| Total                                        | 0.00      | 0.00  | 15.24  | 17.34  | 94.47  | 97.18  | 120.89 |
| <b><i>Trisopterus esmarki</i></b><br>0       | 0.15      | 0.39  | 0.13   | 0.07   | 0.90   | 0.48   | 0.54   |
| 1                                            | 2.04      | 3.08  | 15.12  | 20.50  | 21.44  | 20.26  | 22.87  |
| 2                                            | 15.97     | 18.36 | 24.38  | 27.28  | 33.69  | 34.60  | 38.45  |
| 3                                            | 47.50     | 25.14 | 25.62  | 27.97  | 34.96  | 35.37  | 40.06  |
| 4                                            | 43.64     | 25.45 | 25.60  | 31.41  | 35.06  | 35.10  | 35.56  |
| Total                                        | 0.79      | 2.82  | 10.49  | 18.05  | 23.64  | 21.48  | 25.15  |
| <b><i>Clupea harengus</i></b><br>1           | 0.00      | 22.86 | 64.86  | 67.76  | 81.17  | 69.04  | 66.54  |
| 2                                            | 0.00      | 33.03 | 71.36  | 88.72  | 80.33  | 36.36  | 33.70  |
| 3                                            | 0.00      | 41.97 | 97.79  | 140.70 | 122.65 | 86.58  | 78.40  |
| 4                                            | 0.00      | 45.71 | 118.46 | 163.92 | 112.31 | 74.93  | 63.59  |
| 5                                            | 0.00      | 56.00 | 124.44 | 169.00 | 172.40 | 146.61 | 125.46 |
| Total                                        | 0.00      | 37.98 | 85.68  | 121.38 | 105.10 | 50.19  | 44.09  |
| <b><i>Sprattus sprattus</i></b><br>0         | 0.00      | 0.97  | 0.97   | 0.96   | 0.00   | 0.00   | 0.00   |
| 1                                            | 0.00      | 0.83  | 0.94   | 1.36   | 0.00   | 0.00   | 0.00   |
| Total                                        | 0.00      | 0.96  | 0.97   | 0.99   | 0.00   | 0.00   | 0.00   |
| <b><i>Ammodytidae</i></b><br>0               | 1.21      | 1.86  | 1.46   | 1.46   | 1.17   | 0.87   | 0.82   |
| 1                                            | 2.61      | 3.44  | 3.03   | 2.80   | 2.20   | 1.93   | 1.91   |
| 2                                            | 15.83     | 20.76 | 20.00  | 18.50  | 10.19  | 5.39   | 5.55   |
| 3                                            | 19.22     | 23.80 | 22.44  | 20.65  | 14.46  | 5.52   | 0.00   |
| 4                                            | 19.44     | 23.01 | 22.40  | 21.23  | 13.33  | 5.52   | 0.00   |
| 5                                            | 24.62     | 24.69 | 23.46  | 22.49  | 16.00  | 0.00   | 0.00   |
| 6                                            | 23.83     | 26.11 | 23.81  | 23.23  | 21.33  | 0.00   | 0.00   |
| Total                                        | 2.31      | 4.58  | 2.28   | 1.95   | 1.42   | 1.33   | 1.27   |
| <b>Other</b><br>All size classes             | 0.23      | 0.26  | 0.35   | 0.54   | 0.69   | 0.66   | 0.58   |

**Table 5.4.4c.** Saithe - mean weights of prey at ingestion of Quarter 3. Averages of feeding data collected in 1981, 1986 and 1991

|                                        | Age class |        |       |       |        |        |        |
|----------------------------------------|-----------|--------|-------|-------|--------|--------|--------|
|                                        | 0         | 1      | 2     | 3     | 4      | 5      | 6+     |
| <b>Prey: All species</b>               |           |        |       |       |        |        |        |
| All size classes                       | 2.27      | 0.43   | 0.72  | 1.22  | 5.89   | 4.75   | 4.83   |
| <b><i>Gadus morhua</i></b>             |           |        |       |       |        |        |        |
| 0                                      | 0.00      | 0.00   | 0.00  | 2.35  | 2.35   | 2.36   | 2.45   |
| Total                                  | 0.00      | 14.55  | 15.42 | 11.06 | 2.35   | 2.45   | 2.45   |
| <b><i>Melanogrammus aeglefinus</i></b> |           |        |       |       |        |        |        |
| 0                                      | 14.49     | 8.11   | 7.08  | 8.48  | 22.63  | 14.00  | 7.61   |
| 1                                      | 0.00      | 0.00   | 0.00  | 36.48 | 36.55  | 37.27  | 40.52  |
| 2                                      | 0.00      | 0.00   | 0.00  | 0.00  | 160.00 | 112.00 | 115.20 |
| Total                                  | 11.76     | 7.55   | 6.60  | 6.93  | 20.11  | 14.31  | 8.95   |
| <b><i>Merlangius merlangus</i></b>     |           |        |       |       |        |        |        |
| 0                                      | 6.27      | 6.50   | 5.56  | 5.27  | 16.32  | 25.48  | 21.62  |
| 1                                      | 0.00      | 0.00   | 0.00  | 24.62 | 24.40  | 24.45  | 24.62  |
| Total                                  | 6.27      | 6.51   | 5.71  | 5.80  | 17.16  | 24.90  | 240.69 |
| <b><i>Trisopterus esmarki</i></b>      |           |        |       |       |        |        |        |
| 0                                      | 4.20      | 2.80   | 2.85  | 2.51  | 6.11   | 8.15   | 9.94   |
| 1                                      | 26.77     | 15.88  | 15.87 | 20.65 | 29.54  | 29.31  | 30.68  |
| 2                                      | 30.23     | 15.76  | 20.41 | 38.41 | 43.70  | 43.16  | 40.40  |
| 3                                      | 28.57     | 15.50  | 20.36 | 38.50 | 43.49  | 44.00  | 40.85  |
| Total                                  | 5.27      | 4.85   | 7.91  | 14.52 | 21.41  | 22.78  | 22.72  |
| <b><i>Clupea harengus</i></b>          |           |        |       |       |        |        |        |
| 0                                      | 0.00      | 0.00   | 1.36  | 1.37  | 1.43   | 13.66  | 13.78  |
| 1                                      | 0.00      | 0.00   | 20.77 | 19.41 | 46.47  | 53.41  | 61.59  |
| 2                                      | 80.00     | 107.32 | 32.47 | 27.24 | 147.02 | 190.27 | 188.39 |
| 3                                      | 80.00     | 108.15 | 47.94 | 38.56 | 175.47 | 207.94 | 215.93 |
| 4                                      | 96.00     | 108.00 | 69.34 | 56.20 | 200.71 | 221.89 | 238.48 |
| 5                                      | 128.00    | 108.14 | 75.41 | 61.67 | 228.52 | 248.71 | 266.33 |
| Total                                  | 102.86    | 108.22 | 33.82 | 30.33 | 171.95 | 200.54 | 207.72 |
| <b><i>Sprattus sprattus</i></b>        |           |        |       |       |        |        |        |
| 0                                      | 5.71      | 6.21   | 0.00  | 0.00  | 0.00   | 0.00   | 0.00   |
| Total                                  | 5.71      | 6.21   | 0.00  | 0.00  | 0.00   | 0.00   | 0.00   |
| <b><i>Ammodytidae</i></b>              |           |        |       |       |        |        |        |
| 0                                      | 1.55      | 1.17   | 1.14  | 1.09  | 2.37   | 2.81   | 3.14   |
| 1                                      | 0.00      | 0.00   | 0.00  | 0.00  | 4.35   | 4.38   | 4.41   |
| Total                                  | 5.52      | 1.86   | 1.45  | 1.06  | 3.91   | 4.26   | 4.39   |
| <b>Other</b>                           |           |        |       |       |        |        |        |
| All size classes                       | 1.00      | 0.14   | 0.29  | 0.34  | 1.46   | 1.28   | 1.13   |

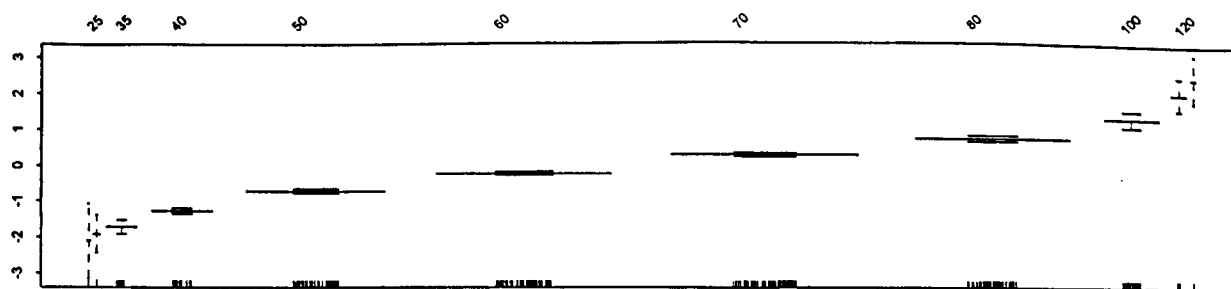
**Table 5.4.4d.** Saithe - mean weights of prey at ingestion of Quarter 4. Averages of feeding data collected in 1981 and 1991

|                                 | Age class |       |       |        |        |       |       |
|---------------------------------|-----------|-------|-------|--------|--------|-------|-------|
|                                 | 0         | 1     | 2     | 3      | 4      | 5     | 6+    |
| <b>Prey: All species</b>        |           |       |       |        |        |       |       |
| All size classes                | 6.21      | 1.90  | 2.67  | 3.62   | 19.16  | 17.69 | 11.76 |
| <i>Gadus morhua</i>             |           |       |       |        |        |       |       |
| <i>Melanogrammus aeglefinus</i> |           |       |       |        |        |       |       |
| 0                               | 17.99     | 22.57 | 22.50 | 20.61  | 28.42  | 28.60 | 23.60 |
| 1                               | 0.00      | 0.00  | 35.56 | 26.67  | 0.00   | 0.00  | 24.11 |
| 2                               | 0.00      | 0.00  | 0.00  | 0.00   | 0.00   | 0.00  | 32.00 |
| Total                           | 17.99     | 22.57 | 22.51 | 20.61  | 28.42  | 28.60 | 23.61 |
| <i>Merlangius merlangus</i>     |           |       |       |        |        |       |       |
| 0                               | 17.32     | 16.14 | 15.25 | 17.82  | 16.05  | 10.55 | 9.89  |
| 1                               | 0.00      | 0.00  | 0.00  | 0.00   | 0.00   | 0.00  | 14.04 |
| 2                               | 0.00      | 0.00  | 0.00  | 0.00   | 0.00   | 0.00  | 9.41  |
| Total                           | 17.32     | 16.14 | 15.25 | 17.82  | 16.05  | 10.55 | 9.93  |
| <i>Trisopterus esmarki</i>      |           |       |       |        |        |       |       |
| 0                               | 7.02      | 7.47  | 8.16  | 9.05   | 9.01   | 8.06  | 9.17  |
| 1                               | 24.52     | 39.26 | 38.34 | 38.72  | 35.82  | 20.70 | 18.88 |
| 2                               | 30.68     | 44.17 | 42.44 | 42.76  | 38.28  | 29.80 | 29.68 |
| 3                               | 40.00     | 46.67 | 43.64 | 50.67  | 66.67  | 53.33 | 0.00  |
| Total                           | 7.28      | 9.11  | 12.46 | 15.01  | 13.63  | 10.00 | 11.83 |
| <i>Clupea harengus</i>          |           |       |       |        |        |       |       |
| 0                               | 0.00      | 0.90  | 4.81  | 16.85  | 19.12  | 19.03 | 36.65 |
| 1                               | 12.80     | 16.62 | 33.13 | 38.41  | 39.02  | 39.44 | 45.66 |
| 2                               | 16.27     | 22.53 | 44.45 | 51.93  | 53.47  | 52.98 | 54.21 |
| 3                               | 19.65     | 38.34 | 76.75 | 102.87 | 102.55 | 95.11 | 93.55 |
| 4                               | 20.18     | 38.19 | 76.74 | 102.87 | 102.56 | 95.11 | 93.55 |
| 5                               | 21.67     | 38.27 | 76.74 | 102.87 | 102.56 | 95.11 | 93.55 |
| Total                           | 17.25     | 27.56 | 56.37 | 69.65  | 52.97  | 58.48 | 65.95 |
| <i>Sprattus sprattus</i>        |           |       |       |        |        |       |       |
| 1                               | 0.00      | 0.00  | 0.00  | 0.00   | 17.78  | 16.67 | 15.74 |
| 2                               | 0.00      | 0.00  | 0.00  | 0.00   | 13.33  | 15.48 | 15.79 |
| 3                               | 0.00      | 0.00  | 0.00  | 0.00   | 0.00   | 0.00  | 12.31 |
| 4                               | 0.00      | 0.00  | 0.00  | 0.00   | 0.00   | 0.00  | 0.00  |
| Total                           | 0.00      | 0.00  | 0.00  | 0.00   | 14.55  | 15.44 | 15.66 |
| <i>Ammodytidae</i>              |           |       |       |        |        |       |       |
| 0                               | 1.03      | 1.80  | 3.20  | 0.00   | 2.78   | 2.78  | 2.79  |
| Total                           | 1.03      | 1.80  | 3.20  | 0.00   | 2.78   | 2.78  | 2.79  |
| <b>Other</b>                    |           |       |       |        |        |       |       |
| All size classes                | 1.38      | 0.57  | 0.64  | 0.70   | 2.42   | 1.46  | 1.90  |

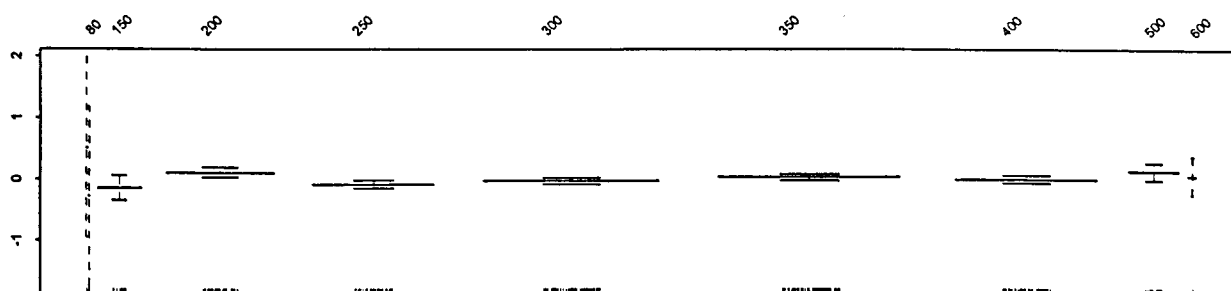
Table 6.1

Comparison of original and modified prey compositions - major changes (&gt;20%).

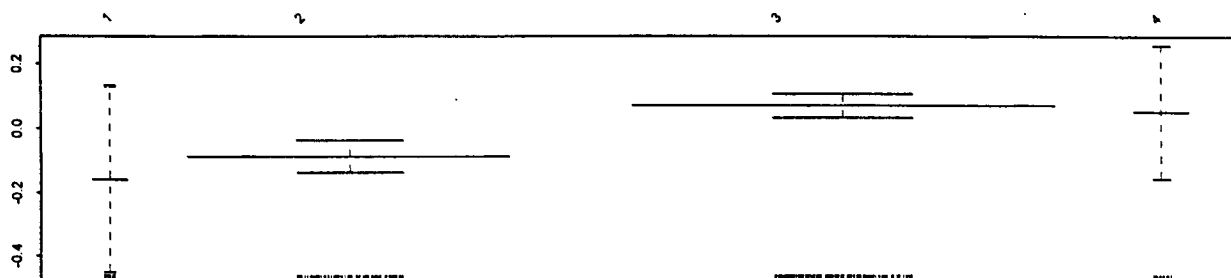
| Predator | Year | Quarter | Age class | Prey species                                  | Factor                       |
|----------|------|---------|-----------|-----------------------------------------------|------------------------------|
| Whiting  | 1981 | 1       | 1         | Other food                                    | 1.30                         |
| Whiting  | 1981 | 1       | 3         | Other food<br>Sprat<br>Norway pout<br>Herring | 1.30<br>0.73<br>1.53<br>0.79 |
| Whiting  | 1981 | 1       | 6         | Other food<br>Norway pout                     | 1.25<br>1.50                 |
| Whiting  | 1981 | 3       | 1         | Other food<br>Sprat                           | 1.82<br>2.00                 |
| Whiting  | 1981 | 3       | 3         | Norway Pout<br>Herring                        | 1.36<br>0.78                 |
| Whiting  | 1981 | 3       | 6         | Other food<br>Norway pout<br>Whiting          | 1.58<br>1.39<br>1.32         |
| Cod      | 1981 | 1       | 1         | Sprat                                         | 0.63                         |
| Cod      | 1981 | 1       | 1         | Norway pout<br>Herring                        | 1.59<br>1.34                 |
| Cod      | 1981 | 1       | 6         | Norway pout                                   | 1.62                         |
| Cod      | 1981 | 3       | 1         | Cod<br>Other food<br>Whiting                  | 1.40<br>2.40<br>1.55         |
| Whiting  | 1991 | 1       | 3         | Norway pout                                   | 1.53                         |
| Whiting  | 1991 | 1       | 6         | Norway pout                                   | 4.12                         |
| Whiting  | 1991 | 3       | 1         | Other food                                    | 2.00                         |
| Whiting  | 1991 | 3       | 3         | Other food                                    | 1.55                         |
| Cod      | 1991 | 1       | 1         | Sprat                                         | 0.45                         |
| Cod      | 1991 | 1       | 3         | Norway pout<br>Herring<br>Whiting             | 1.53<br>1.39<br>1.52         |
| Cod      | 1991 | 1       | 6         | Norway pout                                   | 1.50                         |
| Cod      | 1991 | 3       | 1         | Other food<br>Sandeel<br>Whiting              | 1.50<br>1.11<br>1.88         |
| Cod      | 1991 | 3       | 3         | Sprat<br>Herring                              | 1.34<br>0.77                 |



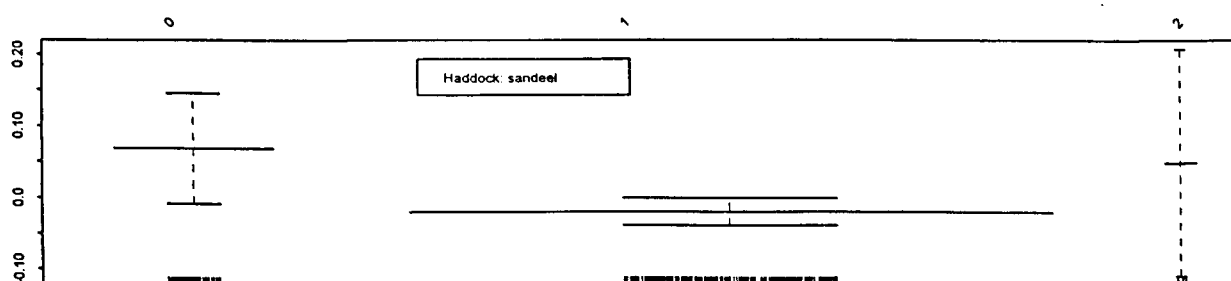
a) Prey length



b) Predator length



c) Quarter



d) Digestion state

Figure 5.3.1 Haddock. The influence of the factors average prey length (a), predator length (b), quarter (c) and digestion state (d) on the average prey weight. In each case, the effect is seen with all other factors accounted for.

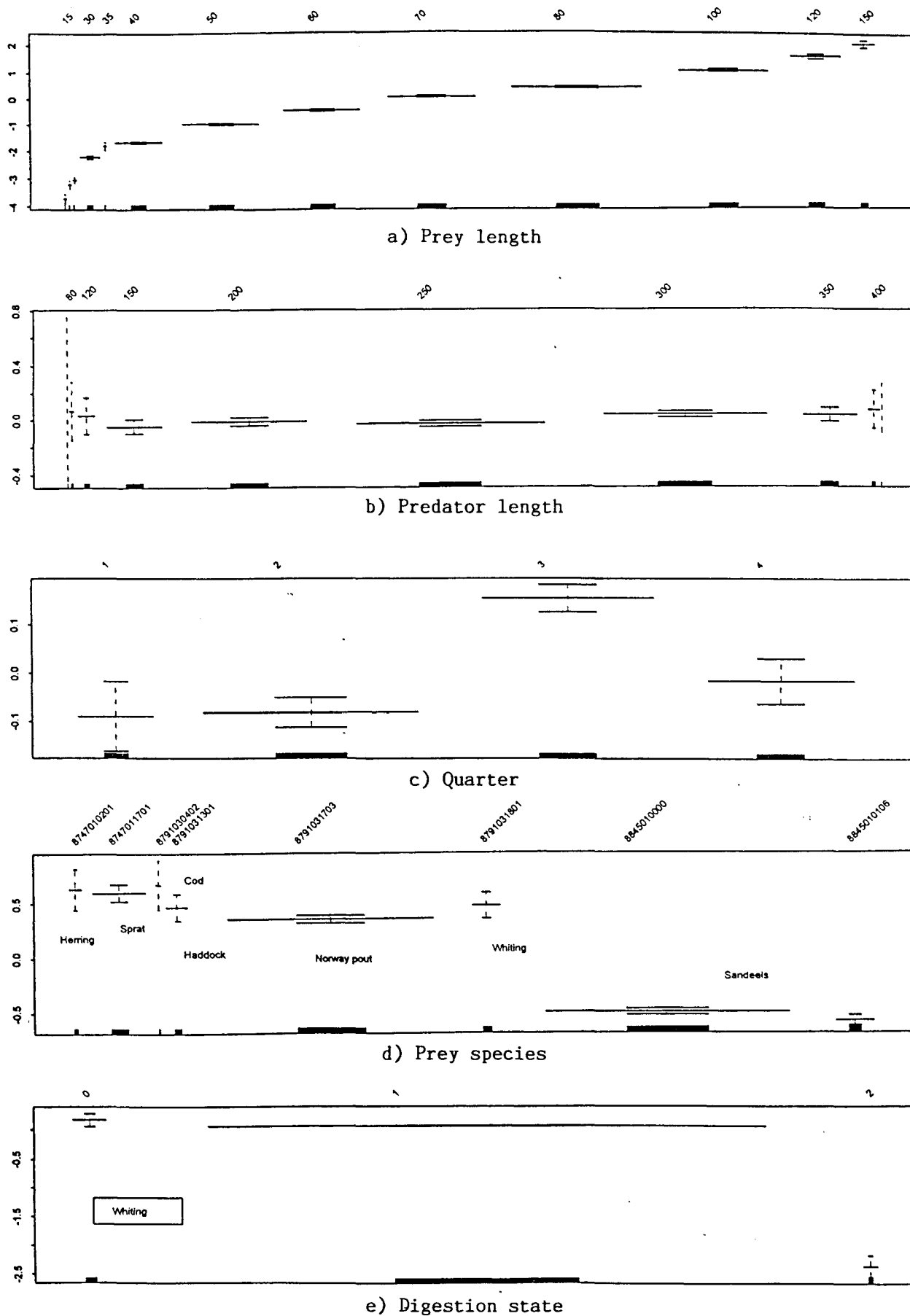


Figure 5.3.3 Whiting. The influence of the factors average prey length (a), predator length (b), quarter (c), prey species (d) and digestion state (e) on the average prey weight. In each case, the effect is seen with all other factors accounted for.

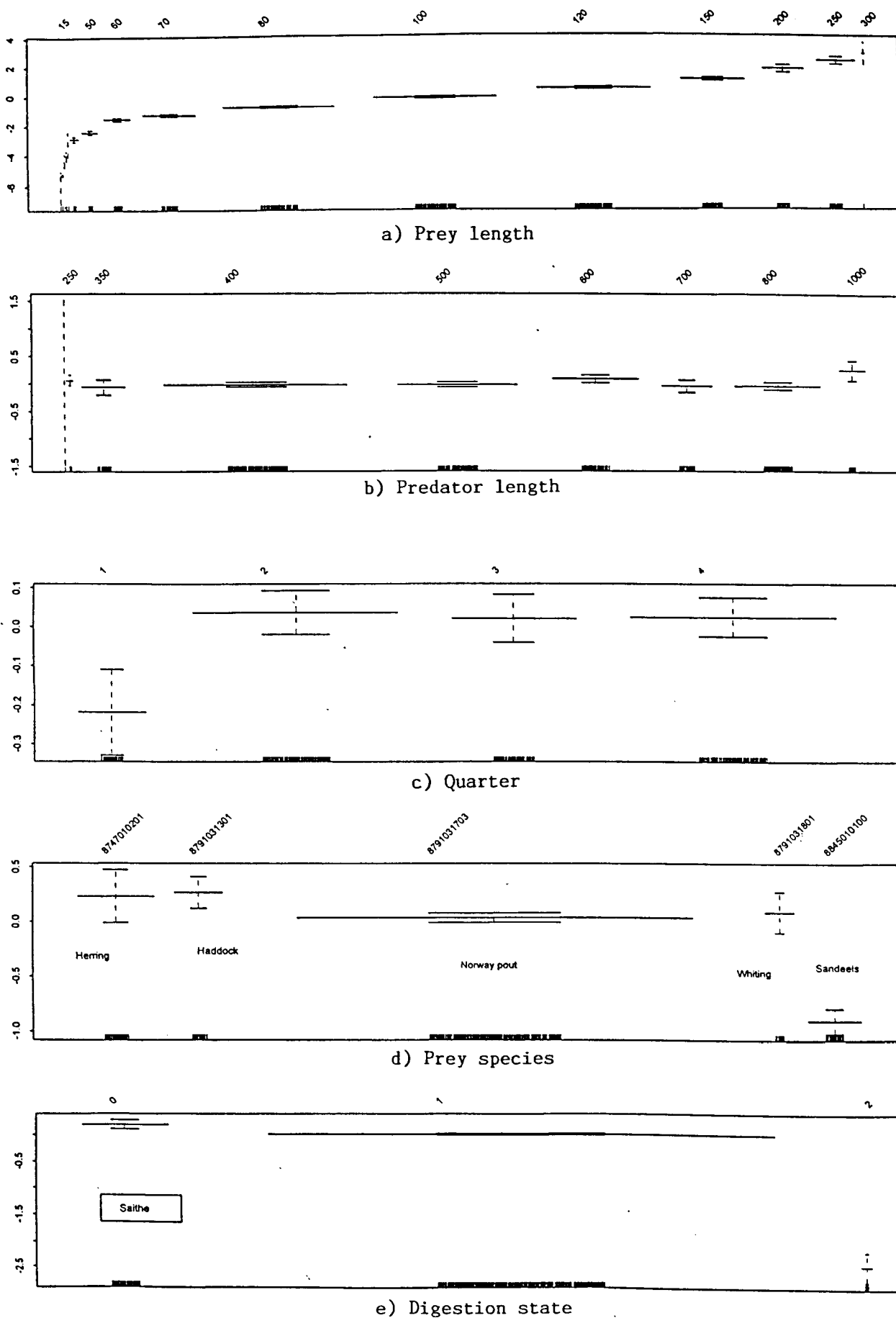


Figure 5.3.2 Saithe. The influence of the factors average prey length (a), predator length (b), quarter (c), prey species (d) and digestion state (e) on the average prey weight. In each case, the effect is seen with all other factors accounted for.

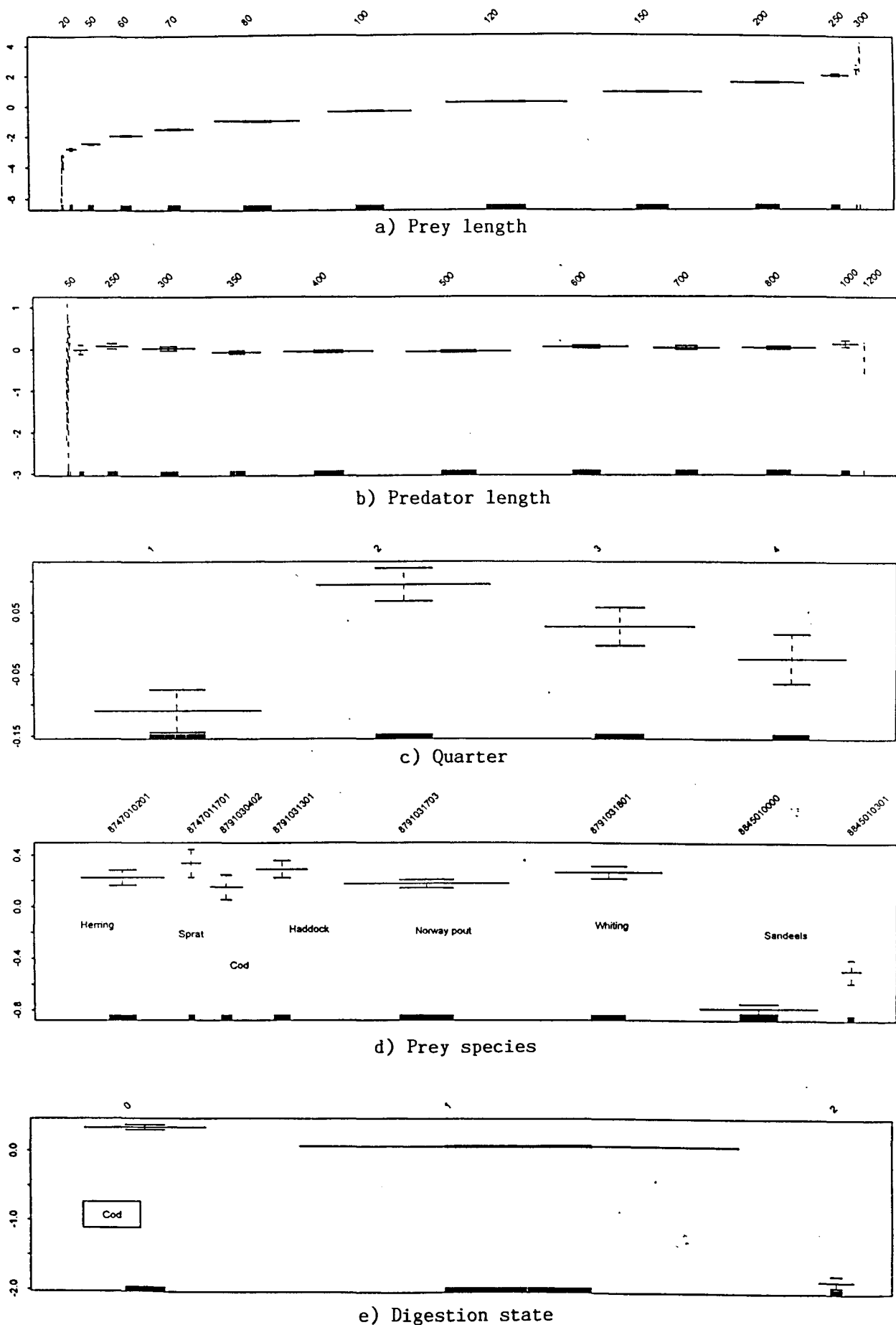
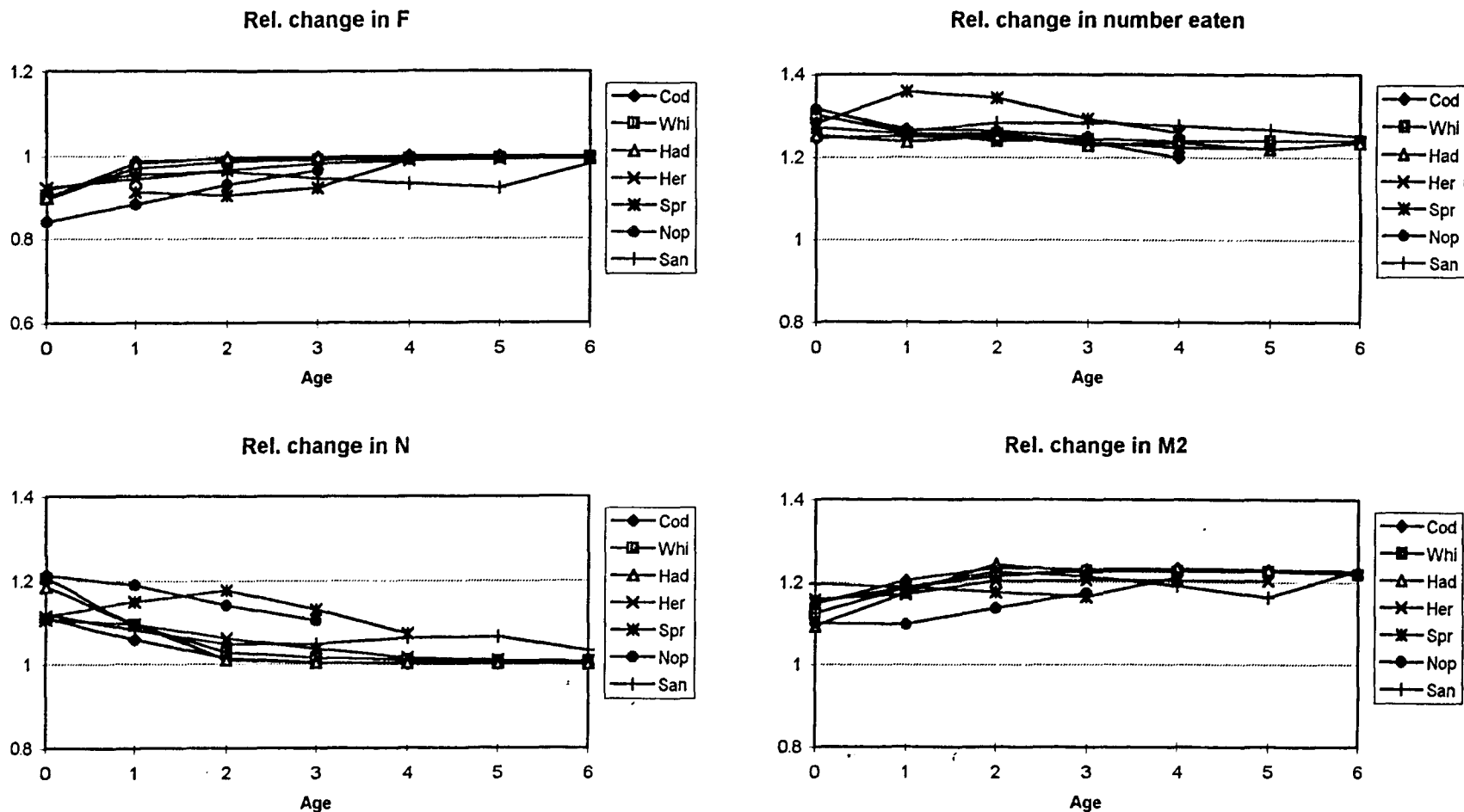


Figure 5.3.4 Cod. The influence of the factors average prey length (a), predator length (b), quarter (c), prey species (d) and digestion state (e) on the average prey weight. In each case, the effect is seen with all other factors accounted for.

Figure 5.4. The effects on MSVPA of using a revised conversion factor (1.6) to estimate prey mean weights at age from the stomach contents data. Values of fishing mortality (F), stock size (N), numbers eaten and predation mortality (M2) are averages for the period 1986-1991. They are expressed as changes relative to the outputs generated using the 'traditional' conversion factor of 2.



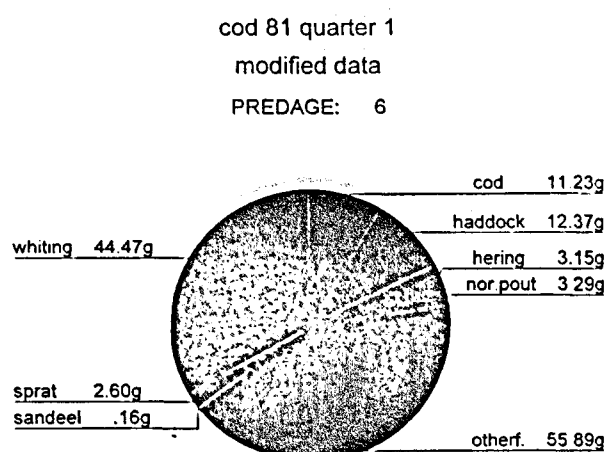
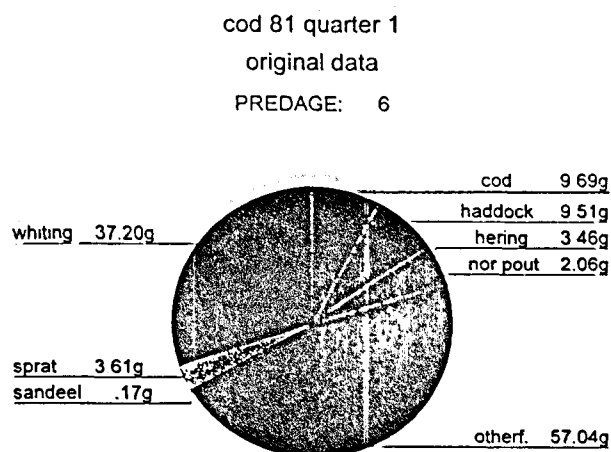
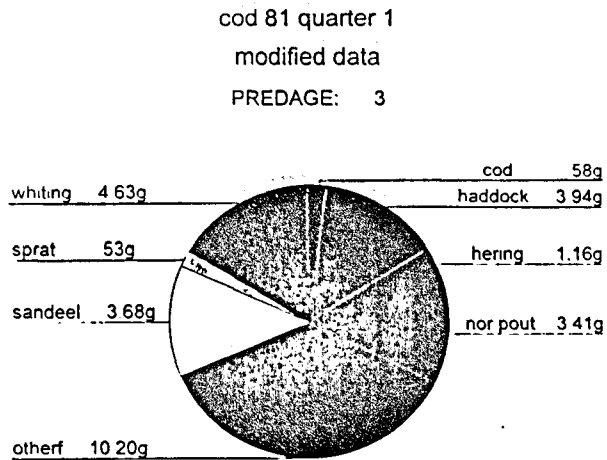
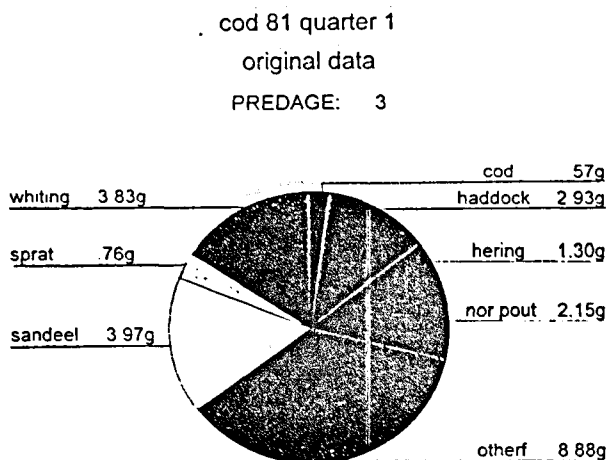
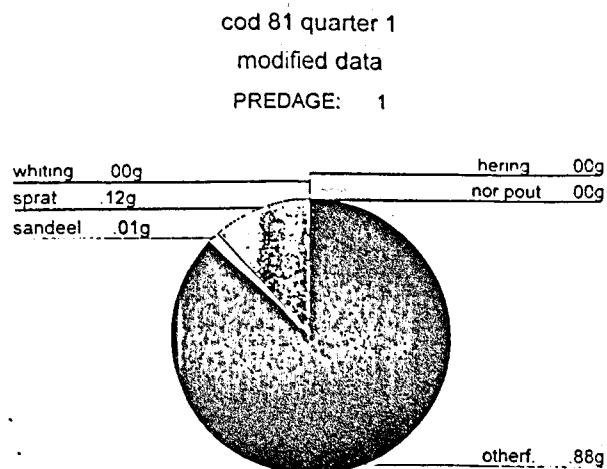
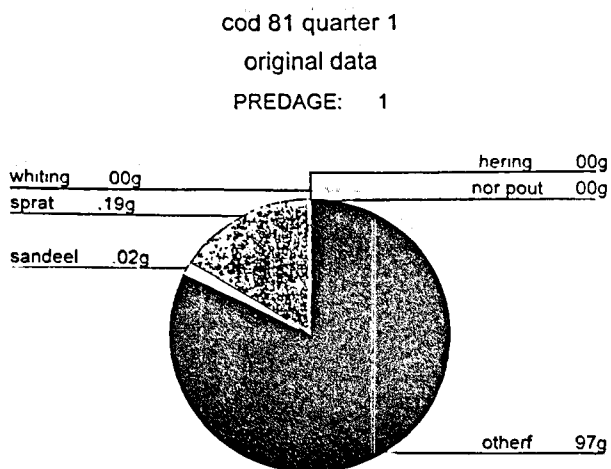
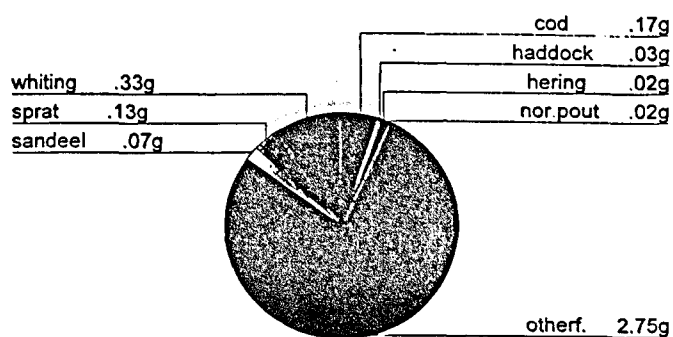


Figure 6.1.a. Cod - Quarter 1, 1981. Comparison of weights of MSVPA prey in stomachs of predators aged 1, 3 and 6, estimated using the standard ISR algorithms (original), with estimates derived from a model incorporating temperature- and prey-specific evacuation rates (modified).

cod 81 quarter 3

original data

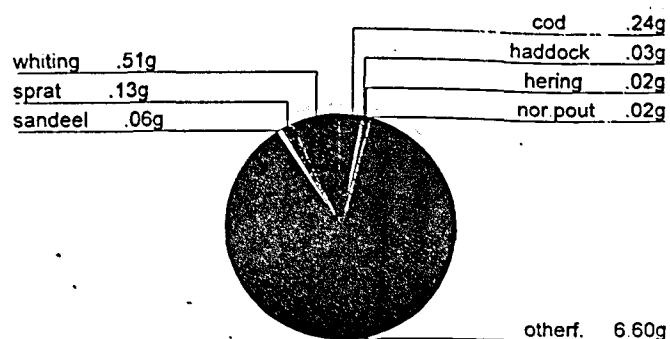
PREDAGE: 1



cod 81 quarter 3

modified data

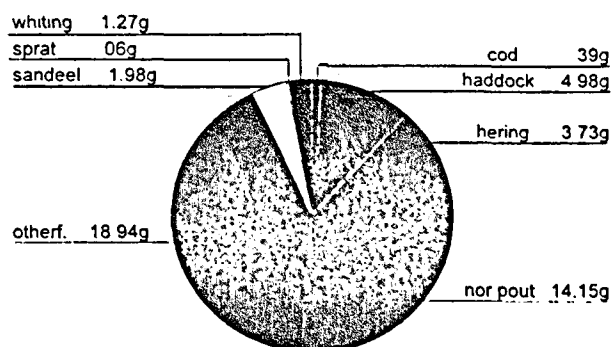
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cod 81 quarter 3

original data

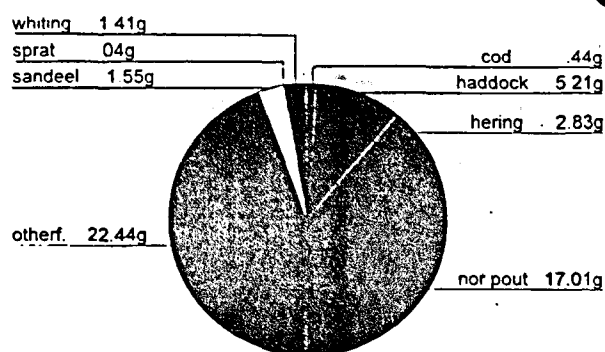
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cod 81 quarter 3

modified data

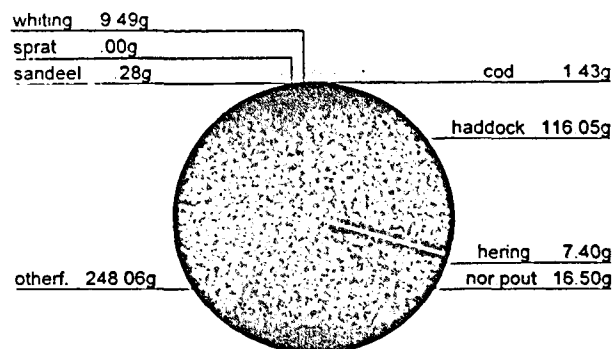
PREDAGE: 3



cod 81 quarter 3

original data

PREDAGE: 6



cod 81 quarter 3

modified data

PREDAGE: 6

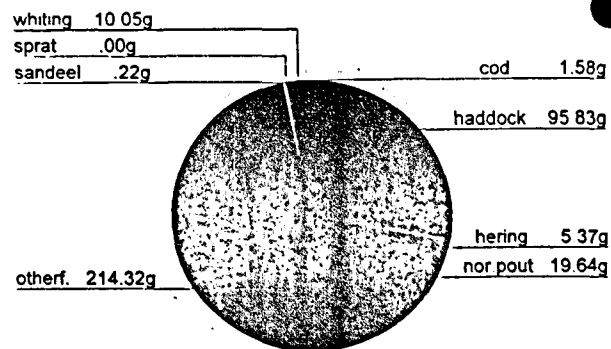


Figure 6.1.b. Cod - Quarter 3, 1981. Comparison of weights of MSVPA prey in stomachs of predators aged 1, 3 and 6, estimated using the standard ISR algorithms (original), with estimates derived from a model incorporating temperature- and prey-specific evacuation rates (modified).

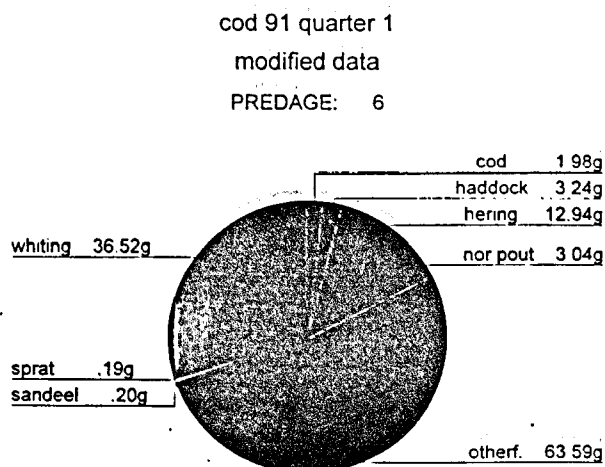
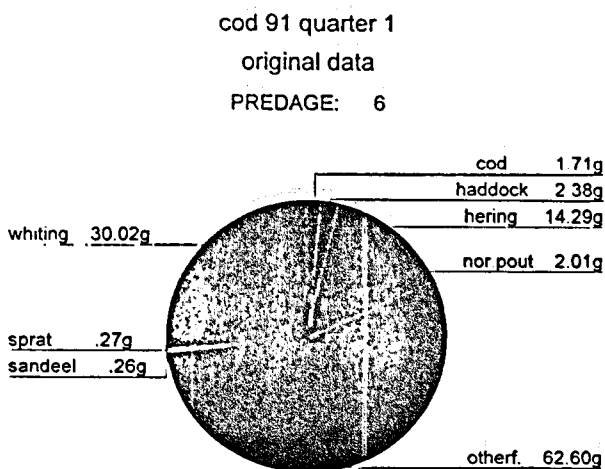
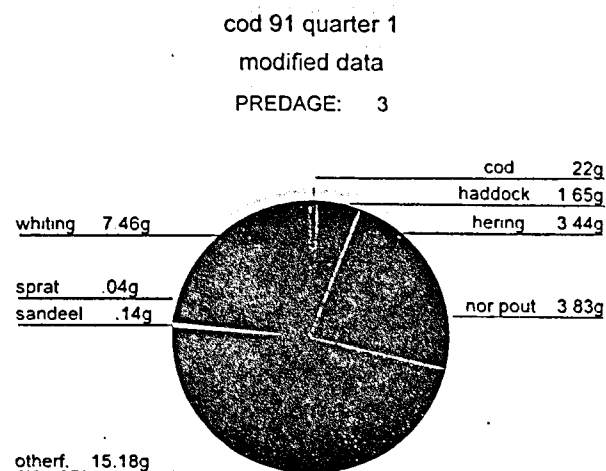
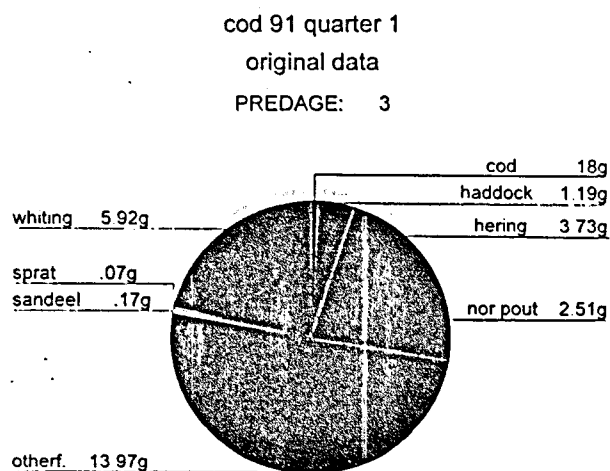
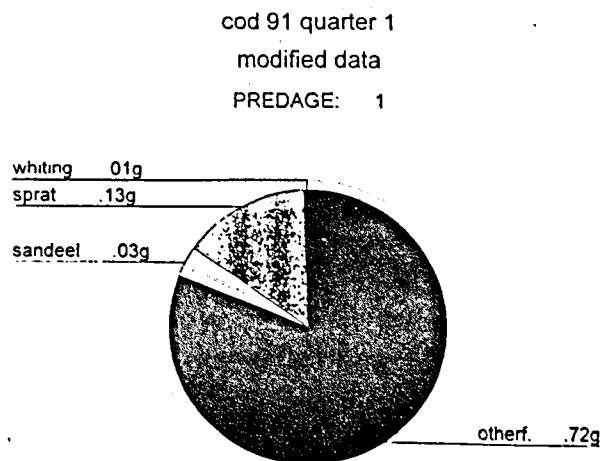
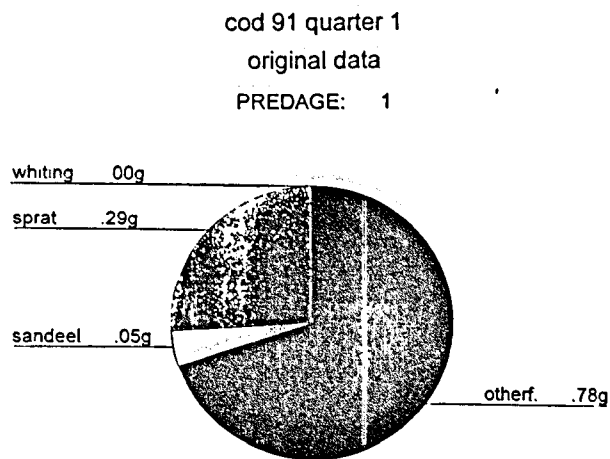


Figure 6.1.c. Cod - Quarter 1, 1991. Comparison of weights of MSVPA prey in stomachs of predators aged 1, 3 and 6, estimated using the standard ISR algorithms (original), with estimates derived from a model incorporating temperature- and prey-specific evacuation rates (modified).

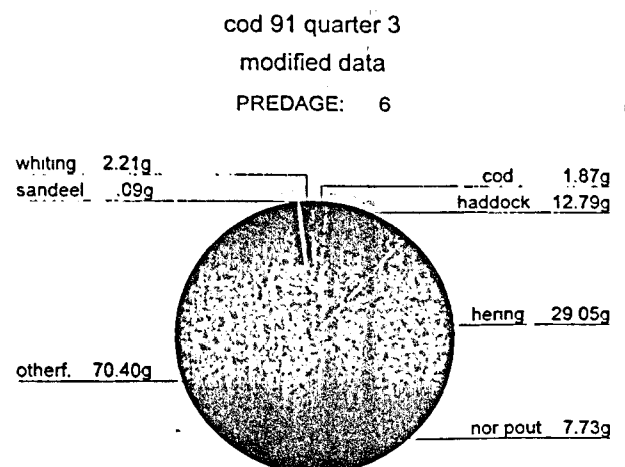
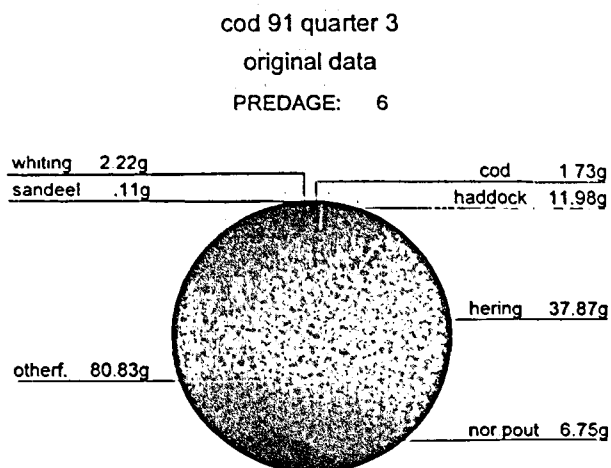
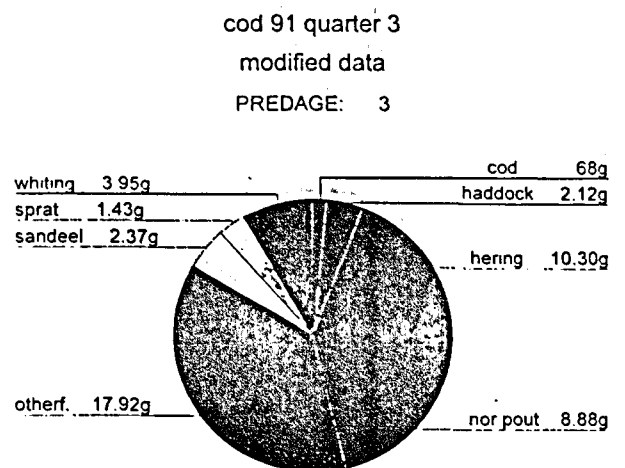
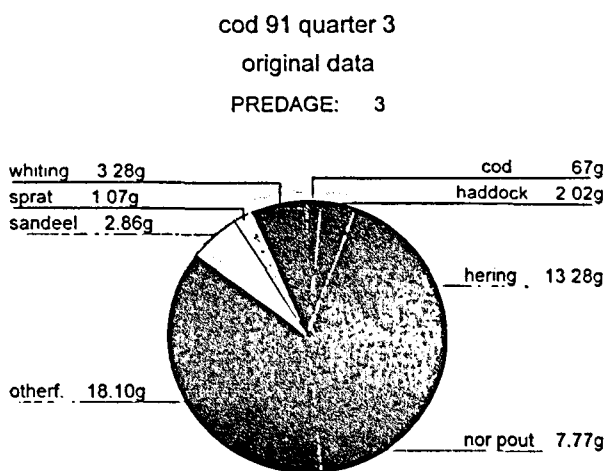
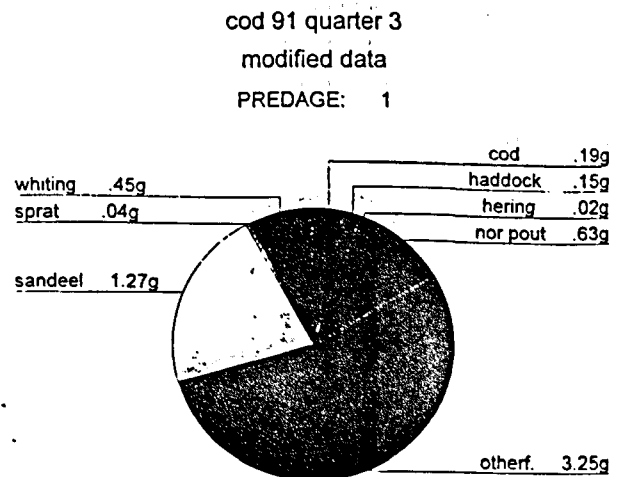
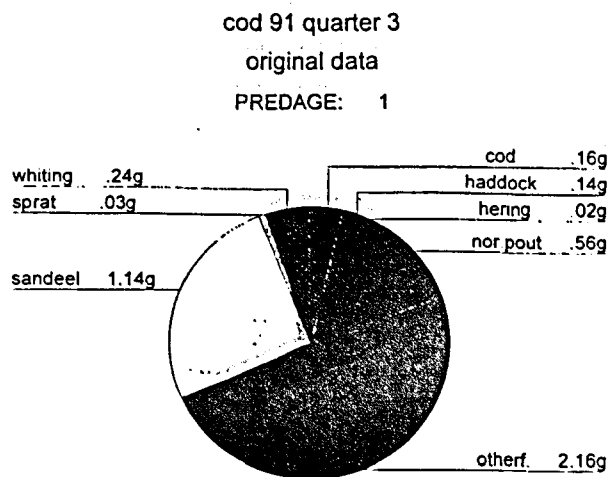


Figure 6.1.d. Cod - Quarter 3, 1991. Comparison of weights of MSVPA prey in stomachs of predators aged 1, 3 and 6, estimated using the standard ISR algorithms (original), with estimates derived from a model incorporating temperature- and prey-specific evacuation rates (modified).

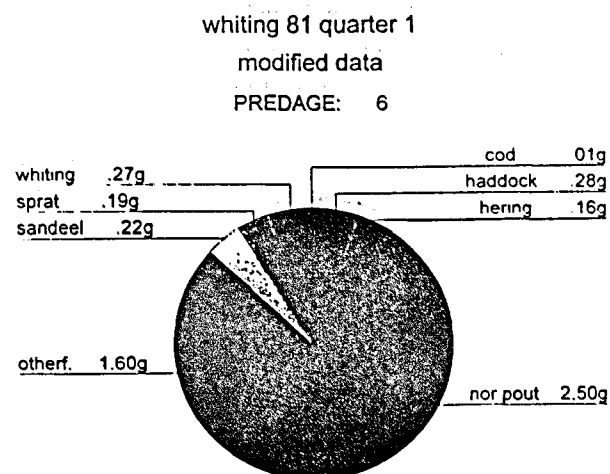
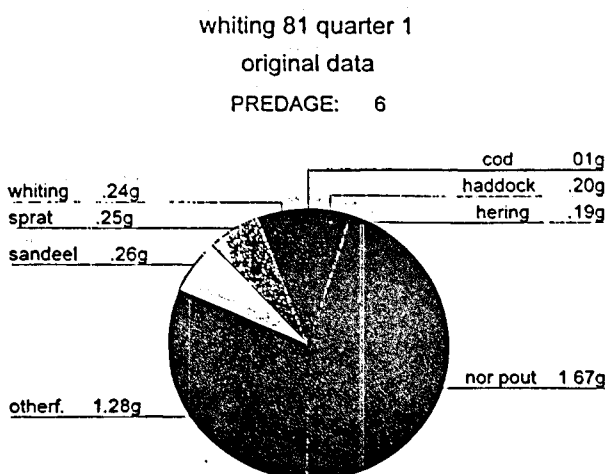
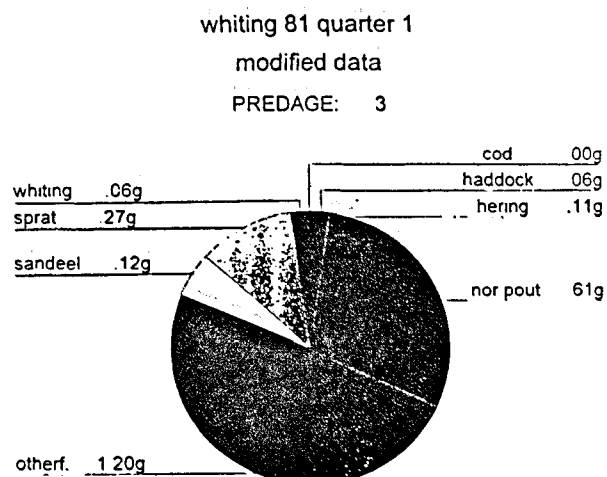
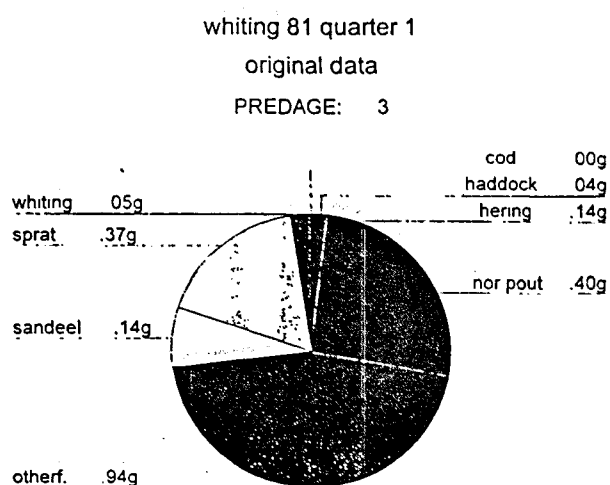
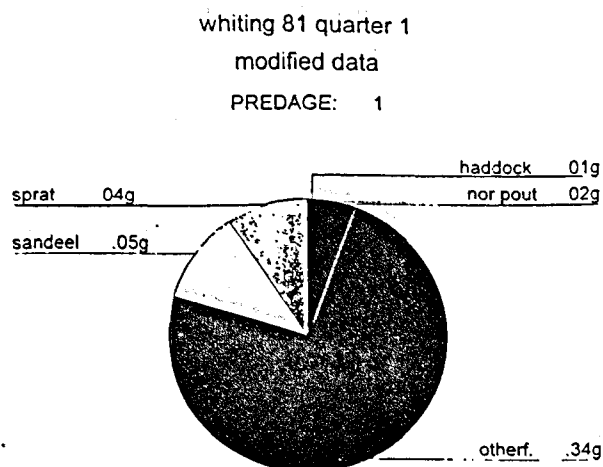
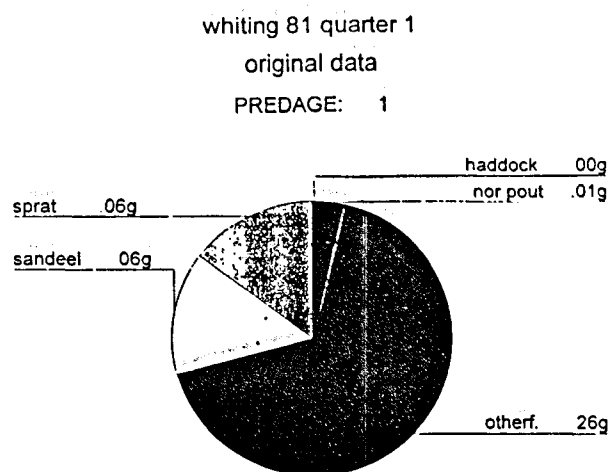


Figure 6.2.a. Whiting - Quarter 1, 1981. Comparison of weights of MSVPA prey in stomachs of predators aged 1, 3 and 6, estimated using the standard ISR algorithms (original), with estimates derived from a model incorporating temperature- and prey-specific evacuation rates (modified).

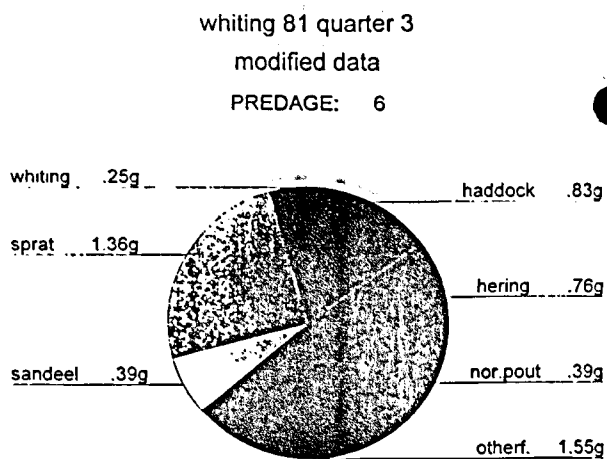
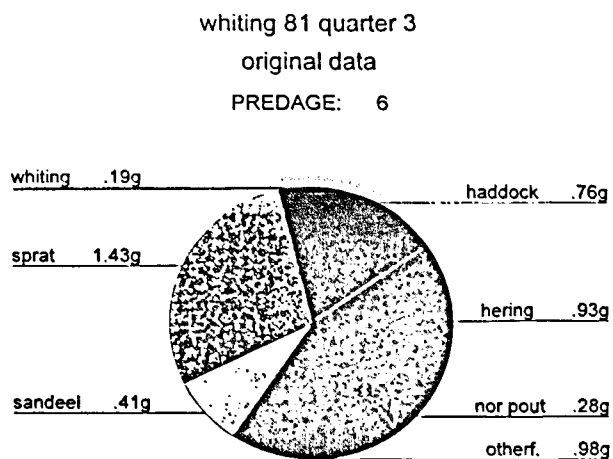
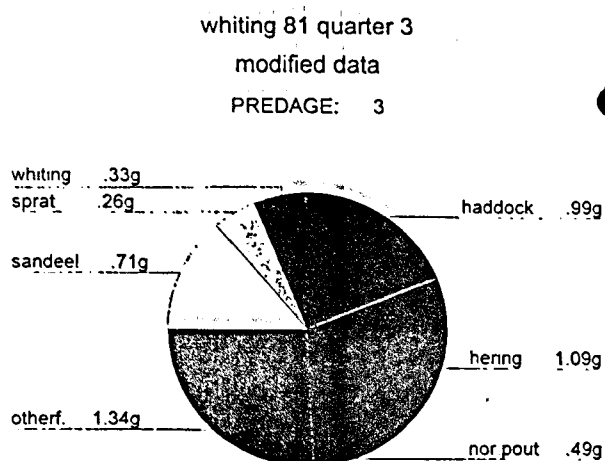
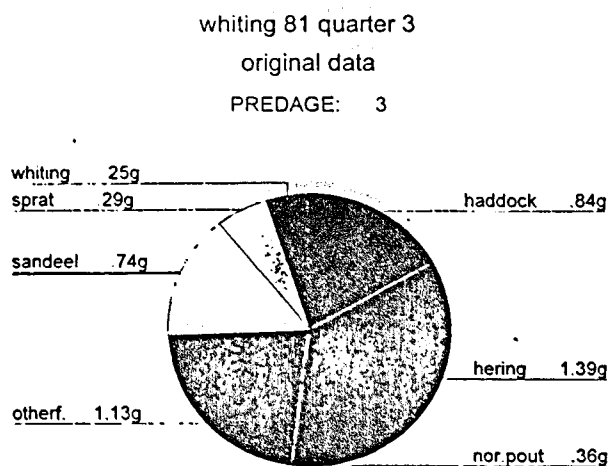
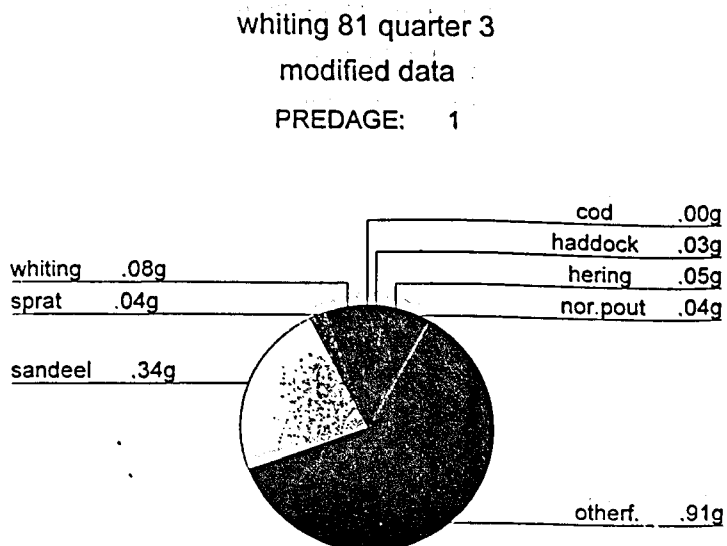
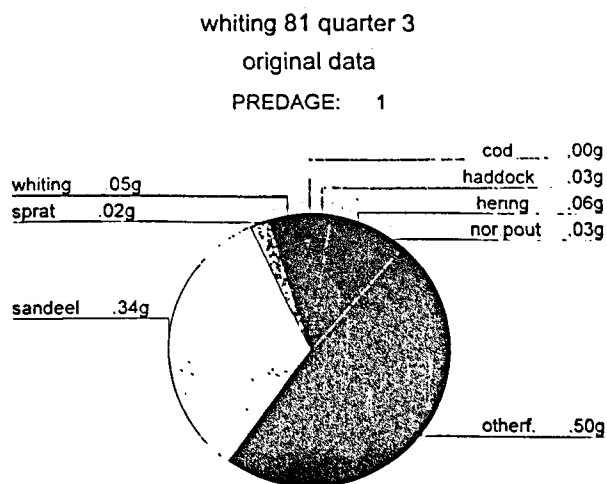


Figure 6.2.b. Whiting - Quarter 3, 1981. Comparison of weights of MSVPA prey in stomachs of predators aged 1, 3 and 6, estimated using the standard ISR algorithms (original), with estimates derived from a model incorporating temperature- and prey-specific evacuation rates (modified).

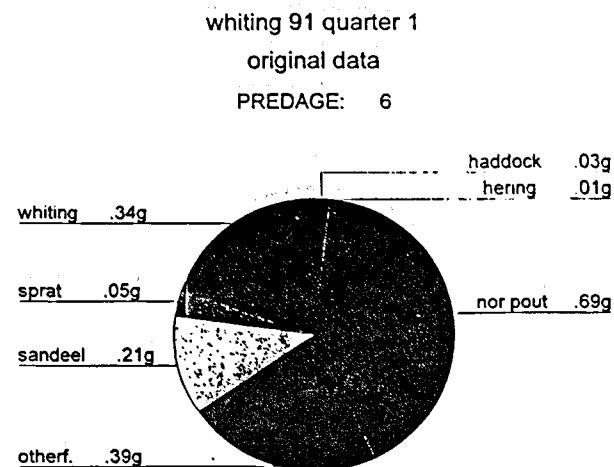
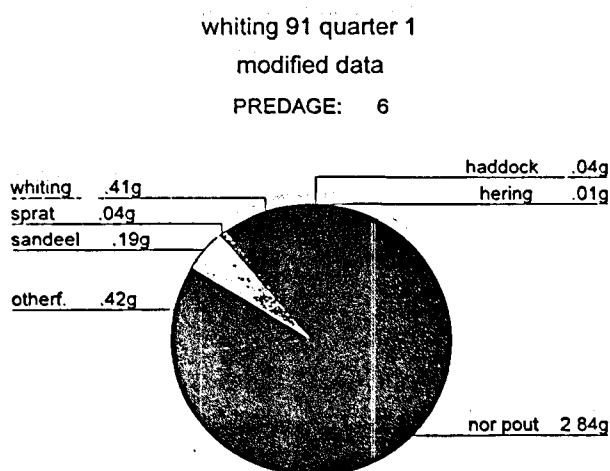
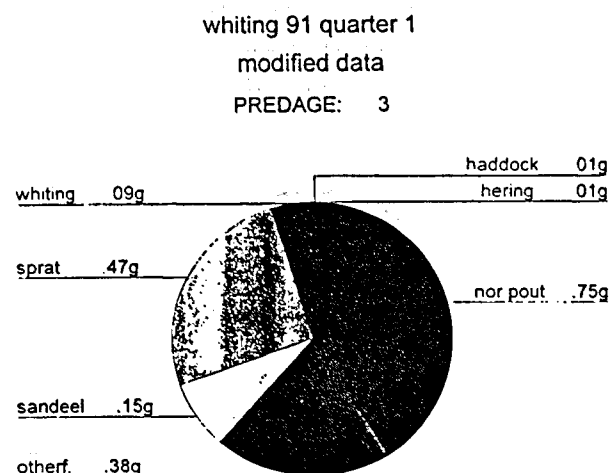
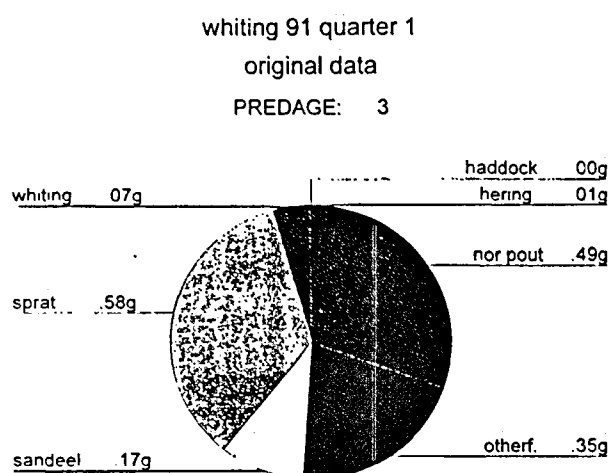
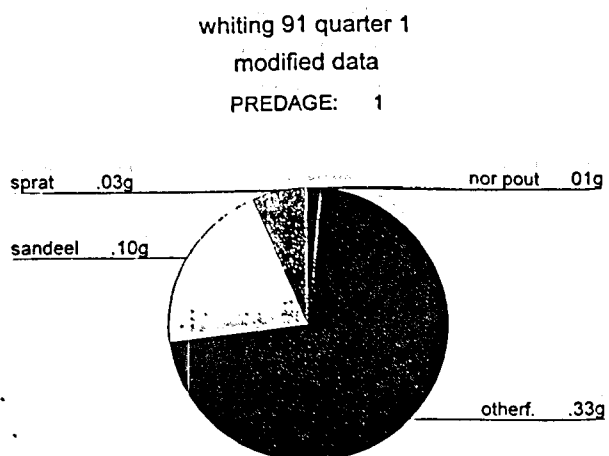
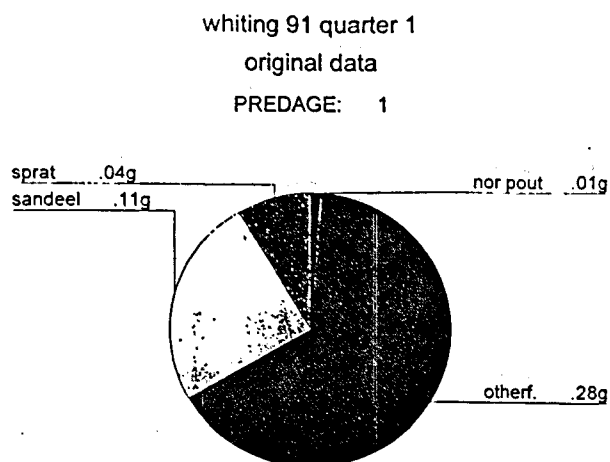


Figure 6.2.c. Whiting - Quarter 1, 1991. Comparison of weights of MSVPA prey in stomachs of predators aged 1, 3 and 6, estimated using the standard ISR algorithms (original), with estimates derived from a model incorporating temperature- and prey-specific evacuation rates (modified).

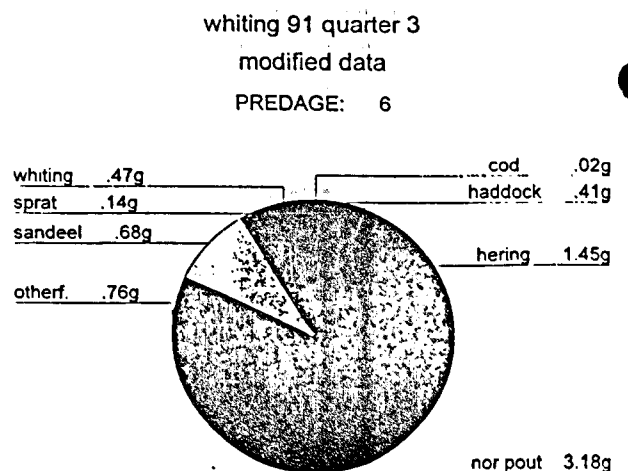
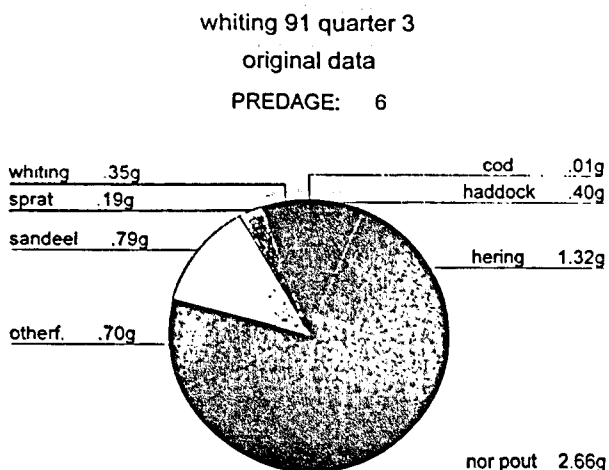
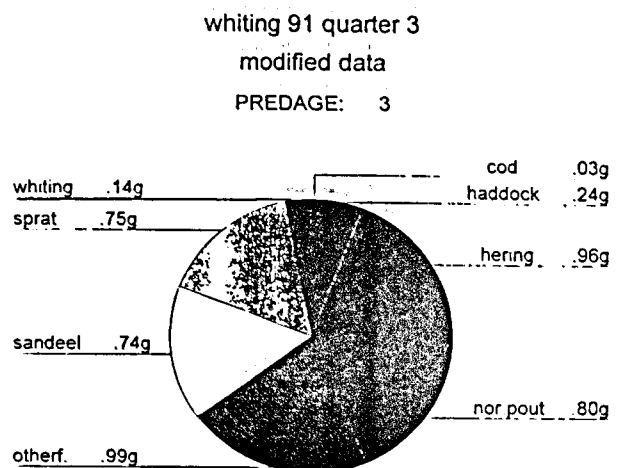
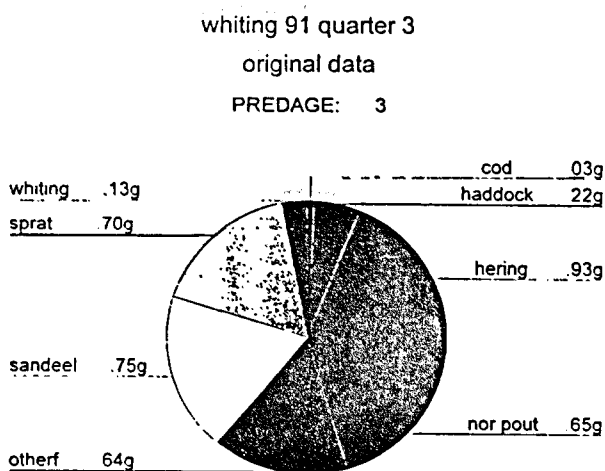
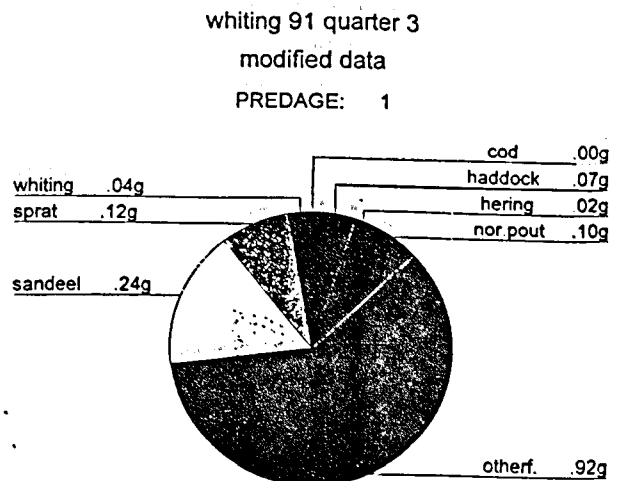
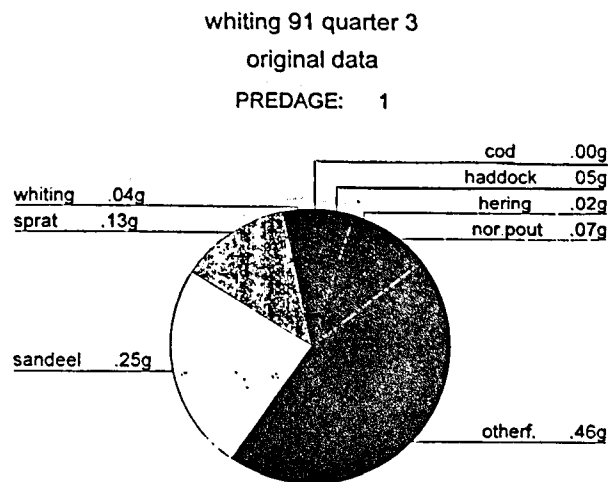


Figure 6.2.d. Whiting - Quarter 3, 1991. Comparison of weights of MSVPA prey in stomachs of predators aged 1, 3 and 6, estimated using the standard ISR algorithms (original), with estimates derived from a model incorporating temperature- and prey-specific evacuation rates (modified).

APPENDIX 1 AVERAGE STOMACH CONTENT TOTAL NORTH SEA

Appendix 1-A. Average stomach content weight (g) per 1000 COD stomachs by age class of prey and predator by quarter for the total North Sea.

| PREDATOR : COD                  |  | Area | : TOTAL NORTH SEA |      |       | YEAR : 1981 |       | QUARTER : 1 |      |
|---------------------------------|--|------|-------------------|------|-------|-------------|-------|-------------|------|
| Age class                       |  |      | 0                 | 1    | 2     | 3           | 4     | 5           | 6+   |
| PREY : ALL SPECIES              |  |      |                   |      |       |             |       |             |      |
| All size classes                |  |      | 1187              | 6362 | 24415 | 60517       | 82680 | 122839      |      |
| PREY : GADUS MORHUA             |  |      |                   |      |       |             |       |             |      |
| Age class                       |  |      |                   |      |       |             |       |             |      |
| 1                               |  |      |                   |      | 60    | 248         | 532   | 1484        | 627  |
| 2                               |  |      |                   |      | 29    | 327         | 3318  | 8741        | 8930 |
| 3                               |  |      |                   |      |       |             | 14    | 41          | 130  |
| Total                           |  |      |                   |      | 89    | 580         | 4120  | 10583       | 9786 |
| PREY : MELANOGRAMMUS AEGLEFINUS |  |      |                   |      |       |             |       |             |      |
| Age class                       |  |      |                   |      |       |             |       |             |      |
| 1                               |  | 0    | 94                | 1510 | 3050  | 2941        | 3008  |             |      |
| 2                               |  |      | 5                 | 1379 | 10097 | 11244       | 6162  |             |      |
| 3                               |  |      | 0                 | 35   | 530   | 602         | 320   |             |      |
| 4                               |  |      | 0                 | 7    | 41    | 49          | 23    |             |      |
| Total                           |  | 0    | 99                | 2932 | 13719 | 14837       | 9513  |             |      |
| PREY : MERLANGIUS MERLANGUS     |  |      |                   |      |       |             |       |             |      |
| Age class                       |  |      |                   |      |       |             |       |             |      |
| 1                               |  | 1    | 319               | 1291 | 2963  | 5447        | 6344  |             |      |
| 2                               |  |      | 179               | 1339 | 9946  | 13728       | 21963 |             |      |
| 3                               |  |      | 19                | 701  | 4452  | 5789        | 7138  |             |      |
| 4                               |  |      | 12                | 409  | 1065  | 771         | 1286  |             |      |
| 5                               |  |      | 3                 | 78   | 206   | 150         | 350   |             |      |
| 6                               |  |      | 0                 | 15   | 42    | 27          | 119   |             |      |
| Total                           |  | 1    | 536               | 3832 | 18673 | 25912       | 37203 |             |      |
| PREY : TRISOPTERUS ESMARKI      |  |      |                   |      |       |             |       |             |      |
| Age class                       |  |      |                   |      |       |             |       |             |      |
| 1                               |  | 2    | 101               | 1033 | 1374  | 992         | 701   |             |      |
| 2                               |  | 0    | 23                | 1059 | 2085  | 1715        | 1281  |             |      |
| 3                               |  |      | 0                 | 54   | 134   | 115         | 81    |             |      |
| Total                           |  | 2    | 125               | 2148 | 3593  | 2822        | 2062  |             |      |
| PREY : CLUPEA HARENGUS          |  |      |                   |      |       |             |       |             |      |
| Age class                       |  |      |                   |      |       |             |       |             |      |
| 1                               |  | 1    | 215               | 500  | 774   | 952         | 1061  |             |      |
| 2                               |  |      | 8                 | 275  | 405   | 309         | 683   |             |      |
| 3                               |  |      | 4                 | 527  | 614   | 430         | 1712  |             |      |
| Total                           |  | 1    | 227               | 1320 | 1804  | 1693        | 3456  |             |      |
| PREY : SPRATTUS SPRATTUS        |  |      |                   |      |       |             |       |             |      |
| Age class                       |  |      |                   |      |       |             |       |             |      |
| 1                               |  | 104  | 149               | 54   | 115   | 259         | 889   |             |      |
| 2                               |  | 85   | 485               | 598  | 1004  | 1540        | 2463  |             |      |
| 3                               |  | 0    | 66                | 108  | 172   | 237         | 259   |             |      |
| 4                               |  | 0    | 1                 | 1    | 2     | 3           | 3     |             |      |
| Total                           |  | 190  | 701               | 761  | 1295  | 2040        | 3614  |             |      |
| PREY : AMMOYTIDAE               |  |      |                   |      |       |             |       |             |      |
| Age class                       |  |      |                   |      |       |             |       |             |      |
| 0                               |  |      | 0                 | 0    |       |             |       |             |      |
| 1                               |  | 19   | 138               | 1095 | 528   | 254         | 109   |             |      |
| 2                               |  | 3    | 62                | 1230 | 579   | 229         | 59    |             |      |
| 3                               |  |      | 5                 | 547  | 287   | 83          |       |             |      |
| 4                               |  |      | 6                 | 653  | 342   | 99          |       |             |      |
| 5                               |  |      | 2                 | 212  | 111   | 32          |       |             |      |
| 6                               |  |      | 2                 | 229  | 120   | 35          |       |             |      |
| Total                           |  | 22   | 216               | 3966 | 1966  | 731         | 168   |             |      |
| PREY : OTHER                    |  |      |                   |      |       |             |       |             |      |
| All size classes                |  |      | 972               | 4368 | 8875  | 15347       | 24061 | 57037       |      |

Appendix 1-A. Average stomach content weight (g) per 1000 COD stomachs by age class of prey and predator by quarter for the total North Sea.

| PREDATOR : COD                  |  | Area : TOTAL NORTH SEA |       |       | YEAR : 1981 |        | QUARTER : 2 |    |
|---------------------------------|--|------------------------|-------|-------|-------------|--------|-------------|----|
| Age class                       |  | 0                      | 1     | 2     | 3           | 4      | 5           | 6+ |
| PREY : ALL SPECIES              |  |                        |       |       |             |        |             |    |
| All size classes                |  | 1767                   | 12173 | 43372 | 93702       | 110506 | 162615      |    |
| PREY : GADUS MORHUA             |  |                        |       |       |             |        |             |    |
| Age class                       |  |                        |       |       |             |        |             |    |
| 0                               |  | 23                     | 88    | 93    | 29          | 1      |             |    |
| 1                               |  | 2                      | 57    | 591   | 6004        | 6286   | 943         |    |
| 2                               |  |                        | 1     | 221   | 2233        | 2499   | 656         |    |
| 3                               |  |                        |       | 67    | 1127        | 1272   | 330         |    |
| Total                           |  | 25                     | 146   | 972   | 9393        | 10058  | 1929        |    |
| PREY : MELANOGRAMMUS AEGLEFINUS |  |                        |       |       |             |        |             |    |
| Age class                       |  |                        |       |       |             |        |             |    |
| 0                               |  | 1                      | 12    | 49    | 150         | 159    | 41          |    |
| 1                               |  | 15                     | 154   | 1092  | 752         | 515    | 1053        |    |
| 2                               |  |                        | 28    | 1280  | 2783        | 5000   | 4530        |    |
| 3                               |  |                        |       | 9     | 116         | 281    | 273         |    |
| Total                           |  | 16                     | 194   | 2430  | 3801        | 5955   | 5897        |    |
| PREY : MERLANGIUS MERLANGUS     |  |                        |       |       |             |        |             |    |
| Age class                       |  |                        |       |       |             |        |             |    |
| 0                               |  | 0                      | 6     | 4     | 164         | 162    | 21          |    |
| 1                               |  | 1                      | 106   | 1129  | 2097        | 807    | 4804        |    |
| 2                               |  |                        | 70    | 1059  | 5860        | 6609   | 13551       |    |
| 3                               |  |                        | 0     | 193   | 2089        | 2762   | 11921       |    |
| 4                               |  |                        |       | 54    | 598         | 690    | 1500        |    |
| 5                               |  |                        |       | 1     | 7           | 24     | 350         |    |
| 6                               |  |                        |       | 0     | 4           | 13     | 199         |    |
| Total                           |  | 1                      | 182   | 2484  | 10813       | 11063  | 32344       |    |
| PREY : TRISOPTERUS ESMARKI      |  |                        |       |       |             |        |             |    |
| Age class                       |  |                        |       |       |             |        |             |    |
| 0                               |  |                        | 4     | 78    | 49          | 34     | 78          |    |
| 1                               |  | 0                      | 94    | 985   | 2048        | 2305   | 1094        |    |
| 2                               |  |                        | 18    | 718   | 1228        | 1320   | 489         |    |
| 3                               |  |                        | 0     | 8     | 14          | 15     | 5           |    |
| Total                           |  | 0                      | 116   | 1790  | 3339        | 3675   | 1667        |    |
| PREY : CLUPEA HARENGUS          |  |                        |       |       |             |        |             |    |
| Age class                       |  |                        |       |       |             |        |             |    |
| 1                               |  | 9                      | 126   | 276   | 1086        | 899    | 2194        |    |
| 2                               |  | 0                      | 29    | 220   | 1843        | 4716   | 6638        |    |
| Total                           |  | 9                      | 155   | 494   | 2914        | 5604   | 8795        |    |
| PREY : SPRATTUS SPRATTUS        |  |                        |       |       |             |        |             |    |
| Age class                       |  |                        |       |       |             |        |             |    |
| 0                               |  | 16                     | 40    | 2     | 16          | 44     | 184         |    |
| 1                               |  | 15                     | 149   | 79    | 426         | 330    | 769         |    |
| 2                               |  | 26                     | 273   | 222   | 1133        | 736    | 1408        |    |
| 3                               |  | 3                      | 33    | 36    | 156         | 79     | 146         |    |
| Total                           |  | 59                     | 496   | 339   | 1731        | 1189   | 2506        |    |
| PREY : AMMODYTIDAE              |  |                        |       |       |             |        |             |    |
| Age class                       |  |                        |       |       |             |        |             |    |
| 0                               |  | 101                    | 1501  | 1541  | 2255        | 2126   | 481         |    |
| 1                               |  | 170                    | 1574  | 1431  | 3457        | 3554   | 1235        |    |
| 2                               |  | 78                     | 417   | 797   | 875         | 825    | 624         |    |
| 3                               |  | 8                      | 121   | 377   | 434         | 276    | 157         |    |
| 4                               |  | 3                      | 66    | 292   | 366         | 205    | 85          |    |
| 5                               |  | 1                      | 27    | 107   | 129         | 73     | 33          |    |
| 6                               |  | 0                      | 15    | 87    | 113         | 58     | 19          |    |
| Total                           |  | 361                    | 3720  | 4632  | 7630        | 7116   | 2635        |    |
| PREY : OTHER                    |  |                        |       |       |             |        |             |    |
| All size classes                |  | 1295                   | 7166  | 30231 | 54081       | 65845  | 106841      |    |

Appendix 1-A. Average stomach content weight (g) per 1000 COD stomachs by age class of prey and predator by quarter for the total North Sea.

| PREDATOR : COD                  |  | Area : TOTAL NORTH SEA |      | YEAR : 1981 |       | QUARTER : 3 |        |        |
|---------------------------------|--|------------------------|------|-------------|-------|-------------|--------|--------|
| Age class                       |  | 0                      | 1    | 2           | 3     | 4           | 5      | 6+     |
| PREY : ALL SPECIES              |  |                        |      |             |       |             |        |        |
| All size classes                |  | 237                    | 3513 | 15309       | 45987 | 115076      | 163152 | 400075 |
| PREY : GADUS MORHUA             |  |                        |      |             |       |             |        |        |
| Age class                       |  | 0                      | 171  | 1006        | 161   | 536         | 1414   | 348    |
|                                 |  | 1                      |      | 6           | 166   | 929         | 3127   | 721    |
|                                 |  | 2                      |      |             | 61    | 442         | 1598   | 362    |
| Total                           |  |                        | 171  | 1012        | 389   | 1907        | 6140   | 1431   |
| PREY : MELANOGRAMMUS AEGLEFINUS |  |                        |      |             |       |             |        |        |
| Age class                       |  | 0                      | 26   | 762         | 1901  | 1597        | 1379   | 731    |
|                                 |  | 1                      | 0    | 143         | 2171  | 6376        | 5779   | 3619   |
|                                 |  | 2                      |      | 26          | 890   | 7039        | 11995  | 76720  |
|                                 |  | 3                      |      | 1           | 18    | 203         | 662    | 28874  |
|                                 |  | 4                      |      |             | 0     | 1           | 5      | 5583   |
|                                 |  | 5                      |      |             |       |             |        | 526    |
| Total                           |  |                        | 27   | 932         | 4927  | 14989       | 19539  | 116248 |
| PREY : MERLANGIUS MERLANGUS     |  |                        |      |             |       |             |        |        |
| Age class                       |  | 0                      | 1    | 324         | 770   | 197         | 22     |        |
|                                 |  | 1                      |      | 2           | 494   | 627         | 1411   | 874    |
|                                 |  | 2                      |      |             | 28    | 278         | 1636   | 1967   |
|                                 |  | 3                      |      |             | 3     | 134         | 551    | 757    |
|                                 |  | 4                      |      |             | 1     | 31          | 102    | 154    |
|                                 |  | 5                      |      |             |       | 3           | 12     | 17     |
|                                 |  | 6                      |      |             |       | 1           | 5      | 7      |
| Total                           |  |                        | 1    | 326         | 1297  | 1272        | 3739   | 3776   |
| PREY : TRISOPTERUS ESMARKI      |  |                        |      |             |       |             |        |        |
| Age class                       |  | 0                      |      | 19          | 1217  | 8255        | 16234  | 19797  |
|                                 |  | 1                      |      |             | 271   | 2463        | 2177   | 1864   |
|                                 |  | 2                      |      |             | 383   | 3436        | 2894   | 2393   |
| Total                           |  |                        |      | 19          | 1907  | 14680       | 22469  | 25459  |
| PREY : CLUPEA HARENGUS          |  |                        |      |             |       |             |        |        |
| Age class                       |  | 0                      |      | 17          | 281   | 125         | 38     | 16     |
|                                 |  | 1                      |      | 0           | 257   | 394         | 279    | 331    |
|                                 |  | 2                      |      | 0           | 56    | 52          | 21     | 31     |
|                                 |  | 3                      |      |             | 99    | 3160        | 15771  | 14583  |
| Total                           |  |                        |      | 17          | 693   | 3731        | 16109  | 14961  |
| PREY : SPRATTUS SPRATTUS        |  |                        |      |             |       |             |        |        |
| Age class                       |  | 0                      |      | 1           | 0     | 0           | 3      | 9      |
|                                 |  | 1                      |      | 108         | 254   | 51          | 15     | 3      |
|                                 |  | 2                      |      | 18          | 80    | 12          | 0      | 0      |
|                                 |  | 3                      |      | 1           | 13    | 1           |        |        |
| Total                           |  |                        |      | 129         | 347   | 64          | 19     | 12     |
| PREY : AMMODYTIDAE              |  |                        |      |             |       |             |        |        |
| Age class                       |  | 0                      |      | 1           | 69    | 875         | 1650   | 757    |
|                                 |  | 1                      |      |             | 1     | 50          | 96     | 7      |
|                                 |  | 2                      |      |             | 3     | 121         | 198    | 17     |
|                                 |  | 3                      |      |             | 0     | 13          | 26     | 2      |
|                                 |  | 4                      |      |             | 0     | 5           | 9      | 1      |
| Total                           |  |                        |      | 1           | 73    | 1066        | 1982   | 784    |
| PREY : OTHER                    |  |                        |      |             |       |             |        |        |
| All size classes                |  | 235                    | 2750 | 8055        | 18943 | 55061       | 92599  | 248056 |

Appendix 1-A. Average stomach content weight (g) per 1000 COD stomachs by age class of prey and predator by quarter for the total North Sea.

| PREDATOR : COD                  |  | Area : TOTAL NORTH SEA |      | YEAR : 1981 |       | QUARTER : 4 |       |        |
|---------------------------------|--|------------------------|------|-------------|-------|-------------|-------|--------|
| Age class                       |  | 0                      | 1    | 2           | 3     | 4           | 5     | 6+     |
| PREY : ALL SPECIES              |  |                        |      |             |       |             |       |        |
| All size classes                |  | 855                    | 7178 | 10889       | 36230 | 98841       | 95356 | 138876 |
| PREY : GADUS MORHUA             |  |                        |      |             |       |             |       |        |
| Age class                       |  | 0                      | 1    | 2           | 3     | 4           | 5     | 6      |
|                                 |  | 2                      | 8    | 42          | 331   | 902         | 716   | 954    |
|                                 |  |                        |      | 17          | 1172  | 6076        | 115   | 1743   |
|                                 |  |                        |      | 13          | 1244  | 4606        | 7612  | 2160   |
|                                 |  |                        |      | 1           | 51    | 188         | 311   | 88     |
| Total                           |  | 2                      | 8    | 73          | 2798  | 11771       | 8754  | 4944   |
| PREY : MELANOGRAMMUS AEGLEFINUS |  |                        |      |             |       |             |       |        |
| Age class                       |  | 0                      | 1    | 2           | 3     | 4           | 5     | 6      |
|                                 |  | 233                    | 1363 | 3106        | 6459  | 7677        | 5471  |        |
|                                 |  |                        | 1    | 30          | 441   | 2525        | 3227  | 6955   |
|                                 |  |                        |      | 7           | 742   | 3331        | 5051  | 27195  |
|                                 |  |                        |      | 1           | 71    | 290         | 460   | 3392   |
|                                 |  |                        |      | 0           | 0     | 3           | 4     | 1      |
|                                 |  |                        |      | 0           | 0     | 1           | 1     | 0      |
| Total                           |  | 234                    | 1401 | 4361        | 12609 | 16420       | 43014 |        |
| PREY : MERLANGIUS MERLANGUS     |  |                        |      |             |       |             |       |        |
| Age class                       |  | 0                      | 1    | 2           | 3     | 4           | 5     | 6      |
|                                 |  | 16                     | 86   | 278         | 652   | 790         | 490   |        |
|                                 |  | 9                      | 85   | 3943        | 12194 | 9039        | 3514  |        |
|                                 |  | 3                      | 36   | 3046        | 10470 | 6700        | 12482 |        |
|                                 |  |                        | 3    | 383         | 1399  | 1665        | 3892  |        |
|                                 |  |                        | 1    | 123         | 445   | 425         | 201   |        |
|                                 |  |                        | 0    | 3           | 12    | 21          | 6     |        |
|                                 |  |                        | 0    | 9           | 34    | 56          | 16    |        |
| Total                           |  | 27                     | 212  | 7785        | 25206 | 18695       | 20600 |        |
| PREY : TRISOPTERUS ESMARKI      |  |                        |      |             |       |             |       |        |
| Age class                       |  | 0                      | 1    | 2           | 3     | 4           | 5     | 6      |
|                                 |  | 5                      | 39   | 596         | 1578  | 2715        | 3149  | 3447   |
|                                 |  |                        | 39   | 353         | 854   | 2539        | 2992  | 420    |
|                                 |  |                        | 4    | 47          | 118   | 251         | 290   | 36     |
| Total                           |  | 5                      | 81   | 996         | 2551  | 5505        | 6431  | 3903   |
| PREY : CLUPEA HARENGUS          |  |                        |      |             |       |             |       |        |
| Age class                       |  | 0                      | 1    | 2           | 3     | 4           | 5     | 6      |
|                                 |  | 50                     | 295  | 725         | 2     | 2           | 1     |        |
|                                 |  | 4                      | 33   | 323         | 863   | 320         | 91    |        |
|                                 |  | 0                      | 1    | 53          | 157   | 58          | 17    |        |
|                                 |  | 0                      | 1    | 13          | 29    | 21          | 6     |        |
|                                 |  | 0                      | 1    | 8           | 11    | 16          | 5     |        |
|                                 |  | 0                      | 2    | 8           | 8     | 19          | 5     |        |
|                                 |  | 0                      | 1    | 139         | 1043  | 1306        | 186   |        |
| Total                           |  | 54                     | 334  | 1269        | 2113  | 1742        | 310   |        |
| PREY : SPRATTUS SPRATTUS        |  |                        |      |             |       |             |       |        |
| Age class                       |  | 1                      | 2    | 3           | 4     | 5           | 6     | 7      |
|                                 |  | 0                      | 13   | 59          | 182   | 610         | 37    | 162    |
|                                 |  |                        | 8    | 64          | 219   | 776         | 48    | 206    |
|                                 |  |                        | 0    | 3           | 11    | 43          | 3     | 11     |
|                                 |  |                        | 0    | 1           | 4     | 14          | 1     | 4      |
| Total                           |  | 0                      | 22   | 126         | 412   | 1431        | 88    | 380    |
| PREY : AMMODYTIDAE              |  |                        |      |             |       |             |       |        |
| Age class                       |  | 0                      | 1    | 2           | 3     | 4           | 5     | 6      |
|                                 |  | 1                      | 170  | 333         | 1129  | 4471        | 2075  | 3365   |
|                                 |  |                        | 20   | 16          | 205   | 729         | 1207  | 2388   |
|                                 |  |                        | 26   | 22          | 283   | 1004        | 1661  | 3292   |
|                                 |  |                        | 11   | 16          | 204   | 718         | 1189  | 2386   |
|                                 |  |                        | 8    | 15          | 194   | 682         | 1129  | 2272   |
|                                 |  |                        | 2    | 4           | 56    | 196         | 325   | 655    |
|                                 |  |                        | 2    | 5           | 62    | 216         | 369   | 715    |
| Total                           |  | 2                      | 239  | 412         | 2138  | 8035        | 7987  | 15135  |
| PREY : OTHER                    |  |                        |      |             |       |             |       |        |
| All size classes                |  | 847                    | 6513 | 7335        | 14915 | 32172       | 35239 | 50589  |

APPENDIX 1 AVERAGE STOMACH CONTENT TOTAL NORTH SEA

Appendix 1-A. Average stomach content weight (g) per 1000 COD stomachs by age class of prey and predator by quarter for the total North Sea.

| PREDATOR : COD                  |   | Area | TOTAL NORTH SEA |       |       | YEAR : 1985 | QUARTER : 1 |      |
|---------------------------------|---|------|-----------------|-------|-------|-------------|-------------|------|
| Age class                       |   | 0    | 1               | 2     | 3     | 4           | 5           | 6+   |
| PREY : ALL SPECIES              |   |      |                 |       |       |             |             |      |
| All size classes                |   | 982  | 10983           | 39432 | 88878 | 108512      | 166523      |      |
| PREY : GADUS MORHUA             |   |      |                 |       |       |             |             |      |
| Age class                       |   |      |                 |       |       |             |             |      |
|                                 | 1 |      |                 | 22    | 36    | 38          | 18          | 88   |
|                                 | 2 |      |                 | 1     | 83    | 314         | 585         | 2343 |
|                                 | 3 |      |                 |       |       | 3           | 8           | 18   |
| Total                           |   |      | 23              | 118   | 355   | 611         | 2448        |      |
| PREY : MELANOGRAMMUS AEGLEFINUS |   |      |                 |       |       |             |             |      |
| Age class                       |   |      |                 |       |       |             |             |      |
|                                 | 1 |      | 474             | 1184  | 1538  | 1613        | 679         |      |
|                                 | 2 |      | 88              | 1423  | 5994  | 7739        | 6314        |      |
|                                 | 3 |      | 1               | 37    | 245   | 464         | 666         |      |
|                                 | 4 |      |                 | 4     | 32    | 60          | 89          |      |
|                                 | 5 |      |                 |       | 1     | 3           | 5           |      |
| Total                           |   |      | 563             | 2648  | 7810  | 9878        | 7753        |      |
| PREY : MERLANGIUS MERLANGUS     |   |      |                 |       |       |             |             |      |
| Age class                       |   |      |                 |       |       |             |             |      |
|                                 | 1 | 28   | 273             | 674   | 491   | 1157        | 1626        |      |
|                                 | 2 |      | 232             | 1856  | 1754  | 4221        | 14694       |      |
|                                 | 3 |      | 21              | 157   | 604   | 1349        | 6365        |      |
|                                 | 4 |      | 6               | 17    | 129   | 272         | 1977        |      |
|                                 | 5 |      | 0               | 2     | 26    | 56          | 704         |      |
|                                 | 6 |      | 0               | 2     | 31    | 70          | 544         |      |
| Total                           |   | 28   | 532             | 2708  | 3034  | 7125        | 25911       |      |
| PREY : TRISOPTERUS ESMARKI      |   |      |                 |       |       |             |             |      |
| Age class                       |   |      |                 |       |       |             |             |      |
|                                 | 0 |      | 1               | 0     |       |             |             |      |
|                                 | 1 |      | 848             | 7709  | 17450 | 14597       | 8286        |      |
|                                 | 2 |      | 290             | 6089  | 21453 | 17214       | 7068        |      |
|                                 | 3 |      | 29              | 379   | 1534  | 1186        | 394         |      |
|                                 | 4 |      | 3               | 21    | 80    | 62          | 21          |      |
| Total                           |   | 0    | 1171            | 14198 | 40523 | 33076       | 15769       |      |
| PREY : CLUPEA HARENGUS          |   |      |                 |       |       |             |             |      |
| Age class                       |   |      |                 |       |       |             |             |      |
|                                 | 1 | 2    | 111             | 62    |       |             |             |      |
|                                 | 2 | 4    | 1274            | 1769  | 1433  | 3303        | 7259        |      |
|                                 | 3 |      | 155             | 3028  | 9736  | 12090       | 10740       |      |
|                                 | 4 |      | 27              | 1071  | 6217  | 8799        | 5850        |      |
|                                 | 5 |      | 1               | 153   | 1438  | 1779        | 1354        |      |
|                                 | 6 |      | 1               | 69    | 607   | 1118        | 607         |      |
| Total                           |   | 6    | 1568            | 6152  | 19433 | 27091       | 25812       |      |
| PREY : SPRATTUS SPRATTUS        |   |      |                 |       |       |             |             |      |
| Age class                       |   |      |                 |       |       |             |             |      |
|                                 | 1 | 12   | 53              | 135   | 200   | 4           | 6           |      |
|                                 | 2 | 3    | 71              | 76    | 79    | 367         | 812         |      |
|                                 | 3 |      | 56              | 199   | 50    | 150         | 370         |      |
|                                 | 4 |      | 7               | 34    | 7     | 17          | 43          |      |
|                                 | 5 |      | 0               | 1     | 0     | 1           | 3           |      |
|                                 | 6 |      | 0               | 0     | 0     | 0           | 0           |      |
| Total                           |   | 15   | 188             | 444   | 336   | 540         | 1234        |      |
| PREY : AMMODYTIDAE              |   |      |                 |       |       |             |             |      |
| Age class                       |   |      |                 |       |       |             |             |      |
|                                 | 1 | 28   | 146             | 389   | 1316  | 1082        | 199         |      |
|                                 | 2 |      | 376             | 481   | 1323  | 1287        | 153         |      |
|                                 | 3 |      | 24              | 62    | 186   | 166         | 14          |      |
|                                 | 4 |      | 1               | 1     | 2     | 3           | 0           |      |
|                                 | 6 |      | 12              | 162   | 276   | 236         |             |      |
| Total                           |   | 28   | 561             | 1094  | 3103  | 2775        | 366         |      |
| PREY : OTHER                    |   |      |                 |       |       |             |             |      |
| All size classes                |   | 905  | 6378            | 12070 | 14283 | 27415       | 87229       |      |

Appendix 1-A. Average stomach content weight (g) per 1000 COD stomachs by age class of prey and predator by quarter for the total North Sea.

| PREDATOR : COD                  |  | Area | : TOTAL NORTH SEA |       |       | YEAR : 1985 | QUARTER : 3 |        |
|---------------------------------|--|------|-------------------|-------|-------|-------------|-------------|--------|
| Age class                       |  | 0    | 1                 | 2     | 3     | 4           | 5           | 6+     |
| PREY : ALL SPECIES              |  |      |                   |       |       |             |             |        |
| All size classes                |  | 71   | 2172              | 12460 | 58054 | 115498      | 174776      | 238362 |
| PREY : GADUS MORHUA             |  |      |                   |       |       |             |             |        |
| Age class                       |  |      |                   |       |       |             |             |        |
| 0                               |  |      | 12                | 36    | 37    | 236         | 196         |        |
| 1                               |  |      |                   |       | 165   | 2047        | 2395        | 793    |
| 2                               |  |      |                   |       | 621   | 7801        | 13177       | 8648   |
| 3                               |  |      |                   |       | 7     | 70          | 58          |        |
| Total                           |  |      | 12                | 36    | 829   | 10154       | 15826       | 9441   |
| PREY : MELANOGRAMMUS AEGLEFINUS |  |      |                   |       |       |             |             |        |
| Age class                       |  |      |                   |       |       |             |             |        |
| 0                               |  |      | 62                | 727   | 774   | 285         | 200         | 140    |
| 1                               |  |      | 0                 | 291   | 2019  | 3503        | 1584        | 1841   |
| 2                               |  |      |                   | 149   | 2506  | 7139        | 4729        | 4378   |
| Total                           |  |      | 62                | 1167  | 5300  | 10928       | 6512        | 6360   |
| PREY : MERLANGIUS MERLANGUS     |  |      |                   |       |       |             |             |        |
| Age class                       |  |      |                   |       |       |             |             |        |
| 0                               |  |      | 28                | 204   | 160   | 43          | 88          | 56     |
| 1                               |  |      |                   | 505   | 1439  | 3329        | 3635        | 3607   |
| 2                               |  |      |                   | 262   | 1566  | 4887        | 3614        | 3624   |
| 3                               |  |      |                   | 18    | 219   | 798         | 288         | 119    |
| 4                               |  |      |                   | 4     | 59    | 273         | 140         | 27     |
| 5                               |  |      |                   |       | 5     | 50          | 41          |        |
| 6                               |  |      |                   |       | 1     | 11          | 9           |        |
| Total                           |  |      | 28                | 992   | 3449  | 9390        | 7815        | 7432   |
| PREY : TRISOPTERUS ESMARKI      |  |      |                   |       |       |             |             |        |
| Age class                       |  |      |                   |       |       |             |             |        |
| 0                               |  | 1    | 8                 | 136   | 378   | 306         | 111         | 17     |
| 1                               |  |      | 20                | 1318  | 5102  | 1393        | 744         | 822    |
| 2                               |  |      | 6                 | 312   | 825   | 145         | 126         | 74     |
| 3                               |  |      | 0                 | 2     | 5     | 1           | 1           | 0      |
| Total                           |  | 1    | 34                | 1769  | 6309  | 1845        | 981         | 912    |
| PREY : CLUPEA HARENGUS          |  |      |                   |       |       |             |             |        |
| Age class                       |  |      |                   |       |       |             |             |        |
| 1                               |  |      | 212               | 170   | 94    | 10          | 0           | 28     |
| 2                               |  |      | 3                 | 288   | 1961  | 2730        | 1736        | 2751   |
| 3                               |  |      |                   | 65    | 537   | 509         | 780         | 551    |
| 4                               |  |      |                   | 141   | 773   | 833         | 1627        | 1043   |
| 5                               |  |      |                   | 1     | 3     | 3           | 6           | 4      |
| Total                           |  |      | 215               | 665   | 3369  | 4086        | 4149        | 4377   |
| PREY : SPRATTUS SPRATTUS        |  |      |                   |       |       |             |             |        |
| Age class                       |  |      |                   |       |       |             |             |        |
| 1                               |  |      | 0                 | 1     | 0     |             |             |        |
| 2                               |  |      | 3                 | 27    | 5     |             |             |        |
| 3                               |  |      | 0                 | 1     | 0     |             |             |        |
| Total                           |  |      | 3                 | 29    | 5     |             |             |        |
| PREY : AMMODYTIDAE              |  |      |                   |       |       |             |             |        |
| Age class                       |  |      |                   |       |       |             |             |        |
| 0                               |  |      | 177               | 1009  | 1443  | 583         | 227         | 269    |
| 1                               |  |      | 5                 | 120   | 85    | 29          | 10          | 16     |
| 2                               |  |      | 9                 | 65    | 11    | 1           |             | 1      |
| 3                               |  |      | 5                 | 28    | 3     | 0           |             | 0      |
| 4                               |  |      | 0                 | 0     |       |             |             |        |
| 5                               |  |      | 0                 | 12    | 2     |             |             |        |
| 6                               |  |      | 0                 | 0     |       |             |             |        |
| Total                           |  |      | 196               | 1235  | 1543  | 612         | 237         | 286    |
| PREY : OTHER                    |  |      |                   |       |       |             |             |        |
| All size classes                |  | 71   | 1623              | 6568  | 37250 | 78483       | 139255      | 209553 |

Appendix 1-A. Average stomach content weight (g) per 1000 COD stomachs by age class of prey and predator by quarter for the total North Sea.

| PREDATOR : COD                  |   | Area | TOTAL NORTH SEA |       |       | YEAR : 1986 | QUARTER : 1 |      |
|---------------------------------|---|------|-----------------|-------|-------|-------------|-------------|------|
| Age class                       |   | 0    | 1               | 2     | 3     | 4           | 5           | 6+   |
| PREY : ALL SPECIES              |   |      |                 |       |       |             |             |      |
| All size classes                |   | 1350 | 8600            | 26166 | 46010 | 77281       | 98224       |      |
| PREY : GADUS MORHUA             |   |      |                 |       |       |             |             |      |
| Age class                       | 1 |      |                 | 34    | 1335  | 168         | 752         | 294  |
|                                 | 2 |      |                 | 1     | 92    | 136         | 1409        | 1215 |
|                                 | 3 |      |                 |       |       | 88          | 756         | 1094 |
| Total                           |   |      |                 | 35    | 1427  | 392         | 2916        | 2604 |
| PREY : MELANOGRAMMUS AEGLEFINUS |   |      |                 |       |       |             |             |      |
| Age class                       | 1 | 13   | 1244            | 3199  | 3226  | 4438        | 5898        |      |
|                                 | 2 |      | 19              | 117   | 978   | 3533        | 4199        |      |
|                                 | 3 |      |                 | 55    | 375   | 1435        | 1827        |      |
| Total                           |   | 13   | 1264            | 3370  | 4580  | 9406        | 11924       |      |
| PREY : MERLANGIUS MERLANGUS     |   |      |                 |       |       |             |             |      |
| Age class                       | 1 | 7    | 712             | 2329  | 1648  | 2022        | 1534        |      |
|                                 | 2 |      | 86              | 434   | 1029  | 2217        | 2429        |      |
|                                 | 3 |      | 6               | 258   | 905   | 1208        | 1563        |      |
|                                 | 4 |      | 0               | 20    | 143   | 193         | 242         |      |
|                                 | 5 |      |                 | 2     | 39    | 59          | 64          |      |
|                                 | 6 |      |                 | 2     | 24    | 28          | 17          |      |
| Total                           |   | 7    | 804             | 3045  | 3788  | 5728        | 5849        |      |
| PREY : TRISOPTERUS ESMARKI      |   |      |                 |       |       |             |             |      |
| Age class                       | 1 |      | 945             | 4963  | 8931  | 9402        | 11391       |      |
|                                 | 2 |      | 204             | 966   | 2718  | 2430        | 951         |      |
|                                 | 3 |      | 9               | 41    | 125   | 143         | 38          |      |
|                                 | 4 |      | 0               | 1     | 3     | 4           | 1           |      |
| Total                           |   | 0    | 1158            | 5970  | 11777 | 11979       | 12380       |      |
| PREY : CLUPEA HARENGUS          |   |      |                 |       |       |             |             |      |
| Age class                       | 1 | 1    | 1               | 1     | 0     | 0           |             |      |
|                                 | 2 | 65   | 491             | 887   | 4330  | 5897        | 7272        |      |
|                                 | 3 | 0    | 114             | 1701  | 5750  | 15406       | 14411       |      |
|                                 | 4 |      | 105             | 589   | 1512  | 3293        | 3443        |      |
|                                 | 5 |      | 42              | 60    | 97    | 250         | 399         |      |
|                                 | 6 |      | 1               | 8     | 27    | 86          | 79          |      |
| Total                           |   | 66   | 755             | 3245  | 11717 | 24932       | 25649       |      |
| PREY : SPRATTUS SPRATTUS        |   |      |                 |       |       |             |             |      |
| Age class                       | 1 | 0    | 1               | 4     | 2     | 1           | 0           |      |
|                                 | 2 | 7    | 51              | 155   | 65    | 25          | 4           |      |
|                                 | 3 | 18   | 165             | 348   | 123   | 47          | 12          |      |
|                                 | 4 | 5    | 41              | 88    | 31    | 12          | 3           |      |
|                                 | 5 | 0    | 2               | 3     | 1     | 0           | 0           |      |
|                                 | 6 | 0    | 0               | 1     | 1     | 0           | 0           |      |
| Total                           |   | 31   | 261             | 599   | 222   | 85          | 20          |      |
| PREY : AMMODYTIDAE              |   |      |                 |       |       |             |             |      |
| Age class                       | 1 | 162  | 1377            | 2125  | 851   | 249         | 149         |      |
|                                 | 2 | 12   | 224             | 144   | 96    | 118         | 143         |      |
|                                 | 3 |      |                 | 0     | 1     | 1           | 5           |      |
|                                 | 4 |      |                 | 0     | 0     | 0           | 0           |      |
| Total                           |   | 174  | 1601            | 2269  | 947   | 369         | 297         |      |
| PREY : OTHER                    |   |      |                 |       |       |             |             |      |
| All size classes                |   | 1060 | 2723            | 6241  | 12589 | 21867       | 39501       |      |

Appendix 1-A. Average stomach content weight (g) per 1000 COD stomachs by age class of prey and predator by quarter for the total North Sea.

| PREDATOR : COD                  |  | Area | TOTAL NORTH SEA |       | YEAR : 1986 |       | QUARTER : 3 |        |
|---------------------------------|--|------|-----------------|-------|-------------|-------|-------------|--------|
| Age class                       |  | 0    | 1               | 2     | 3           | 4     | 5           | 6+     |
| PREY : ALL SPECIES              |  |      |                 |       |             |       |             |        |
| All size classes                |  | 80   | 3637            | 15649 | 37545       | 80837 | 125687      | 366563 |
| PREY : GADUS MORHUA             |  |      |                 |       |             |       |             |        |
| Age class                       |  | 0    | 12              | 16    | 13          | 39    | 7           |        |
|                                 |  | 1    |                 |       | 6           | 83    | 774         | 346    |
| Total                           |  | 12   | 0               | 19    | 31          | 121   | 781         | 346    |
| PREY : MELANOGRAMMUS AEGLEFINUS |  |      |                 |       |             |       |             |        |
| Age class                       |  | 0    | 19              | 881   | 1584        | 1752  | 104         | 13     |
|                                 |  | 1    | 0               | 427   | 947         | 2589  | 5451        | 8811   |
|                                 |  | 2    | 0               | 7     | 9           | 30    | 84          | 4902   |
|                                 |  | 3    |                 | 0     | 1           | 12    | 29          | 11299  |
|                                 |  | 4    |                 |       |             |       |             | 159    |
| Total                           |  |      | 19              | 1315  | 2541        | 4382  | 5667        | 25185  |
| PREY : MERLANGIUS MERLANGUS     |  |      |                 |       |             |       |             |        |
| Age class                       |  | 0    | 28              | 104   | 235         | 567   | 140         | 1204   |
|                                 |  | 1    | 1               | 138   | 445         | 998   | 2255        | 1095   |
|                                 |  | 2    |                 |       | 31          | 1247  | 3964        | 2587   |
|                                 |  | 3    |                 |       | 13          | 403   | 1690        | 1635   |
|                                 |  | 4    |                 |       | 0           | 18    | 39          | 137    |
|                                 |  | 5    |                 |       | 0           | 8     | 18          | 22     |
| Total                           |  |      | 30              | 242   | 725         | 3241  | 8106        | 6680   |
| PREY : TRISOPTERUS ESMARKI      |  |      |                 |       |             |       |             |        |
| Age class                       |  | 0    | 18              | 905   | 1496        | 2118  | 1604        | 2018   |
|                                 |  | 1    | 4               | 2991  | 7426        | 12030 | 3920        | 5692   |
|                                 |  | 2    | 0               | 127   | 505         | 1244  | 595         | 337    |
|                                 |  | 3    |                 |       | 94          | 362   | 488         | 212    |
| Total                           |  |      | 23              | 4023  | 9521        | 15754 | 6608        | 8260   |
| PREY : CLUPEA HARENGUS          |  |      |                 |       |             |       |             |        |
| Age class                       |  | 0    | 0               |       |             |       |             |        |
|                                 |  | 1    | 102             | 319   | 205         | 173   | 1           | 44     |
|                                 |  | 2    | 3               | 366   | 1086        | 2661  | 8938        | 69472  |
|                                 |  | 3    | 1               | 263   | 1601        | 7238  | 13539       | 40734  |
|                                 |  | 4    | 0               | 21    | 274         | 1380  | 10294       | 102761 |
|                                 |  | 5    |                 | 1     | 26          | 126   | 1182        | 12875  |
|                                 |  | 6    |                 |       |             | 1099  | 2626        | 1142   |
| Total                           |  |      | 107             | 970   | 3192        | 12677 | 36597       | 227014 |
| PREY : SPRATTUS SPRATTUS        |  |      |                 |       |             |       |             |        |
| PREY : AMMODYTIDAE              |  |      |                 |       |             |       |             |        |
| Age class                       |  | 0    | 201             | 855   | 500         | 713   | 6147        | 2747   |
|                                 |  | 1    | 336             | 693   | 185         | 103   | 810         | 398    |
|                                 |  | 2    | 20              | 42    | 15          | 8     | 52          | 31     |
|                                 |  | 3    | 6               | 12    | 4           | 1     |             | 4      |
|                                 |  | 4    | 0               | 0     | 0           | 0     |             | 0      |
|                                 |  | 5    |                 |       | 1           | 0     |             | 1      |
| Total                           |  |      | 563             | 1603  | 705         | 826   | 7009        | 3181   |
| PREY : OTHER                    |  |      |                 |       |             |       |             |        |
| All size classes                |  | 68   | 2896            | 7478  | 20829       | 43836 | 60919       | 95897  |

Appendix 1-A. Average stomach content weight (g) per 1000 COD stomachs by age class of prey and predator by quarter for the total North Sea.

| PREDATOR : COD                  |  | Area | : TOTAL NORTH SEA |       | YEAR : 1987 | QUARTER : 1 |       |    |
|---------------------------------|--|------|-------------------|-------|-------------|-------------|-------|----|
| Age class                       |  | 0    | 1                 | 2     | 3           | 4           | 5     | 6+ |
| PREY : ALL SPECIES              |  |      |                   |       |             |             |       |    |
| All size classes                |  | 1175 | 6845              | 20579 | 63969       | 67900       | 77397 |    |
| PREY : GADUS MORHUA             |  |      |                   |       |             |             |       |    |
| Age class                       |  |      |                   |       |             |             |       |    |
| 1                               |  | 2    | 160               | 187   | 308         | 270         | 1343  |    |
| 2                               |  |      |                   | 1     | 3263        | 3895        | 5392  |    |
| 3                               |  |      |                   |       | 84          | 80          | 192   |    |
| Total                           |  | 2    | 160               | 188   | 3655        | 4246        | 6927  |    |
| PREY : MELANOGRAMMUS AEGLEFINUS |  |      |                   |       |             |             |       |    |
| Age class                       |  |      |                   |       |             |             |       |    |
| 1                               |  | 47   | 497               | 1596  | 2768        | 4933        | 2760  |    |
| 2                               |  |      | 8                 | 73    | 5292        | 8879        | 3316  |    |
| 3                               |  |      | 0                 | 1     | 119         | 120         | 83    |    |
| 4                               |  |      |                   |       | 37          | 22          | 26    |    |
| Total                           |  | 47   | 505               | 1670  | 8217        | 13954       | 6185  |    |
| PREY : MERLANGIUS MERLANGUS     |  |      |                   |       |             |             |       |    |
| Age class                       |  |      |                   |       |             |             |       |    |
| 1                               |  | 13   | 724               | 3223  | 4402        | 2725        | 2412  |    |
| 2                               |  | 0    | 11                | 1134  | 6180        | 5647        | 3068  |    |
| 3                               |  |      | 0                 | 208   | 1131        | 1843        | 1159  |    |
| 4                               |  |      | 0                 | 50    | 262         | 471         | 791   |    |
| 5                               |  |      |                   |       |             | 2           | 31    |    |
| 6                               |  |      |                   |       |             |             | 15    |    |
| Total                           |  | 13   | 735               | 4616  | 11975       | 10688       | 7476  |    |
| PREY : TRISOPTERUS ESMARKI      |  |      |                   |       |             |             |       |    |
| Age class                       |  |      |                   |       |             |             |       |    |
| 1                               |  | 6    | 616               | 1896  | 1577        | 2171        | 367   |    |
| 2                               |  | 0    | 55                | 1316  | 773         | 279         | 453   |    |
| 3                               |  |      | 4                 | 53    | 109         | 156         | 275   |    |
| 4                               |  |      | 0                 | 1     | 12          | 21          | 37    |    |
| 5                               |  |      |                   |       | 46          | 85          | 151   |    |
| Total                           |  | 6    | 674               | 3266  | 2518        | 2714        | 1286  |    |
| PREY : CLUPEA HARENGUS          |  |      |                   |       |             |             |       |    |
| Age class                       |  |      |                   |       |             |             |       |    |
| 1                               |  |      | 8                 | 4     | 21          | 11          | 7     |    |
| 2                               |  | 56   | 547               | 1262  | 4991        | 5103        | 6524  |    |
| 3                               |  |      | 98                | 671   | 2366        | 4253        | 2169  |    |
| 4                               |  |      | 10                | 58    | 336         | 802         | 218   |    |
| 5                               |  |      |                   | 0     | 168         | 412         | 82    |    |
| 6                               |  |      |                   |       | 121         | 298         | 58    |    |
| Total                           |  | 56   | 662               | 1995  | 8003        | 10880       | 9057  |    |
| PREY : SPRATTUS SPRATTUS        |  |      |                   |       |             |             |       |    |
| Age class                       |  |      |                   |       |             |             |       |    |
| 1                               |  | 1    | 1                 | 1     |             |             |       |    |
| 2                               |  |      | 1                 | 2     | 0           |             |       |    |
| 3                               |  |      | 4                 | 15    | 5           |             |       |    |
| 4                               |  |      | 1                 | 6     | 2           |             |       |    |
| 5                               |  |      | 0                 | 0     | 0           |             |       |    |
| 6                               |  |      | 0                 | 0     | 0           |             |       |    |
| Total                           |  | 1    | 7                 | 25    | 7           |             |       |    |
| PREY : AMMODYTIDAE              |  |      |                   |       |             |             |       |    |
| Age class                       |  |      |                   |       |             |             |       |    |
| 1                               |  | 20   | 158               | 272   | 16          |             |       |    |
| 2                               |  | 20   | 448               | 738   | 15          |             |       |    |
| 3                               |  | 0    | 9                 | 32    | 0           |             |       |    |
| 4                               |  |      | 0                 | 0     | 0           |             |       |    |
| 6                               |  |      | 3                 | 91    | 163         | 89          | 156   |    |
| Total                           |  | 41   | 617               | 1133  | 195         | 90          | 156   |    |
| PREY : OTHER                    |  |      |                   |       |             |             |       |    |
| All size classes                |  | 1009 | 3484              | 7687  | 29401       | 25328       | 46310 |    |

Appendix 1-A. Average stomach content weight (g) per 1000 COD stomachs by age class of prey and predator by quarter for the total North Sea.

| PREDATOR : COD                  |   | Area | TOTAL NORTH SEA |       | YEAR : 1987 |       | QUARTER : 3 |        |
|---------------------------------|---|------|-----------------|-------|-------------|-------|-------------|--------|
| Age class                       |   | 0    | 1               | 2     | 3           | 4     | 5           | 6+     |
| PREY : ALL SPECIES              |   |      |                 |       |             |       |             |        |
| All size classes                |   | 238  | 3685            | 12879 | 47074       | 94990 | 159968      | 254626 |
| PREY : GADUS MORHUA             |   |      |                 |       |             |       |             |        |
| Age class                       |   | 0    |                 | 2     | 1           | 0     |             |        |
|                                 | 1 |      |                 |       | 103         | 3736  | 6142        | 2184   |
|                                 | 2 |      |                 |       | 201         | 3256  | 3810        | 39030  |
| Total                           |   |      |                 | 2     | 304         | 6991  | 9952        | 41213  |
| PREY : MELANOGRAMMUS AEGLEFINUS |   |      |                 |       |             |       |             |        |
| Age class                       |   | 0    | 23              | 351   | 508         | 256   | 57          | 15     |
|                                 | 1 |      | 1               | 137   | 3362        | 9690  | 7335        | 2592   |
|                                 | 2 |      |                 | 0     | 403         | 3543  | 1759        | 17660  |
|                                 | 3 |      |                 |       | 55          | 490   | 237         | 835    |
|                                 | 4 |      |                 |       | 4           | 36    | 17          | 1900   |
| Total                           |   |      | 24              | 488   | 4331        | 14014 | 9406        | 23000  |
| PREY : MERLANGIUS MERLANGUS     |   |      |                 |       |             |       |             |        |
| Age class                       |   | 0    | 56              | 311   | 250         | 180   | 935         | 1062   |
|                                 | 1 |      | 15              | 285   | 1626        | 4953  | 15830       | 7709   |
|                                 | 2 |      | 0               | 62    | 1435        | 8764  | 11788       | 3672   |
|                                 | 3 |      |                 | 0     | 214         | 1870  | 3041        | 1157   |
|                                 | 4 |      |                 |       | 72          | 585   | 1084        | 444    |
|                                 | 5 |      |                 |       | 13          | 105   | 189         | 78     |
| Total                           |   |      | 71              | 658   | 3610        | 16457 | 32866       | 14123  |
| PREY : TRISOPTERUS ESMARKI      |   |      |                 |       |             |       |             |        |
| Age class                       |   | 0    | 38              | 536   | 1644        | 3269  | 2995        | 1182   |
|                                 | 1 |      | 22              | 688   | 2728        | 8873  | 9225        | 3692   |
|                                 | 2 |      | 0               | 18    | 127         | 363   | 351         | 77     |
|                                 | 3 |      |                 | 3     | 31          | 65    | 55          |        |
| Total                           |   |      | 60              | 1245  | 4530        | 12570 | 12626       | 4950   |
| PREY : CLUPEA HARENGUS          |   |      |                 |       |             |       |             |        |
| Age class                       |   | 0    | 3               | 1     |             |       |             |        |
|                                 | 1 |      | 157             | 1096  | 2132        | 439   | 823         | 5485   |
|                                 | 2 |      | 55              | 900   | 2410        | 4441  | 6245        | 14777  |
|                                 | 3 |      | 1               | 122   | 1041        | 2184  | 4055        | 10654  |
|                                 | 4 |      | 0               | 27    | 149         | 338   | 1126        | 4095   |
|                                 | 5 |      |                 | 6     | 31          | 72    | 251         | 909    |
| Total                           |   |      | 217             | 2151  | 5762        | 7475  | 12500       | 35921  |
| PREY : SPRATTUS SPRATTUS        |   |      |                 |       |             |       |             |        |
| Age class                       |   | 0    | 0               | 0     |             |       |             |        |
|                                 | 1 |      | 0               | 0     | 3           |       |             |        |
|                                 | 2 |      | 2               | 11    | 92          |       |             |        |
|                                 | 3 |      | 0               | 0     | 3           |       |             |        |
| Total                           |   |      | 2               | 12    | 98          |       |             |        |
| PREY : AMMODYTIDAE              |   |      |                 |       |             |       |             |        |
| Age class                       |   | 0    | 163             | 403   | 685         | 481   | 1913        | 8664   |
|                                 | 1 |      | 53              | 187   | 184         | 301   | 1054        | 12299  |
|                                 | 2 |      | 80              | 412   | 382         | 176   | 1711        | 7868   |
|                                 | 3 |      | 3               | 42    | 25          | 1     | 51          | 1826   |
|                                 | 4 |      | 1               | 8     | 5           | 0     | 13          | 315    |
|                                 | 5 |      | 0               | 1     | 1           | 0     | 2           | 5      |
| Total                           |   |      | 300             | 1052  | 1283        | 960   | 4744        | 30976  |
| PREY : OTHER                    |   |      |                 |       |             |       |             |        |
| All size classes                |   | 238  | 3010            | 7269  | 27155       | 36522 | 77873       | 104443 |

APPENDIX 1 AVERAGE STOMACH CONTENT TOTAL NORTH SEA

Appendix 1-A. Average stomach content weight (g) per 1000 COD stomachs by age class of prey and predator by quarter for the total North Sea.

| PREDATOR : COD     |  | Area                            | : TOTAL NORTH SEA |       |       | YEAR : 1991 |        | QUARTER : 1 |  |
|--------------------|--|---------------------------------|-------------------|-------|-------|-------------|--------|-------------|--|
| Age class          |  | 0                               | 1                 | 2     | 3     | 4           | 5      | 6+          |  |
|                    |  |                                 |                   |       |       |             |        |             |  |
| PREY : ALL SPECIES |  |                                 |                   |       |       |             |        |             |  |
| All size classes   |  | 1113                            | 7601              | 27760 | 69124 | 93458       | 113538 |             |  |
|                    |  |                                 |                   |       |       |             |        |             |  |
| Age class          |  | PREY : GADUS MORHUA             |                   |       |       |             |        |             |  |
| 1                  |  |                                 |                   |       | 41    | 106         | 160    | 627         |  |
| 2                  |  |                                 |                   |       | 133   | 1923        | 801    | 1071        |  |
| 3                  |  |                                 |                   |       | 8     | 121         | 34     | 11          |  |
| Total              |  |                                 | 2                 | 182   | 2151  | 995         | 1710   |             |  |
|                    |  |                                 |                   |       |       |             |        |             |  |
| Age class          |  | PREY : MELANOGRAMMUS AEGLEFINUS |                   |       |       |             |        |             |  |
| 1                  |  |                                 | 89                | 1193  | 1478  | 1274        | 634    |             |  |
| 2                  |  |                                 |                   | 1     | 1     | 1           | 500    |             |  |
| 3                  |  |                                 |                   |       | 23    | 309         | 219    |             |  |
| 4                  |  |                                 |                   |       | 37    | 506         | 309    |             |  |
| 5                  |  |                                 |                   |       | 65    | 892         | 544    |             |  |
| 6                  |  |                                 |                   |       | 21    | 288         | 175    |             |  |
| Total              |  |                                 | 92                | 1194  | 1625  | 3271        | 2381   |             |  |
|                    |  |                                 |                   |       |       |             |        |             |  |
| Age class          |  | PREY : MERLANGIUS MERLANGUS     |                   |       |       |             |        |             |  |
| 1                  |  | 4                               | 1146              | 2277  | 4231  | 3903        | 10142  |             |  |
| 2                  |  |                                 | 141               | 1969  | 6681  | 6323        | 9759   |             |  |
| 3                  |  |                                 | 12                | 1294  | 4360  | 5579        | 7314   |             |  |
| 4                  |  |                                 | 2                 | 219   | 1308  | 1208        | 1730   |             |  |
| 5                  |  |                                 | 0                 | 122   | 626   | 686         | 840    |             |  |
| 6                  |  |                                 | 0                 | 40    | 245   | 238         | 239    |             |  |
| Total              |  | 5                               | 1301              | 5920  | 17450 | 17938       | 30023  |             |  |
|                    |  |                                 |                   |       |       |             |        |             |  |
| Age class          |  | PREY : TRISOPTERUS ESMARKI      |                   |       |       |             |        |             |  |
| 1                  |  |                                 | 871               | 1701  | 2295  | 2390        | 1317   |             |  |
| 2                  |  |                                 | 85                | 734   | 1171  | 1527        | 606    |             |  |
| 3                  |  |                                 | 0                 | 70    | 67    | 154         | 85     |             |  |
| Total              |  | 1                               | 956               | 2506  | 3533  | 4070        | 2008   |             |  |
|                    |  |                                 |                   |       |       |             |        |             |  |
| Age class          |  | PREY : CLUPEA HARENGUS          |                   |       |       |             |        |             |  |
| 1                  |  |                                 | 219               | 1088  | 3481  | 1985        | 3301   |             |  |
| 2                  |  |                                 | 63                | 1235  | 3985  | 4763        | 4767   |             |  |
| 3                  |  |                                 | 28                | 931   | 1680  | 4246        | 2786   |             |  |
| 4                  |  |                                 | 6                 | 309   | 783   | 3131        | 1958   |             |  |
| 5                  |  |                                 | 0                 | 167   | 561   | 2277        | 1473   |             |  |
| Total              |  |                                 | 316               | 3742  | 10490 | 16403       | 14285  |             |  |
|                    |  |                                 |                   |       |       |             |        |             |  |
| Age class          |  | PREY : SPRATTUS SPRATTUS        |                   |       |       |             |        |             |  |
| 1                  |  | 285                             | 28                | 44    | 122   | 56          | 234    |             |  |
| 2                  |  | 0                               | 31                | 14    | 71    | 98          | 33     |             |  |
| 3                  |  |                                 | 24                | 8     | 17    | 20          | 7      |             |  |
| 4                  |  |                                 | 2                 | 1     | 0     | 0           | 0      |             |  |
| 5                  |  |                                 | 1                 | 0     | 2     | 3           | 1      |             |  |
| Total              |  | 285                             | 87                | 67    | 213   | 178         | 274    |             |  |
|                    |  |                                 |                   |       |       |             |        |             |  |
| Age class          |  | PREY : AMMODYTIDAE              |                   |       |       |             |        |             |  |
| 1                  |  | 38                              | 201               | 155   | 129   | 176         | 191    |             |  |
| 2                  |  | 5                               | 11                | 9     | 15    | 46          | 37     |             |  |
| 3                  |  | 2                               | 6                 | 5     | 9     | 25          | 19     |             |  |
| 4                  |  | 1                               | 2                 | 2     | 2     | 4           | 3      |             |  |
| 5                  |  | 0                               | 1                 | 1     | 2     | 5           | 4      |             |  |
| 6                  |  | 0                               | 2                 | 2     | 2     | 2           | 2      |             |  |
| Total              |  | 46                              | 223               | 175   | 176   | 265         | 258    |             |  |
|                    |  |                                 |                   |       |       |             |        |             |  |
| PREY : OTHER       |  |                                 |                   |       |       |             |        |             |  |
| All size classes   |  | 776                             | 4624              | 13974 | 33485 | 50340       | 62599  |             |  |

Appendix 1-A. Average stomach content weight (g) per 1000 COD stomachs by age class of prey and predator by quarter for the total North Sea.

| PREDATOR : COD                  |  | Area : TOTAL NORTH SEA |      |       | YEAR : 1991 |        | QUARTER : 2 |        |
|---------------------------------|--|------------------------|------|-------|-------------|--------|-------------|--------|
| Age class                       |  | 0                      | 1    | 2     | 3           | 4      | 5           | 6+     |
|                                 |  |                        |      |       |             |        |             |        |
| PREY : ALL SPECIES              |  |                        |      |       |             |        |             |        |
| All size classes                |  | 44                     | 2604 | 18804 | 51400       | 111741 | 190870      | 251585 |
|                                 |  |                        |      |       |             |        |             |        |
| PREY : GADUS MORHUA             |  |                        |      |       |             |        |             |        |
| Age class                       |  |                        |      |       |             |        |             |        |
| 0                               |  |                        | 1    | 1     | 0           | 0      |             |        |
| 1                               |  |                        | 2    | 43    | 240         | 278    | 296         | 155    |
| 2                               |  |                        |      |       | 26          | 227    | 8624        | 8695   |
| 3                               |  |                        |      |       | 12          | 107    | 4568        | 4614   |
| 4                               |  |                        |      |       | 0           | 2      | 285         | 291    |
| Total                           |  |                        | 3    | 45    | 279         | 614    | 13774       | 13755  |
|                                 |  |                        |      |       |             |        |             |        |
| PREY : MELANOGRAMMUS AEGLEFINUS |  |                        |      |       |             |        |             |        |
| Age class                       |  |                        |      |       |             |        |             |        |
| 0                               |  |                        | 2    | 3     | 2           | 0      |             |        |
| 1                               |  |                        |      | 131   | 1296        | 9022   | 16032       | 26583  |
| 2                               |  |                        |      | 1     | 67          | 356    | 2086        | 1755   |
| 3                               |  |                        |      | 0     | 9           | 175    | 1615        | 1233   |
| 4                               |  |                        |      |       | 1           | 32     | 298         | 228    |
| 5                               |  |                        |      |       | 2           | 35     | 332         | 254    |
| 6                               |  |                        |      |       | 0           | 7      | 66          | 50     |
| Total                           |  |                        | 2    | 135   | 1378        | 9628   | 20429       | 30103  |
|                                 |  |                        |      |       |             |        |             |        |
| PREY : MERLANGIUS MERLANGUS     |  |                        |      |       |             |        |             |        |
| Age class                       |  |                        |      |       |             |        |             |        |
| 0                               |  |                        | 1    | 15    | 12          | 1      | 0           |        |
| 1                               |  |                        | 10   | 655   | 1389        | 2868   | 2549        | 5283   |
| 2                               |  |                        |      | 363   | 1642        | 4000   | 3158        | 9609   |
| 3                               |  |                        |      | 78    | 1136        | 2517   | 3337        | 9713   |
| 4                               |  |                        |      | 8     | 184         | 1087   | 796         | 1783   |
| 5                               |  |                        |      | 5     | 99          | 465    | 561         | 915    |
| 6                               |  |                        |      | 1     | 40          | 62     | 135         | 222    |
| Total                           |  |                        | 11   | 1125  | 4502        | 11002  | 10537       | 27712  |
|                                 |  |                        |      |       |             |        |             |        |
| PREY : TRISOPTERUS ESMARKI      |  |                        |      |       |             |        |             |        |
| Age class                       |  |                        |      |       |             |        |             |        |
| 0                               |  |                        |      | 6     | 4           | 0      |             |        |
| 1                               |  |                        | 40   | 1940  | 5636        | 5596   | 4127        | 9538   |
| 2                               |  |                        | 2    | 601   | 899         | 960    | 2742        | 2202   |
| 3                               |  |                        | 0    | 278   | 510         | 219    | 257         | 186    |
| 4                               |  |                        | 0    | 23    | 39          | 21     | 45          | 33     |
| Total                           |  |                        | 42   | 2849  | 7087        | 6796   | 7172        | 11960  |
|                                 |  |                        |      |       |             |        |             |        |
| PREY : CLUPEA HARENGUS          |  |                        |      |       |             |        |             |        |
| Age class                       |  |                        |      |       |             |        |             |        |
| 0                               |  |                        | 2    | 21    | 8           | 32     | 47          | 22     |
| 1                               |  |                        | 0    | 131   | 773         | 2712   | 2369        | 4870   |
| 2                               |  |                        | 1    | 112   | 5775        | 12603  | 18135       | 20364  |
| 3                               |  |                        | 0    | 77    | 1858        | 4443   | 8314        | 9979   |
| 4                               |  |                        | 0    | 29    | 462         | 953    | 1898        | 2832   |
| 5                               |  |                        | 0    | 49    | 672         | 1349   | 3030        | 4715   |
| Total                           |  |                        | 4    | 419   | 9548        | 22092  | 33792       | 42782  |
|                                 |  |                        |      |       |             |        |             |        |
| PREY : SPRATTUS SPRATTUS        |  |                        |      |       |             |        |             |        |
| Age class                       |  |                        |      |       |             |        |             |        |
| 1                               |  |                        | 7    | 81    | 38          | 180    | 355         | 495    |
| 2                               |  |                        | 0    | 14    | 159         | 211    | 204         | 193    |
| 3                               |  |                        | 0    | 2     | 20          | 34     | 10          | 28     |
| 4                               |  |                        |      |       | 0           | 3      |             | 0      |
| 5                               |  |                        |      |       | 0           | 3      |             | 0      |
| Total                           |  |                        | 8    | 96    | 217         | 431    | 569         | 717    |
|                                 |  |                        |      |       |             |        |             |        |
| PREY : AMMODYTIDAE              |  |                        |      |       |             |        |             |        |
| Age class                       |  |                        |      |       |             |        |             |        |
| 0                               |  | 3                      | 38   | 728   | 767         | 384    | 1087        | 822    |
| 1                               |  |                        | 96   | 859   | 891         | 964    | 2172        | 2151   |
| 2                               |  |                        | 79   | 685   | 723         | 1276   | 2917        | 3860   |
| 3                               |  |                        | 55   | 381   | 510         | 1251   | 2963        | 3715   |
| 4                               |  |                        | 13   | 94    | 110         | 207    | 415         | 631    |
| 5                               |  |                        | 7    | 86    | 155         | 565    | 1467        | 1366   |
| 6                               |  |                        | 11   | 90    | 134         | 313    | 696         | 794    |
| Total                           |  | 3                      | 299  | 2923  | 3289        | 4958   | 11753       | 13348  |
|                                 |  |                        |      |       |             |        |             |        |
| PREY : OTHER                    |  |                        |      |       |             |        |             |        |
| All size classes                |  | 42                     | 2235 | 11212 | 25100       | 56220  | 92844       | 111209 |

Appendix 1-A. Average stomach content weight (g) per 1000 COD stomachs by age class of prey and predator by quarter for the total North Sea.

| PREDATOR : COD                  |  | Area | : TOTAL NORTH SEA |       | YEAR : 1991 |       | QUARTER : 3 |        |
|---------------------------------|--|------|-------------------|-------|-------------|-------|-------------|--------|
| Age class                       |  | 0    | 1                 | 2     | 3           | 4     | 5           | 6+     |
| PREY : ALL SPECIES              |  |      |                   |       |             |       |             |        |
| All size classes                |  | 75   | 4439              | 22205 | 48994       | 97297 | 120542      | 141504 |
| PREY : GADUS MORHUA             |  |      |                   |       |             |       |             |        |
| Age class                       |  | 0    | 161               | 869   | 626         | 377   | 269         | 62     |
|                                 |  | 1    |                   | 11    | 44          |       |             | 88     |
|                                 |  | 2    |                   |       |             |       |             | 1332   |
|                                 |  | 3    |                   |       |             |       |             | 234    |
|                                 |  | 4    |                   |       |             |       |             | 17     |
| Total                           |  | 0    | 161               | 880   | 670         | 377   | 269         | 1734   |
| PREY : MELANOGRAMMUS AEGLEFINUS |  |      |                   |       |             |       |             |        |
| Age class                       |  | 0    | 138               | 928   | 1661        | 566   | 1208        | 511    |
|                                 |  | 1    |                   | 34    | 356         | 105   | 159         | 11105  |
|                                 |  | 2    |                   |       |             |       |             | 368    |
| Total                           |  |      | 138               | 962   | 2017        | 671   | 1366        | 11984  |
| PREY : MERLANGIUS MERLANGUS     |  |      |                   |       |             |       |             |        |
| Age class                       |  | 0    | 87                | 786   | 1087        | 639   | 793         | 254    |
|                                 |  | 1    | 152               | 76    | 1317        | 5007  | 5524        | 1739   |
|                                 |  | 2    |                   | 8     | 371         | 872   | 818         | 216    |
|                                 |  | 3    |                   | 10    | 374         | 161   | 200         | 8      |
|                                 |  | 4    |                   | 1     | 45          | 36    | 20          |        |
|                                 |  | 5    |                   | 1     | 21          | 12    | 10          |        |
|                                 |  | 6    |                   | 0     | 8           | 2     | 4           |        |
| Total                           |  | 0    | 239               | 882   | 3223        | 6729  | 7369        | 2217   |
| PREY : TRISOPTERUS ESMARKI      |  |      |                   |       |             |       |             |        |
| Age class                       |  | 0    | 498               | 2372  | 2214        | 2799  | 3095        | 1266   |
|                                 |  | 1    | 52                | 2753  | 4752        | 5443  | 3673        | 5393   |
|                                 |  | 2    | 4                 | 180   | 772         | 812   | 153         | 88     |
|                                 |  | 3    | 0                 | 6     | 35          | 37    | 5           | 3      |
| Total                           |  | 0    | 554               | 5313  | 7774        | 9094  | 6927        | 6750   |
| PREY : CLUPEA HARENGUS          |  |      |                   |       |             |       |             |        |
| Age class                       |  | 0    | 12                | 1     | 61          | 792   |             |        |
|                                 |  | 1    | 3                 | 968   | 2384        | 4605  | 12538       | 6097   |
|                                 |  | 2    |                   | 401   | 2593        | 14049 | 25382       | 11507  |
|                                 |  | 3    |                   | 283   | 1960        | 6761  | 10007       | 5787   |
|                                 |  | 4    |                   | 170   | 2881        | 6343  | 7224        | 6674   |
|                                 |  | 5    |                   | 161   | 3403        | 7737  | 8644        | 7808   |
| Total                           |  |      | 14                | 1984  | 13281       | 40286 | 63792       | 37873  |
| PREY : SPRATTUS SPRATTUS        |  |      |                   |       |             |       |             |        |
| Age class                       |  | 0    | 3                 |       |             |       |             |        |
|                                 |  | 1    | 28                | 546   | 528         |       |             |        |
|                                 |  | 2    | 0                 | 373   | 434         |       |             |        |
|                                 |  | 3    |                   | 81    | 105         |       |             |        |
| Total                           |  |      | 32                | 1000  | 1067        |       |             |        |
| PREY : AMMODYTIDAE              |  |      |                   |       |             |       |             |        |
| Age class                       |  | 0    | 1081              | 1135  | 2195        | 1609  | 553         | 110    |
|                                 |  | 1    | 0                 | 17    | 173         | 400   | 16          | 2      |
|                                 |  | 2    | 0                 | 4     | 5           | 58    | 83          | 1      |
|                                 |  | 3    | 0                 | 11    | 13          | 59    | 94          | 0      |
|                                 |  | 4    | 0                 | 8     | 32          | 34    | 32          | 0      |
|                                 |  | 5    |                   | 5     | 39          | 34    | 17          |        |
|                                 |  | 6    |                   | 11    | 107         | 76    | 17          |        |
| Total                           |  | 0    | 1137              | 1503  | 2857        | 2257  | 571         | 112    |
| PREY : OTHER                    |  |      |                   |       |             |       |             |        |
| All size classes                |  | 74   | 2163              | 9681  | 18104       | 37883 | 40247       | 80834  |

Appendix 1-A. Average stomach content weight (g) per 1000 COD stomachs by age class of prey and predator by quarter for the total North Sea.

| PREDATOR : COD                  |  | Area : TOTAL NORTH SEA |      |       | YEAR : 1991 |       | QUARTER : 4 |        |
|---------------------------------|--|------------------------|------|-------|-------------|-------|-------------|--------|
| Age class                       |  | 0                      | 1    | 2     | 3           | 4     | 5           | 6+     |
| PREY : ALL SPECIES              |  |                        |      |       |             |       |             |        |
| All size classes                |  | 1068                   | 7529 | 23937 | 53880       | 78422 | 190421      | 277656 |
| PREY : GADUS MORHUA             |  |                        |      |       |             |       |             |        |
| Age class 0                     |  |                        | 67   | 116   | 153         |       |             | 267    |
| Total                           |  |                        | 67   | 155   | 153         |       |             | 267    |
| PREY : MELANOGRAMMUS AEGLEFINUS |  |                        |      |       |             |       |             |        |
| Age class 0                     |  |                        | 957  | 1912  | 4284        | 6390  | 7985        | 7574   |
| 1                               |  |                        | 1    | 3     | 919         | 4282  | 6264        | 5698   |
| 2                               |  |                        |      |       | 5           | 29    | 14          | 4      |
| Total                           |  |                        | 960  | 2087  | 5472        | 10700 | 14262       | 13276  |
| PREY : MERLANGIUS MERLANGUS     |  |                        |      |       |             |       |             |        |
| Age class 0                     |  |                        | 417  | 1441  | 751         | 508   | 303         | 1504   |
| 1                               |  |                        | 324  | 2272  | 2549        | 6710  | 8098        | 9653   |
| 2                               |  |                        | 72   | 490   | 1058        | 2911  | 5687        | 6418   |
| 3                               |  |                        | 37   | 225   | 291         | 2703  | 3022        | 3433   |
| 4                               |  |                        | 22   | 133   | 11          | 223   |             |        |
| 5                               |  |                        | 9    | 55    |             | 46    |             |        |
| 6                               |  |                        | 7    | 42    |             | 46    |             |        |
| Total                           |  |                        | 888  | 4658  | 4659        | 13147 | 17110       | 21008  |
| PREY : TRISOPTERUS ESMARKI      |  |                        |      |       |             |       |             |        |
| Age class 0                     |  |                        | 811  | 2541  | 5032        | 10456 | 20089       | 20483  |
| 1                               |  |                        | 12   | 457   | 2488        | 5944  | 5795        | 4814   |
| 2                               |  |                        | 0    | 19    | 90          | 214   | 215         | 180    |
| 3                               |  |                        | 0    | 1     | 5           | 11    | 11          | 9      |
| Total                           |  |                        | 838  | 3018  | 7615        | 16644 | 26110       | 25487  |
| PREY : CLUPEA HARENGUS          |  |                        |      |       |             |       |             |        |
| Age class 0                     |  |                        |      | 41    | 21          |       |             | 3602   |
| 1                               |  |                        | 3    | 81    | 758         | 1494  | 73509       | 99433  |
| 2                               |  |                        | 3    | 99    | 698         | 1391  | 4704        | 5763   |
| 3                               |  |                        |      | 26    |             |       | 208         | 279    |
| 4                               |  |                        |      | 5     |             |       |             |        |
| 5                               |  |                        |      | 14    |             |       |             |        |
| Total                           |  |                        | 7    | 266   | 1480        | 2885  | 78422       | 109077 |
| PREY : SPRATTUS SPRATTUS        |  |                        |      |       |             |       |             |        |
| Age class 0                     |  | 1                      | 59   | 53    | 182         | 24    | 24          | 772    |
| 1                               |  |                        | 120  | 2     | 2           | 0     |             | 116    |
| 2                               |  |                        | 27   |       |             |       |             |        |
| 3                               |  |                        | 13   |       |             |       |             |        |
| 4                               |  |                        | 0    |       |             |       |             |        |
| Total                           |  | 1                      | 219  | 55    | 184         | 25    | 24          | 888    |
| PREY : AMMODYTIDAE              |  |                        |      |       |             |       |             |        |
| Age class 0                     |  |                        | 66   | 353   | 305         | 23    | 32          | 16     |
| 1                               |  |                        | 28   | 103   | 90          |       |             |        |
| 2                               |  |                        | 7    | 21    | 8           |       |             |        |
| 3                               |  |                        | 12   | 77    | 73          |       |             |        |
| 4                               |  |                        | 4    | 16    | 1           |       |             |        |
| 5                               |  |                        | 3    | 10    | 0           |       |             |        |
| 6                               |  |                        | 3    | 11    | 0           |       |             |        |
| Total                           |  | 4                      | 122  | 590   | 478         | 23    | 32          | 16     |
| PREY : OTHER                    |  |                        |      |       |             |       |             |        |
| All size classes                |  | 1063                   | 4427 | 13108 | 33839       | 34999 | 54461       | 107637 |

APPENDIX 1 AVERAGE STOMACH CONTENT TOTAL NORTH SEA

Appendix 1-8. Average stomach content weight (g) per 1000 HADDOCK stomachs by age class of prey and predator by quarter for the total North Sea.

PREDATOR : HADD Area : TOTAL NORTH SEA YEAR : 1981 QUARTER : 1

Age class 0 1 2 3 4 5 6+

PREY : ALL SPECIES

All size classes 221 856 2361 4673 7469 7595

Age class PREY : TRISOPTERUS ESMARKI

0 0 0 2 2 1

1 103 735 1764 2470 2815

2 1 54 452 656 394

Total 104 789 2219 3129 3210

Age class PREY : CLUPEA HARENGUS

1 1 2 6 16

2 0 1 2 4

Total 1 3 8 20

Age class PREY : SPRATTUS SPRATTUS

1 1 6 37 10 6 22

2 7 50 14 9 33

3 0 0 0 0 1

4 0 0 0 0 0

Total 1 13 87 24 16 55

Age class PREY : AMMODYTIDAE

1 4 112 262 233 201 176

2 3 57 309 484 478

3 0 19 16 1

4 0 23 19 1

5 0 7 6 0

6 0 8 7 0

Total 4 116 376 591 688 654

PREY : OTHER

All size classes 217 623 1108 1836 3628 3656

Appendix 1-8. Average stomach content weight (g) per 1000 HADDOCK stomachs by age class of prey and predator by quarter for the total North Sea.

PREDATOR : HADD Area : TOTAL NORTH SEA YEAR : 1981 QUARTER : 2

| Age class | 0 | 1 | 2 | 3 | 4 | 5 | 6+ |
|-----------|---|---|---|---|---|---|----|
|-----------|---|---|---|---|---|---|----|

PREY : ALL SPECIES

|                  |     |     |      |      |       |       |       |
|------------------|-----|-----|------|------|-------|-------|-------|
| All size classes | 190 | 312 | 1909 | 5978 | 10208 | 10405 | 16860 |
|------------------|-----|-----|------|------|-------|-------|-------|

Age class PREY : TRISOPTERUS ESMARKI

|       |  |   |    |     |     |     |
|-------|--|---|----|-----|-----|-----|
| 1     |  | 1 | 41 | 351 | 821 | 107 |
| 2     |  |   | 2  | 18  | 43  | 6   |
| Total |  | 1 | 43 | 369 | 864 | 112 |

Age class PREY : SPRATTUS SPRATTUS

|       |  |   |   |
|-------|--|---|---|
| 0     |  | 0 | 0 |
| 1     |  | 0 | 0 |
| 2     |  | 0 | 0 |
| Total |  | 0 | 0 |

Age class PREY : AMMOOYTIDAE

|       |    |     |      |      |      |       |
|-------|----|-----|------|------|------|-------|
| 0     | 14 | 158 | 249  | 626  | 691  | 684   |
| 1     | 2  | 450 | 2802 | 5347 | 4953 | 10949 |
| 2     | 1  | 158 | 979  | 1752 | 1555 | 3491  |
| 3     | 0  | 12  | 96   | 273  | 243  | 576   |
| 4     | 0  | 5   | 42   | 107  | 95   | 223   |
| 5     |    | 1   | 9    | 40   | 36   | 87    |
| 6     |    | 0   | 2    | 10   | 9    | 22    |
| Total | 19 | 785 | 4179 | 8154 | 7581 | 16032 |

PREY : OTHER

|                  |     |     |      |      |      |      |     |
|------------------|-----|-----|------|------|------|------|-----|
| All size classes | 190 | 292 | 1124 | 1756 | 1685 | 1959 | 716 |
|------------------|-----|-----|------|------|------|------|-----|

Appendix 1-B. Average stomach content weight (g) per 1000 HADDOCK stomachs by age class of prey and predator by quarter for the total North Sea.

PREDATOR : HADD Area : TOTAL NORTH SEA YEAR : 1981 QUARTER : 3

| Age class | 0 | 1 | 2 | 3 | 4 | 5 | 6+ |
|-----------|---|---|---|---|---|---|----|
|-----------|---|---|---|---|---|---|----|

PREY : ALL SPECIES

|                  |     |      |      |      |       |       |      |
|------------------|-----|------|------|------|-------|-------|------|
| All size classes | 163 | 1296 | 2875 | 5604 | 10101 | 19741 | 8119 |
|------------------|-----|------|------|------|-------|-------|------|

Age class PREY : MELANOGRAMMUS AEGLEFINUS

|       |  |   |   |   |    |    |  |
|-------|--|---|---|---|----|----|--|
| 0     |  |   | 1 | 8 | 21 | 21 |  |
| Total |  | 0 | 1 | 8 | 21 | 21 |  |

Age class PREY : MERLANGIUS MERLANGUS

|       |  |  |  |   |   |  |  |
|-------|--|--|--|---|---|--|--|
| 0     |  |  |  | 1 | 4 |  |  |
| Total |  |  |  | 1 | 4 |  |  |

Age class PREY : TRISOPTERUS ESMARKI

|       |   |   |     |      |      |      |      |
|-------|---|---|-----|------|------|------|------|
| 0     | 8 | 1 | 229 | 1127 | 2791 | 6373 | 1004 |
| 1     |   |   | 0   | 10   | 39   | 78   | 11   |
| 2     |   |   | 0   | 8    | 26   | 23   |      |
| Total | 8 | 1 | 231 | 1177 | 3001 | 6908 | 1089 |

Age class PREY : SPRATTUS SPRATTUS

|       |  |   |   |   |   |   |  |
|-------|--|---|---|---|---|---|--|
| 0     |  | 0 | 0 | 1 | 2 | 2 |  |
| 1     |  | 1 | 2 | 2 | 6 |   |  |
| 2     |  | 0 | 0 | 0 | 0 |   |  |
| Total |  | 1 | 2 | 2 | 8 | 2 |  |

Age class PREY : AMMODYTIDAE

|       |   |     |     |      |      |      |      |
|-------|---|-----|-----|------|------|------|------|
| 0     | 6 | 215 | 686 | 1816 | 2697 | 4429 | 2390 |
| 1     |   | 0   | 0   | 0    | 1    | 1    |      |
| 2     |   | 1   | 0   | 3    | 9    | 10   |      |
| Total | 6 | 217 | 686 | 1819 | 2707 | 4439 | 2390 |

PREY : OTHER

|                  |     |      |      |      |      |      |      |
|------------------|-----|------|------|------|------|------|------|
| All size classes | 149 | 1078 | 1954 | 2597 | 4360 | 8371 | 4640 |
|------------------|-----|------|------|------|------|------|------|

Appendix 1-B. Average stomach content weight (g) per 1000 HADDOCK stomachs by age class of prey and predator by quarter for the total North Sea.

|                                 |   |      |                   |      |      |             |             |      |
|---------------------------------|---|------|-------------------|------|------|-------------|-------------|------|
| PREDATOR : HADD                 |   | Area | : TOTAL NORTH SEA |      |      | YEAR : 1981 | QUARTER : 4 |      |
| Age class                       |   | 0    | 1                 | 2    | 3    | 4           | 5           | 6+   |
| PREY : ALL SPECIES              |   |      |                   |      |      |             |             |      |
| All size classes                |   | 280  | 1218              | 2535 | 5291 | 6857        | 10837       | 8040 |
| PREY : MELANOGRAMMUS AEGLEFINUS |   |      |                   |      |      |             |             |      |
| Age class                       | 0 |      | 13                | 17   |      |             |             |      |
| Total                           |   |      | 13                | 17   |      |             |             |      |
| PREY : MERLANGIUS MERLANGUS     |   |      |                   |      |      |             |             |      |
| Age class                       | 0 |      | 0                 | 2    | 12   |             |             | 37   |
| Total                           |   |      | 0                 | 2    | 12   |             |             | 37   |
| PREY : TRISOPTERUS ESMARKI      |   |      |                   |      |      |             |             |      |
| Age class                       | 0 | 0    | 155               | 277  | 586  | 903         | 1761        | 535  |
|                                 | 1 |      | 17                | 47   | 98   | 114         | 170         | 61   |
|                                 | 2 |      | 0                 | 0    | 1    | 1           | 2           | 1    |
| Total                           |   | 0    | 172               | 325  | 686  | 1018        | 1932        | 597  |
| PREY : CLUPEA HARENGUS          |   |      |                   |      |      |             |             |      |
| Age class                       | 0 |      |                   | 0    | 19   |             |             |      |
|                                 | 1 |      |                   | 0    | 0    |             |             |      |
| Total                           |   |      |                   | 0    | 19   |             |             |      |
| PREY : AMMODYTIDAE              |   |      |                   |      |      |             |             |      |
| Age class                       | 0 | 3    | 57                | 586  | 1221 | 1573        | 2326        | 1629 |
| Total                           |   | 3    | 57                | 586  | 1221 | 1573        | 2326        | 1629 |
| PREY : OTHER                    |   |      |                   |      |      |             |             |      |
| All size classes                |   | 276  | 976               | 1605 | 3353 | 4266        | 6579        | 5777 |

APPENDIX 1 AVERAGE STOMACH CONTENT TOTAL NORTH SEA

Appendix 1-B. Average stomach content weight (g) per 1000 HADDOCK stomachs by age class of prey and predator by quarter for the total North Sea.

| PREDATOR : HADD            |  | Area | : TOTAL NORTH SEA |     | YEAR : 1991 |      | QUARTER : 1 |    |
|----------------------------|--|------|-------------------|-----|-------------|------|-------------|----|
| Age class                  |  | 0    | 1                 | 2   | 3           | 4    | 5           | 6+ |
| PREY : ALL SPECIES         |  |      |                   |     |             |      |             |    |
| All size classes           |  | 223  | 481               | 881 | 1439        | 1590 | 3006        |    |
| PREY : TRISOPTERUS ESMARKI |  |      |                   |     |             |      |             |    |
| Age class 1                |  | 0    | 8                 | 64  | 237         | 229  | 303         |    |
| 2                          |  |      | 0                 | 14  | 12          | 12   | 7           |    |
| Total                      |  | 0    | 8                 | 78  | 250         | 241  | 309         |    |
| PREY : CLUPEA HARENGUS     |  |      |                   |     |             |      |             |    |
| Age class 1                |  |      |                   | 1   |             | 14   | 11          |    |
| 2                          |  |      |                   | 8   |             | 87   | 73          |    |
| 3                          |  |      |                   | 0   |             | 0    | 0           |    |
| Total                      |  |      |                   | 9   |             | 101  | 85          |    |
| PREY : AMMODYTIDAE         |  |      |                   |     |             |      |             |    |
| Age class 1                |  | 10   | 31                | 56  | 31          | 19   | 8           |    |
| 2                          |  | 0    | 0                 | 0   | 0           | 0    | 0           |    |
| Total                      |  | 10   | 31                | 56  | 31          | 19   | 8           |    |
| PREY : OTHER               |  |      |                   |     |             |      |             |    |
| All size classes           |  | 214  | 441               | 739 | 1159        | 1230 | 2603        |    |

Appendix 1-B. Average stomach content weight (g) per 1000 HADDOCK stomachs by age class of prey and predator by quarter for the total North Sea.

| PREDATOR : HADD            |   | Area : TOTAL NORTH SEA |      | YEAR : 1991 |      | QUARTER : 2 |      |      |
|----------------------------|---|------------------------|------|-------------|------|-------------|------|------|
| Age class                  |   | 0                      | 1    | 2           | 3    | 4           | 5    | 6+   |
| PREY : ALL SPECIES         |   |                        |      |             |      |             |      |      |
| All size classes           |   | 37                     | 1171 | 2166        | 3296 | 4543        | 5316 | 4773 |
| PREY : TRISOPTERUS ESMARKI |   |                        |      |             |      |             |      |      |
| Age class                  |   |                        |      |             |      |             |      |      |
|                            | 1 |                        |      |             | 2    | 6           | 4    | 1    |
|                            | 2 |                        |      |             | 0    | 1           | 0    | 0    |
| Total                      |   |                        | 0    | 0           | 2    | 7           | 4    | 1    |
| PREY : CLUPEA HARENGUS     |   |                        |      |             |      |             |      |      |
| Age class                  |   |                        |      |             |      |             |      |      |
| Total                      |   |                        |      |             |      |             | 4    | 41   |
| PREY : SPRATTUS SPRATTUS   |   |                        |      |             |      |             |      |      |
| Age class                  |   |                        |      |             |      |             |      |      |
|                            | 1 |                        |      |             | 1    | 1           | 2    | 2    |
|                            | 2 |                        |      |             | 0    | 0           | 2    | 2    |
| Total                      |   |                        |      |             | 1    | 1           | 4    | 4    |
| PREY : AMMODYTIDAE         |   |                        |      |             |      |             |      |      |
| Age class                  |   |                        |      |             |      |             |      |      |
|                            | 0 | 27                     | 395  | 533         | 587  | 496         | 928  | 921  |
|                            | 1 |                        | 15   | 74          | 161  | 282         | 261  | 164  |
|                            | 2 |                        | 0    | 8           | 65   | 69          | 99   | 59   |
|                            | 3 |                        | 0    | 4           | 30   | 27          | 46   | 27   |
|                            | 4 |                        |      | 1           | 5    | 4           | 7    | 4    |
|                            | 5 |                        |      | 1           | 5    | 4           | 8    | 5    |
|                            | 6 |                        |      | 0           | 3    | 2           | 4    | 2    |
| Total                      |   | 27                     | 410  | 621         | 978  | 1048        | 1685 | 1337 |
| PREY : OTHER               |   |                        |      |             |      |             |      |      |
| All size classes           |   | 10                     | 762  | 1544        | 2315 | 3488        | 3618 | 3389 |

Appendix 1-B. Average stomach content weight (g) per 1000 HADDOCK stomachs by age class of prey and predator by quarter for the total North Sea.

| PREDATOR : HADD                 |   | Area | : TOTAL NORTH SEA |      |      | YEAR : 1991 |      | QUARTER : 3 |
|---------------------------------|---|------|-------------------|------|------|-------------|------|-------------|
| Age class                       |   | 0    | 1                 | 2    | 3    | 4           | 5    | 6+          |
| PREY : ALL SPECIES              |   |      |                   |      |      |             |      |             |
| All size classes                |   | 102  | 1201              | 2483 | 5687 | 4636        | 5007 | 7633        |
| PREY : GADUS MORHUA             |   |      |                   |      |      |             |      |             |
| Age class                       | 0 |      |                   |      |      | 6           | 2    | 9           |
| Total                           |   |      |                   |      |      | 6           | 2    | 9           |
| PREY : MELANOGRAMMUS AEGLEFINUS |   |      |                   |      |      |             |      |             |
| Age class                       | 0 |      | 6                 | 14   | 52   | 94          | 39   | 212         |
|                                 | 1 |      |                   | 0    | 11   | 20          | 8    | 49          |
| Total                           |   |      | 6                 | 14   | 63   | 114         | 47   | 261         |
| PREY : TRISOPTERUS ESMARKI      |   |      |                   |      |      |             |      |             |
| Age class                       | 0 | 0    | 19                | 238  | 220  | 51          | 34   | 33          |
|                                 | 1 |      |                   |      |      |             |      | 1839        |
| Total                           |   | 0    | 19                | 238  | 220  | 51          | 34   | 1872        |
| PREY : AMMODYTIDAE              |   |      |                   |      |      |             |      |             |
| Age class                       | 0 | 5    | 557               | 1039 | 3220 | 2714        | 2992 | 3733        |
|                                 | 1 |      | 6                 | 8    | 143  | 33          | 85   | 24          |
|                                 | 2 |      | 0                 | 1    | 4    | 3           | 3    | 1           |
|                                 | 3 |      | 1                 | 3    | 8    | 7           | 4    | 0           |
|                                 | 4 |      | 1                 | 2    | 6    | 6           | 3    | 0           |
|                                 | 5 |      | 1                 | 2    | 4    | 4           | 2    |             |
|                                 | 6 |      | 1                 | 2    | 5    | 5           | 2    |             |
| Total                           |   | 7    | 642               | 1069 | 3391 | 2771        | 3092 | 3759        |
| PREY : OTHER                    |   |      |                   |      |      |             |      |             |
| All size classes                |   | 95   | 534               | 1162 | 2014 | 1693        | 1832 | 1732        |

Appendix 1-B. Average stomach content weight (g) per 1000 HADDOCK stomachs by age class of prey and predator by quarter for the total North Sea.

|                                 |   |      |      |                 |             |             |      |       |
|---------------------------------|---|------|------|-----------------|-------------|-------------|------|-------|
| PREDATOR : HADD                 |   | Area | :    | TOTAL NORTH SEA | YEAR : 1991 | QUARTER : 4 |      |       |
| Age class                       |   | 0    | 1    | 2               | 3           | 4           | 5    | 6+    |
| PREY : ALL SPECIES              |   |      |      |                 |             |             |      |       |
| All size classes                |   | 181  | 1033 | 2076            | 3242        | 4479        | 6149 | 14191 |
| PREY : MELANOGRAMMUS AEGLEFINUS |   |      |      |                 |             |             |      |       |
| Age class                       | 0 |      |      |                 | 54          | 140         | 347  | 765   |
| Total                           |   |      |      |                 | 54          | 140         | 347  | 765   |
| PREY : MERLANGIUS MERLANGUS     |   |      |      |                 |             |             |      |       |
| PREY : TRISOPTERUS ESMARKI      |   |      |      |                 |             |             |      |       |
| Age class                       | 0 | 5    | 146  | 395             | 553         | 853         | 878  | 4161  |
|                                 | 1 |      | 0    | 0               | 18          | 43          | 103  | 232   |
| Total                           |   | 5    | 146  | 395             | 572         | 896         | 982  | 4393  |
| PREY : CLUPEA HARENGUS          |   |      |      |                 |             |             |      |       |
| Age class                       | 0 |      | 0    | 0               |             |             |      |       |
| Total                           |   |      | 0    | 0               | 35          | 90          | 222  | 490   |
| PREY : SPRATTUS SPRATTUS        |   |      |      |                 |             |             |      |       |
| PREY : AMMODYTIDAE              |   |      |      |                 |             |             |      |       |
| Age class                       | 0 | 0    | 112  | 285             | 363         | 406         | 304  | 623   |
|                                 | 1 |      | 12   | 39              | 30          | 26          | 26   | 4     |
|                                 | 2 |      | 1    | 2               | 1           | 1           | 1    |       |
|                                 | 3 |      | 0    | 2               | 1           | 3           | 2    |       |
|                                 | 4 |      | 0    | 0               | 0           | 0           | 0    |       |
| Total                           |   | 0    | 125  | 329             | 395         | 436         | 334  | 664   |
| PREY : OTHER                    |   |      |      |                 |             |             |      |       |
| All size classes                |   | 175  | 762  | 1351            | 2187        | 2917        | 4264 | 7878  |

APPENDIX 1 AVERAGE STOMACH CONTENT TOTAL NORTH SEA

Appendix 1-C. Average stomach content weight (g) per 1000 WHITING stomachs by age class of prey and predator by quarter for the total North Sea.

|                    |  |                                 |      |             |      |             |      |     |
|--------------------|--|---------------------------------|------|-------------|------|-------------|------|-----|
| PREDATOR : WHIT    |  | Area : TOTAL NORTH SEA          |      | YEAR : 1981 |      | QUARTER : 1 |      |     |
| Age class          |  | 0                               | 1    | 2           | 3    | 4           | 5    | 6+  |
|                    |  |                                 |      |             |      |             |      |     |
| PREY : ALL SPECIES |  |                                 |      |             |      |             |      |     |
| All size classes   |  | 387                             | 1088 | 2075        | 3164 | 3457        | 4346 |     |
|                    |  |                                 |      |             |      |             |      |     |
| Age class          |  | PREY : GADUS MORHUA             |      |             |      |             |      |     |
| 1                  |  | 0                               | 3    | 1           |      |             |      | 5   |
| 2                  |  |                                 |      |             |      |             |      | 253 |
| Total              |  | 0                               | 3    | 1           |      |             |      | 258 |
|                    |  |                                 |      |             |      |             |      |     |
| Age class          |  | PREY : MELANOGRAMMUS AEGLEFINUS |      |             |      |             |      |     |
| 1                  |  | 3                               | 2    | 38          | 84   | 112         | 171  |     |
| 2                  |  |                                 | 0    | 4           | 9    | 11          | 26   |     |
| Total              |  | 3                               | 2    | 42          | 93   | 123         | 197  |     |
|                    |  |                                 |      |             |      |             |      |     |
| Age class          |  | PREY : MERLANGIUS MERLANGUS     |      |             |      |             |      |     |
| 1                  |  |                                 | 6    | 49          | 152  | 356         | 236  |     |
| 2                  |  |                                 | 0    | 1           | 3    | 6           | 4    |     |
| Total              |  |                                 | 6    | 50          | 155  | 362         | 240  |     |
|                    |  |                                 |      |             |      |             |      |     |
| Age class          |  | PREY : TRISOPTERUS ESMARKI      |      |             |      |             |      |     |
| 0                  |  | 0                               | 0    | 0           |      |             |      |     |
| 1                  |  | 11                              | 41   | 216         | 343  | 401         | 689  |     |
| 2                  |  | 0                               | 17   | 174         | 374  | 523         | 941  |     |
| 3                  |  |                                 | 0    | 6           | 14   | 20          | 37   |     |
| Total              |  | 12                              | 58   | 396         | 731  | 944         | 1667 |     |
|                    |  |                                 |      |             |      |             |      |     |
| Age class          |  | PREY : CLUPEA HARENGUS          |      |             |      |             |      |     |
| 1                  |  |                                 | 60   | 135         | 268  | 176         | 188  |     |
| 2                  |  |                                 | 0    | 1           | 4    | 5           | 2    |     |
| Total              |  |                                 | 60   | 136         | 272  | 181         | 190  |     |
|                    |  |                                 |      |             |      |             |      |     |
| Age class          |  | PREY : SPRATTUS SPRATTUS        |      |             |      |             |      |     |
| 1                  |  | 39                              | 126  | 127         | 129  | 143         | 98   |     |
| 2                  |  | 16                              | 149  | 210         | 329  | 252         | 136  |     |
| 3                  |  | 1                               | 17   | 29          | 49   | 31          | 14   |     |
| 4                  |  | 0                               | 0    | 0           | 1    | 0           | 0    |     |
| Total              |  | 56                              | 292  | 366         | 508  | 427         | 249  |     |
|                    |  |                                 |      |             |      |             |      |     |
| Age class          |  | PREY : AMMOOYTIDAE              |      |             |      |             |      |     |
| 0                  |  | 0                               | 0    | 1           | 0    | 0           | 0    |     |
| 1                  |  | 51                              | 74   | 83          | 61   | 65          | 81   |     |
| 2                  |  | 5                               | 15   | 42          | 54   | 68          | 133  |     |
| 3                  |  |                                 | 0    | 5           | 17   | 27          | 16   |     |
| 4                  |  |                                 | 1    | 7           | 20   | 33          | 19   |     |
| 5                  |  |                                 | 0    | 2           | 6    | 11          | 6    |     |
| 6                  |  |                                 | 0    | 2           | 7    | 11          | 7    |     |
| Total              |  | 56                              | 91   | 142         | 166  | 215         | 264  |     |
|                    |  |                                 |      |             |      |             |      |     |
| PREY : OTHER       |  |                                 |      |             |      |             |      |     |
| All size classes   |  | 259                             | 577  | 941         | 1239 | 1205        | 1281 |     |

Appendix-1-C. Average stomach content weight (g) per 1000 WHITING stomachs by age class of prey and predator by quarter for the total North Sea.

| PREDATOR : WHIT                 |  | Area | : TOTAL NORTH SEA |      |      | YEAR : 1981 |      | QUARTER : 2 |  |
|---------------------------------|--|------|-------------------|------|------|-------------|------|-------------|--|
| Age class                       |  | 0    | 1                 | 2    | 3    | 4           | 5    | 6+          |  |
| PREY : ALL SPECIES              |  |      |                   |      |      |             |      |             |  |
| All size classes                |  | 820  | 1585              | 2918 | 3130 | 3812        | 3777 |             |  |
| PREY : GADUS MORHUA             |  |      |                   |      |      |             |      |             |  |
| Age class 0                     |  | 5    | 8                 | 16   | 8    | 8           | 14   |             |  |
| Total                           |  | 5    | 8                 | 16   | 8    | 8           | 14   |             |  |
| PREY : MELANOGRAMMUS AEGLEFINUS |  |      |                   |      |      |             |      |             |  |
| Age class 0                     |  | 10   | 24                | 96   | 94   | 65          | 92   |             |  |
| 1                               |  |      | 7                 | 103  | 116  | 96          | 286  |             |  |
| 2                               |  |      | 2                 | 20   | 19   | 14          | 15   |             |  |
| Total                           |  | 10   | 33                | 219  | 229  | 175         | 392  |             |  |
| PREY : MERLANGIUS MERLANGUS     |  |      |                   |      |      |             |      |             |  |
| Age class 0                     |  |      | 0                 | 0    | 0    | 0           | 0    |             |  |
| 1                               |  | 1    | 16                | 59   | 57   | 39          | 67   |             |  |
| Total                           |  | 1    | 16                | 59   | 57   | 39          | 67   |             |  |
| PREY : TRISOPTERUS ESMARKI      |  |      |                   |      |      |             |      |             |  |
| Age class 0                     |  | 3    | 29                | 5    | 3    | 2           | 2    |             |  |
| 1                               |  | 0    | 79                | 435  | 333  | 236         | 436  |             |  |
| 2                               |  |      | 16                | 102  | 87   | 71          | 113  |             |  |
| 3                               |  |      | 0                 | 1    | 1    | 1           | 1    |             |  |
| Total                           |  | 3    | 124               | 543  | 424  | 311         | 552  |             |  |
| PREY : CLUPEA HARENGUS          |  |      |                   |      |      |             |      |             |  |
| Age class 1                     |  | 10   | 6                 | 3    | 6    | 0           | 1    |             |  |
| Total                           |  | 10   | 11                | 15   | 16   | 0           | 1    |             |  |
| PREY : SPRATTUS SPRATTUS        |  |      |                   |      |      |             |      |             |  |
| Age class 0                     |  | 13   | 17                | 17   | 48   | 34          | 29   |             |  |
| 1                               |  | 6    | 21                | 28   | 82   | 66          | 55   |             |  |
| 2                               |  | 7    | 12                | 17   | 58   | 52          | 45   |             |  |
| 3                               |  | 1    | 1                 | 1    | 4    | 4           | 4    |             |  |
| Total                           |  | 27   | 51                | 63   | 192  | 157         | 132  |             |  |
| PREY : AMMODYTIDAE              |  |      |                   |      |      |             |      |             |  |
| Age class 0                     |  | 263  | 250               | 234  | 231  | 179         | 285  |             |  |
| 1                               |  | 103  | 393               | 693  | 627  | 521         | 785  |             |  |
| 2                               |  | 17   | 149               | 276  | 318  | 260         | 371  |             |  |
| 3                               |  | 2    | 26                | 52   | 50   | 43          | 55   |             |  |
| 4                               |  | 1    | 10                | 20   | 20   | 17          | 22   |             |  |
| 5                               |  | 0    | 4                 | 8    | 7    | 6           | 8    |             |  |
| 6                               |  | 0    | 1                 | 2    | 2    | 2           | 2    |             |  |
| Total                           |  | 388  | 834               | 1285 | 1255 | 1028        | 1528 |             |  |
| PREY : OTHER                    |  |      |                   |      |      |             |      |             |  |
| All size classes                |  | 377  | 508               | 718  | 949  | 2094        | 1091 |             |  |

Appendix 1-C. Average stomach content weight (g) per 1000 WHITING stomachs by age class of prey and predator by quarter for the total North Sea.

| PREDATOR : WHIT                 |  | Area | : TOTAL NORTH SEA |      |      | YEAR : 1981 |      | QUARTER : 3 |  |
|---------------------------------|--|------|-------------------|------|------|-------------|------|-------------|--|
| Age class                       |  | 0    | 1                 | 2    | 3    | 4           | 5    | 6+          |  |
| PREY : ALL SPECIES              |  |      |                   |      |      |             |      |             |  |
| All size classes                |  | 124  | 1027              | 3212 | 5010 | 4694        | 5699 | 4987        |  |
| PREY : GADUS MORHUA             |  |      |                   |      |      |             |      |             |  |
| Age class 0                     |  | 0    | 1                 |      |      |             |      |             |  |
| Total                           |  | 0    | 1                 | 0    | 0    |             |      |             |  |
| PREY : MELANOGRAMMUS AEGLEFINUS |  |      |                   |      |      |             |      |             |  |
| Age class 0                     |  | 0    | 25                | 367  | 837  | 704         | 765  | 762         |  |
| Age class 1                     |  | 1    | 0                 | 3    | 5    | 2           | 3    | 2           |  |
| Total                           |  | 0    | 25                | 370  | 842  | 707         | 769  | 764         |  |
| PREY : MERLANGIUS MERLANGUS     |  |      |                   |      |      |             |      |             |  |
| Age class 0                     |  | 0    | 49                | 201  | 253  | 166         | 194  | 186         |  |
| Total                           |  |      | 49                | 201  | 253  | 166         | 194  | 186         |  |
| PREY : TRISOPTERUS ESMARKI      |  |      |                   |      |      |             |      |             |  |
| Age class 0                     |  | 0    | 31                | 191  | 359  | 221         | 205  | 284         |  |
| Age class 1                     |  | 1    |                   | 0    | 0    | 0           | 0    | 0           |  |
| Total                           |  | 0    | 32                | 192  | 363  | 225         | 208  | 287         |  |
| PREY : CLUPEA HARENGUS          |  |      |                   |      |      |             |      |             |  |
| Age class 0                     |  | 0    | 61                | 747  | 1393 | 1144        | 1290 | 932         |  |
| Total                           |  |      | 61                | 747  | 1393 | 1144        | 1290 | 932         |  |
| PREY : SPRATTUS SPRATTUS        |  |      |                   |      |      |             |      |             |  |
| Age class 0                     |  | 0    | 1                 | 3    | 2    | 3           | 4    | 2           |  |
| Age class 1                     |  | 1    | 21                | 117  | 237  | 942         | 1513 | 1145        |  |
| Age class 2                     |  | 2    | 1                 | 21   | 47   | 215         | 349  | 267         |  |
| Age class 3                     |  | 3    | 0                 | 1    | 2    | 10          | 16   | 12          |  |
| Total                           |  |      | 23                | 142  | 288  | 1170        | 1881 | 1426        |  |
| PREY : AMMODYTIDAE              |  |      |                   |      |      |             |      |             |  |
| Age class 0                     |  | 0    | 324               | 315  | 358  | 295         | 225  | 334         |  |
| Age class 1                     |  | 1    | 5                 | 104  | 138  | 20          | 28   | 27          |  |
| Age class 2                     |  | 2    | 7                 | 139  | 184  | 26          | 37   | 37          |  |
| Age class 3                     |  | 3    | 2                 | 31   | 41   | 6           | 8    | 8           |  |
| Age class 4                     |  | 4    | 1                 | 11   | 15   | 2           | 3    | 3           |  |
| Total                           |  | 1    | 339               | 602  | 740  | 352         | 302  | 410         |  |
| PREY : OTHER                    |  |      |                   |      |      |             |      |             |  |
| All size classes                |  | 123  | 496               | 957  | 1132 | 931         | 1056 | 981         |  |

Appendix 1-C. Average stomach content weight (g) per 1000 WHITING stomachs by age class of prey and predator by quarter for the total North Sea.

| PREDATOR : WHIT                 |  | Area | TOTAL NORTH SEA |      |      | YEAR : 1981 |      | QUARTER : 4 |  |
|---------------------------------|--|------|-----------------|------|------|-------------|------|-------------|--|
| Age class                       |  | 0    | 1               | 2    | 3    | 4           | 5    | 6+          |  |
| PREY : ALL SPECIES              |  |      |                 |      |      |             |      |             |  |
| All size classes                |  | 317  | 1290            | 1862 | 2983 | 3744        | 4461 | 5808        |  |
| PREY : GADUS MORHUA             |  |      |                 |      |      |             |      |             |  |
| Age class 0                     |  |      | 4               | 18   | 38   | 41          | 33   | 73          |  |
| Total                           |  |      | 4               | 18   | 38   | 41          | 33   | 73          |  |
| PREY : MELANOGRAMMUS AEGLEFINUS |  |      |                 |      |      |             |      |             |  |
| Age class 0                     |  | 0    | 51              | 127  | 406  | 555         | 703  | 1036        |  |
| 1                               |  |      | 1               | 2    | 5    | 7           | 13   | 20          |  |
| Total                           |  | 0    | 52              | 130  | 416  | 583         | 756  | 1118        |  |
| PREY : MERLANGIUS MERLANGUS     |  |      |                 |      |      |             |      |             |  |
| Age class 0                     |  | 1    | 53              | 47   | 76   | 84          | 192  | 139         |  |
| Total                           |  | 1    | 53              | 47   | 76   | 84          | 192  | 139         |  |
| PREY : TRISOPTERUS ESMARKI      |  |      |                 |      |      |             |      |             |  |
| Age class 0                     |  | 4    | 158             | 313  | 792  | 815         | 570  | 670         |  |
| 1                               |  |      | 17              | 40   | 125  | 172         | 165  | 246         |  |
| 2                               |  |      | 0               | 0    | 1    | 2           | 2    | 2           |  |
| Total                           |  | 4    | 175             | 356  | 958  | 1067        | 779  | 1025        |  |
| PREY : CLUPEA HARENGUS          |  |      |                 |      |      |             |      |             |  |
| Age class 0                     |  | 17   | 35              | 67   | 50   | 164         | 319  | 398         |  |
| 1                               |  |      | 0               | 0    | 1    | 30          | 86   | 199         |  |
| 2                               |  |      |                 |      | 0    | 1           | 3    | 8           |  |
| Total                           |  | 17   | 35              | 67   | 51   | 195         | 408  | 605         |  |
| PREY : SPRATTUS SPRATTUS        |  |      |                 |      |      |             |      |             |  |
| Age class 1                     |  | 7    | 141             | 129  | 108  | 136         | 220  | 116         |  |
| 2                               |  | 6    | 125             | 131  | 80   | 135         | 92   | 109         |  |
| 3                               |  | 0    | 3               | 6    | 4    | 7           | 4    | 6           |  |
| 4                               |  | 0    | 1               | 2    | 1    | 2           | 1    | 2           |  |
| Total                           |  | 13   | 270             | 266  | 192  | 278         | 316  | 230         |  |
| PREY : AMMOOYTIDAE              |  |      |                 |      |      |             |      |             |  |
| Age class 0                     |  | 17   | 186             | 145  | 102  | 72          | 64   | 22          |  |
| 1                               |  |      | 4               | 36   | 76   | 78          | 109  | 65          |  |
| 2                               |  |      | 5               | 46   | 96   | 99          | 139  | 82          |  |
| 3                               |  |      | 1               | 11   | 23   | 23          | 33   | 19          |  |
| 4                               |  |      | 0               | 4    | 8    | 8           | 12   | 7           |  |
| Total                           |  | 17   | 196             | 244  | 309  | 284         | 360  | 198         |  |
| PREY : OTHER                    |  |      |                 |      |      |             |      |             |  |
| All size classes                |  | 266  | 504             | 735  | 943  | 1212        | 1617 | 2420        |  |

APPENDIX 1 AVERAGE STOMACH CONTENT TOTAL NORTH SEA

Appendix 1-C. Average stomach content weight (g) per 1000 WHITING stomachs by age class of prey and predator by quarter for the total North Sea.

| PREDATOR : WHIT                 |   | Area : TOTAL NORTH SEA |      | YEAR : 1985 |      | QUARTER : 1 |      |    |
|---------------------------------|---|------------------------|------|-------------|------|-------------|------|----|
| Age class                       |   | 0                      | 1    | 2           | 3    | 4           | 5    | 6+ |
| PREY : ALL SPECIES              |   |                        |      |             |      |             |      |    |
| All size classes                |   | 423                    | 1858 | 3892        | 5278 | 5718        | 5695 |    |
| PREY : GADUS MORHUA             |   |                        |      |             |      |             |      |    |
| Age class                       | 1 |                        |      |             | 0    | 1           | 6    | 11 |
| Total                           |   |                        |      |             | 0    | 1           | 6    | 11 |
| PREY : MELANOGRAMMUS AEGLEFINUS |   |                        |      |             |      |             |      |    |
| Age class                       | 1 |                        | 34   | 171         | 182  | 265         | 253  |    |
|                                 | 2 |                        | 0    | 1           | 0    | 0           | 1    |    |
| Total                           |   |                        | 34   | 172         | 182  | 265         | 254  |    |
| PREY : MERLANGIUS MERLANGUS     |   |                        |      |             |      |             |      |    |
| Age class                       | 1 | 1                      | 67   | 134         | 124  | 134         | 162  |    |
|                                 | 2 |                        | 1    | 6           | 45   | 163         | 279  |    |
|                                 | 3 |                        |      | 0           | 0    | 3           | 4    |    |
| Total                           |   | 1                      | 68   | 140         | 169  | 299         | 445  |    |
| PREY : TRISOPTERUS ESMARKI      |   |                        |      |             |      |             |      |    |
| Age class                       | 0 |                        | 0    | 1           | 0    | 0           | 0    |    |
|                                 | 1 | 24                     | 410  | 1424        | 1827 | 2376        | 2174 |    |
|                                 | 2 | 2                      | 118  | 489         | 605  | 851         | 811  |    |
|                                 | 3 | 0                      | 3    | 11          | 10   | 13          | 8    |    |
|                                 | 4 | 0                      | 0    | 0           | 0    | 1           | 0    |    |
| Total                           |   | 26                     | 532  | 1924        | 2443 | 3241        | 2993 |    |
| PREY : CLUPEA HARENGUS          |   |                        |      |             |      |             |      |    |
| Age class                       | 1 | 0                      | 1    | 2           | 2    | 1           | 0    |    |
|                                 | 2 | 1                      | 84   | 293         | 469  | 348         | 432  |    |
|                                 | 3 |                        | 0    | 4           | 16   | 18          | 31   |    |
|                                 | 4 |                        | 0    | 0           | 0    | 0           | 0    |    |
| Total                           |   | 1                      | 85   | 299         | 487  | 367         | 464  |    |
| PREY : SPRATTUS SPRATTUS        |   |                        |      |             |      |             |      |    |
| Age class                       | 1 | 57                     | 117  | 132         | 68   | 57          | 84   |    |
|                                 | 2 | 25                     | 170  | 338         | 681  | 278         | 375  |    |
|                                 | 3 | 1                      | 56   | 157         | 238  | 145         | 179  |    |
|                                 | 4 | 0                      | 8    | 24          | 44   | 25          | 34   |    |
|                                 | 5 | 0                      | 1    | 5           | 11   | 5           | 8    |    |
|                                 | 6 | 0                      | 0    | 1           | 3    | 1           | 2    |    |
| Total                           |   | 83                     | 352  | 656         | 1046 | 511         | 682  |    |
| PREY : AMMODYTIDAE              |   |                        |      |             |      |             |      |    |
| Age class                       | 1 | 25                     | 60   | 146         | 221  | 291         | 241  |    |
|                                 | 2 | 8                      | 51   | 76          | 225  | 289         | 168  |    |
|                                 | 3 | 0                      | 4    | 5           | 19   | 25          | 15   |    |
|                                 | 4 | 0                      | 0    | 0           | 1    | 1           | 0    |    |
|                                 | 6 |                        | 3    | 6           | 19   | 6           | 1    |    |
| Total                           |   | 34                     | 119  | 234         | 485  | 612         | 426  |    |
| PREY : OTHER                    |   |                        |      |             |      |             |      |    |
| All size classes                |   | 278                    | 668  | 466         | 464  | 416         | 420  |    |

Appendix 1-C. Average stomach content weight (g) per 1000 WHITING stomachs by age class of prey and predator by quarter for the total North Sea.

| PREDATOR : WHIT                 |  | Area : TOTAL NORTH SEA |      | YEAR : 1985 |      | QUARTER : 3 |       |       |
|---------------------------------|--|------------------------|------|-------------|------|-------------|-------|-------|
| Age class                       |  | 0                      | 1    | 2           | 3    | 4           | 5     | 6+    |
| PREY : ALL SPECIES              |  |                        |      |             |      |             |       |       |
| All size classes                |  | 128                    | 1662 | 2580        | 5218 | 7443        | 11978 | 13235 |
| PREY : GADUS MORHUA             |  |                        |      |             |      |             |       |       |
| Age class 0                     |  |                        | 4    | 5           | 4    | 6           | 1     |       |
| Total                           |  |                        | 4    | 5           | 4    | 6           | 1     |       |
| PREY : MELANOGRAMMUS AEGLEFINUS |  |                        |      |             |      |             |       |       |
| Age class 0                     |  | 7                      | 34   | 127         | 543  | 644         | 2074  | 1706  |
| Age class 1                     |  |                        |      | 0           | 0    | 0           | 0     | 0     |
| Total                           |  | 7                      | 34   | 127         | 543  | 644         | 2075  | 1707  |
| PREY : MERLANGIUS MERLANGUS     |  |                        |      |             |      |             |       |       |
| Age class 0                     |  | 53                     | 160  | 143         | 330  | 269         | 538   | 493   |
| Total                           |  | 53                     | 160  | 143         | 330  | 269         | 538   | 493   |
| PREY : TRISOPTERUS ESMARKI      |  |                        |      |             |      |             |       |       |
| Age class 0                     |  | 2                      | 3    | 11          | 58   | 69          | 375   | 442   |
| Age class 1                     |  |                        |      | 11          | 288  | 536         | 2200  | 2934  |
| Age class 2                     |  |                        |      | 1           | 18   | 29          | 119   | 156   |
| Age class 3                     |  |                        |      | 0           | 0    | 0           | 0     | 0     |
| Total                           |  | 2                      | 3    | 23          | 364  | 634         | 2694  | 3533  |
| PREY : CLUPEA HARENGUS          |  |                        |      |             |      |             |       |       |
| Age class 0                     |  |                        | 9    | 23          | 46   | 50          | 16    | 30    |
| Age class 1                     |  |                        | 57   | 302         | 1127 | 1534        | 2342  | 1926  |
| Age class 2                     |  |                        | 0    | 69          | 297  | 829         | 1227  | 1768  |
| Age class 4                     |  |                        |      |             | 0    | 0           |       | 0     |
| Total                           |  |                        | 66   | 394         | 1470 | 2413        | 3585  | 3724  |
| PREY : SPRATTUS SPRATTUS        |  |                        |      |             |      |             |       |       |
| Age class 0                     |  | 6                      | 99   | 177         | 313  | 335         | 906   | 690   |
| Age class 1                     |  |                        | 1    | 3           | 6    | 6           | 9     | 8     |
| Age class 2                     |  |                        | 31   | 83          | 142  | 148         | 274   | 199   |
| Age class 3                     |  |                        | 1    | 3           | 5    | 5           | 9     | 6     |
| Total                           |  | 6                      | 132  | 265         | 466  | 494         | 1199  | 903   |
| PREY : AMMOODYTIDAE             |  |                        |      |             |      |             |       |       |
| Age class 0                     |  | 18                     | 426  | 208         | 280  | 363         | 501   | 454   |
| Age class 1                     |  | 0                      | 94   | 96          | 199  | 289         | 594   | 705   |
| Age class 2                     |  |                        | 34   | 53          | 93   | 128         | 121   | 183   |
| Age class 3                     |  |                        | 1    | 9           | 32   | 36          | 23    | 47    |
| Age class 4                     |  |                        |      | 1           | 3    | 3           | 2     | 4     |
| Age class 5                     |  |                        |      | 0           | 2    | 2           | 1     | 3     |
| Age class 6                     |  |                        |      | 0           | 1    | 1           | 1     | 1     |
| Total                           |  | 18                     | 555  | 367         | 609  | 822         | 1244  | 1397  |
| PREY : OTHER                    |  |                        |      |             |      |             |       |       |
| All size classes                |  | 41                     | 706  | 1255        | 1433 | 2161        | 642   | 1479  |

Appendix 1-C. Average stomach content weight (g) per 1000 WHITING stomachs by age class of prey and predator by quarter for the total North Sea.

| PREDATOR : WHIT                 |   | Area | : TOTAL NORTH SEA |      | YEAR : 1986 |      | QUARTER : 1 |    |
|---------------------------------|---|------|-------------------|------|-------------|------|-------------|----|
| Age class                       |   | 0    | 1                 | 2    | 3           | 4    | 5           | 6+ |
| PREY : ALL SPECIES              |   |      |                   |      |             |      |             |    |
| All size classes                |   | 733  | 2368              | 3893 | 4685        | 5727 | 6809        |    |
| PREY : GADUS MORHUA             |   |      |                   |      |             |      |             |    |
| Age class                       | 1 | 5    | 10                | 7    | 10          | 6    | 2           |    |
| Total                           |   | 5    | 10                | 7    | 10          | 6    | 2           |    |
| PREY : MELANOGRAMMUS AEGLEFINUS |   |      |                   |      |             |      |             |    |
| Age class                       | 1 | 2    | 86                | 167  | 96          | 203  | 177         |    |
| Total                           |   | 2    | 86                | 167  | 96          | 203  | 177         |    |
| PREY : MERLANGIUS MERLANGUS     |   |      |                   |      |             |      |             |    |
| Age class                       | 1 | 60   | 128               | 144  | 214         | 333  | 404         |    |
|                                 | 2 |      |                   | 2    | 15          | 9    | 12          |    |
| Total                           |   | 60   | 128               | 147  | 229         | 342  | 416         |    |
| PREY : TRISOPTERUS ESMARKI      |   |      |                   |      |             |      |             |    |
| Age class                       | 0 | 5    | 0                 |      |             |      |             |    |
|                                 | 1 | 8    | 576               | 1363 | 1411        | 2421 | 3338        |    |
|                                 | 2 | 0    | 14                | 72   | 115         | 190  | 304         |    |
|                                 | 3 |      | 1                 | 11   | 19          | 26   | 35          |    |
|                                 | 4 |      | 0                 | 0    | 1           | 1    | 1           |    |
| Total                           |   | 14   | 591               | 1446 | 1545        | 2638 | 3678        |    |
| PREY : CLUPEA HARENGUS          |   |      |                   |      |             |      |             |    |
| Age class                       | 1 | 5    | 42                | 33   | 21          | 13   | 1           |    |
|                                 | 2 | 32   | 284               | 330  | 517         | 313  | 192         |    |
|                                 | 3 | 0    | 0                 | 2    | 5           | 3    | 2           |    |
| Total                           |   | 37   | 326               | 364  | 543         | 329  | 195         |    |
| PREY : SPRATTUS SPRATTUS        |   |      |                   |      |             |      |             |    |
| Age class                       | 1 | 2    | 4                 | 11   | 20          | 32   | 66          |    |
|                                 | 2 | 4    | 25                | 111  | 306         | 170  | 98          |    |
|                                 | 3 | 1    | 5                 | 63   | 204         | 121  | 87          |    |
|                                 | 4 | 0    | 1                 | 20   | 66          | 43   | 34          |    |
|                                 | 5 | 0    | 0                 | 1    | 2           | 1    | 1           |    |
|                                 | 6 | 0    | 0                 | 0    | 1           | 0    | 0           |    |
| Total                           |   | 6    | 34                | 206  | 598         | 367  | 286         |    |
| PREY : AMMODYTIDAE              |   |      |                   |      |             |      |             |    |
| Age class                       | 1 | 248  | 585               | 663  | 561         | 647  | 816         |    |
|                                 | 2 | 20   | 48                | 113  | 165         | 145  | 191         |    |
|                                 | 3 |      |                   | 0    | 0           | 0    | 0           |    |
|                                 | 4 |      |                   | 0    | 0           | 0    | 0           |    |
| Total                           |   | 268  | 633               | 776  | 726         | 792  | 1008        |    |
| PREY : OTHER                    |   |      |                   |      |             |      |             |    |
| All size classes                |   | 341  | 560               | 780  | 938         | 1050 | 1048        |    |

Appendix 1-C. Average stomach content weight (g) per 1000 WHITING stomachs by age class of prey and predator by quarter for the total North Sea.

| PREDATOR : WHIT                 |   | Area : TOTAL NORTH SEA |      | YEAR : 1986 |      | QUARTER : 3 |      |      |
|---------------------------------|---|------------------------|------|-------------|------|-------------|------|------|
| Age class                       |   | 0                      | 1    | 2           | 3    | 4           | 5    | 6+   |
| PREY : ALL SPECIES              |   |                        |      |             |      |             |      |      |
| All size classes                |   | 143                    | 1335 | 2271        | 2879 | 5433        | 6869 | 6022 |
| PREY : GADUS MORHUA             |   |                        |      |             |      |             |      |      |
| Age class                       | 0 | 0                      | 0    | 2           | 1    | 3           | 6    | 0    |
| Total                           |   | 0                      | 0    | 2           | 1    | 3           | 6    | 0    |
| PREY : MELANOGRAMMUS AEGLEFINUS |   |                        |      |             |      |             |      |      |
| Age class                       | 0 | 4                      | 14   | 115         | 58   | 160         | 133  | 450  |
|                                 | 1 |                        | 0    | 0           | 0    | 0           | 0    | 0    |
| Total                           |   | 4                      | 14   | 115         | 60   | 174         | 158  | 450  |
| PREY : MERLANGIUS MERLANGUS     |   |                        |      |             |      |             |      |      |
| Age class                       | 0 | 2                      | 35   | 72          | 73   | 148         | 176  | 205  |
|                                 | 1 |                        |      | 0           | 0    | 1           | 2    |      |
| Total                           |   | 2                      | 35   | 72          | 73   | 149         | 178  | 205  |
| PREY : TRISOPTERUS ESMARKI      |   |                        |      |             |      |             |      |      |
| Age class                       | 0 | 11                     | 50   | 329         | 244  | 768         | 541  | 605  |
|                                 | 1 |                        | 1    | 61          | 106  | 654         | 564  | 885  |
|                                 | 2 |                        |      | 1           | 1    | 10          | 15   | 10   |
|                                 | 3 |                        |      | 1           | 1    | 4           | 10   |      |
|                                 | 4 |                        |      | 0           | 0    | 0           | 0    |      |
| Total                           |   | 11                     | 51   | 391         | 353  | 1436        | 1131 | 1500 |
| PREY : CLUPEA HARENGUS          |   |                        |      |             |      |             |      |      |
| Age class                       | 0 |                        | 15   | 20          | 26   | 21          | 33   | 19   |
|                                 | 1 | 2                      | 88   | 210         | 401  | 884         | 1426 | 2162 |
|                                 | 2 |                        | 0    | 7           | 49   | 172         | 1000 | 2    |
| Total                           |   | 2                      | 104  | 237         | 476  | 1077        | 2459 | 2182 |
| PREY : SPRATTUS SPRATTUS        |   |                        |      |             |      |             |      |      |
| Age class                       | 0 |                        | 33   | 53          | 46   | 114         | 188  | 89   |
|                                 | 1 |                        | 19   | 17          | 8    | 7           | 11   | 0    |
|                                 | 2 |                        | 11   | 23          | 40   | 74          | 65   | 1    |
|                                 | 3 |                        | 0    | 1           | 1    | 2           | 2    | 0    |
| Total                           |   |                        | 63   | 94          | 96   | 197         | 267  | 90   |
| PREY : AMMODYTIDAE              |   |                        |      |             |      |             |      |      |
| Age class                       | 0 | 11                     | 468  | 380         | 190  | 438         | 388  | 1213 |
|                                 | 1 | 0                      | 117  | 234         | 176  | 466         | 398  | 131  |
|                                 | 2 |                        | 4    | 10          | 8    | 22          | 19   | 11   |
|                                 | 3 |                        | 0    | 1           | 1    | 3           | 3    | 0    |
|                                 | 4 |                        | 0    | 0           | 0    | 0           | 0    | 0    |
|                                 | 5 |                        |      | 0           | 0    | 0           |      |      |
| Total                           |   | 11                     | 590  | 625         | 375  | 929         | 807  | 1356 |
| PREY : OTHER                    |   |                        |      |             |      |             |      |      |
| All size classes                |   | 113                    | 478  | 735         | 1445 | 1468        | 1863 | 238  |

Appendix 1-C. Average stomach content weight (g) per 1000 WHITING stomachs by age class of prey and predator by quarter for the total North Sea.

| PREDATOR : WHIT    |  | Area                            | : TOTAL NORTH SEA |      | YEAR : 1987 | QUARTER : 1 |      |    |
|--------------------|--|---------------------------------|-------------------|------|-------------|-------------|------|----|
| Age class          |  | 0                               | 1                 | 2    | 3           | 4           | 5    | 6+ |
| PREY : ALL SPECIES |  |                                 |                   |      |             |             |      |    |
| All size classes   |  | 595                             | 2023              | 3371 | 4218        | 5020        | 4992 |    |
| Age class          |  | PREY : GADUS MORHUA             |                   |      |             |             |      |    |
| Age class          |  | PREY : MELANOGRAMMUS AEGLEFINUS |                   |      |             |             |      |    |
| 1                  |  | 8                               | 200               | 383  | 430         | 457         | 425  |    |
| Total              |  | 8                               | 200               | 383  | 430         | 457         | 425  |    |
| Age class          |  | PREY : MERLANGIUS MERLANGUS     |                   |      |             |             |      |    |
| 1                  |  | 14                              | 50                | 75   | 107         | 140         | 137  |    |
| 2                  |  |                                 | 0                 | 0    | 0           | 1           | 2    |    |
| Total              |  | 14                              | 50                | 75   | 107         | 140         | 139  |    |
| Age class          |  | PREY : TRISOPTERUS ESMARKI      |                   |      |             |             |      |    |
| 1                  |  | 45                              | 656               | 1382 | 1367        | 1331        | 814  |    |
| 2                  |  | 0                               | 1                 | 15   | 30          | 23          | 26   |    |
| 3                  |  |                                 | 0                 | 0    | 1           | 1           | 1    |    |
| Total              |  | 45                              | 657               | 1398 | 1399        | 1355        | 842  |    |
| Age class          |  | PREY : CLUPEA HARENGUS          |                   |      |             |             |      |    |
| 1                  |  | 2                               | 0                 | 0    | 0           |             |      |    |
| 2                  |  | 22                              | 97                | 269  | 683         | 1475        | 2053 |    |
| 3                  |  |                                 | 2                 | 25   | 112         | 304         | 315  |    |
| Total              |  | 23                              | 99                | 295  | 795         | 1779        | 2368 |    |
| Age class          |  | PREY : SPRATTUS SPRATTUS        |                   |      |             |             |      |    |
| 1                  |  | 21                              | 50                | 16   | 32          | 10          | 24   |    |
| 2                  |  | 24                              | 104               | 216  | 386         | 412         | 192  |    |
| 3                  |  | 4                               | 43                | 99   | 194         | 107         | 166  |    |
| 4                  |  | 1                               | 9                 | 22   | 44          | 31          | 62   |    |
| 5                  |  | 0                               | 0                 | 1    | 2           | 1           | 2    |    |
| Total              |  | 50                              | 207               | 354  | 658         | 561         | 446  |    |
| Age class          |  | PREY : AMMODYTIDAE              |                   |      |             |             |      |    |
| 0                  |  | 0                               |                   |      |             |             |      |    |
| 1                  |  | 86                              | 160               | 145  | 111         | 66          | 36   |    |
| 2                  |  | 57                              | 192               | 153  | 145         | 144         | 112  |    |
| 3                  |  | 0                               | 5                 | 8    | 9           | 9           | 6    |    |
| 4                  |  |                                 | 0                 | 0    | 0           | 0           | 0    |    |
| Total              |  | 143                             | 357               | 306  | 265         | 219         | 155  |    |
| Age class          |  | PREY : OTHER                    |                   |      |             |             |      |    |
| All size classes   |  | 312                             | 453               | 560  | 564         | 508         | 617  |    |

Appendix 1-C. Average stomach content weight (g) per 1000 WHITING stomachs by age class of prey and predator by quarter for the total North Sea.

| PREDATOR : WHIT                 |  | Area : TOTAL NORTH SEA |      | YEAR : 1987 |      | QUARTER : 3 |      |      |
|---------------------------------|--|------------------------|------|-------------|------|-------------|------|------|
| Age class                       |  | 0                      | 1    | 2           | 3    | 4           | 5    | 6+   |
| PREY : ALL SPECIES              |  |                        |      |             |      |             |      |      |
| All size classes                |  | 47                     | 1085 | 3050        | 5008 | 3800        | 4954 | 2366 |
| PREY : GADUS MORHUA             |  |                        |      |             |      |             |      |      |
| Age class 0                     |  |                        |      |             | 6    | 9           | 27   | 8    |
| Total                           |  |                        |      |             | 6    | 9           | 27   | 8    |
| PREY : MELANOGRAMMUS AEGLEFINUS |  |                        |      |             |      |             |      |      |
| Age class 0                     |  | 0                      | 4    | 23          | 93   | 61          | 110  | 32   |
| 1                               |  |                        |      | 1           | 14   | 29          | 31   | 0    |
| Total                           |  | 0                      | 4    | 24          | 108  | 90          | 141  | 33   |
| PREY : MERLANGIUS MERLANGUS     |  |                        |      |             |      |             |      |      |
| Age class 0                     |  | 4                      | 72   | 150         | 161  | 55          | 57   | 27   |
| 1                               |  |                        |      | 0           | 2    | 2           | 4    | 1    |
| Total                           |  | 4                      | 72   | 150         | 163  | 57          | 61   | 28   |
| PREY : TRISOPTERUS ESMARKI      |  |                        |      |             |      |             |      |      |
| Age class 0                     |  | 0                      | 18   | 175         | 652  | 353         | 614  | 122  |
| 1                               |  |                        | 6    | 128         | 556  | 312         | 551  | 117  |
| 2                               |  |                        | 0    | 0           | 5    | 3           | 6    | 1    |
| Total                           |  | 0                      | 25   | 303         | 1214 | 669         | 1171 | 240  |
| PREY : CLUPEA HARENGUS          |  |                        |      |             |      |             |      |      |
| Age class 0                     |  |                        | 0    | 0           |      |             |      |      |
| 1                               |  |                        | 10   | 117         | 267  | 614         | 696  | 433  |
| 2                               |  |                        | 0    | 5           | 27   | 83          | 106  | 44   |
| Total                           |  |                        | 11   | 123         | 294  | 696         | 802  | 477  |
| PREY : SPRATTUS SPRATTUS        |  |                        |      |             |      |             |      |      |
| Age class 0                     |  |                        | 19   | 77          | 126  | 145         | 102  | 104  |
| 1                               |  |                        | 5    | 25          | 103  | 177         | 298  | 148  |
| 2                               |  |                        | 23   | 84          | 182  | 243         | 178  | 199  |
| 3                               |  |                        | 1    | 3           | 8    | 9           | 7    | 7    |
| 4                               |  |                        | 0    | 0           | 0    | 0           | 0    | 0    |
| Total                           |  |                        | 48   | 189         | 419  | 574         | 584  | 458  |
| PREY : AMMODYTIDAE              |  |                        |      |             |      |             |      |      |
| Age class 0                     |  | 1                      | 219  | 978         | 1153 | 344         | 372  | 108  |
| 1                               |  | 0                      | 96   | 324         | 437  | 230         | 316  | 122  |
| 2                               |  |                        | 170  | 319         | 439  | 366         | 592  | 218  |
| 3                               |  |                        | 4    | 6           | 7    | 9           | 19   | 5    |
| 4                               |  |                        | 1    | 1           | 2    | 2           | 5    | 1    |
| 5                               |  |                        | 0    | 0           | 0    | 0           | 1    | 0    |
| Total                           |  | 1                      | 491  | 1628        | 2038 | 952         | 1304 | 453  |
| PREY : OTHER                    |  |                        |      |             |      |             |      |      |
| All size classes                |  | 41                     | 435  | 634         | 767  | 754         | 865  | 670  |

APPENDIX 1 AVERAGE STOMACH CONTENT TOTAL NORTH SEA

Appendix 1-C. Average stomach content weight (g) per 1000 WHITING stomachs by age class of prey and predator by quarter for the total North Sea.

| PREDATOR : WHIT                 |   | Area : TOTAL NORTH SEA |      | YEAR : 1991 |      | QUARTER : 1 |      |    |
|---------------------------------|---|------------------------|------|-------------|------|-------------|------|----|
| age class                       |   | 0                      | 1    | 2           | 3    | 4           | 5    | 6+ |
| PREY : ALL SPECIES              |   |                        |      |             |      |             |      |    |
| All size classes                |   | 432                    | 1038 | 1688        | 2351 | 2172        | 2978 |    |
| PREY : MELANOGRAMMUS AEGLEFINUS |   |                        |      |             |      |             |      |    |
| Age class                       | 1 |                        | 1    | 4           | 28   | 25          | 32   |    |
|                                 | 2 |                        |      | 0           | 0    | 0           |      |    |
| Total                           |   |                        | 1    | 4           | 28   | 25          | 32   |    |
| PREY : MERLANGIUS MERLANGUS     |   |                        |      |             |      |             |      |    |
| Age class                       | 0 |                        | 0    | 0           | 0    | 0           | 0    |    |
|                                 | 1 | 0                      | 40   | 67          | 179  | 177         | 332  |    |
|                                 | 2 |                        | 0    | 0           | 1    | 2           | 3    |    |
| Total                           |   | 0                      | 40   | 67          | 180  | 179         | 335  |    |
| PREY : TRISOPTERUS ESMARKI      |   |                        |      |             |      |             |      |    |
| Age class                       | 1 | 5                      | 219  | 513         | 835  | 820         | 1907 |    |
|                                 | 2 | 0                      | 1    | 2           | 13   | 14          | 42   |    |
|                                 | 3 | 0                      | 0    | 0           | 1    | 2           | 4    |    |
| Total                           |   | 5                      | 219  | 515         | 848  | 836         | 1953 |    |
| PREY : CLUPEA HARENGUS          |   |                        |      |             |      |             |      |    |
| Age class                       | 1 | 0                      | 16   | 9           | 14   | 11          | 12   |    |
|                                 | 2 |                        |      | 0           | 0    | 0           | 0    |    |
| Total                           |   | 0                      | 16   | 9           | 14   | 11          | 12   |    |
| PREY : SPRATTUS SPRATTUS        |   |                        |      |             |      |             |      |    |
| Age class                       | 1 | 35                     | 187  | 430         | 296  | 246         | 46   |    |
|                                 | 2 | 1                      | 51   | 150         | 93   | 74          | 4    |    |
|                                 | 3 | 0                      | 1    | 1           | 3    | 1           | 1    |    |
|                                 | 4 | 0                      | 0    | 0           | 0    | 0           | 0    |    |
|                                 | 5 | 0                      | 0    | 0           | 0    | 0           | 0    |    |
| Total                           |   | 37                     | 238  | 580         | 392  | 321         | 51   |    |
| PREY : AMMODYTIDAE              |   |                        |      |             |      |             |      |    |
| Age class                       | 1 | 107                    | 135  | 143         | 126  | 146         | 197  |    |
|                                 | 2 | 0                      | 11   | 13          | 20   | 14          | 7    |    |
|                                 | 3 | 0                      | 6    | 7           | 11   | 6           | 1    |    |
|                                 | 4 | 0                      | 1    | 1           | 2    | 1           | 0    |    |
|                                 | 5 | 0                      | 1    | 1           | 2    | 1           | 0    |    |
|                                 | 6 | 0                      | 1    | 1           | 1    | 1           | 0    |    |
| Total                           |   | 107                    | 154  | 165         | 162  | 169         | 204  |    |
| PREY : OTHER                    |   |                        |      |             |      |             |      |    |
| All size classes                |   | 283                    | 369  | 347         | 728  | 630         | 391  |    |

Appendix 1-C. Average stomach content weight (g) per 1000 WHITING stomachs by age class of prey and predator by quarter for the total North Sea.

| PREDATOR : WHIT                 |   | Area : TOTAL NORTH SEA |      | YEAR : 1991 |      | QUARTER : 2 |      |    |
|---------------------------------|---|------------------------|------|-------------|------|-------------|------|----|
| age class                       |   | 0                      | 1    | 2           | 3    | 4           | 5    | 6+ |
| PREY : ALL SPECIES              |   |                        |      |             |      |             |      |    |
| All size classes                |   | 948                    | 2219 | 3017        | 3598 | 3782        | 4226 |    |
| PREY : GADUS MORHUA             |   |                        |      |             |      |             |      |    |
| Age class                       | 0 | 6                      | 3    | 2           | 2    | 3           | 0    |    |
| Total                           |   | 6                      | 3    | 2           | 2    | 3           | 1    |    |
| PREY : MELANOGRAMMUS AEGLEFINUS |   |                        |      |             |      |             |      |    |
| Age class                       | 0 | 0                      | 2    | 3           | 1    | 0           | 1    |    |
| Total                           |   | 0                      | 2    | 3           | 1    | 0           | 1    |    |
| PREY : MERLANGIUS MERLANGUS     |   |                        |      |             |      |             |      |    |
| Age class                       | 0 | 1                      | 1    | 1           | 4    | 5           | 8    |    |
|                                 | 1 | 1                      | 11   | 26          | 50   | 43          | 55   |    |
| Total                           |   | 2                      | 12   | 28          | 54   | 48          | 62   |    |
| PREY : TRISOPTERUS ESMARKI      |   |                        |      |             |      |             |      |    |
| Age class                       | 0 | 1                      | 6    | 10          | 7    | 7           | 10   |    |
|                                 | 1 | 2                      | 47   | 120         | 139  | 211         | 306  |    |
|                                 | 2 | 0                      | 2    | 7           | 11   | 19          | 22   |    |
|                                 | 3 | 0                      | 0    | 0           | 1    | 1           | 2    |    |
|                                 | 4 | 0                      | 0    | 0           | 0    | 0           | 0    |    |
| Total                           |   | 3                      | 55   | 137         | 158  | 239         | 340  |    |
| PREY : CLUPEA HARENGUS          |   |                        |      |             |      |             |      |    |
| Age class                       | 0 | 1                      | 6    | 7           | 16   | 28          | 8    |    |
|                                 | 1 | 1                      | 9    | 19          | 64   | 111         | 118  |    |
|                                 | 2 | 0                      | 0    | 0           | 0    | 1           | 0    |    |
| Total                           |   | 1                      | 15   | 26          | 81   | 140         | 126  |    |
| PREY : SPRATTUS SPRATTUS        |   |                        |      |             |      |             |      |    |
| Age class                       | 0 | 1                      | 0    | 0           | 0    | 0           | 0    |    |
|                                 | 1 | 69                     | 300  | 395         | 642  | 517         | 648  |    |
|                                 | 2 | 9                      | 33   | 40          | 76   | 61          | 94   |    |
|                                 | 3 | 3                      | 6    | 5           | 12   | 12          | 21   |    |
|                                 | 4 | 0                      | 1    | 0           | 1    | 1           | 1    |    |
|                                 | 5 | 0                      | 1    | 0           | 1    | 1           | 1    |    |
|                                 | 6 | 0                      | 0    | 0           | 0    | 0           | 0    |    |
| Total                           |   | 82                     | 341  | 441         | 731  | 592         | 767  |    |
| PREY : AMMODYTIDAE              |   |                        |      |             |      |             |      |    |
| Age class                       | 0 | 218                    | 741  | 1060        | 865  | 854         | 1136 |    |
|                                 | 1 | 97                     | 296  | 387         | 522  | 494         | 571  |    |
|                                 | 2 | 20                     | 107  | 156         | 258  | 277         | 273  |    |
|                                 | 3 | 4                      | 34   | 57          | 95   | 92          | 106  |    |
|                                 | 4 | 1                      | 7    | 13          | 22   | 22          | 24   |    |
|                                 | 5 | 1                      | 4    | 7           | 12   | 12          | 14   |    |
|                                 | 6 | 1                      | 6    | 10          | 23   | 23          | 22   |    |
| Total                           |   | 341                    | 1197 | 1691        | 1797 | 1775        | 2145 |    |
| PREY : OTHER                    |   |                        |      |             |      |             |      |    |
| All size classes                |   | 513                    | 594  | 689         | 774  | 985         | 785  |    |

Appendix 1-C. Average stomach content weight (g) per 1000 WHITING stomachs by age class of prey and predator by quarter for the total North Sea.

| PREDATOR : WHIT                 |   | Area : TOTAL NORTH SEA |      | YEAR : 1991 |      | QUARTER : 3 |      |      |
|---------------------------------|---|------------------------|------|-------------|------|-------------|------|------|
| age class                       |   | 0                      | 1    | 2           | 3    | 4           | 5    | 6+   |
| PREY : ALL SPECIES              |   |                        |      |             |      |             |      |      |
| All size classes                |   | 269                    | 1015 | 2845        | 4037 | 4515        | 4585 | 6421 |
| PREY : GADUS MORHUA             |   |                        |      |             |      |             |      |      |
| Age class                       | 0 |                        | 3    | 36          | 26   | 23          | 23   | 13   |
| Total                           |   |                        | 3    | 36          | 26   | 23          | 23   | 13   |
| PREY : MELANOGRAMMUS AEGLEFINUS |   |                        |      |             |      |             |      |      |
| Age class                       | 0 | 1                      | 49   | 294         | 224  | 268         | 238  | 396  |
| Total                           |   | 1                      | 49   | 294         | 224  | 268         | 238  | 396  |
| PREY : MERLANGIUS MERLANGUS     |   |                        |      |             |      |             |      |      |
| Age class                       | 0 | 1                      | 35   | 101         | 126  | 164         | 170  | 348  |
|                                 | 1 |                        | 0    | 2           | 1    | 3           | 14   | 6    |
|                                 | 2 |                        |      |             | 0    | 0           |      | 0    |
|                                 | 3 |                        |      |             | 0    | 0           |      | 0    |
|                                 | 4 |                        |      |             | 0    | 0           |      | 0    |
| Total                           |   | 1                      | 35   | 103         | 127  | 167         | 184  | 355  |
| PREY : TRISOPTERUS ESMARKI      |   |                        |      |             |      |             |      |      |
| Age class                       | 0 | 36                     | 73   | 320         | 384  | 445         | 425  | 1070 |
|                                 | 1 |                        | 0    | 29          | 248  | 252         | 307  | 1537 |
|                                 | 2 |                        | 0    | 1           | 13   | 10          | 16   | 50   |
|                                 | 3 |                        | 0    | 0           | 0    | 0           | 0    | 0    |
| Total                           |   | 36                     | 73   | 352         | 646  | 706         | 753  | 2656 |
| PREY : CLUPEA HARENGUS          |   |                        |      |             |      |             |      |      |
| Age class                       | 0 |                        | 21   | 221         | 507  | 365         | 496  | 575  |
|                                 | 1 |                        | 0    | 49          | 422  | 298         | 802  | 741  |
| Total                           |   |                        | 21   | 270         | 929  | 662         | 1298 | 1316 |
| PREY : SPRATTUS SPRATTUS        |   |                        |      |             |      |             |      |      |
| Age class                       | 0 | 0                      | 9    | 93          | 77   | 86          | 110  | 4    |
|                                 | 1 |                        | 116  | 393         | 514  | 883         | 517  | 127  |
|                                 | 2 |                        | 1    | 30          | 91   | 146         | 68   | 46   |
|                                 | 3 |                        | 0    | 4           | 13   | 8           | 17   | 12   |
|                                 | 4 |                        | 0    | 0           | 1    | 1           | 1    | 1    |
|                                 | 5 |                        | 0    | 0           | 1    | 1           | 1    | 1    |
| Total                           |   | 0                      | 127  | 521         | 698  | 1123        | 714  | 192  |
| PREY : AMMODYTIDAE              |   |                        |      |             |      |             |      |      |
| Age class                       | 0 | 106                    | 233  | 492         | 491  | 424         | 458  | 632  |
|                                 | 1 | 0                      | 7    | 38          | 74   | 44          | 45   | 98   |
|                                 | 2 |                        | 0    | 2           | 7    | 10          | 6    | 6    |
|                                 | 3 |                        | 4    | 32          | 68   | 70          | 43   | 25   |
|                                 | 4 |                        | 0    | 10          | 25   | 46          | 24   | 12   |
|                                 | 5 |                        | 0    | 7           | 17   | 31          | 16   | 8    |
|                                 | 6 |                        | 1    | 34          | 65   | 57          | 28   | 10   |
| Total                           |   | 106                    | 245  | 615         | 747  | 682         | 620  | 793  |
| PREY : OTHER                    |   |                        |      |             |      |             |      |      |
| All size classes                |   | 124                    | 462  | 654         | 640  | 883         | 754  | 700  |

Appendix 1-C. Average stomach content weight (g) per 1000 WHITING stomachs by age class of prey and predator by quarter for the total North Sea.

| PREDATOR : WHIT                 |   | Area | TOTAL NORTH SEA |      | YEAR : 1991 |      | QUARTER : 4 |      |
|---------------------------------|---|------|-----------------|------|-------------|------|-------------|------|
| age class                       |   | 0    | 1               | 2    | 3           | 4    | 5           | 6+   |
| PREY : ALL SPECIES              |   |      |                 |      |             |      |             |      |
| All size classes                |   | 624  | 1687            | 2675 | 4192        | 3217 | 3324        | 3288 |
| PREY : GADUS MORHUA             |   |      |                 |      |             |      |             |      |
| Age class                       | 0 | 0    | 1               | 3    | 3           | 3    | 6           | 1    |
| Total                           |   | 0    | 1               | 3    | 3           | 3    | 6           | 1    |
| PREY : MELANOGRAMMUS AEGLEFINUS |   |      |                 |      |             |      |             |      |
| Age class                       | 0 | 12   | 19              | 110  | 323         | 108  | 145         | 176  |
|                                 | 1 |      |                 | 0    | 0           | 0    | 0           | 0    |
| Total                           |   | 12   | 19              | 110  | 323         | 108  | 145         | 176  |
| PREY : MERLANGIUS MERLANGUS     |   |      |                 |      |             |      |             |      |
| Age class                       | 0 | 2    | 33              | 85   | 232         | 122  | 162         | 221  |
| Total                           |   | 2    | 33              | 86   | 233         | 124  | 162         | 221  |
| PREY : TRISOPTERUS ESMARKI      |   |      |                 |      |             |      |             |      |
| Age class                       | 0 | 142  | 487             | 1120 | 2067        | 902  | 856         | 689  |
|                                 | 1 | 0    | 5               | 76   | 119         | 145  | 55          | 123  |
|                                 | 2 |      | 0               | 20   | 19          | 38   | 2           | 5    |
|                                 | 3 |      | 0               | 0    | 0           | 0    | 0           | 0    |
| Total                           |   | 142  | 492             | 1216 | 2205        | 1085 | 913         | 818  |
| PREY : CLUPEA HARENGUS          |   |      |                 |      |             |      |             |      |
| Age class                       | 0 | 3    | 29              | 44   | 124         | 38   | 55          | 63   |
|                                 | 1 |      | 3               | 5    | 2           | 5    | 7           | 2    |
| Total                           |   | 3    | 32              | 49   | 126         | 42   | 61          | 65   |
| PREY : SPRATTUS SPRATTUS        |   |      |                 |      |             |      |             |      |
| Age class                       | 0 | 19   | 127             | 151  | 125         | 354  | 434         | 455  |
|                                 | 1 | 1    | 20              | 40   | 75          | 190  | 186         | 242  |
|                                 | 2 | 0    | 1               | 1    | 2           | 4    | 4           | 5    |
|                                 | 3 |      | 0               | 0    | 1           | 2    | 2           | 2    |
|                                 | 4 |      | 0               | 0    | 0           | 0    | 0           | 0    |
| Total                           |   | 20   | 148             | 193  | 202         | 550  | 626         | 705  |
| PREY : AMMODYTIDAE              |   |      |                 |      |             |      |             |      |
| Age class                       | 0 | 34   | 223             | 181  | 168         | 150  | 122         | 116  |
|                                 | 1 | 11   | 62              | 96   | 184         | 101  | 43          | 71   |
|                                 | 2 | 1    | 3               | 6    | 6           | 4    | 2           | 3    |
|                                 | 3 | 1    | 8               | 23   | 25          | 33   | 10          | 9    |
|                                 | 4 | 0    | 12              | 18   | 37          | 24   | 12          | 15   |
|                                 | 5 | 0    | 13              | 19   | 45          | 25   | 12          | 18   |
|                                 | 6 | 0    | 19              | 28   | 66          | 35   | 17          | 26   |
| Total                           |   | 46   | 339             | 377  | 543         | 401  | 242         | 291  |
| PREY : OTHER                    |   |      |                 |      |             |      |             |      |
| All size classes                |   | 398  | 622             | 641  | 558         | 904  | 1168        | 1011 |

APPENDIX 1 AVERAGE STOMACH CONTENT TOTAL NORTH SEA

Appendix 1-D. Average stomach content weight (g) per 1000 SAITHE stomachs by age class of prey and predator by quarter for the total North Sea.

| PREDATOR : SAIT    |  | Area : TOTAL NORTH SEA          |      | YEAR : 1981 |      | QUARTER : 1 |       |    |
|--------------------|--|---------------------------------|------|-------------|------|-------------|-------|----|
| Age class          |  | 3                               | 4    | 5           | 6    | 7           | 8     | 9+ |
| PREY : ALL SPECIES |  |                                 |      |             |      |             |       |    |
| All size classes   |  | 6908                            | 5309 | 6668        | 9351 | 24883       | 29680 |    |
| Age class          |  | PREY : MELANOGRAMMUS AEGLEFINUS |      |             |      |             |       |    |
| 1                  |  | 102                             | 90   | 142         | 512  | 850         | 947   |    |
| 2                  |  |                                 | 1    | 7           | 42   | 81          | 92    |    |
| 3                  |  |                                 |      |             | 0    | 1           | 1     |    |
| 4                  |  |                                 |      |             | 0    | 0           | 1     |    |
| Total              |  | 102                             | 92   | 149         | 554  | 932         | 1041  |    |
| Age class          |  | PREY : MERLANGIUS MERLANGUS     |      |             |      |             |       |    |
| 1                  |  |                                 |      |             | 3    | 66          | 85    |    |
| 2                  |  |                                 |      |             | 5    | 127         | 168   |    |
| 3                  |  |                                 |      |             | 1    | 18          | 27    |    |
| 4                  |  |                                 |      |             |      |             | 1     |    |
| 5                  |  |                                 |      |             |      |             | 0     |    |
| Total              |  |                                 |      |             | 8    | 210         | 281   |    |
| Age class          |  | PREY : TRISOPTERUS ESMARKI      |      |             |      |             |       |    |
| 0                  |  |                                 |      |             | 0    | 4           | 6     |    |
| 1                  |  | 111                             | 124  | 420         | 3370 | 8668        | 10257 |    |
| 2                  |  | 1                               | 53   | 341         | 2676 | 8499        | 10305 |    |
| 3                  |  |                                 | 4    | 19          | 101  | 248         | 298   |    |
| 4                  |  |                                 |      |             |      |             | 1     |    |
| Total              |  | 112                             | 181  | 780         | 6147 | 17419       | 20867 |    |
| Age class          |  | PREY : CLUPEA HARENGUS          |      |             |      |             |       |    |
| 1                  |  |                                 |      |             | 13   | 332         | 429   |    |
| 2                  |  |                                 |      |             | 11   | 271         | 351   |    |
| 3                  |  |                                 |      |             | 1    | 23          | 30    |    |
| Total              |  |                                 |      |             | 25   | 626         | 810   |    |
| Age class          |  | PREY : SPRATTUS SPRATTUS        |      |             |      |             |       |    |
| 1                  |  |                                 | 2    | 7           | 1    | 0           | 0     |    |
| 2                  |  |                                 | 298  | 994         | 114  | 53          | 68    |    |
| 3                  |  |                                 | 59   | 197         | 23   | 10          | 14    |    |
| 4                  |  |                                 | 1    | 2           | 0    | 0           | 0     |    |
| Total              |  |                                 | 360  | 1200        | 138  | 64          | 83    |    |
| Age class          |  | PREY : AMMODYTIDAE              |      |             |      |             |       |    |
| 1                  |  | 2502                            | 1632 | 1635        | 50   | 4           | 6     |    |
| 2                  |  | 265                             | 212  | 265         | 14   | 2           | 3     |    |
| Total              |  | 2767                            | 1843 | 1901        | 64   | 6           | 8     |    |
| Age class          |  | PREY : OTHER                    |      |             |      |             |       |    |
| All size classes   |  | 3927                            | 2833 | 2639        | 2415 | 5625        | 6590  |    |

Appendix 1-D. Average stomach content weight (g) per 1000 SAITHE stomachs by age class of prey and predator by quarter for the total North Sea.

| PREDATOR : SAIT                 |   | Area | : TOTAL NORTH SEA |      |      | YEAR : 1981 |       | QUARTER : 2 |    |
|---------------------------------|---|------|-------------------|------|------|-------------|-------|-------------|----|
| Age class                       |   |      | 3                 | 4    | 5    | 6           | 7     | 8           | 9+ |
| PREY : ALL SPECIES              |   |      |                   |      |      |             |       |             |    |
| All size classes                |   |      | 5524              | 6358 | 7817 | 27240       | 43618 | 46288       |    |
| PREY : GADUS MORHUA             |   |      |                   |      |      |             |       |             |    |
| Age class                       | 0 |      | 47                | 43   | 31   | 330         | 431   | 135         |    |
| Total                           |   |      | 47                | 43   | 31   | 330         | 431   | 135         |    |
| PREY : MELANOGRAMMUS AEGLEFINUS |   |      |                   |      |      |             |       |             |    |
| Age class                       | 0 |      |                   | 2    | 20   | 320         | 883   | 621         |    |
|                                 | 1 |      |                   | 2    | 25   | 385         | 426   | 78          |    |
| Total                           |   |      |                   | 4    | 44   | 705         | 1309  | 698         |    |
| PREY : TRISOPTERUS ESMARKI      |   |      |                   |      |      |             |       |             |    |
| Age class                       | 0 |      |                   |      |      | 1           | 20    | 27          |    |
|                                 | 1 |      |                   | 1    | 14   | 250         | 1368  | 9407        |    |
|                                 | 2 |      |                   | 2    | 24   | 406         | 1410  | 9299        |    |
|                                 | 3 |      |                   | 0    | 0    | 5           | 16    | 109         |    |
| Total                           |   |      |                   | 4    | 39   | 662         | 2814  | 18841       |    |
| PREY : SPRATTUS SPRATTUS        |   |      |                   |      |      |             |       |             |    |
| Age class                       | 0 |      | 59                | 52   | 12   |             |       |             |    |
|                                 | 1 |      | 3                 | 3    | 1    |             |       |             |    |
| Total                           |   |      | 62                | 55   | 13   |             |       |             |    |
| PREY : AMMODYTIDAE              |   |      |                   |      |      |             |       |             |    |
| Age class                       | 0 |      | 103               | 91   | 21   | 66          | 2438  | 2471        |    |
|                                 | 1 |      | 1341              | 1182 | 277  | 335         | 10467 | 10559       |    |
|                                 | 2 |      | 1270              | 1120 | 261  | 29          | 32    | 6           |    |
|                                 | 3 |      | 455               | 401  | 93   | 2           | 2     | 0           |    |
|                                 | 4 |      | 160               | 141  | 33   | 1           | 1     | 0           |    |
|                                 | 5 |      | 90                | 80   | 18   |             |       |             |    |
|                                 | 6 |      | 23                | 20   | 5    |             |       |             |    |
| Total                           |   |      | 3441              | 3034 | 708  | 432         | 12940 | 13037       |    |
| PREY : OTHER                    |   |      |                   |      |      |             |       |             |    |
| All size classes                |   |      | 1975              | 3218 | 6982 | 25111       | 26125 | 13577       |    |

Appendix 1-D. Average stomach content weight (g) per 1000 SAITHE stomachs by age class of prey and predator by quarter for the total North Sea.

| PREDATOR : SAIT                 |   | Area : TOTAL NORTH SEA |      | YEAR : 1981 |       | QUARTER : 3 |       |    |
|---------------------------------|---|------------------------|------|-------------|-------|-------------|-------|----|
| Age class                       |   | 3                      | 4    | 5           | 6     | 7           | 8     | 9+ |
| PREY : ALL SPECIES              |   |                        |      |             |       |             |       |    |
| All size classes                |   | 5105                   | 6086 | 8052        | 14266 | 26725       | 36437 |    |
| PREY : GADUS MORHUA             |   |                        |      |             |       |             |       |    |
| Age class                       | 0 |                        |      |             | 2     | 18          | 22    | 10 |
| Total                           |   |                        |      |             | 2     | 18          | 22    | 10 |
| PREY : MELANOGRAMMUS AEGLEFINUS |   |                        |      |             |       |             |       |    |
| Age class                       | 0 | 1267                   | 1479 | 2083        | 4953  | 6919        | 5548  |    |
|                                 | 1 |                        | 0    | 334         | 3020  | 3868        | 2176  |    |
|                                 | 2 |                        |      |             | 1     | 7           | 18    |    |
| Total                           |   | 1267                   | 1479 | 2417        | 7973  | 10793       | 7738  |    |
| PREY : MERLANGIUS MERLANGUS     |   |                        |      |             |       |             |       |    |
| Age class                       | 0 |                        | 46   | 178         | 706   | 841         | 369   |    |
|                                 | 1 |                        |      | 18          | 160   | 195         | 86    |    |
| Total                           |   |                        | 46   | 196         | 866   | 1036        | 454   |    |
| PREY : TRISOPTERUS ESMARKI      |   |                        |      |             |       |             |       |    |
| Age class                       | 0 | 67                     | 386  | 838         | 846   | 1563        | 2297  |    |
|                                 | 1 |                        | 0    | 6           | 70    | 270         | 549   |    |
|                                 | 2 |                        |      | 9           | 96    | 373         | 760   |    |
| Total                           |   | 67                     | 386  | 856         | 1037  | 2281        | 3749  |    |
| PREY : CLUPEA HARENGUS          |   |                        |      |             |       |             |       |    |
| Age class                       | 0 |                        | 18   | 40          | 6     | 7           | 18    |    |
|                                 | 1 |                        |      |             | 4     | 49          | 123   |    |
|                                 | 2 |                        |      |             | 0     | 4           | 11    |    |
|                                 | 3 |                        |      |             |       |             | 348   |    |
| Total                           |   |                        | 18   | 40          | 10    | 60          | 500   |    |
| PREY : AMMODYTIDAE              |   |                        |      |             |       |             |       |    |
| Age class                       | 0 | 1574                   | 1270 | 768         | 94    | 94          | 41    |    |
| Total                           |   | 1574                   | 1270 | 768         | 94    | 94          | 41    |    |
| PREY : OTHER                    |   |                        |      |             |       |             |       |    |
| All size classes                |   | 2198                   | 2886 | 3772        | 4268  | 12440       | 23945 |    |

Appendix 1-D. Average stomach content weight (g) per 1000 SAITHE stomachs by age class of prey and predator by quarter for the total North Sea.

| PREDATOR : SAIT    |   | Area                            | : TOTAL NORTH SEA |      | YEAR : 1981 | QUARTER : 4 |       |       |
|--------------------|---|---------------------------------|-------------------|------|-------------|-------------|-------|-------|
| Age class          |   | 3                               | 4                 | 5    | 6           | 7           | 8     | 9+    |
| PREY : ALL SPECIES |   |                                 |                   |      |             |             |       |       |
| All size classes   |   | 5566                            | 6899              | 9493 | 21677       | 22840       | 35993 |       |
| Age class          |   | PREY : MELANOGRAMMUS AEGLEFINUS |                   |      |             |             |       |       |
|                    | 0 |                                 |                   | 49   | 250         | 4656        | 3570  | 1543  |
|                    | 1 |                                 |                   |      |             |             |       | 11    |
|                    | 2 |                                 |                   |      |             |             |       | 1     |
| Total              |   |                                 |                   | 49   | 250         | 4656        | 3570  | 1555  |
| Age class          |   | PREY : MERLANGIUS MERLANGUS     |                   |      |             |             |       |       |
|                    | 1 |                                 |                   |      |             |             |       | 5     |
|                    | 2 |                                 |                   |      |             |             |       | 1     |
| Total              |   |                                 |                   |      |             |             |       | 6     |
| Age class          |   | PREY : TRISOPTERUS ESMARKI      |                   |      |             |             |       |       |
|                    | 0 |                                 |                   | 187  | 1005        | 1600        | 2106  | 4418  |
|                    | 1 |                                 |                   | 103  | 744         | 1616        | 3179  | 9030  |
|                    | 2 |                                 |                   | 8    | 72          | 183         | 413   | 1255  |
| Total              |   |                                 |                   | 298  | 1822        | 3398        | 5699  | 14703 |
| Age class          |   | PREY : CLUPEA HARENGUS          |                   |      |             |             |       |       |
|                    | 0 |                                 |                   | 11   | 97          | 10823       | 7569  | 343   |
|                    | 1 |                                 |                   | 0    | 2           | 221         | 154   | 6     |
| Total              |   |                                 |                   | 11   | 99          | 11043       | 7723  | 350   |
| Age class          |   | PREY : SPRATTUS SPRATTUS        |                   |      |             |             |       |       |
|                    | 1 |                                 |                   |      |             | 1           | 5     | 18    |
|                    | 2 |                                 |                   |      |             | 1           | 6     | 23    |
|                    | 3 |                                 |                   |      |             | 0           | 0     | 1     |
|                    | 4 |                                 |                   |      |             | 0           | 0     | 0     |
| Total              |   |                                 |                   |      |             | 2           | 11    | 42    |
| Age class          |   | PREY : AMMODYTIDAE              |                   |      |             |             |       |       |
|                    | 0 |                                 |                   |      |             | 42          | 222   | 839   |
| Total              |   |                                 |                   |      |             | 42          | 222   | 839   |
| Age class          |   | PREY : OTHER                    |                   |      |             |             |       |       |
| All size classes   |   | 5566                            | 6541              | 7322 | 2535        | 5614        | 18498 |       |

APPENDIX 1 AVERAGE STOMACH CONTENT TOTAL NORTH SEA

Appendix 1-D. Average stomach content weight (g) per 1000 SAITHE stomachs by age class of prey and predator by quarter for the total North Sea.

|                                 |  |                        |      |             |       |             |             |
|---------------------------------|--|------------------------|------|-------------|-------|-------------|-------------|
| PREDATOR : SAIT                 |  | Area : TOTAL NORTH SEA |      | YEAR : 1986 |       | QUARTER : 3 |             |
| Age class                       |  | 3                      | 4    | 5           | 6     | 7           | 8 9+        |
| PREY : ALL SPECIES              |  |                        |      |             |       |             |             |
| All size classes                |  | 6805                   | 8350 | 19778       | 29027 | 36961       | 57978 75576 |
| PREY : GADUS MORHUA             |  |                        |      |             |       |             |             |
| Age class                       |  |                        |      |             |       |             |             |
| Total                           |  | 0                      | 1    | 8           | 28    | 0           | 1           |
| PREY : MELANOGRAMMUS AEGLEFINUS |  |                        |      |             |       |             |             |
| Age class                       |  |                        |      |             |       |             |             |
| Total                           |  | 407                    | 419  | 657         | 2189  | 1292        | 2579 2140   |
| PREY : MERLANGIUS MERLANGUS     |  |                        |      |             |       |             |             |
| Age class                       |  |                        |      |             |       |             |             |
| Total                           |  | 15                     | 22   | 69          | 237   | 2           | 8 13898     |
| PREY : TRISOPTERUS ESMARKI      |  |                        |      |             |       |             |             |
| Age class                       |  |                        |      |             |       |             |             |
| Total                           |  | 1036                   | 1741 | 6962        | 17630 | 13536       | 26931 22492 |
| PREY : CLUPEA HARENGUS          |  |                        |      |             |       |             |             |
| Age class                       |  |                        |      |             |       |             |             |
| Total                           |  |                        |      | 0           | 97    | 3711        | 7312 16454  |
| PREY : SPRATTUS SPRATTUS        |  |                        |      |             |       |             |             |
| Age class                       |  |                        |      |             |       |             |             |
| Total                           |  |                        |      |             |       |             |             |
| PREY : AMMODYTIDAE              |  |                        |      |             |       |             |             |
| Age class                       |  |                        |      |             |       |             |             |
| Total                           |  | 1362                   | 1319 | 690         | 49    | 772         | 1521 1297   |
| PREY : OTHER                    |  |                        |      |             |       |             |             |
| All size classes                |  | 3985                   | 4848 | 11392       | 8797  | 17647       | 19626 19295 |

APPENDIX 1 AVERAGE STOMACH CONTENT TOTAL NORTH SEA

Appendix 1-D. Average stomach content weight (g) per 1000 SAITHE stomachs by age class of prey and predator by quarter for the total North Sea.

| PREDATOR : SAIT                 |  | Area : TOTAL NORTH SEA |      | YEAR : 1991 |       | QUARTER : 1 |       |        |
|---------------------------------|--|------------------------|------|-------------|-------|-------------|-------|--------|
| age class                       |  | 3                      | 4    | 5           | 6     | 7           | 8     | 9+     |
| PREY : ALL SPECIES              |  |                        |      |             |       |             |       |        |
| All size classes                |  | 2621                   | 4590 | 10602       | 14983 | 22367       | 24905 | 133178 |
| PREY : GADUS MORHUA             |  |                        |      |             |       |             |       |        |
| PREY : MELANOGRAMMUS AEGLEFINUS |  |                        |      |             |       |             |       |        |
| PREY : MERLANGIUS MERLANGUS     |  |                        |      |             |       |             |       |        |
| PREY : TRISOPTERUS ESMARKI      |  |                        |      |             |       |             |       |        |
| 1                               |  | 1128                   | 1304 | 720         | 851   | 1228        | 1661  | 512    |
| 2                               |  | 447                    | 797  | 1952        | 3159  | 3283        | 2311  | 823    |
| 3                               |  | 42                     | 102  | 788         | 1852  | 2991        | 3003  | 1072   |
| 4                               |  |                        |      | 41          | 224   | 688         | 915   | 374    |
| Total                           |  | 1617                   | 2203 | 3501        | 6085  | 8191        | 7890  | 2781   |
| PREY : CLUPEA HARENGUS          |  |                        |      |             |       |             |       |        |
| 1                               |  | 2                      | 9    | 143         | 383   | 494         | 385   | 47     |
| 2                               |  | 11                     | 430  | 2354        | 2873  | 5526        | 7468  | 36960  |
| 3                               |  | 11                     | 420  | 2161        | 2133  | 3027        | 3344  | 45194  |
| 4                               |  | 2                      | 91   | 515         | 661   | 1053        | 1315  | 25738  |
| 5                               |  | 0                      | 4    | 120         | 425   | 846         | 960   | 15659  |
| Total                           |  | 27                     | 954  | 5293        | 6475  | 10947       | 13472 | 123606 |
| PREY : SPRATTUS SPRATTUS        |  |                        |      |             |       |             |       |        |
| PREY : AMMODYTIDAE              |  |                        |      |             |       |             |       |        |
| 1                               |  | 21                     | 31   | 53          | 30    | 11          | 236   | 588    |
| 2                               |  | 0                      | 1    | 0           | 0     |             | 5     | 12     |
| 3                               |  | 0                      | 0    | 0           | 0     |             | 0     | 1      |
| 4                               |  | 0                      | 0    | 0           | 0     |             | 0     | 0      |
| Total                           |  | 21                     | 32   | 54          | 30    | 11          | 242   | 602    |
| PREY : OTHER                    |  |                        |      |             |       |             |       |        |
| All size classes                |  | 957                    | 1402 | 1754        | 2393  | 3218        | 3301  | 6190   |

Appendix 1-D. Average stomach content weight (g) per 1000 SAITHE stomachs by age class of prey and predator by quarter for the total North Sea.

|                    |   |                                 |       |             |       |             |        |        |
|--------------------|---|---------------------------------|-------|-------------|-------|-------------|--------|--------|
| PREDATOR : SAIT    |   | Area : TOTAL NORTH SEA          |       | YEAR : 1991 |       | QUARTER : 2 |        |        |
| age class          |   | 3                               | 4     | 5           | 6     | 7           | 8      | 9+     |
| PREY : ALL SPECIES |   |                                 |       |             |       |             |        |        |
| All size classes   |   | 16385                           | 21251 | 43237       | 64741 | 116279      | 125194 | 151095 |
| Age class          |   | PREY : GADUS MORHUA             |       |             |       |             |        |        |
| Age class          |   | PREY : MELANOGRAMMUS AEGLEFINUS |       |             |       |             |        |        |
|                    | 1 | 2                               | 26    | 84          | 37    | 3107        | 5578   | 11815  |
|                    | 2 |                                 |       |             |       | 1525        | 2738   | 2803   |
|                    | 3 |                                 |       |             |       | 61          | 110    | 109    |
| Total              |   | 2                               | 26    | 84          | 37    | 4694        | 8426   | 14727  |
| Age class          |   | PREY : MERLANGIUS MERLANGUS     |       |             |       |             |        |        |
|                    | 1 |                                 |       |             |       | 369         | 667    | 5548   |
|                    | 2 |                                 |       | 1           | 9     | 2129        | 3808   | 13612  |
|                    | 3 |                                 |       | 1           | 11    | 1885        | 3360   | 8858   |
|                    | 4 |                                 |       | 0           | 1     | 300         | 536    | 1655   |
|                    | 5 |                                 |       | 0           | 0     | 121         | 217    | 560    |
|                    | 6 |                                 |       | 0           | 0     | 44          | 78     | 312    |
| Total              |   |                                 |       | 2           | 22    | 4848        | 8667   | 30547  |
| Age class          |   | PREY : TRISOPTERUS ESMARKI      |       |             |       |             |        |        |
|                    | 0 | 243                             | 168   | 57          | 12    |             |        |        |
|                    | 1 | 1283                            | 2818  | 9451        | 13542 | 15979       | 14444  | 15911  |
|                    | 2 | 226                             | 851   | 2851        | 3835  | 4737        | 3075   | 1343   |
|                    | 3 | 19                              | 77    | 254         | 337   | 413         | 242    | 58     |
|                    | 4 | 3                               | 14    | 44          | 53    | 71          | 43     | 10     |
| Total              |   | 1775                            | 3928  | 12657       | 17780 | 21200       | 17804  | 17323  |
| Age class          |   | PREY : CLUPEA HARENGUS          |       |             |       |             |        |        |
|                    | 1 |                                 | 1     | 45          | 72    | 555         | 970    | 1132   |
|                    | 2 |                                 | 32    | 1165        | 2493  | 9782        | 22883  | 32746  |
|                    | 3 |                                 | 16    | 701         | 2464  | 7168        | 8095   | 9636   |
|                    | 4 |                                 | 4     | 211         | 879   | 2812        | 3316   | 4198   |
|                    | 5 |                                 | 7     | 336         | 1446  | 5061        | 6001   | 6498   |
| Total              |   | 0                               | 61    | 2457        | 7354  | 25376       | 41266  | 54210  |
| Age class          |   | PREY : SPRATTUS SPRATTUS        |       |             |       |             |        |        |
| Age class          |   | PREY : AMMODYTIDAE              |       |             |       |             |        |        |
|                    | 0 | 305                             | 733   | 4952        | 4458  | 4018        | 4524   | 4879   |
|                    | 1 | 294                             | 528   | 2726        | 2709  | 1808        | 1333   | 1407   |
|                    | 2 | 170                             | 204   | 198         | 179   | 79          |        |        |
|                    | 3 | 80                              | 95    | 73          | 63    | 28          |        |        |
|                    | 4 | 13                              | 15    | 12          | 10    | 5           |        |        |
|                    | 5 | 14                              | 16    | 9           | 8     | 3           |        |        |
|                    | 6 | 7                               | 8     | 5           | 4     | 2           |        |        |
| Total              |   | 881                             | 1599  | 7976        | 7432  | 5943        | 5857   | 6286   |
| Age class          |   | PREY : OTHER                    |       |             |       |             |        |        |
| All size classes   |   | 13727                           | 15638 | 20061       | 32117 | 54218       | 43175  | 28001  |

Appendix 1-D. Average stomach content weight (g) per 1000 SAITHE stomachs by age class of prey and predator by quarter for the total North Sea.

| PREDATOR : SAIT    |   | Area : TOTAL NORTH SEA          |       | YEAR : 1991 |       | QUARTER : 3 |        |        |
|--------------------|---|---------------------------------|-------|-------------|-------|-------------|--------|--------|
| age class          |   | 3                               | 4     | 5           | 6     | 7           | 8      | 9+     |
| PREY : ALL SPECIES |   |                                 |       |             |       |             |        |        |
| All size classes   |   | 9233                            | 14674 | 17219       | 18784 | 124840      | 176415 | 281064 |
| Age class          |   | PREY : GADUS MORHUA             |       |             |       |             |        |        |
| Age class          |   | PREY : MELANOGRAMMUS AEGLEFINUS |       |             |       |             |        |        |
|                    | 0 | 3423                            | 2383  | 1518        | 915   | 1298        | 1337   | 2420   |
| Total              |   | 3423                            | 2383  | 1518        | 915   | 1298        | 1337   | 2420   |
| Age class          |   | PREY : MERLANGIUS MERLANGUS     |       |             |       |             |        |        |
|                    | 0 | 576                             | 663   | 626         | 581   | 167         | 64     | 64     |
| Total              |   | 576                             | 663   | 626         | 581   | 167         | 64     | 64     |
| Age class          |   | PREY : TRISOPTERUS ESMARKI      |       |             |       |             |        |        |
|                    | 0 | 2617                            | 4901  | 4096        | 734   | 1936        | 2703   | 4264   |
|                    | 1 | 630                             | 3585  | 6829        | 9870  | 10955       | 10252  | 12624  |
|                    | 2 | 113                             | 609   | 931         | 1361  | 1730        | 1401   | 1536   |
|                    | 3 | 5                               | 28    | 43          | 64    | 81          | 66     | 72     |
| Total              |   | 3366                            | 9123  | 11899       | 12030 | 14703       | 14422  | 18497  |
| Age class          |   | PREY : CLUPEA HARENGUS          |       |             |       |             |        |        |
|                    | 1 |                                 |       | 142         | 449   | 3261        | 3830   | 6885   |
|                    | 2 | 1                               | 55    | 265         | 725   | 17530       | 29568  | 41762  |
|                    | 3 | 1                               | 73    | 222         | 554   | 13824       | 20583  | 32972  |
|                    | 4 | 3                               | 162   | 400         | 933   | 22855       | 29763  | 54446  |
|                    | 5 | 4                               | 196   | 468         | 1078  | 33394       | 43460  | 80348  |
| Total              |   | 9                               | 487   | 1497        | 3740  | 90862       | 127200 | 216409 |
| Age class          |   | PREY : SPRATTUS SPRATTUS        |       |             |       |             |        |        |
|                    | 0 | 8                               | 4     |             |       |             |        |        |
| Total              |   | 8                               | 4     |             |       |             |        |        |
| Age class          |   | PREY : AMMODYTIDAE              |       |             |       |             |        |        |
|                    | 0 | 376                             | 414   | 186         |       | 254         | 571    | 635    |
|                    | 1 |                                 |       |             |       | 15          | 34     | 38     |
| Total              |   | 376                             | 414   | 186         |       | 269         | 605    | 673    |
| Age class          |   | PREY : OTHER                    |       |             |       |             |        |        |
| All size classes   |   | 1474                            | 1602  | 1492        | 1519  | 17542       | 32787  | 43002  |

Appendix 1-D. Average stomach content weight (g) per 1000 SAITHE stomachs by age class of prey and predator by quarter for the total North Sea.

| PREDATOR : SAIT                 |   | Area : TOTAL NORTH SEA |       | YEAR : 1991 |       | QUARTER : 4 |        |        |
|---------------------------------|---|------------------------|-------|-------------|-------|-------------|--------|--------|
| age class                       |   | 3                      | 4     | 5           | 6     | 7           | 8      | 9+     |
| PREY : ALL SPECIES              |   |                        |       |             |       |             |        |        |
| All size classes                |   | 13827                  | 21154 | 42296       | 68361 | 97602       | 112464 | 128896 |
| PREY : GADUS MORHUA             |   |                        |       |             |       |             |        |        |
| PREY : MELANOGRAMMUS AEGLEFINUS |   |                        |       |             |       |             |        |        |
| Age class                       | 0 | 1059                   | 1283  | 1491        | 2944  | 3841        | 3154   | 4640   |
|                                 | 1 | 0                      | 0     | 2           | 1     |             |        |        |
| Total                           |   | 1059                   | 1283  | 1493        | 2945  | 3841        | 3154   | 4640   |
| PREY : MERLANGIUS MERLANGUS     |   |                        |       |             |       |             |        |        |
| Age class                       | 0 | 245                    | 248   | 240         | 928   | 1152        | 519    | 377    |
| Total                           |   | 245                    | 248   | 240         | 928   | 1152        | 519    | 377    |
| PREY : TRISOPTERUS ESMARKI      |   |                        |       |             |       |             |        |        |
| Age class                       | 0 | 11126                  | 12511 | 11768       | 9156  | 7399        | 7354   | 10909  |
|                                 | 1 | 584                    | 3443  | 8820        | 9728  | 5437        | 680    | 820    |
|                                 | 2 | 14                     | 127   | 340         | 354   | 184         | 23     |        |
|                                 | 3 | 1                      | 7     | 18          | 19    | 10          | 1      |        |
| Total                           |   | 11725                  | 16088 | 20946       | 19257 | 13029       | 8058   | 11729  |
| PREY : CLUPEA HARENGUS          |   |                        |       |             |       |             |        |        |
| Age class                       | 0 | 0                      | 1     | 3           | 2     |             |        | 3504   |
|                                 | 1 | 8                      | 216   | 2101        | 5529  | 10489       | 13710  | 20706  |
|                                 | 2 | 12                     | 330   | 3353        | 8687  | 16710       | 22196  | 26343  |
|                                 | 3 | 7                      | 191   | 2057        | 5207  | 10215       | 13875  | 13179  |
|                                 | 4 | 14                     | 370   | 3998        | 10122 | 19857       | 26969  | 25611  |
|                                 | 5 | 13                     | 320   | 3452        | 8739  | 17143       | 23284  | 22111  |
| Total                           |   | 54                     | 1427  | 14964       | 38287 | 74418       | 100038 | 111459 |
| PREY : SPRATTUS SPRATTUS        |   |                        |       |             |       |             |        |        |
| PREY : AMMOODYTIDAE             |   |                        |       |             |       |             |        |        |
| Age class                       | 0 | 4                      | 5     | 2           |       |             |        |        |
| Total                           |   | 4                      | 5     | 2           |       |             |        |        |
| PREY : OTHER                    |   |                        |       |             |       |             |        |        |
| All size classes                |   | 740                    | 2102  | 4651        | 6943  | 5161        | 694    | 691    |

APPENDIX 1 AVERAGE STOMACH CONTENT TOTAL NORTH SEA

Appendix 1-E. Average stomach content weight (g) per 1000 MACKEREL stomachs by age class of prey and predator by quarter for the total North Sea.

|                    |   |                        |     |             |     |             |     |    |
|--------------------|---|------------------------|-----|-------------|-----|-------------|-----|----|
| PREDATOR : MACK    |   | Area : TOTAL NORTH SEA |     | YEAR : 1991 |     | QUARTER : 1 |     |    |
| age class          |   | 0                      | 1   | 2           | 3   | 4           | 5   | 6+ |
| PREY : ALL SPECIES |   |                        |     |             |     |             |     |    |
| All size classes   |   | 416                    | 389 | 235         | 222 | 34          | 864 |    |
| PREY : AMMODYTIDAE |   |                        |     |             |     |             |     |    |
| Age class          | 1 |                        | 0   | 230         | 217 | 33          |     |    |
| Total              |   |                        | 0   | 230         | 217 | 33          |     |    |
| PREY : OTHER       |   |                        |     |             |     |             |     |    |
| All size classes   |   | 416                    | 389 | 5           | 5   | 1           | 864 |    |

Appendix 1-E. Average stomach content weight (g) per 1000 MACKEREL stomachs by age class of prey and predator by quarter for the total North Sea.

| PREDATOR : MACK                 |   | Area : TOTAL NORTH SEA |      | YEAR : 1991 |      | QUARTER : 2 |      |    |
|---------------------------------|---|------------------------|------|-------------|------|-------------|------|----|
| age class                       |   | 0                      | 1    | 2           | 3    | 4           | 5    | 6+ |
| PREY : ALL SPECIES              |   |                        |      |             |      |             |      |    |
| All size classes                |   | 1135                   | 2443 | 3141        | 3661 | 3805        | 4975 |    |
| PREY : GADUS MORHUA             |   |                        |      |             |      |             |      |    |
| Age class                       | 0 | 1                      | 2    | 2           | 2    | 1           | 12   |    |
| Total                           |   | 1                      | 2    | 2           | 2    | 1           | 12   |    |
| PREY : MELANOGRAMMUS AEGLEFINUS |   |                        |      |             |      |             |      |    |
| Age class                       | 0 | 0                      | 0    | 0           |      |             |      |    |
| Total                           |   | 0                      | 0    | 0           |      |             |      |    |
| PREY : TRISOPTERUS ESMARKI      |   |                        |      |             |      |             |      |    |
| Age class                       | 0 | 1                      | 5    | 6           | 6    | 6           | 10   |    |
|                                 | 1 |                        | 0    | 1           | 3    | 6           | 10   |    |
| Total                           |   | 1                      | 5    | 6           | 9    | 11          | 20   |    |
| PREY : CLUPEA HARENGUS          |   |                        |      |             |      |             |      |    |
| Age class                       | 0 |                        | 4    | 11          | 24   | 24          | 28   |    |
|                                 | 1 |                        | 0    | 12          | 5    | 36          | 43   |    |
| Total                           |   |                        | 4    | 23          | 29   | 59          | 72   |    |
| PREY : SPRATTUS SPRATTUS        |   |                        |      |             |      |             |      |    |
| Age class                       | 1 | 21                     | 2    | 16          | 47   | 82          | 146  |    |
|                                 | 2 |                        | 0    | 6           | 22   | 44          | 82   |    |
|                                 | 3 |                        | 0    | 3           | 13   | 26          | 48   |    |
|                                 | 4 |                        | 0    | 1           | 2    | 4           | 8    |    |
|                                 | 5 |                        | 0    | 1           | 2    | 4           | 7    |    |
|                                 | 6 |                        |      |             |      |             | 27   |    |
| Total                           |   | 38                     | 3    | 26          | 86   | 159         | 318  |    |
| PREY : AMMOOYTIDAE              |   |                        |      |             |      |             |      |    |
| Age class                       | 0 | 69                     | 120  | 213         | 220  | 317         | 243  |    |
|                                 | 1 | 17                     | 85   | 258         | 308  | 372         | 311  |    |
|                                 | 2 | 0                      | 2    | 13          | 27   | 47          | 301  |    |
|                                 | 3 | 0                      | 26   | 112         | 43   | 92          | 242  |    |
|                                 | 4 |                        | 16   | 65          | 19   | 44          | 59   |    |
|                                 | 5 |                        | 5    | 22          | 7    | 16          | 30   |    |
|                                 | 6 |                        | 15   | 65          | 18   | 42          | 48   |    |
| Total                           |   | 87                     | 270  | 748         | 642  | 929         | 1233 |    |
| PREY : OTHER                    |   |                        |      |             |      |             |      |    |
| All size classes                |   | 1009                   | 2159 | 2335        | 2894 | 2644        | 3320 |    |

Appendix 1-E. Average stomach content weight (g) per 1000 MACKEREL stomachs by age class of prey and predator by quarter for the total North Sea.

|                             |   |                        |      |             |      |             |      |
|-----------------------------|---|------------------------|------|-------------|------|-------------|------|
| PREDATOR : MACK             |   | Area : TOTAL NORTH SEA |      | YEAR : 1991 |      | QUARTER : 3 |      |
| age class                   |   | 0                      | 1    | 2           | 3    | 4           | 5 6+ |
| PREY : ALL SPECIES          |   |                        |      |             |      |             |      |
| All size classes            |   | 847                    | 2857 | 3351        | 2734 | 2202        | 2409 |
| PREY : GADUS MORHUA         |   |                        |      |             |      |             |      |
| Age class                   | 0 |                        | 2    | 3           | 1    | 0           | 0    |
| Total                       |   |                        | 2    | 3           | 1    | 0           | 0    |
| PREY : MERLANGIUS MERLANGUS |   |                        |      |             |      |             |      |
| Age class                   | 0 |                        | 0    | 1           | 1    | 1           | 0    |
| Total                       |   |                        | 0    | 1           | 1    | 1           | 0    |
| PREY : TRISOPTERUS ESMARKI  |   |                        |      |             |      |             |      |
| Age class                   | 0 | 1                      | 121  | 150         | 224  | 59          | 46   |
|                             | 1 |                        |      | 0           | 9    | 2           | 1    |
| Total                       |   | 1                      | 121  | 151         | 232  | 61          | 47   |
| PREY : CLUPEA HARENGUS      |   |                        |      |             |      |             |      |
| Age class                   | 0 |                        | 3    | 15          | 13   | 25          | 26   |
| Total                       |   | 0                      | 3    | 15          | 13   | 25          | 26   |
| PREY : SPRATTUS SPRATTUS    |   |                        |      |             |      |             |      |
| Age class                   | 0 |                        | 0    | 0           | 0    | 0           | 0    |
|                             | 1 |                        | 0    | 3           | 7    | 20          | 21   |
| Total                       |   |                        | 1    | 4           | 7    | 20          | 21   |
| PREY : AMMODYTIDAE          |   |                        |      |             |      |             |      |
| Age class                   | 0 | 5                      | 339  | 450         | 427  | 194         | 91   |
|                             | 1 |                        | 1    | 1           | 7    | 2           | 18   |
|                             | 2 |                        | 0    | 0           | 1    | 1           | 7    |
|                             | 3 |                        | 0    | 1           | 2    | 7           | 13   |
|                             | 4 |                        | 0    | 1           | 2    | 6           | 7    |
|                             | 5 |                        | 0    | 1           | 1    | 4           | 5    |
|                             | 6 |                        | 0    | 1           | 2    | 5           | 5    |
| Total                       |   | 5                      | 341  | 456         | 441  | 219         | 146  |
| PREY : OTHER                |   |                        |      |             |      |             |      |
| All size classes            |   | 840                    | 2389 | 2722        | 2039 | 1875        | 2168 |

Appendix 1-E. Average stomach content weight (g) per 1000 MACKEREL stomachs by age class of prey and predator by quarter for the total North Sea.

|                            |   |      |                   |     |             |     |             |      |
|----------------------------|---|------|-------------------|-----|-------------|-----|-------------|------|
| PREDATOR : MACK            |   | Area | : TOTAL NORTH SEA |     | YEAR : 1991 |     | QUARTER : 4 |      |
| age class                  |   | 0    | 1                 | 2   | 3           | 4   | 5           | 6+   |
| PREY : ALL SPECIES         |   |      |                   |     |             |     |             |      |
| All size classes           |   | 1374 | 44                | 157 | 397         | 885 | 2666        | 3040 |
| PREY : TRISOPTERUS ESMARKI |   |      |                   |     |             |     |             |      |
| Age class                  | 0 |      | 7                 | 43  | 152         | 147 | 880         | 369  |
| Total                      |   |      | 7                 | 43  | 152         | 147 | 880         | 369  |
| PREY : CLUPEA HARENGUS     |   |      |                   |     |             |     |             |      |
| Age class                  | 0 |      | 1                 | 3   | 10          | 33  | 51          | 66   |
| Total                      |   |      | 1                 | 3   | 10          | 33  | 51          | 66   |
| PREY : SPRATTUS SPRATTUS   |   |      |                   |     |             |     |             |      |
| Age class                  | 0 | 63   | 1                 | 2   | 5           | 19  | 35          | 49   |
|                            | 1 |      | 0                 | 1   | 5           | 29  | 75          | 144  |
|                            | 2 |      | 0                 | 0   | 0           | 3   | 9           | 20   |
|                            | 3 |      |                   | 0   | 0           | 1   | 3           | 8    |
|                            | 4 |      |                   | 0   | 0           | 0   | 0           | 0    |
| Total                      |   | 63   | 1                 | 3   | 11          | 53  | 123         | 221  |
| PREY : AMMODYTIDAE         |   |      |                   |     |             |     |             |      |
| Age class                  | 0 | 147  | 0                 | 3   | 13          | 99  | 284         | 400  |
|                            | 1 |      |                   | 0   | 1           | 9   | 25          | 35   |
|                            | 6 |      |                   |     |             |     |             | 31   |
| Total                      |   | 147  | 0                 | 3   | 14          | 108 | 309         | 466  |
| PREY : OTHER               |   |      |                   |     |             |     |             |      |
| All size classes           |   | 1164 | 34                | 105 | 210         | 544 | 1303        | 1918 |

APPENDIX 2 AVERAGE PREY WEIGHTS.

Appendix 2-A. Average prey weight (g) at time of ingestion for COD by age class of prey and predator by quarter for the total North Sea.

| PREDATOR : COD                  |   | Area : TOTAL NORTH SEA |        |        | YEAR : 1981 |        | QUARTER : 1 |       |
|---------------------------------|---|------------------------|--------|--------|-------------|--------|-------------|-------|
| Age class                       |   | 0                      | 1      | 2      | 3           | 4      | 5           | 6+    |
| PREY : ALL SPECIES              |   |                        |        |        |             |        |             |       |
| All size classes                |   | 0.70                   | 2.12   | 9.22   | 20.67       | 22.38  | 29.45       |       |
| PREY : GADUS MORHUA             |   |                        |        |        |             |        |             |       |
| Age class                       | 1 |                        | 56.63  | 52.43  | 64.22       | 62.47  | 40.89       |       |
|                                 | 2 |                        | 270.85 | 180.92 | 156.40      | 160.53 | 141.68      |       |
|                                 | 3 |                        |        |        | 213.43      | 183.79 | 105.65      |       |
| Total                           |   |                        | 75.20  | 81.35  | 82.27       | 97.48  | 108.96      |       |
| PREY : MELANOGRAMMUS AEGLEFINUS |   |                        |        |        |             |        |             |       |
| Age class                       | 1 | 7.84                   | 15.49  | 18.48  | 26.11       | 30.00  | 30.78       |       |
|                                 | 2 |                        | 64.29  | 83.04  | 112.16      | 108.52 | 122.91      |       |
|                                 | 3 |                        | 122.73 | 127.01 | 122.21      | 108.94 | 133.44      |       |
|                                 | 4 |                        | 140.80 | 121.52 | 115.58      | 84.95  | 116.46      |       |
| Total                           |   | 7.84                   | 16.18  | 29.71  | 64.86       | 71.42  | 63.23       |       |
| PREY : MERLANGIUS MERLANGUS     |   |                        |        |        |             |        |             |       |
| Age class                       | 1 | 0.18                   | 24.20  | 27.88  | 32.31       | 34.19  | 30.42       |       |
|                                 | 2 |                        | 63.98  | 63.73  | 101.25      | 105.34 | 46.72       |       |
|                                 | 3 |                        | 196.89 | 136.52 | 139.39      | 142.13 | 108.95      |       |
|                                 | 4 |                        | 499.80 | 196.56 | 193.79      | 200.15 | 210.42      |       |
|                                 | 5 |                        | 499.80 | 207.65 | 201.40      | 210.46 | 221.30      |       |
|                                 | 6 |                        | 499.80 | 199.96 | 240.09      | 319.53 | 296.28      |       |
| Total                           |   | 0.18                   | 31.47  | 51.11  | 81.70       | 77.34  | 49.45       |       |
| PREY : TRISOPTERUS ESMARKI      |   |                        |        |        |             |        |             |       |
| Age class                       | 1 |                        | 9.01   | 5.94   | 8.16        | 8.83   | 9.19        | 10.88 |
|                                 | 2 |                        | 9.01   | 14.38  | 14.89       | 20.78  | 24.01       | 25.54 |
|                                 | 3 |                        |        | 32.29  | 19.77       | 26.78  | 29.83       | 30.93 |
| Total                           |   |                        | 8.67   | 6.51   | 10.66       | 13.77  | 15.40       | 17.60 |
| PREY : CLUPEA HARENGUS          |   |                        |        |        |             |        |             |       |
| Age class                       | 1 | 19.20                  | 19.43  | 25.68  | 29.00       | 31.52  | 33.66       |       |
|                                 | 2 |                        | 32.28  | 25.90  | 33.57       | 42.27  | 38.20       |       |
|                                 | 3 |                        | 44.24  | 79.31  | 93.72       | 93.42  | 80.51       |       |
| Total                           |   | 19.20                  | 19.87  | 33.96  | 38.69       | 39.87  | 48.91       |       |
| PREY : SPRATTUS SPRATTUS        |   |                        |        |        |             |        |             |       |
| Age class                       | 1 | 2.11                   | 3.20   | 2.92   | 3.93        | 4.53   | 5.90        |       |
|                                 | 2 | 5.41                   | 8.45   | 11.17  | 10.75       | 9.89   | 8.00        |       |
|                                 | 3 | 10.40                  | 12.86  | 14.12  | 13.00       | 12.55  | 9.62        |       |
|                                 | 4 | 10.40                  | 12.86  | 14.12  | 13.00       | 12.55  | 9.62        |       |
| Total                           |   | 2.90                   | 6.42   | 9.54   | 9.02        | 8.74   | 7.44        |       |
| PREY : AMMOYTIDAE               |   |                        |        |        |             |        |             |       |
| Age class                       | 0 |                        | 0.20   | 0.22   |             |        |             |       |
|                                 | 1 | 2.93                   | 3.18   | 5.02   | 4.01        | 3.52   | 2.91        |       |
|                                 | 2 | 4.61                   | 7.75   | 12.31  | 10.78       | 8.19   | 5.14        |       |
|                                 | 3 |                        | 32.55  | 26.22  | 24.79       | 24.80  |             |       |
|                                 | 4 |                        | 32.55  | 26.22  | 24.79       | 24.80  |             |       |
|                                 | 5 |                        | 32.55  | 26.22  | 24.79       | 24.80  |             |       |
|                                 | 6 |                        | 32.55  | 26.22  | 24.79       | 24.80  |             |       |
| Total                           |   | 3.08                   | 4.12   | 10.41  | 8.94        | 6.64   | 3.43        |       |
| PREY : OTHER                    |   |                        |        |        |             |        |             |       |
| All size classes                |   | 0.60                   | 1.57   | 5.02   | 8.69        | 9.73   | 23.23       |       |

Appendix 2-A. Average prey weight (g) at time of ingestion for COO by age class of prey and predator by quarter for the total North Sea.

| PREDATOR : COD   |   | Area                            | TOTAL NORTH SEA |        |        | YEAR : 1981 | QUARTER : 2 |        |    |
|------------------|---|---------------------------------|-----------------|--------|--------|-------------|-------------|--------|----|
| Age class        |   |                                 | 0               | 1      | 2      | 3           | 4           | 5      | 6+ |
| All size classes |   | PREY : ALL SPECIES              | 0.76            | 1.22   | 1.86   | 2.05        | 2.04        | 5.68   |    |
| Age class        |   | PREY : GADUS MORHUA             |                 |        |        |             |             |        |    |
|                  | 0 |                                 | 0.71            | 1.13   | 1.88   | 2.13        | 0.54        |        |    |
|                  | 1 |                                 | 12.16           | 33.31  | 45.51  | 51.80       | 51.52       | 40.24  |    |
|                  | 2 |                                 |                 | 137.60 | 162.40 | 190.44      | 191.61      | 172.31 |    |
|                  | 3 |                                 |                 |        | 502.68 | 502.68      | 502.68      | 502.68 |    |
| Total            |   |                                 | 0.76            | 1.84   | 15.22  | 65.42       | 71.96       | 69.17  |    |
| Age class        |   | PREY : MELANOGRAMMUS AEGLEFINUS |                 |        |        |             |             |        |    |
|                  | 0 |                                 | 18.16           | 4.91   | 9.50   | 8.11        | 8.13        | 8.13   |    |
|                  | 1 |                                 | 18.16           | 23.75  | 51.24  | 26.52       | 20.82       | 22.85  |    |
|                  | 2 |                                 |                 | 50.57  | 81.81  | 116.68      | 105.32      | 76.76  |    |
|                  | 3 |                                 |                 |        | 221.40 | 229.44      | 231.70      | 231.92 |    |
| Total            |   |                                 | 18.16           | 20.41  | 57.66  | 53.41       | 64.01       | 52.96  |    |
| Age class        |   | PREY : MERLANGIUS MERLANGUS     |                 |        |        |             |             |        |    |
|                  | 0 |                                 | 16.48           | 1.39   | 1.24   | 4.18        | 4.49        | 4.49   |    |
|                  | 1 |                                 | 16.48           | 17.19  | 21.15  | 61.24       | 62.30       | 96.86  |    |
|                  | 2 |                                 |                 | 78.03  | 89.99  | 83.95       | 84.89       | 121.79 |    |
|                  | 3 |                                 |                 | 97.03  | 131.46 | 137.08      | 156.30      | 164.45 |    |
|                  | 4 |                                 |                 |        | 137.10 | 160.47      | 175.87      | 168.73 |    |
|                  | 5 |                                 |                 |        | 281.60 | 281.60      | 281.60      | 171.26 |    |
|                  | 6 |                                 |                 |        | 281.60 | 281.60      | 281.60      | 171.26 |    |
| Total            |   |                                 | 16.48           | 16.24  | 29.72  | 66.65       | 74.40       | 129.31 |    |
| Age class        |   | PREY : TRISOPTERUS ESMARKI      |                 |        |        |             |             |        |    |
|                  | 0 |                                 |                 | 1.96   | 1.05   | 1.74        | 2.86        | 1.79   |    |
|                  | 1 |                                 | 10.56           | 17.51  | 22.07  | 24.36       | 22.03       | 17.65  |    |
|                  | 2 |                                 |                 | 34.85  | 64.17  | 46.34       | 42.36       | 36.52  |    |
|                  | 3 |                                 |                 | 53.66  | 75.31  | 50.69       | 46.67       | 42.10  |    |
| Total            |   |                                 | 10.56           | 14.54  | 13.71  | 24.02       | 24.80       | 14.01  |    |
| Age class        |   | PREY : CLUPEA HARENGUS          |                 |        |        |             |             |        |    |
|                  | 1 |                                 | 0.53            | 14.94  | 27.49  | 82.08       | 130.89      | 61.87  |    |
|                  | 2 |                                 | 4.22            | 38.62  | 86.39  | 160.74      | 274.82      | 148.01 |    |
| Total            |   |                                 | 0.54            | 16.84  | 39.34  | 118.77      | 233.78      | 110.35 |    |
| Age class        |   | PREY : SPRATTUS SPRATTUS        |                 |        |        |             |             |        |    |
|                  | 0 |                                 | 0.67            | 5.50   | 1.73   | 10.40       | 12.80       | 12.08  |    |
|                  | 1 |                                 | 4.71            | 12.60  | 17.82  | 23.33       | 21.73       | 17.35  |    |
|                  | 2 |                                 | 14.60           | 19.21  | 19.74  | 25.35       | 25.68       | 22.02  |    |
|                  | 3 |                                 | 17.09           | 22.08  | 23.66  | 27.50       | 26.34       | 23.09  |    |
| Total            |   |                                 | 2.08            | 14.20  | 18.35  | 24.66       | 23.65       | 19.31  |    |
| Age class        |   | PREY : AMMODYTIDAE              |                 |        |        |             |             |        |    |
|                  | 0 |                                 | 0.62            | 0.83   | 0.76   | 0.73        | 0.75        | 0.81   |    |
|                  | 1 |                                 | 4.21            | 2.36   | 2.54   | 1.93        | 2.07        | 1.80   |    |
|                  | 2 |                                 | 6.43            | 10.07  | 10.58  | 2.39        | 11.09       | 0.66   |    |
|                  | 3 |                                 | 7.58            | 15.03  | 18.25  | 3.26        | 19.30       | 0.47   |    |
|                  | 4 |                                 | 7.24            | 16.94  | 20.99  | 6.60        | 23.33       | 0.72   |    |
|                  | 5 |                                 | 10.67           | 18.21  | 21.49  | 4.59        | 24.81       | 0.51   |    |
|                  | 6 |                                 | 10.67           | 21.97  | 23.86  | 10.96       | 29.15       | 1.11   |    |
| Total            |   |                                 | 1.66            | 1.47   | 1.71   | 1.39        | 1.53        | 0.96   |    |
| All size classes |   | PREY : OTHER                    | 0.64            | 0.98   | 1.49   | 1.37        | 1.35        | 4.25   |    |

Appendix 2-A. Average prey weight (g) at time of ingestion for COD by age class of prey and predator by quarter for the total North Sea.

| PREDATOR : COD                  |  | Area : | TOTAL NORTH SEA |        |        | YEAR : 1981 |        | QUARTER : 3 |        |
|---------------------------------|--|--------|-----------------|--------|--------|-------------|--------|-------------|--------|
| Age class                       |  |        | 0               | 1      | 2      | 3           | 4      | 5           | 6+     |
| PREY : ALL SPECIES              |  |        |                 |        |        |             |        |             |        |
| All size classes                |  | 0.23   | 1.05            | 2.13   | 2.72   | 10.37       | 23.77  | 94.27       |        |
| PREY : GADUS MORHUA             |  |        |                 |        |        |             |        |             |        |
| Age class                       |  |        |                 |        |        |             |        |             |        |
| 0                               |  |        | 8.71            | 7.98   | 27.71  | 15.91       | 12.30  | 13.18       |        |
| 1                               |  |        |                 | 99.20  | 107.47 | 110.21      | 111.12 | 110.90      |        |
| 2                               |  |        |                 |        | 13.60  | 13.60       | 13.60  | 13.60       |        |
| Total                           |  |        | 8.71            | 8.03   | 32.80  | 25.55       | 23.56  | 24.04       |        |
| PREY : MELANOGRAMMUS AEGLEFINUS |  |        |                 |        |        |             |        |             |        |
| Age class                       |  |        |                 |        |        |             |        |             |        |
| 0                               |  |        | 4.58            | 8.76   | 11.78  | 11.31       | 11.85  | 7.16        |        |
| 1                               |  |        | 11.14           | 80.98  | 109.45 | 119.37      | 120.02 | 126.83      |        |
| 2                               |  |        |                 | 118.15 | 160.39 | 153.53      | 216.22 | 452.52      |        |
| 3                               |  |        |                 | 85.84  | 122.63 | 140.39      | 254.61 | 566.02      |        |
| 4                               |  |        |                 |        | 152.71 | 152.71      | 273.85 | 1014.19     |        |
| 5                               |  |        |                 |        |        |             |        | 1433.83     |        |
| Total                           |  |        | 4.59            | 10.48  | 26.42  | 62.36       | 88.61  | 326.06      |        |
| PREY : MERLANGIUS MERLANGUS     |  |        |                 |        |        |             |        |             |        |
| Age class                       |  |        |                 |        |        |             |        |             |        |
| 0                               |  |        | 8.00            | 6.63   | 6.51   | 7.25        | 38.00  |             |        |
| 1                               |  |        |                 | 46.52  | 60.04  | 65.65       | 122.62 | 135.05      | 197.03 |
| 2                               |  |        |                 |        | 120.23 | 150.91      | 148.84 | 215.00      | 311.13 |
| 3                               |  |        |                 |        | 151.36 | 340.39      | 300.51 | 352.40      | 340.00 |
| 4                               |  |        |                 |        | 208.00 | 358.78      | 401.47 | 387.26      | 358.00 |
| 5                               |  |        |                 |        |        | 441.60      | 441.60 | 441.60      | 441.60 |
| 6                               |  |        |                 |        |        | 441.60      | 441.60 | 441.60      | 441.60 |
| Total                           |  |        | 8.00            | 6.67   | 10.23  | 32.60       | 148.34 | 207.22      | 298.55 |
| PREY : TRISOPTERUS ESMARKI      |  |        |                 |        |        |             |        |             |        |
| Age class                       |  |        |                 |        |        |             |        |             |        |
| 0                               |  |        |                 | 2.83   | 5.69   | 13.59       | 18.37  | 17.73       | 13.22  |
| 1                               |  |        |                 |        | 35.17  | 42.02       | 42.25  | 42.04       | 56.99  |
| 2                               |  |        |                 |        | 35.78  | 43.12       | 45.08  | 46.31       | 60.37  |
| Total                           |  |        |                 | 2.83   | 8.14   | 19.11       | 21.44  | 20.02       | 18.41  |
| PREY : CLUPEA HARENGUS          |  |        |                 |        |        |             |        |             |        |
| Age class                       |  |        |                 |        |        |             |        |             |        |
| 0                               |  |        |                 | 22.12  | 18.44  | 13.84       | 12.83  | 19.69       |        |
| 1                               |  |        |                 | 29.44  | 89.14  | 60.68       | 49.52  | 55.32       |        |
| 2                               |  |        |                 | 29.44  | 118.92 | 114.54      | 92.64  | 106.58      |        |
| 3                               |  |        |                 |        | 36.19  | 116.81      | 255.72 | 298.01      | 301.88 |
| Total                           |  |        |                 | 22.24  | 32.46  | 86.74       | 228.45 | 267.11      | 301.88 |
| PREY : SPRATTUS SPRATTUS        |  |        |                 |        |        |             |        |             |        |
| Age class                       |  |        |                 |        |        |             |        |             |        |
| 0                               |  |        |                 | 4.85   | 2.65   | 2.72        | 3.19   | 3.05        | 3.04   |
| 1                               |  |        |                 | 9.38   | 16.69  | 8.37        | 4.24   | 4.24        |        |
| 2                               |  |        |                 | 21.86  | 23.39  | 9.68        | 4.24   | 4.24        |        |
| 3                               |  |        |                 | 36.85  | 36.38  | 9.92        |        |             |        |
| Total                           |  |        |                 | 10.16  | 18.18  | 8.48        | 4.03   | 3.32        | 3.04   |
| PREY : AMMODYTIDAE              |  |        |                 |        |        |             |        |             |        |
| Age class                       |  |        |                 |        |        |             |        |             |        |
| 0                               |  |        |                 | 2.07   | 1.57   | 2.21        | 2.14   | 2.10        | 2.25   |
| 1                               |  |        |                 |        | 9.87   | 12.96       | 15.74  | 14.03       | 3.97   |
| 2                               |  |        |                 |        | 6.35   | 7.27        | 8.20   | 7.12        | 4.09   |
| 3                               |  |        |                 |        | 12.95  | 17.66       | 21.09  | 20.51       | 3.97   |
| 4                               |  |        |                 |        | 12.95  | 17.66       | 21.09  | 20.51       |        |
| Total                           |  |        |                 | 2.07   | 1.65   | 2.55        | 2.47   | 2.15        | 2.26   |
| PREY : OTHER                    |  |        |                 |        |        |             |        |             |        |
| All size classes                |  | 0.23   | 0.86            | 1.31   | 1.26   | 5.94        | 19.50  | 91.39       |        |

Appendix 2-A. Average prey weight (g) at time of ingestion for COD by age class of prey and predator by quarter for the total North Sea.

| PREDATOR : COD                  |       | Area : TOTAL NORTH SEA |        | YEAR : 1981 |        | QUARTER : 4 |        |       |
|---------------------------------|-------|------------------------|--------|-------------|--------|-------------|--------|-------|
| Age class                       |       | 0                      | 1      | 2           | 3      | 4           | 5      | 6+    |
| PREY : ALL SPECIES              |       | 0.63                   | 2.19   | 4.36        | 13.09  | 22.37       | 24.35  | 31.73 |
| All size classes                |       |                        |        |             |        |             |        |       |
| PREY : GADUS MORHUA             |       |                        |        |             |        |             |        |       |
| Age class                       |       |                        |        |             |        |             |        |       |
| 0                               | 24.48 | 24.14                  | 10.54  | 28.22       | 39.49  | 53.40       | 98.70  |       |
| 1                               |       |                        | 381.90 | 377.51      | 377.44 | 292.45      | 358.66 |       |
| 2                               |       |                        | 637.21 | 607.77      | 565.12 | 584.70      | 617.91 |       |
| 3                               |       |                        | 641.83 | 619.42      | 585.96 | 601.47      | 627.21 |       |
| Total                           | 24.48 | 24.14                  | 18.12  | 164.87      | 248.36 | 320.26      | 272.29 |       |
| PREY : MELANOGRAMMUS AEGLEFINUS |       |                        |        |             |        |             |        |       |
| Age class                       |       |                        |        |             |        |             |        |       |
| 0                               |       | 12.02                  | 12.58  | 13.81       | 14.80  | 14.51       | 25.88  |       |
| 1                               |       | 46.44                  | 48.86  | 102.89      | 128.21 | 130.86      | 140.56 |       |
| 2                               |       |                        | 340.36 | 304.10      | 257.87 | 262.45      | 271.27 |       |
| 3                               |       |                        | 402.75 | 355.82      | 290.21 | 299.19      | 277.19 |       |
| 4                               |       |                        | 148.78 | 147.50      | 144.65 | 144.54      | 147.23 |       |
| 5                               |       |                        | 148.78 | 147.50      | 144.65 | 144.54      | 147.23 |       |
| Total                           |       | 12.05                  | 12.85  | 18.81       | 26.82  | 28.57       | 115.20 |       |
| PREY : MERLANGIUS MERLANGUS     |       |                        |        |             |        |             |        |       |
| Age class                       |       |                        |        |             |        |             |        |       |
| 0                               |       | 5.97                   | 13.96  | 28.43       | 49.78  | 37.42       | 49.84  |       |
| 1                               |       | 110.38                 | 107.56 | 107.02      | 104.85 | 91.15       | 84.67  |       |
| 2                               |       | 110.40                 | 123.86 | 148.45      | 150.73 | 138.96      | 103.53 |       |
| 3                               |       |                        | 198.03 | 192.18      | 193.75 | 199.32      | 111.08 |       |
| 4                               |       |                        | 271.32 | 227.17      | 230.16 | 291.46      | 337.39 |       |
| 5                               |       |                        | 340.04 | 340.04      | 340.04 | 340.04      | 340.04 |       |
| 6                               |       |                        | 340.04 | 340.04      | 340.04 | 340.04      | 340.04 |       |
| Total                           |       | 9.73                   | 29.17  | 111.70      | 121.10 | 104.72      | 99.24  |       |
| PREY : TRISOPTERUS ESMARKI      |       |                        |        |             |        |             |        |       |
| Age class                       |       |                        |        |             |        |             |        |       |
| 0                               | 6.40  | 4.35                   | 5.76   | 6.17        | 6.57   | 6.35        | 7.89   |       |
| 1                               |       | 12.68                  | 15.08  | 16.91       | 18.47  | 19.08       | 18.67  |       |
| 2                               |       | 36.57                  | 36.06  | 36.01       | 43.01  | 48.51       | 46.25  |       |
| Total                           | 6.40  | 6.73                   | 7.72   | 8.21        | 9.89   | 9.77        | 8.48   |       |
| PREY : CLUPEA HARENGUS          |       |                        |        |             |        |             |        |       |
| Age class                       |       |                        |        |             |        |             |        |       |
| 0                               |       | 15.80                  | 16.67  | 13.60       | 27.47  | 68.80       | 68.80  |       |
| 1                               |       | 40.29                  | 41.67  | 53.28       | 55.60  | 85.44       | 85.44  |       |
| 2                               |       | 62.40                  | 62.28  | 62.22       | 55.64  | 85.50       | 85.50  |       |
| 3                               |       | 24.48                  | 25.01  | 42.57       | 51.96  | 114.99      | 114.99 |       |
| 4                               |       | 24.48                  | 24.65  | 32.34       | 45.45  | 141.39      | 141.39 |       |
| 5                               |       | 24.48                  | 24.57  | 28.46       | 38.93  | 155.20      | 155.20 |       |
| 6                               |       | 24.48                  | 68.47  | 205.25      | 214.15 | 214.89      | 214.74 |       |
| Total                           |       | 16.64                  | 17.87  | 20.55       | 86.98  | 159.05      | 137.63 |       |
| PREY : SPRATTUS SPRATTUS        |       |                        |        |             |        |             |        |       |
| Age class                       |       |                        |        |             |        |             |        |       |
| 1                               | 0.29  | 1.65                   | 6.83   | 12.97       | 16.83  | 15.37       | 16.85  |       |
| 2                               |       | 10.29                  | 14.39  | 15.03       | 16.92  | 15.37       | 16.85  |       |
| 3                               |       | 17.34                  | 18.12  | 17.22       | 16.94  | 15.37       | 16.85  |       |
| 4                               |       | 17.34                  | 18.12  | 17.22       | 16.94  | 15.37       | 16.85  |       |
| Total                           | 0.29  | 2.48                   | 9.52   | 14.09       | 16.88  | 15.37       | 16.85  |       |
| PREY : AMMOODYTIDAE             |       |                        |        |             |        |             |        |       |
| Age class                       |       |                        |        |             |        |             |        |       |
| 0                               | 0.84  | 3.62                   | 2.12   | 3.81        | 4.52   | 5.41        | 3.80   |       |
| 1                               |       | 6.84                   | 8.67   | 14.33       | 14.41  | 14.41       | 19.63  |       |
| 2                               |       | 6.91                   | 9.15   | 15.03       | 15.10  | 15.10       | 20.50  |       |
| 3                               |       | 8.08                   | 16.47  | 24.66       | 24.56  | 24.56       | 31.81  |       |
| 4                               |       | 9.05                   | 21.55  | 30.47       | 30.24  | 30.24       | 37.99  |       |
| 5                               |       | 10.20                  | 26.62  | 35.67       | 35.31  | 35.31       | 43.16  |       |
| 6                               |       | 10.20                  | 26.64  | 35.94       | 35.51  | 35.98       | 43.24  |       |
| Total                           | 0.46  | 4.26                   | 2.52   | 6.14        | 6.86   | 11.66       | 11.31  |       |
| PREY : OTHER                    |       |                        |        |             |        |             |        |       |
| All size classes                |       | 0.63                   | 2.05   | 3.57        | 8.78   | 17.34       | 19.86  | 25.89 |

## APPENDIX 2 AVERAGE PREY WEIGHTS.

Appendix 2-A. Average prey weight (g) at time of ingestion for COD by age class of prey and predator by quarter for the total North Sea.

| PREDATOR : COD   |   | Area :                          | TOTAL NORTH SEA |        |        | YEAR : 1985 | QUARTER : 1 |        |    |
|------------------|---|---------------------------------|-----------------|--------|--------|-------------|-------------|--------|----|
| Age class        |   |                                 | 0               | 1      | 2      | 3           | 4           | 5      | 6+ |
| All size classes |   | PREY : ALL SPECIES              | 0.49            | 2.71   | 6.19   | 18.01       | 24.31       | 34.72  |    |
| Age class        |   | PREY : GADUS MORHUA             |                 |        |        |             |             |        |    |
|                  | 1 |                                 |                 | 58.40  | 26.80  | 25.49       | 44.44       | 54.20  |    |
|                  | 2 |                                 |                 | 177.92 | 47.41  | 59.65       | 84.42       | 113.46 |    |
|                  | 3 |                                 |                 |        |        | 129.32      | 110.66      | 110.66 |    |
| Total            |   |                                 |                 | 59.69  | 38.47  | 52.34       | 82.44       | 109.17 |    |
| Age class        |   | PREY : MELANOGRAMMUS AEGLEFINUS |                 |        |        |             |             |        |    |
|                  | 1 |                                 |                 | 17.60  | 24.72  | 40.58       | 36.82       | 25.08  |    |
|                  | 2 |                                 |                 | 89.97  | 99.61  | 118.73      | 117.07      | 110.90 |    |
|                  | 3 |                                 |                 | 220.26 | 194.71 | 171.91      | 181.33      | 202.43 |    |
|                  | 4 |                                 |                 |        | 223.99 | 180.15      | 186.62      | 207.07 |    |
|                  | 5 |                                 |                 |        |        | 206.30      | 206.40      | 206.40 |    |
| Total            |   |                                 |                 | 20.16  | 42.45  | 86.78       | 87.57       | 88.36  |    |
| Age class        |   | PREY : MERLANGIUS MERLANGUS     |                 |        |        |             |             |        |    |
|                  | 1 |                                 | 8.27            | 14.38  | 35.80  | 25.96       | 31.03       | 22.87  |    |
|                  | 2 |                                 |                 | 73.22  | 80.87  | 62.50       | 75.30       | 89.13  |    |
|                  | 3 |                                 |                 | 98.14  | 130.66 | 83.44       | 86.92       | 115.78 |    |
|                  | 4 |                                 |                 | 106.10 | 144.97 | 118.41      | 118.80      | 172.95 |    |
|                  | 5 |                                 |                 | 182.40 | 144.10 | 135.08      | 129.53      | 200.64 |    |
|                  | 6 |                                 |                 | 182.40 | 135.62 | 149.15      | 138.70      | 179.69 |    |
| Total            |   |                                 | 8.27            | 23.72  | 62.81  | 54.50       | 63.57       | 83.88  |    |
| Age class        |   | PREY : TRISOPTERUS ESMARKI      |                 |        |        |             |             |        |    |
|                  | 0 |                                 |                 | 1.02   | 1.02   |             |             |        |    |
|                  | 1 |                                 |                 | 7.23   | 10.64  | 13.81       | 14.06       | 14.47  |    |
|                  | 2 |                                 |                 | 16.87  | 23.61  | 23.62       | 23.08       | 22.28  |    |
|                  | 3 |                                 |                 | 45.98  | 44.98  | 32.53       | 32.02       | 35.09  |    |
|                  | 4 |                                 |                 | 51.03  | 46.26  | 32.85       | 31.89       | 35.04  |    |
| Total            |   |                                 | 0.86            | 8.62   | 14.32  | 18.24       | 18.11       | 17.49  |    |
| Age class        |   | PREY : CLUPEA HARENGUS          |                 |        |        |             |             |        |    |
|                  | 1 |                                 | 1.10            | 1.56   | 1.34   |             |             |        |    |
|                  | 2 |                                 | 8.67            | 9.21   | 18.99  | 16.56       | 20.09       | 20.77  |    |
|                  | 3 |                                 |                 | 27.86  | 57.51  | 61.66       | 55.03       | 50.41  |    |
|                  | 4 |                                 |                 | 25.35  | 72.27  | 87.59       | 86.18       | 68.02  |    |
|                  | 5 |                                 |                 | 26.09  | 103.52 | 106.38      | 99.73       | 76.70  |    |
|                  | 6 |                                 |                 | 67.14  | 88.64  | 104.29      | 116.46      | 80.65  |    |
| Total            |   |                                 | 2.64            | 7.26   | 29.45  | 58.05       | 52.74       | 38.32  |    |
| Age class        |   | PREY : SPRATTUS SPRATTUS        |                 |        |        |             |             |        |    |
|                  | 1 |                                 | 2.87            | 2.46   | 1.49   | 1.49        | 2.18        | 2.18   |    |
|                  | 2 |                                 | 1.51            | 6.21   | 3.71   | 5.90        | 9.55        | 9.56   |    |
|                  | 3 |                                 |                 | 8.66   | 10.20  | 9.24        | 17.16       | 16.07  |    |
|                  | 4 |                                 |                 | 9.59   | 14.78  | 17.43       | 21.16       | 18.78  |    |
|                  | 5 |                                 |                 | 10.85  | 13.58  | 21.48       | 25.97       | 24.07  |    |
|                  | 6 |                                 |                 | 11.27  | 12.40  | 24.24       | 26.16       | 24.31  |    |
| Total            |   |                                 | 2.41            | 4.67   | 3.35   | 2.18        | 10.78       | 10.90  |    |
| Age class        |   | PREY : AMMODYTIDAE              |                 |        |        |             |             |        |    |
|                  | 1 |                                 | 0.98            | 2.17   | 1.53   | 5.91        | 6.15        | 4.17   |    |
|                  | 2 |                                 |                 | 6.47   | 9.14   | 11.04       | 10.69       | 8.09   |    |
|                  | 3 |                                 |                 | 11.22  | 11.92  | 13.01       | 12.87       | 14.87  |    |
|                  | 4 |                                 |                 | 11.34  | 13.43  | 11.20       | 11.24       | 14.34  |    |
|                  | 6 |                                 |                 | 32.71  | 57.70  | 43.89       | 32.37       |        |    |
| Total            |   |                                 | 0.97            | 4.36   | 3.47   | 8.54        | 8.76        | 5.41   |    |
| All size classes |   | PREY : OTHER                    | 0.47            | 1.83   | 2.61   | 8.36        | 17.98       | 33.28  |    |

Appendix 2-A. Average prey weight (g) at time of ingestion for COD by age class of prey and predator by quarter for the total North Sea.

| PREDATOR : COD                  |  | Area : TOTAL NORTH SEA |       |        | YEAR : 1985 |        | QUARTER : 3 |        |
|---------------------------------|--|------------------------|-------|--------|-------------|--------|-------------|--------|
| Age class                       |  | 0                      | 1     | 2      | 3           | 4      | 5           | 6+     |
| PREY : ALL SPECIES              |  |                        |       |        |             |        |             |        |
| All size classes                |  | 0.13                   | 0.99  | 4.40   | 13.59       | 21.07  | 17.18       | 17.70  |
| PREY : GADUS MORHUA             |  |                        |       |        |             |        |             |        |
| Age class                       |  |                        |       |        |             |        |             |        |
| 0                               |  |                        | 6.76  | 4.36   | 8.21        | 23.04  | 23.04       |        |
| 1                               |  |                        |       |        | 171.62      | 150.78 | 141.48      | 127.45 |
| 2                               |  |                        |       |        | 337.76      | 238.78 | 231.23      | 240.89 |
| 3                               |  |                        |       |        | 331.52      | 331.52 | 331.52      |        |
| Total                           |  |                        | 6.76  | 4.36   | 113.91      | 179.02 | 191.60      | 224.13 |
| PREY : MELANOGRAMMUS AEGLEFINUS |  |                        |       |        |             |        |             |        |
| Age class                       |  |                        |       |        |             |        |             |        |
| 0                               |  |                        | 2.92  | 5.88   | 8.69        | 2.70   | 4.06        | 4.64   |
| 1                               |  |                        | 2.90  | 65.51  | 69.98       | 126.39 | 167.44      | 191.30 |
| 2                               |  |                        |       | 307.02 | 287.79      | 255.59 | 240.53      | 255.63 |
| Total                           |  |                        | 2.92  | 9.07   | 41.84       | 67.77  | 83.10       | 111.85 |
| PREY : MERLANGIUS MERLANGUS     |  |                        |       |        |             |        |             |        |
| Age class                       |  |                        |       |        |             |        |             |        |
| 0                               |  |                        | 4.19  |        | 4.15        | 4.75   | 4.45        | 4.45   |
| 1                               |  |                        |       |        | 73.97       | 82.98  | 117.27      | 90.25  |
| 2                               |  |                        |       |        | 122.08      | 201.87 | 176.40      | 133.99 |
| 3                               |  |                        |       |        | 191.81      | 257.56 | 201.99      | 170.40 |
| 4                               |  |                        |       |        | 187.92      | 258.05 | 205.04      | 192.93 |
| 5                               |  |                        |       |        |             | 204.80 | 204.80      | 204.80 |
| 6                               |  |                        |       |        |             | 204.80 | 204.80      | 204.80 |
| Total                           |  |                        | 4.19  | 17.07  | 57.65       | 131.74 | 87.17       | 88.47  |
| PREY : TRISOPTERUS ESMARKI      |  |                        |       |        |             |        |             |        |
| Age class                       |  |                        |       |        |             |        |             |        |
| 0                               |  |                        | 1.45  | 2.47   | 3.72        | 4.34   | 3.94        | 3.97   |
| 1                               |  |                        |       | 25.71  | 21.92       | 27.13  | 19.45       | 20.63  |
| 2                               |  |                        |       | 33.39  | 30.89       | 37.77  | 27.00       | 28.86  |
| 3                               |  |                        |       | 35.50  | 34.92       | 46.46  | 44.52       | 35.14  |
| Total                           |  |                        | 1.45  | 8.19   | 14.09       | 20.24  | 12.50       | 25.12  |
| PREY : CLUPEA HARENGUS          |  |                        |       |        |             |        |             |        |
| Age class                       |  |                        |       |        |             |        |             |        |
| 1                               |  |                        | 4.99  | 11.35  | 6.48        | 3.83   | 16.64       | 24.34  |
| 2                               |  |                        | 14.95 | 21.45  | 57.51       | 70.54  | 49.47       | 71.96  |
| 3                               |  |                        |       | 152.11 | 59.55       | 46.17  | 53.30       | 58.38  |
| 4                               |  |                        |       | 183.77 | 157.27      | 42.09  | 51.00       | 52.82  |
| 5                               |  |                        |       | 183.77 | 157.27      | 42.09  | 51.00       | 52.82  |
| Total                           |  |                        | 5.03  | 22.48  | 53.88       | 56.54  | 50.75       | 63.76  |
| PREY : SPRATTUS SPRATTUS        |  |                        |       |        |             |        |             |        |
| Age class                       |  |                        |       |        |             |        |             |        |
| 1                               |  |                        | 31.69 | 31.69  | 31.69       |        |             |        |
| 2                               |  |                        | 31.69 | 31.69  | 31.69       |        |             |        |
| 3                               |  |                        | 31.69 | 31.69  | 31.69       |        |             |        |
| Total                           |  |                        | 31.69 | 31.69  | 31.69       |        |             |        |
| PREY : AMMODYTIDAE              |  |                        |       |        |             |        |             |        |
| Age class                       |  |                        |       |        |             |        |             |        |
| 0                               |  |                        | 1.26  | 1.90   | 2.40        | 3.11   | 2.96        | 3.65   |
| 1                               |  |                        | 3.28  | 8.41   | 3.57        | 4.45   | 4.49        | 4.75   |
| 2                               |  |                        | 6.40  | 21.35  | 8.01        | 2.92   |             | 5.91   |
| 3                               |  |                        | 17.31 | 46.96  | 34.59       | 2.92   |             | 5.91   |
| 4                               |  |                        | 20.00 | 19.20  |             |        |             |        |
| 5                               |  |                        | 20.00 | 64.94  | 65.22       |        |             |        |
| 6                               |  |                        | 20.00 | 19.20  |             |        |             |        |
| Total                           |  |                        | 1.36  | 2.24   | 2.46        | 3.15   | 3.00        | 3.70   |
| PREY : OTHER                    |  |                        |       |        |             |        |             |        |
| All size classes                |  | 0.13                   | 0.82  | 3.41   | 12.11       | 16.43  | 14.36       | 15.99  |

Appendix 2-A. Average prey weight (g) at time of ingestion for COD by age class of prey and predator by quarter for the total North Sea.

| PREDATOR : COD                  |   | Area : TOTAL NORTH SEA |       |        | YEAR : 1986 |        | QUARTER : 1 |    |
|---------------------------------|---|------------------------|-------|--------|-------------|--------|-------------|----|
| Age class                       |   | 0                      | 1     | 2      | 3           | 4      | 5           | 6+ |
| PREY : ALL SPECIES              |   |                        |       |        |             |        |             |    |
| All size classes                |   | 0.84                   | 3.85  | 8.60   | 13.32       | 24.21  | 25.67       |    |
| PREY : GADUS MORHUA             |   |                        |       |        |             |        |             |    |
| Age class                       | 1 |                        | 74.53 | 65.21  | 45.58       | 64.23  | 31.90       |    |
|                                 | 2 |                        | 67.54 | 176.07 | 260.52      | 266.87 | 143.32      |    |
|                                 | 3 |                        |       |        | 428.32      | 459.04 | 215.48      |    |
| Total                           |   |                        | 74.39 | 67.96  | 88.77       | 156.56 | 114.29      |    |
| PREY : MELANOGRAMMUS AEGLEFINUS |   |                        |       |        |             |        |             |    |
| Age class                       | 1 | 15.99                  | 20.36 | 19.04  | 21.67       | 27.19  | 35.38       |    |
|                                 | 2 |                        | 73.24 | 81.23  | 110.97      | 118.34 | 130.15      |    |
|                                 | 3 |                        |       | 70.23  | 121.01      | 124.86 | 162.05      |    |
| Total                           |   | 15.99                  | 20.59 | 19.79  | 28.48       | 45.98  | 56.71       |    |
| PREY : MERLANGIUS MERLANGUS     |   |                        |       |        |             |        |             |    |
| Age class                       | 1 | 3.04                   | 25.02 | 31.48  | 36.81       | 32.17  | 25.14       |    |
|                                 | 2 |                        | 47.41 | 66.38  | 99.72       | 131.76 | 105.44      |    |
|                                 | 3 |                        | 75.17 | 92.85  | 139.62      | 161.67 | 122.23      |    |
|                                 | 4 |                        | 57.67 | 126.20 | 200.00      | 213.88 | 140.94      |    |
|                                 | 5 |                        |       | 210.26 | 288.07      | 275.91 | 157.67      |    |
|                                 | 6 |                        |       | 219.75 | 286.94      | 260.00 | 108.15      |    |
| Total                           |   | 3.04                   | 26.49 | 36.48  | 60.61       | 64.82  | 59.00       |    |
| PREY : TRISOPTERUS ESMARKI      |   |                        |       |        |             |        |             |    |
| Age class                       | 1 |                        | 9.57  | 8.55   | 9.65        | 10.73  | 10.88       |    |
|                                 | 2 |                        | 24.28 | 31.37  | 36.96       | 35.86  | 25.50       |    |
|                                 | 3 |                        | 26.43 | 41.63  | 44.61       | 42.96  | 44.05       |    |
|                                 | 4 |                        | 26.43 | 41.63  | 44.48       | 42.28  | 43.46       |    |
| Total                           |   | 0.99                   | 10.77 | 9.76   | 11.76       | 12.65  | 11.40       |    |
| PREY : CLUPEA HARENGUS          |   |                        |       |        |             |        |             |    |
| Age class                       | 1 | 0.60                   | 0.84  | 0.76   | 0.78        | 1.68   |             |    |
|                                 | 2 | 4.00                   | 9.79  | 21.24  | 38.36       | 30.76  | 15.33       |    |
|                                 | 3 | 6.29                   | 39.48 | 55.73  | 44.41       | 60.47  | 69.84       |    |
|                                 | 4 |                        | 77.91 | 63.83  | 45.63       | 60.76  | 78.57       |    |
|                                 | 5 |                        | 81.12 | 88.68  | 150.36      | 130.93 | 168.16      |    |
|                                 | 6 |                        | 81.12 | 96.41  | 127.32      | 89.34  | 94.21       |    |
| Total                           |   | 3.74                   | 13.35 | 39.02  | 42.37       | 49.51  | 35.21       |    |
| PREY : SPRATTUS SPRATTUS        |   |                        |       |        |             |        |             |    |
| Age class                       | 1 | 2.90                   | 5.05  | 5.48   | 5.00        | 5.07   | 12.84       |    |
|                                 | 2 | 3.04                   | 5.53  | 6.27   | 5.62        | 5.76   | 8.35        |    |
|                                 | 3 | 3.39                   | 9.12  | 10.62  | 9.61        | 10.21  | 12.55       |    |
|                                 | 4 | 3.41                   | 9.28  | 11.18  | 10.23       | 10.95  | 12.84       |    |
|                                 | 5 | 3.42                   | 12.32 | 11.48  | 10.42       | 11.15  | 12.84       |    |
|                                 | 6 | 3.42                   | 7.61  | 11.29  | 10.42       | 11.15  | 12.84       |    |
| Total                           |   | 3.30                   | 8.10  | 9.02   | 7.98        | 8.32   | 11.35       |    |
| PREY : AMMOOYTIDAE              |   |                        |       |        |             |        |             |    |
| Age class                       | 1 | 1.71                   | 2.88  | 3.12   | 3.32        | 4.49   | 3.62        |    |
|                                 | 2 | 6.12                   | 2.71  | 4.19   | 6.85        | 9.66   | 12.78       |    |
|                                 | 3 |                        |       | 7.34   | 6.62        | 27.67  | 34.08       |    |
|                                 | 4 |                        |       | 7.34   | 6.62        | 27.67  | 34.08       |    |
| Total                           |   | 1.80                   | 2.85  | 3.17   | 3.51        | 5.44   | 5.67        |    |
| PREY : OTHER                    |   |                        |       |        |             |        |             |    |
| All size classes                |   | 0.72                   | 1.97  | 4.84   | 7.63        | 16.18  | 24.29       |    |

Appendix 2-A. Average prey weight (g) at time of ingestion for COD by age class of prey and predator by quarter for the total North Sea.

| PREDATOR : COD   |   | Area : TOTAL NORTH SEA          |        |        | YEAR : 1986 |        | QUARTER : 3 |        |
|------------------|---|---------------------------------|--------|--------|-------------|--------|-------------|--------|
| Age class        |   | 0                               | 1      | 2      | 3           | 4      | 5           | 6+     |
| All size classes |   | PREY : ALL SPECIES<br>0.14      | 1.46   | 6.58   | 12.93       | 23.47  | 25.90       | 62.61  |
| Age class        |   | PREY : GADUS MORHUA             |        |        |             |        |             |        |
|                  | 0 | 1.41                            |        | 3.14   | 3.02        | 2.90   | 2.90        |        |
|                  | 1 |                                 |        |        | 119.20      | 119.20 | 119.20      | 119.20 |
| Total            |   | 1.41                            | 2.62   | 3.05   | 2.57        | 8.68   | 86.20       | 119.20 |
| Age class        |   | PREY : MELANOGRAMMUS AEGLEFINUS |        |        |             |        |             |        |
|                  | 0 | 5.65                            | 10.83  | 10.75  | 11.99       | 13.55  | 79.04       |        |
|                  | 1 | 87.54                           | 58.84  | 50.96  | 68.38       | 130.29 | 130.77      |        |
|                  | 2 | 96.64                           | 103.52 | 104.77 | 144.09      | 139.04 | 213.44      |        |
|                  | 3 |                                 | 110.86 | 104.96 | 146.40      | 146.40 | 219.61      |        |
|                  | 4 |                                 |        |        |             |        | 219.73      |        |
| Total            |   | 5.71                            | 14.83  | 15.30  | 23.79       | 112.68 | 176.50      |        |
| Age class        |   | PREY : MERLANGIUS MERLANGUS     |        |        |             |        |             |        |
|                  | 0 | 7.72                            | 9.61   | 13.19  | 20.24       | 18.87  | 23.87       |        |
|                  | 1 | 40.37                           | 52.99  | 60.25  | 86.25       | 128.00 | 108.86      |        |
|                  | 2 |                                 |        | 176.10 | 304.87      | 390.23 | 241.07      |        |
|                  | 3 |                                 |        | 238.40 | 330.92      | 444.46 | 197.26      |        |
|                  | 4 |                                 |        | 118.24 | 285.84      | 333.64 | 144.81      |        |
|                  | 5 |                                 |        | 118.24 | 285.84      | 333.64 | 169.66      |        |
| Total            |   | 8.04                            | 18.05  | 28.49  | 72.07       | 207.04 | 82.89       |        |
| Age class        |   | PREY : TRISOPTERUS ESMARKI      |        |        |             |        |             |        |
|                  | 0 | 2.69                            | 7.58   | 9.01   | 9.45        | 9.78   | 17.11       |        |
|                  | 1 | 18.43                           | 22.54  | 22.69  | 32.19       | 19.62  | 25.64       |        |
|                  | 2 | 48.96                           | 38.52  | 44.06  | 58.65       | 79.77  | 68.44       |        |
|                  | 3 |                                 |        | 157.27 | 117.28      | 97.28  | 97.28       |        |
| Total            |   | 3.22                            | 15.75  | 18.84  | 25.32       | 17.56  | 23.80       |        |
| Age class        |   | PREY : CLUPEA HARENGUS          |        |        |             |        |             |        |
|                  | 0 | 0.10                            |        |        |             |        |             |        |
|                  | 1 | 5.95                            | 9.46   | 7.77   | 3.51        | 0.50   | 1.99        |        |
|                  | 2 | 83.28                           | 51.10  | 61.10  | 58.02       | 57.41  | 105.27      |        |
|                  | 3 | 96.83                           | 134.08 | 89.25  | 73.45       | 74.43  | 139.36      |        |
|                  | 4 | 96.83                           | 119.88 | 139.02 | 198.18      | 176.29 | 255.47      |        |
|                  | 5 |                                 | 141.44 | 149.85 | 167.54      | 167.48 | 255.15      |        |
|                  | 6 |                                 |        |        | 395.20      | 395.20 | 395.20      |        |
| Total            |   | 5.96                            | 22.54  | 49.70  | 62.04       | 87.12  | 158.74      |        |
| Age class        |   | PREY : SPRATTUS SPRATTUS        |        |        |             |        |             |        |
| Age class        |   | PREY : AMMODYTIDAE              |        |        |             |        |             |        |
|                  | 0 | 2.10                            | 2.17   | 2.22   | 4.13        | 4.41   | 4.41        |        |
|                  | 1 | 10.69                           | 11.20  | 11.28  | 7.94        | 7.93   | 8.29        |        |
|                  | 2 | 12.48                           | 12.15  | 14.19  | 23.84       | 24.80  | 24.50       |        |
|                  | 3 | 17.11                           | 15.10  | 19.51  | 24.92       |        | 24.92       |        |
|                  | 4 | 17.11                           | 15.10  | 15.29  | 13.76       |        | 13.76       |        |
|                  | 5 |                                 |        | 32.16  | 32.16       |        | 32.16       |        |
| Total            |   | 4.36                            | 3.48   | 2.90   | 4.44        | 4.68   | 4.73        |        |
| All size classes |   | PREY : OTHER                    |        |        |             |        |             |        |
|                  |   | 0.12                            | 1.24   | 4.94   | 11.04       | 20.03  | 24.77       | 30.17  |

Appendix 2-A. Average prey weight (g) at time of ingestion for COD by age class of prey and predator by quarter for the total North Sea.

| PREDATOR : COD                  |   | Area : | TOTAL NORTH SEA |        | YEAR : 1987 |        | QUARTER : 1 |        |    |
|---------------------------------|---|--------|-----------------|--------|-------------|--------|-------------|--------|----|
| Age class                       |   |        | 0               | 1      | 2           | 3      | 4           | 5      | 6+ |
| PREY : ALL SPECIES              |   |        |                 |        |             |        |             |        |    |
| All size classes                |   |        | 0.59            | 2.57   | 11.13       | 25.52  | 27.98       | 33.65  |    |
| PREY : GADUS MORHUA             |   |        |                 |        |             |        |             |        |    |
| Age class                       |   |        |                 |        |             |        |             |        |    |
|                                 | 1 |        | 27.09           | 26.82  | 22.43       | 30.46  | 45.09       | 127.94 |    |
|                                 | 2 |        |                 |        | 16.10       | 118.81 | 96.32       | 109.39 |    |
|                                 | 3 |        |                 |        |             | 136.93 | 116.36      | 146.13 |    |
| Total                           |   |        | 27.09           | 26.82  | 22.38       | 95.73  | 90.10       | 113.37 |    |
| PREY : MELANOGRAMMUS AEGLEFINUS |   |        |                 |        |             |        |             |        |    |
| Age class                       |   |        |                 |        |             |        |             |        |    |
|                                 | 1 |        | 6.98            | 16.63  | 19.76       | 28.39  | 39.91       | 36.06  |    |
|                                 | 2 |        |                 | 118.83 | 108.70      | 182.29 | 184.82      | 183.60 |    |
|                                 | 3 |        |                 | 121.12 | 105.14      | 187.91 | 185.52      | 184.25 |    |
|                                 | 4 |        |                 |        |             | 196.40 | 188.90      | 185.60 |    |
| Total                           |   |        | 6.98            | 16.86  | 20.51       | 64.53  | 80.94       | 64.97  |    |
| PREY : MERLANGIUS MERLANGUS     |   |        |                 |        |             |        |             |        |    |
| Age class                       |   |        |                 |        |             |        |             |        |    |
|                                 | 1 |        | 6.57            | 14.21  | 37.97       | 41.49  | 28.39       | 25.17  |    |
|                                 | 2 |        | 16.96           | 40.76  | 106.42      | 114.45 | 109.70      | 139.61 |    |
|                                 | 3 |        |                 | 124.15 | 194.23      | 119.42 | 105.81      | 144.81 |    |
|                                 | 4 |        |                 | 215.23 | 204.24      | 116.21 | 107.02      | 140.30 |    |
|                                 | 5 |        |                 |        |             |        | 289.07      | 289.07 |    |
|                                 | 6 |        |                 |        |             |        |             | 105.60 |    |
| Total                           |   |        | 6.59            | 14.37  | 47.65       | 69.69  | 63.13       | 56.76  |    |
| PREY : TRISOPTERUS ESMARKI      |   |        |                 |        |             |        |             |        |    |
| Age class                       |   |        |                 |        |             |        |             |        |    |
|                                 | 1 |        | 7.99            | 10.77  | 13.72       | 13.40  | 14.62       | 15.37  |    |
|                                 | 2 |        | 8.91            | 37.07  | 37.06       | 43.80  | 79.28       | 117.95 |    |
|                                 | 3 |        |                 | 39.37  | 32.54       | 76.90  | 113.87      | 119.36 |    |
|                                 | 4 |        |                 | 39.34  | 19.12       | 101.92 | 116.53      | 119.36 |    |
|                                 | 5 |        |                 |        |             | 119.36 | 119.36      | 119.36 |    |
| Total                           |   |        | 8.00            | 11.47  | 18.62       | 18.35  | 17.59       | 40.71  |    |
| PREY : CLUPEA HARENGUS          |   |        |                 |        |             |        |             |        |    |
| Age class                       |   |        |                 |        |             |        |             |        |    |
|                                 | 1 |        |                 | 1.26   | 1.59        | 2.30   | 2.45        | 2.51   |    |
|                                 | 2 |        | 3.29            | 7.06   | 14.20       | 24.39  | 27.30       | 17.65  |    |
|                                 | 3 |        |                 | 35.25  | 34.46       | 53.71  | 65.74       | 58.57  |    |
|                                 | 4 |        |                 | 39.64  | 45.10       | 115.27 | 118.15      | 69.54  |    |
|                                 | 5 |        |                 |        | 45.44       | 130.00 | 131.03      | 120.90 |    |
|                                 | 6 |        |                 |        |             | 131.24 | 131.52      | 131.52 |    |
| Total                           |   |        | 3.29            | 7.64   | 17.77       | 30.43  | 40.52       | 21.90  |    |
| PREY : SPRATTUS SPRATTUS        |   |        |                 |        |             |        |             |        |    |
| Age class                       |   |        |                 |        |             |        |             |        |    |
|                                 | 1 |        | 1.62            | 0.95   | 0.94        |        |             |        |    |
|                                 | 2 |        |                 | 17.92  | 17.26       | 15.89  |             |        |    |
|                                 | 3 |        |                 | 16.84  | 16.23       | 15.89  |             |        |    |
|                                 | 4 |        |                 | 16.76  | 16.19       | 15.89  |             |        |    |
|                                 | 5 |        |                 | 17.04  | 16.34       | 15.89  |             |        |    |
|                                 | 6 |        |                 | 18.31  | 18.25       |        |             |        |    |
| Total                           |   |        | 1.62            | 6.03   | 9.25        | 15.89  |             |        |    |
| PREY : AMMODYTIDAE              |   |        |                 |        |             |        |             |        |    |
| Age class                       |   |        |                 |        |             |        |             |        |    |
|                                 | 1 |        | 1.19            | 2.17   | 2.12        | 1.12   |             |        |    |
|                                 | 2 |        | 6.39            | 5.42   | 5.04        | 2.84   |             |        |    |
|                                 | 3 |        | 20.24           | 12.93  | 15.40       | 12.37  |             |        |    |
|                                 | 4 |        |                 | 9.63   | 11.88       | 12.37  |             |        |    |
|                                 | 6 |        |                 | 31.16  | 47.36       | 62.72  | 80.80       | 80.80  |    |
| Total                           |   |        | 2.01            | 3.96   | 4.07        | 8.76   | 27.26       | 80.80  |    |
| PREY : OTHER                    |   |        |                 |        |             |        |             |        |    |
| All size classes                |   |        | 0.51            | 1.53   | 7.03        | 16.84  | 15.71       | 29.59  |    |

Appendix 2-A. Average prey weight (g) at time of ingestion for COD by age class of prey and predator by quarter for the total North Sea.

| PREDATOR : COD                  |   | Area | : TOTAL NORTH SEA |       | YEAR : 1987 | QUARTER : 3 |        |        |        |
|---------------------------------|---|------|-------------------|-------|-------------|-------------|--------|--------|--------|
| Age class                       |   | 0    | 1                 | 2     | 3           | 4           | 5      | 6+     |        |
| PREY : ALL SPECIES              |   |      |                   |       |             |             |        |        |        |
| All size classes                |   | 0.18 | 1.01              | 4.65  | 12.92       | 29.03       | 29.88  | 37.09  |        |
| PREY : GADUS MORHUA             |   |      |                   |       |             |             |        |        |        |
| Age class                       | 0 |      |                   | 9.31  | 9.31        | 9.31        |        |        |        |
|                                 | 1 |      |                   |       | 248.00      | 176.26      | 496.97 | 92.01  |        |
|                                 | 2 |      |                   |       | 248.00      | 199.85      | 425.09 | 512.82 |        |
| Total                           |   |      |                   | 9.31  | 236.90      | 186.36      | 466.75 | 412.80 |        |
| PREY : MELANOGRAMMUS AEGLEFINUS |   |      |                   |       |             |             |        |        |        |
| Age class                       | 0 |      |                   | 5.40  | 10.41       | 9.75        | 9.77   | 7.61   | 7.28   |
|                                 | 1 |      |                   | 13.76 | 41.33       | 60.22       | 82.25  | 75.09  | 76.20  |
|                                 | 2 |      |                   |       | 81.47       | 317.93      | 345.23 | 330.17 | 504.51 |
|                                 | 3 |      |                   |       |             | 364.80      | 364.80 | 364.80 | 492.88 |
|                                 | 4 |      |                   |       |             | 364.80      | 364.80 | 364.80 | 512.90 |
| Total                           |   |      |                   | 5.51  | 13.19       | 39.61       | 90.00  | 84.55  | 300.74 |
| PREY : MERLANGIUS MERLANGUS     |   |      |                   |       |             |             |        |        |        |
| Age class                       | 0 |      |                   | 4.81  | 6.54        | 5.33        | 5.46   | 29.93  | 11.75  |
|                                 | 1 |      |                   | 18.81 | 46.20       | 61.31       | 60.70  | 84.21  | 80.64  |
|                                 | 2 |      |                   | 43.99 | 119.48      | 138.06      | 162.07 | 145.91 | 145.78 |
|                                 | 3 |      |                   |       | 96.96       | 181.37      | 172.53 | 147.83 | 145.54 |
|                                 | 4 |      |                   |       |             | 174.56      | 167.17 | 144.19 | 142.86 |
|                                 | 5 |      |                   |       |             | 176.97      | 168.41 | 144.13 | 143.55 |
| Total                           |   |      |                   | 5.71  | 12.13       | 42.25       | 89.62  | 99.77  | 63.39  |
| PREY : TRISOPTERUS ESMARKI      |   |      |                   |       |             |             |        |        |        |
| Age class                       | 0 |      |                   | 3.05  | 5.19        | 19.48       | 23.86  | 17.10  | 16.64  |
|                                 | 1 |      |                   | 14.60 | 21.59       | 24.41       | 31.19  | 28.41  | 28.24  |
|                                 | 2 |      |                   | 41.57 | 47.28       | 53.11       | 48.95  | 48.12  | 37.95  |
|                                 | 3 |      |                   |       | 71.52       | 71.52       | 71.52  | 71.52  |        |
| Total                           |   |      |                   | 4.30  | 9.19        | 22.77       | 29.24  | 24.86  | 24.30  |
| PREY : CLUPEA HARENGUS          |   |      |                   |       |             |             |        |        |        |
| Age class                       | 0 |      |                   | 0.74  | 0.97        |             |        |        |        |
|                                 | 1 |      |                   | 7.15  | 9.47        | 17.19       | 9.94   | 34.24  | 15.82  |
|                                 | 2 |      |                   | 14.10 | 36.15       | 55.80       | 66.31  | 78.30  | 89.03  |
|                                 | 3 |      |                   | 26.13 | 84.98       | 123.67      | 109.64 | 129.20 | 197.56 |
|                                 | 4 |      |                   | 47.28 | 243.41      | 254.27      | 301.45 | 350.75 | 294.76 |
|                                 | 5 |      |                   |       | 261.12      | 291.20      | 361.35 | 369.60 | 308.80 |
| Total                           |   |      |                   | 7.10  | 15.07       | 32.68       | 56.45  | 89.89  | 61.57  |
| PREY : SPRATTUS SPRATTUS        |   |      |                   |       |             |             |        |        |        |
| Age class                       | 0 |      |                   | 0.14  | 0.14        |             |        |        |        |
|                                 | 1 |      |                   | 44.64 | 36.05       | 31.84       |        |        |        |
|                                 | 2 |      |                   | 44.64 | 36.05       | 31.84       |        |        |        |
|                                 | 3 |      |                   | 44.64 | 36.05       | 31.84       |        |        |        |
| Total                           |   |      |                   | 1.54  | 25.52       | 31.84       |        |        |        |
| PREY : AMMOOYTIDAE              |   |      |                   |       |             |             |        |        |        |
| Age class                       | 0 |      |                   | 2.48  | 1.53        | 1.67        | 5.70   | 1.60   | 4.76   |
|                                 | 1 |      |                   | 9.73  | 9.24        | 7.54        | 8.40   | 8.53   | 14.99  |
|                                 | 2 |      |                   | 11.27 | 10.87       | 9.02        | 5.45   | 8.45   | 22.11  |
|                                 | 3 |      |                   | 17.59 | 31.08       | 26.33       | 35.82  | 10.96  | 58.09  |
|                                 | 4 |      |                   | 17.40 | 28.00       | 24.21       | 33.40  | 10.96  | 54.58  |
|                                 | 5 |      |                   | 17.14 | 17.86       | 18.79       | 18.57  | 10.96  | 19.83  |
| Total                           |   |      |                   | 3.81  | 3.25        | 2.68        | 6.29   | 3.11   | 10.21  |
| PREY : OTHER                    |   |      |                   |       |             |             |        |        |        |
| All size classes                |   | 0.18 | 0.86              | 3.50  | 10.48       | 16.75       | 28.66  | 39.47  |        |

APPENDIX 2 AVERAGE PREY WEIGHTS.

Appendix 2-A. Average prey weight (g) at time of ingestion for COD by age class of prey and predator by quarter for the total North Sea.

| PREDATOR : COD   |   | Area                            | : TOTAL NORTH SEA |        |        | YEAR : 1991 |        | QUARTER : 1 |    |
|------------------|---|---------------------------------|-------------------|--------|--------|-------------|--------|-------------|----|
| Age class        |   |                                 | 0                 | 1      | 2      | 3           | 4      | 5           | 6+ |
| All size classes |   | PREY : ALL SPECIES              | 0.83              | 3.85   | 13.96  | 28.00       | 35.30  | 34.67       |    |
| Age class        |   | PREY : GADUS MORHUA             |                   |        |        |             |        |             |    |
|                  | 1 |                                 |                   |        | 15.90  | 47.10       | 73.33  | 66.55       |    |
|                  | 2 |                                 |                   |        | 171.88 | 286.09      | 63.87  | 166.86      |    |
|                  | 3 |                                 |                   |        | 442.85 | 438.93      | 308.80 | 403.47      |    |
| Total            |   |                                 | 10.06             |        | 53.71  | 232.37      | 67.09  | 81.48       |    |
| Age class        |   | PREY : MELANOGRAMMUS AEGLEFINUS |                   |        |        |             |        |             |    |
|                  | 1 |                                 | 30.49             | 38.38  | 32.67  | 33.53       | 44.28  |             |    |
|                  | 2 |                                 |                   | 44.61  | 35.67  | 47.01       | 199.22 |             |    |
|                  | 3 |                                 |                   |        | 385.01 | 426.63      | 392.91 |             |    |
|                  | 4 |                                 |                   |        | 385.01 | 426.63      | 462.78 |             |    |
|                  | 5 |                                 |                   |        | 385.01 | 426.63      | 462.78 |             |    |
|                  | 6 |                                 |                   |        | 385.01 | 426.63      | 462.78 |             |    |
| Total            |   |                                 | 25.03             | 38.38  | 35.59  | 76.59       | 121.43 |             |    |
| Age class        |   | PREY : MERLANGIUS MERLANGUS     |                   |        |        |             |        |             |    |
|                  | 1 | 20.95                           | 18.14             | 24.34  | 28.96  | 22.99       | 23.92  |             |    |
|                  | 2 |                                 | 59.34             | 76.61  | 93.66  | 79.18       | 79.51  |             |    |
|                  | 3 |                                 | 59.33             | 94.11  | 119.87 | 116.02      | 136.63 |             |    |
|                  | 4 |                                 | 63.53             | 145.39 | 158.88 | 145.71      | 164.35 |             |    |
|                  | 5 |                                 | 164.72            | 161.52 | 171.79 | 164.54      | 174.08 |             |    |
|                  | 6 |                                 | 164.72            | 205.98 | 180.56 | 166.03      | 183.46 |             |    |
| Total            |   | 7.74                            | 19.77             | 43.71  | 65.35  | 57.57       | 48.67  |             |    |
| Age class        |   | PREY : TRISOPTERUS ESMARKI      |                   |        |        |             |        |             |    |
|                  | 1 |                                 | 10.54             | 11.65  | 16.54  | 16.79       | 15.79  |             |    |
|                  | 2 |                                 | 14.98             | 17.86  | 26.94  | 30.50       | 30.14  |             |    |
|                  | 3 |                                 | 12.15             | 24.18  | 33.26  | 41.79       | 41.45  |             |    |
| Total            |   | 0.82                            | 10.83             | 13.18  | 19.18  | 20.76       | 19.03  |             |    |
| Age class        |   | PREY : CLUPEA HARENGUS.         |                   |        |        |             |        |             |    |
|                  | 1 |                                 | 20.64             | 40.37  | 39.65  | 20.76       | 23.76  |             |    |
|                  | 2 |                                 | 31.83             | 51.56  | 52.73  | 54.81       | 53.80  |             |    |
|                  | 3 |                                 | 22.45             | 49.02  | 48.38  | 65.63       | 62.92  |             |    |
|                  | 4 |                                 | 21.36             | 58.30  | 63.81  | 101.12      | 99.27  |             |    |
|                  | 5 |                                 | 25.09             | 96.02  | 85.68  | 122.55      | 116.10 |             |    |
| Total            |   |                                 | 22.40             | 48.05  | 48.36  | 55.27       | 46.95  |             |    |
| Age class        |   | PREY : SPRATTUS SPRATTUS        |                   |        |        |             |        |             |    |
|                  | 1 | 4.65                            | 7.43              | 6.76   | 7.03   | 7.36        | 7.98   |             |    |
|                  | 2 | 7.19                            | 22.59             | 17.63  | 17.30  | 15.07       | 14.93  |             |    |
|                  | 3 |                                 | 23.49             | 22.29  | 18.17  | 15.12       | 15.15  |             |    |
|                  | 4 |                                 | 23.52             | 23.47  | 23.39  | 23.14       | 23.14  |             |    |
|                  | 5 |                                 | 23.52             | 20.56  | 17.41  | 15.09       | 15.08  |             |    |
| Total            |   | 4.65                            | 13.80             | 8.70   | 9.43   | 11.31       | 8.57   |             |    |
| Age class        |   | PREY : AMMODYTIDAE              |                   |        |        |             |        |             |    |
|                  | 1 |                                 | 3.51              | 2.43   | 3.55   | 2.85        | 2.88   | 2.64        |    |
|                  | 2 |                                 | 8.90              | 8.23   | 6.53   | 8.54        | 8.50   | 7.99        |    |
|                  | 3 |                                 | 8.97              | 17.35  | 16.03  | 11.00       | 8.86   | 8.62        |    |
|                  | 4 |                                 | 8.97              | 22.56  | 22.34  | 15.71       | 8.81   | 8.50        |    |
|                  | 5 |                                 | 8.97              | 21.31  | 21.40  | 11.07       | 8.93   | 8.75        |    |
|                  | 6 |                                 | 8.97              | 40.98  | 40.15  | 19.77       | 8.93   | 8.75        |    |
| Total            |   |                                 | 3.93              | 2.63   | 3.85   | 3.60        | 3.71   | 3.21        |    |
| All size classes |   | PREY : OTHER                    | 0.61              | 2.70   | 9.33   | 20.00       | 29.63  | 29.87       |    |

Appendix 2-A. Average prey weight (g) at time of ingestion for COD by age class of prey and predator by quarter for the total North Sea.

| PREDATOR : COD                  |  | Area : TOTAL NORTH SEA |        | YEAR : 1991 |        | QUARTER : 2 |         |         |
|---------------------------------|--|------------------------|--------|-------------|--------|-------------|---------|---------|
| Age class                       |  | 0                      | 1      | 2           | 3      | 4           | 5       | 6       |
| PREY : ALL SPECIES              |  |                        |        |             |        |             |         |         |
| All size classes                |  | 0.04                   | 0.27   | 1.38        | 7.83   | 19.73       | 27.03   | 35.23   |
| PREY : GADUS MORHUA             |  |                        |        |             |        |             |         |         |
| Age class                       |  |                        |        |             |        |             |         |         |
| 0                               |  |                        | 1.30   | 1.51        | 2.32   | 1.46        |         |         |
| 1                               |  |                        | 3.46   | 29.48       | 36.30  | 9.84        | 36.27   | 110.35  |
| 2                               |  |                        |        |             | 42.24  | 42.24       | 1027.45 | 1562.46 |
| 3                               |  |                        |        |             | 42.24  | 42.24       | 1075.18 | 1576.42 |
| 4                               |  |                        |        |             | 42.24  | 42.24       | 1479.20 | 1662.75 |
| Total                           |  |                        | 2.29   | 18.81       | 36.09  | 16.93       | 655.78  | 1365.41 |
| PREY : MELANOGRAMMUS AEGLEFINUS |  |                        |        |             |        |             |         |         |
| Age class                       |  |                        |        |             |        |             |         |         |
| 0                               |  |                        | 1.27   | 6.16        | 5.82   | 5.99        |         |         |
| 1                               |  |                        |        | 32.86       | 63.45  | 114.34      | 137.13  | 121.66  |
| 2                               |  |                        |        | 121.75      | 150.08 | 197.12      | 277.57  | 246.58  |
| 3                               |  |                        |        | 162.79      | 248.22 | 308.15      | 306.65  | 305.81  |
| 4                               |  |                        |        |             | 303.94 | 312.88      | 306.72  | 305.81  |
| 5                               |  |                        |        |             | 303.94 | 312.88      | 306.72  | 305.81  |
| 6                               |  |                        |        |             | 303.94 | 312.88      | 306.72  | 305.81  |
| Total                           |  |                        | 1.27   | 29.75       | 64.67  | 118.05      | 154.81  | 130.10  |
| PREY : MERLANGIUS MERLANGUS     |  |                        |        |             |        |             |         |         |
| Age class                       |  |                        |        |             |        |             |         |         |
| 0                               |  |                        | 0.52   | 1.94        | 1.90   | 1.29        | 0.83    |         |
| 1                               |  |                        | 29.57  | 33.02       | 36.05  | 60.06       | 95.61   | 117.39  |
| 2                               |  |                        |        | 78.40       | 59.69  | 99.75       | 109.98  | 140.68  |
| 3                               |  |                        |        | 86.29       | 86.95  | 135.08      | 161.37  | 151.30  |
| 4                               |  |                        |        | 90.90       | 119.70 | 217.48      | 210.78  | 178.51  |
| 5                               |  |                        |        | 86.01       | 164.27 | 222.18      | 257.34  | 230.60  |
| 6                               |  |                        |        | 113.61      | 151.11 | 176.61      | 239.06  | 186.38  |
| Total                           |  |                        | 3.97   | 33.69       | 51.14  | 96.03       | 127.03  | 134.38  |
| PREY : TRISOPTERUS ESMARKI      |  |                        |        |             |        |             |         |         |
| Age class                       |  |                        |        |             |        |             |         |         |
| 0                               |  |                        |        | 1.35        | 1.32   | 0.52        |         |         |
| 1                               |  |                        | 15.42  | 17.51       | 23.49  | 27.30       | 33.31   | 31.11   |
| 2                               |  |                        | 23.52  | 21.92       | 29.22  | 37.82       | 47.74   | 44.53   |
| 3                               |  |                        | 31.97  | 53.87       | 54.89  | 52.30       | 48.64   | 48.80   |
| 4                               |  |                        | 37.66  | 40.42       | 48.07  | 46.95       | 48.37   | 48.72   |
| Total                           |  |                        | 15.74  | 19.15       | 25.00  | 28.83       | 38.24   | 33.17   |
| PREY : CLUPEA HARENGUS          |  |                        |        |             |        |             |         |         |
| Age class                       |  |                        |        |             |        |             |         |         |
| 0                               |  |                        | 3.00   | 3.54        | 18.81  | 24.29       | 23.81   | 24.29   |
| 1                               |  |                        | 124.59 | 42.65       | 26.01  | 33.11       | 48.87   | 52.90   |
| 2                               |  |                        | 124.59 | 70.20       | 75.14  | 83.04       | 109.69  | 120.33  |
| 3                               |  |                        | 124.59 | 149.03      | 101.34 | 113.62      | 103.23  | 122.97  |
| 4                               |  |                        | 124.59 | 216.18      | 139.35 | 134.72      | 94.37   | 126.03  |
| 5                               |  |                        | 124.59 | 225.42      | 164.86 | 141.93      | 92.85   | 129.82  |
| Total                           |  |                        | 5.33   | 36.92       | 71.95  | 76.00       | 96.81   | 106.38  |
| PREY : SPRATTUS SPRATTUS        |  |                        |        |             |        |             |         |         |
| Age class                       |  |                        |        |             |        |             |         |         |
| 1                               |  |                        | 6.42   | 12.85       | 10.93  | 9.26        | 8.84    | 12.64   |
| 2                               |  |                        | 18.43  | 25.63       | 29.29  | 21.36       | 16.33   | 13.91   |
| 3                               |  |                        | 18.43  | 27.17       | 29.56  | 25.75       | 29.90   | 16.71   |
| 4                               |  |                        |        |             | 23.24  | 23.24       |         | 23.24   |
| 5                               |  |                        |        |             | 23.24  | 23.24       |         | 23.24   |
| Total                           |  |                        | 6.64   | 13.97       | 22.61  | 13.97       | 10.74   | 13.10   |
| PREY : AMMOODYTIDAE             |  |                        |        |             |        |             |         |         |
| Age class                       |  |                        |        |             |        |             |         |         |
| 0                               |  |                        | 0.07   | 0.69        | 0.56   | 0.63        | 1.29    | 1.32    |
| 1                               |  |                        |        | 3.76        | 5.73   | 6.47        | 10.28   | 7.68    |
| 2                               |  |                        |        | 7.42        | 13.52  | 16.70       | 26.99   | 31.12   |
| 3                               |  |                        |        | 9.86        | 21.34  | 23.07       | 28.67   | 35.91   |
| 4                               |  |                        |        | 10.72       | 22.06  | 22.32       | 27.08   | 35.01   |
| 5                               |  |                        |        | 9.83        | 24.44  | 28.60       | 30.20   | 39.44   |
| 6                               |  |                        |        | 11.44       | 23.72  | 27.23       | 29.30   | 39.01   |
| Total                           |  |                        | 0.07   | 2.99        | 1.90   | 2.08        | 5.99    | 8.34    |
| PREY : OTHER                    |  |                        |        |             |        |             |         |         |
| All size classes                |  |                        | 0.04   | 0.24        | 0.95   | 5.65        | 13.90   | 19.24   |
|                                 |  |                        |        |             |        |             |         | 24.27   |

Appendix 2-A. Average prey weight (g) at time of ingestion for COD by age class of prey and predator by quarter for the total North Sea.

| PREDATOR : COD                  |  | Area : TOTAL NORTH SEA |        |        | YEAR : 1991 |        | QUARTER : 3 |       |
|---------------------------------|--|------------------------|--------|--------|-------------|--------|-------------|-------|
| Age class                       |  | 0                      | 1      | 2      | 3           | 4      | 5           | 6+    |
| PREY : ALL SPECIES              |  |                        |        |        |             |        |             |       |
| All size classes                |  | 0.02                   | 1.43   | 6.94   | 11.29       | 19.50  | 28.40       | 32.23 |
| PREY : GADUS MORHUA             |  |                        |        |        |             |        |             |       |
| Age class                       |  | 0.31                   | 3.73   | 6.31   | 8.64        | 9.56   | 8.14        | 7.71  |
| 0                               |  |                        |        | 17.97  | 16.08       |        |             | 42.13 |
| 1                               |  |                        |        |        |             |        |             | 42.13 |
| 2                               |  |                        |        |        |             |        |             | 42.13 |
| 3                               |  |                        |        |        |             |        |             | 42.13 |
| 4                               |  |                        |        |        |             |        |             | 42.13 |
| Total                           |  | 0.31                   | 3.73   | 6.35   | 8.91        | 9.56   | 8.14        | 36.35 |
| PREY : MELANOGRAMMUS AEGLEFINUS |  |                        |        |        |             |        |             |       |
| Age class                       |  | 8.29                   | 15.17  | 12.39  | 15.43       | 16.34  | 14.68       |       |
| 0                               |  |                        | 76.29  | 110.50 | 119.21      | 122.07 | 144.56      |       |
| 1                               |  |                        |        |        |             |        | 144.56      |       |
| 2                               |  |                        |        |        |             |        | 104.97      |       |
| Total                           |  | 8.29                   | 15.60  | 14.69  | 17.85       | 18.17  |             |       |
| PREY : MERLANGIUS MERLANGUS     |  |                        |        |        |             |        |             |       |
| Age class                       |  | 0.45                   | 7.00   | 14.09  | 12.90       | 13.67  | 91.28       | 91.28 |
| 0                               |  |                        | 39.11  | 72.24  | 52.50       | 43.35  | 53.72       | 53.60 |
| 1                               |  |                        |        | 107.20 | 84.21       | 64.90  | 50.97       | 46.36 |
| 2                               |  |                        |        | 108.58 | 82.03       | 80.65  | 83.93       | 46.36 |
| 3                               |  |                        |        | 105.79 | 81.35       | 84.72  | 93.29       |       |
| 4                               |  |                        |        | 100.37 | 76.75       | 96.15  | 88.52       |       |
| 5                               |  |                        |        | 100.37 | 75.64       | 90.22  | 88.52       |       |
| 6                               |  |                        |        |        |             |        |             |       |
| Total                           |  | 0.45                   | 14.64  | 15.48  | 27.02       | 37.75  | 56.54       | 55.34 |
| PREY : TRISOPTERUS ESMARKI      |  |                        |        |        |             |        |             |       |
| Age class                       |  | 1.99                   | 4.74   | 5.75   | 4.78        | 5.97   | 8.10        | 7.28  |
| 0                               |  |                        | 20.74  | 32.05  | 37.63       | 41.15  | 36.18       | 58.58 |
| 1                               |  |                        | 25.19  | 41.16  | 47.98       | 48.95  | 28.11       | 24.24 |
| 2                               |  |                        | 23.78  | 42.14  | 48.23       | 48.83  | 23.38       | 21.84 |
| 3                               |  |                        |        |        |             |        |             |       |
| Total                           |  | 1.99                   | 5.15   | 10.53  | 12.79       | 14.63  | 14.16       | 25.02 |
| PREY : CLUPEA HARENGUS          |  |                        |        |        |             |        |             |       |
| Age class                       |  | 26.42                  | 48.68  | 10.63  | 29.36       |        |             |       |
| 0                               |  | 54.69                  | 59.59  | 80.88  | 49.17       | 48.79  | 52.69       |       |
| 1                               |  |                        | 130.67 | 141.07 | 104.33      | 73.31  | 71.33       |       |
| 2                               |  |                        | 178.55 | 175.71 | 137.51      | 83.21  | 77.15       |       |
| 3                               |  |                        | 134.69 | 187.58 | 147.24      | 62.86  | 69.67       |       |
| 4                               |  |                        | 116.27 | 189.57 | 149.96      | 63.86  | 70.38       |       |
| 5                               |  |                        |        | 84.16  | 135.38      | 100.94 | 65.51       | 67.77 |
| Total                           |  | 28.35                  |        |        |             |        |             |       |
| PREY : SPRATTUS SPRATTUS        |  |                        |        |        |             |        |             |       |
| Age class                       |  | 5.20                   |        |        |             |        |             |       |
| 0                               |  | 12.44                  | 30.74  | 29.34  |             |        |             |       |
| 1                               |  | 33.12                  | 30.10  | 29.62  |             |        |             |       |
| 2                               |  |                        | 30.08  | 29.06  |             |        |             |       |
| 3                               |  |                        |        |        |             |        |             |       |
| Total                           |  | 10.83                  | 30.44  | 29.42  |             |        |             |       |
| PREY : AMMODYTIDAE              |  |                        |        |        |             |        |             |       |
| Age class                       |  | 3.32                   | 0.94   | 1.62   | 1.87        | 2.70   | 2.48        | 3.06  |
| 0                               |  | 9.20                   | 6.20   | 18.02  | 5.60        | 6.68   | 4.28        | 1.95  |
| 1                               |  | 9.20                   | 8.43   | 16.10  | 7.49        | 19.42  | 8.86        |       |
| 2                               |  | 9.20                   | 8.83   | 25.40  | 7.88        | 24.12  | 8.86        |       |
| 3                               |  | 9.20                   | 9.10   | 31.21  | 8.14        | 23.79  | 8.86        |       |
| 4                               |  |                        | 9.29   | 31.70  | 8.26        | 25.07  |             |       |
| 5                               |  |                        | 8.54   | 38.63  | 10.20       | 24.28  |             |       |
| 6                               |  |                        |        |        |             |        |             |       |
| Total                           |  | 4.17                   | 0.99   | 2.10   | 2.24        | 3.38   | 2.51        | 3.03  |
| PREY : OTHER                    |  |                        |        |        |             |        |             |       |
| All size classes                |  | 0.02                   | 1.22   | 5.82   | 9.10        | 12.44  | 17.38       | 24.33 |

Appendix 2-A. Average prey weight (g) at time of ingestion for COD by age class of prey and predator by quarter for the total North Sea.

| PREDATOR : COD                  |   | Area | TOTAL NORTH SEA |       | YEAR : 1991 |        | QUARTER : 4 |        |       |
|---------------------------------|---|------|-----------------|-------|-------------|--------|-------------|--------|-------|
| Age class                       |   |      | 0               | 1     | 2           | 3      | 4           | 5      | 6+    |
| PREY : ALL SPECIES              |   |      |                 |       |             |        |             |        |       |
| All size classes                |   | 0.56 | 2.86            | 7.08  | 10.81       | 13.70  | 30.46       | 40.29  |       |
| PREY : GADUS MORHUA             |   |      |                 |       |             |        |             |        |       |
| Age class                       | 0 |      | 3.08            | 7.84  | 13.67       |        |             |        | 28.67 |
| Total                           |   |      | 3.08            | 6.51  | 13.67       |        |             |        | 28.67 |
| PREY : MELANOGRAMMUS AEGLEFINUS |   |      |                 |       |             |        |             |        |       |
| Age class                       | 0 |      | 14.90           | 15.33 | 17.44       | 22.12  | 28.61       | 32.36  |       |
|                                 | 1 |      | 73.51           | 56.10 | 181.95      | 210.22 | 156.90      | 144.80 |       |
|                                 | 2 |      |                 |       | 239.40      | 245.86 | 252.57      | 254.86 |       |
| Total                           |   |      | 14.77           | 14.65 | 19.87       | 34.59  | 44.70       | 48.56  |       |
| PREY : MERLANGIUS MERLANGUS     |   |      |                 |       |             |        |             |        |       |
| Age class                       | 0 |      | 24.38           | 37.84 | 28.55       | 38.34  | 40.60       | 49.60  |       |
|                                 | 1 |      | 50.99           | 84.28 | 111.55      | 142.32 | 188.26      | 136.58 |       |
|                                 | 2 |      | 61.15           | 92.32 | 184.96      | 174.30 | 226.38      | 223.55 |       |
|                                 | 3 |      | 99.06           | 99.06 | 228.20      | 175.26 | 241.05      | 242.16 |       |
|                                 | 4 |      | 99.06           | 99.06 | 253.34      | 166.38 |             |        |       |
|                                 | 5 |      | 99.06           | 99.06 |             | 166.38 |             |        |       |
|                                 | 6 |      | 99.06           | 99.06 |             | 166.38 |             |        |       |
| Total                           |   |      | 34.48           | 62.16 | 82.93       | 139.26 | 194.12      | 146.01 |       |
| PREY : TRISOPTERUS ESMARKI      |   |      |                 |       |             |        |             |        |       |
| Age class                       | 0 |      | 6.79            | 9.10  | 10.17       | 9.41   | 9.36        | 9.42   |       |
|                                 | 1 |      | 17.37           | 30.65 | 34.95       | 41.04  | 44.64       | 44.61  |       |
|                                 | 2 |      | 43.51           | 36.20 | 46.43       | 55.04  | 51.98       | 49.39  |       |
|                                 | 3 |      | 43.51           | 39.19 | 47.02       | 55.04  | 51.98       | 49.39  |       |
| Total                           |   |      | 6.37            | 10.24 | 13.40       | 13.20  | 11.45       | 11.15  |       |
| PREY : CLUPEA HARENGUS          |   |      |                 |       |             |        |             |        |       |
| Age class                       | 0 |      |                 | 26.61 | 26.12       |        |             | 38.71  |       |
|                                 | 1 |      | 42.69           | 38.38 | 65.03       | 44.37  | 143.03      | 142.85 |       |
|                                 | 2 |      | 42.69           | 50.72 | 66.51       | 44.37  | 96.91       | 115.41 |       |
|                                 | 3 |      |                 | 60.39 |             |        | 148.24      | 148.24 |       |
|                                 | 4 |      |                 | 60.39 |             |        |             |        |       |
|                                 | 5 |      |                 | 60.39 |             |        |             |        |       |
| Total                           |   |      | 42.69           | 41.87 | 62.00       | 44.24  | 139.08      | 129.71 |       |
| PREY : SPRATTUS SPRATTUS        |   |      |                 |       |             |        |             |        |       |
| Age class                       | 0 | 4.93 | 5.63            | 5.59  | 5.20        | 6.09   | 8.16        | 7.33   |       |
|                                 | 1 |      | 21.38           | 6.10  | 6.70        | 6.70   |             | 8.19   |       |
|                                 | 2 |      | 25.85           |       |             |        |             |        |       |
|                                 | 3 |      | 27.11           |       |             |        |             |        |       |
|                                 | 4 |      | 27.11           |       |             |        |             |        |       |
| Total                           |   | 4.93 | 12.46           | 5.61  | 5.21        | 6.10   | 8.16        | 7.43   |       |
| PREY : AMMODYTIDAE              |   |      |                 |       |             |        |             |        |       |
| Age class                       | 0 |      | 2.38            | 2.52  | 2.82        | 2.00   | 2.77        | 2.77   |       |
|                                 | 1 |      | 10.59           | 13.18 | 10.27       |        |             |        |       |
|                                 | 2 |      | 18.21           | 18.03 | 9.47        |        |             |        |       |
|                                 | 3 |      | 15.72           | 11.95 | 10.47       |        |             |        |       |
|                                 | 4 |      | 17.81           | 13.09 | 9.47        |        |             |        |       |
|                                 | 5 |      | 17.69           | 12.62 | 9.47        |        |             |        |       |
|                                 | 6 |      | 17.42           | 12.34 | 9.47        |        |             |        |       |
| Total                           |   | 1.89 | 3.81            | 3.73  | 3.83        | 2.00   | 2.77        | 2.77   |       |
| PREY : OTHER                    |   |      |                 |       |             |        |             |        |       |
| All size classes                |   | 0.56 | 1.89            | 4.91  | 8.70        | 8.80   | 18.23       | 33.49  |       |

## APPENDIX 2 AVERAGE PREY WEIGHTS.

Appendix 2-B. Average prey weight (g) at time of ingestion for HADDOCK by age class of prey and predator by quarter for the total North Sea.

PREDATOR : HADD Area : TOTAL NORTH SEA YEAR : 1981 QUARTER : 1

Age class 0 1 2 3 4 5 6+

## PREY : ALL SPECIES

All size classes 0.15 0.22 0.68 0.99 1.30 1.33

## Age class PREY : TRISOPTERUS ESMARKI

0 0.02 0.07 0.76 0.75 0.72

1 9.33 7.77 8.54 9.66 10.98

2 9.54 12.75 13.87 14.41 16.54

Total 7.84 7.73 9.18 10.27 11.41

## Age class PREY : CLUPEA HARENGUS

1 6.40 6.40 6.40 6.40

2 6.40 6.40 6.40 6.40

Total 6.40 6.40 6.40 6.40

## Age class PREY : SPRATTUS SPRATTUS

1 2.48 9.40 10.85 10.68 7.66 10.05

2 17.40 19.42 19.39 18.73 19.20

3 14.13 16.18 17.68 16.67 17.68

4 14.13 16.18 17.68 16.67 17.68

Total 2.48 12.71 14.50 14.43 11.89 14.09

## Age class PREY : AMMODYTIDAE

1 2.80 3.19 3.56 5.13 6.50 5.30

2 3.65 12.98 15.54 17.82 24.26

3 38.23 33.09 32.27 31.68

4 38.23 33.09 32.27 31.68

5 38.23 33.09 32.27 31.68

6 38.23 33.09 32.27 31.68

Total 2.80 3.22 4.71 8.84 11.82 12.37

## PREY : OTHER

All size classes 0.15 0.16 0.34 0.42 0.67 0.68

Appendix 2-B. Average prey weight (g) at time of ingestion for HADDOCK by age class of prey and predator by quarter for the total North Sea.

PREDATOR : HADD Area : TOTAL NORTH SEA YEAR : 1981 QUARTER : 2

| Age class | 0 | 1 | 2 | 3 | 4 | 5 | 6+ |
|-----------|---|---|---|---|---|---|----|
|-----------|---|---|---|---|---|---|----|

PREY : ALL SPECIES

|                  |      |      |      |      |      |      |      |
|------------------|------|------|------|------|------|------|------|
| All size classes | 0.15 | 0.11 | 0.15 | 0.34 | 1.59 | 2.67 | 8.08 |
|------------------|------|------|------|------|------|------|------|

Age class PREY : TRISOPTERUS ESMARKI

|   |  |  |      |       |       |       |       |
|---|--|--|------|-------|-------|-------|-------|
| 1 |  |  | 6.78 | 15.16 | 20.15 | 21.05 | 21.59 |
|---|--|--|------|-------|-------|-------|-------|

|   |  |  |  |       |       |       |       |
|---|--|--|--|-------|-------|-------|-------|
| 2 |  |  |  | 20.51 | 20.70 | 21.05 | 21.59 |
|---|--|--|--|-------|-------|-------|-------|

|       |  |  |      |       |       |       |       |
|-------|--|--|------|-------|-------|-------|-------|
| Total |  |  | 6.78 | 15.33 | 20.18 | 21.05 | 21.59 |
|-------|--|--|------|-------|-------|-------|-------|

Age class PREY : SPRATTUS SPRATTUS

|   |  |  |      |      |  |  |  |
|---|--|--|------|------|--|--|--|
| 0 |  |  | 9.48 | 9.48 |  |  |  |
|---|--|--|------|------|--|--|--|

|   |  |  |      |      |  |  |  |
|---|--|--|------|------|--|--|--|
| 1 |  |  | 9.48 | 9.48 |  |  |  |
|---|--|--|------|------|--|--|--|

|   |  |  |      |      |  |  |  |
|---|--|--|------|------|--|--|--|
| 2 |  |  | 9.48 | 9.48 |  |  |  |
|---|--|--|------|------|--|--|--|

|       |  |  |      |      |  |  |  |
|-------|--|--|------|------|--|--|--|
| Total |  |  | 9.48 | 9.48 |  |  |  |
|-------|--|--|------|------|--|--|--|

Age class PREY : AMMODYTIDAE

|   |  |      |      |      |      |      |      |
|---|--|------|------|------|------|------|------|
| 0 |  | 1.27 | 1.61 | 2.39 | 3.93 | 3.72 | 7.39 |
|---|--|------|------|------|------|------|------|

|   |  |      |      |      |      |      |      |
|---|--|------|------|------|------|------|------|
| 1 |  | 1.87 | 6.19 | 8.62 | 8.84 | 8.55 | 8.74 |
|---|--|------|------|------|------|------|------|

|   |  |      |       |       |       |       |       |
|---|--|------|-------|-------|-------|-------|-------|
| 2 |  | 6.35 | 10.34 | 11.80 | 11.66 | 12.01 | 12.16 |
|---|--|------|-------|-------|-------|-------|-------|

|   |  |      |       |       |       |       |       |
|---|--|------|-------|-------|-------|-------|-------|
| 3 |  | 6.35 | 10.89 | 12.95 | 13.36 | 13.38 | 13.50 |
|---|--|------|-------|-------|-------|-------|-------|

|   |  |      |       |       |       |       |       |
|---|--|------|-------|-------|-------|-------|-------|
| 4 |  | 6.35 | 10.71 | 12.63 | 13.02 | 13.12 | 13.25 |
|---|--|------|-------|-------|-------|-------|-------|

|   |  |  |       |       |       |       |       |
|---|--|--|-------|-------|-------|-------|-------|
| 5 |  |  | 14.43 | 15.35 | 14.74 | 14.43 | 14.42 |
|---|--|--|-------|-------|-------|-------|-------|

|   |  |  |       |       |       |       |       |
|---|--|--|-------|-------|-------|-------|-------|
| 6 |  |  | 14.43 | 15.35 | 14.74 | 14.43 | 14.42 |
|---|--|--|-------|-------|-------|-------|-------|

|       |  |      |      |      |      |      |      |
|-------|--|------|------|------|------|------|------|
| Total |  | 1.20 | 4.17 | 7.98 | 8.62 | 8.22 | 9.44 |
|-------|--|------|------|------|------|------|------|

PREY : OTHER

|                  |      |      |      |      |      |      |      |
|------------------|------|------|------|------|------|------|------|
| All size classes | 0.15 | 0.10 | 0.09 | 0.10 | 0.31 | 0.67 | 1.87 |
|------------------|------|------|------|------|------|------|------|

Appendix 2-B. Average prey weight (g) at time of ingestion for HADDOCK by age class of prey and predator by quarter for the total North Sea.

| PREDATOR : HADD                 |   | Area : TOTAL NORTH SEA |       | YEAR : 1981 |       | QUARTER : 3 |       |       |
|---------------------------------|---|------------------------|-------|-------------|-------|-------------|-------|-------|
| Age class                       |   | 0                      | 1     | 2           | 3     | 4           | 5     | 6+    |
| PREY : ALL SPECIES              |   |                        |       |             |       |             |       |       |
| All size classes                |   | 0.16                   | 0.16  | 0.19        | 0.68  | 1.19        | 2.84  | 1.13  |
| PREY : MELANOGRAMMUS AEGLEFINUS |   |                        |       |             |       |             |       |       |
| Age class                       | 0 |                        |       | 3.26        | 7.55  | 13.76       | 17.39 |       |
| Total                           |   |                        | 4.01  | 3.26        | 7.55  | 13.76       | 17.39 |       |
| PREY : MERLANGIUS MERLANGUS     |   |                        |       |             |       |             |       |       |
| Age class                       | 0 |                        |       |             | 13.34 | 13.34       |       |       |
| Total                           |   |                        |       |             | 13.34 | 13.34       |       |       |
| PREY : TRISOPTERUS ESMARKI      |   |                        |       |             |       |             |       |       |
| Age class                       | 0 | 2.11                   | 3.83  | 2.32        | 3.11  | 8.02        | 20.94 | 29.17 |
|                                 | 1 |                        |       | 20.60       | 46.40 | 46.76       | 40.30 | 37.92 |
|                                 | 2 |                        |       | 56.87       | 62.47 | 57.59       | 52.51 |       |
| Total                           |   | 2.11                   | 3.83  | 2.35        | 3.24  | 8.51        | 21.71 | 29.70 |
| PREY : SPRATTUS SPRATTUS        |   |                        |       |             |       |             |       |       |
| Age class                       | 0 |                        | 20.75 | 16.33       | 1.94  | 1.96        | 1.81  |       |
|                                 | 1 |                        | 20.75 | 20.75       | 19.19 | 18.88       |       |       |
|                                 | 2 |                        | 20.75 | 20.75       | 19.19 | 18.88       |       |       |
| Total                           |   |                        | 20.75 | 20.58       | 5.27  | 5.61        | 1.81  |       |
| PREY : AMMODYTIDAE              |   |                        |       |             |       |             |       |       |
| Age class                       | 0 | 2.05                   | 2.33  | 2.81        | 2.96  | 3.26        | 3.85  | 2.18  |
|                                 | 1 |                        | 4.17  | 0.96        | 2.41  | 5.66        | 7.62  |       |
|                                 | 2 |                        | 4.17  | 0.96        | 2.41  | 5.66        | 7.62  |       |
| Total                           |   | 2.05                   | 2.34  | 2.80        | 2.96  | 3.27        | 3.85  | 2.18  |
| PREY : OTHER                    |   |                        |       |             |       |             |       |       |
| All size classes                |   | 0.15                   | 0.14  | 0.13        | 0.36  | 0.60        | 1.53  | 0.77  |

Appendix 2-B. Average prey weight (g) at time of ingestion for HADDOCK by age class of prey and predator by quarter for the total North Sea.

|                                 |  |                        |       |       |             |       |             |       |       |
|---------------------------------|--|------------------------|-------|-------|-------------|-------|-------------|-------|-------|
| PREDATOR : HADD                 |  | Area : TOTAL NORTH SEA |       |       | YEAR : 1981 |       | QUARTER : 4 |       |       |
| Age class                       |  | 0                      | 1     | 2     | 3           | 4     | 5           | 6+    |       |
| PREY : ALL SPECIES              |  |                        |       |       |             |       |             |       |       |
| All size classes                |  | 0.09                   | 0.39  | 0.26  | 0.52        | 0.80  | 1.44        | 0.52  |       |
| PREY : MELANOGRAMMUS AEGLEFINUS |  |                        |       |       |             |       |             |       |       |
| Age class                       |  | 0                      | 16.01 | 16.01 |             |       |             |       |       |
| Total                           |  |                        | 16.01 | 16.01 |             |       |             |       |       |
| PREY : MERLANGIUS MERLANGUS     |  |                        |       |       |             |       |             |       |       |
| Age class                       |  | 0                      | 7.04  | 7.36  | 5.80        | 8.89  |             |       |       |
| Total                           |  |                        | 7.04  | 7.36  | 5.80        | 8.89  |             |       |       |
| PREY : TRISOPTERUS ESMARKI      |  |                        |       |       |             |       |             |       |       |
| Age class                       |  | 0                      | 7.65  | 6.85  | 9.94        | 12.00 | 10.11       | 9.27  | 9.16  |
|                                 |  | 1                      |       | 13.17 | 14.93       | 19.30 | 16.97       | 14.92 | 15.56 |
|                                 |  | 2                      |       | 13.17 | 14.93       | 19.30 | 16.97       | 14.92 | 15.56 |
| Total                           |  |                        | 7.65  | 7.20  | 10.45       | 12.68 | 10.60       | 9.59  | 9.56  |
| PREY : CLUPEA HARENGUS          |  |                        |       |       |             |       |             |       |       |
| Age class                       |  | 0                      |       | 13.76 | 13.76       |       |             |       |       |
|                                 |  | 1                      |       | 13.76 | 13.76       |       |             |       |       |
| Total                           |  |                        |       | 13.76 | 13.76       |       |             |       |       |
| PREY : AMMODYTIDAE              |  |                        |       |       |             |       |             |       |       |
| Age class                       |  | 0                      | 2.24  | 3.50  | 4.13        | 3.61  | 3.50        | 3.72  | 3.11  |
| Total                           |  |                        | 2.24  | 3.50  | 4.13        | 3.61  | 3.50        | 3.72  | 3.11  |
| PREY : OTHER                    |  |                        |       |       |             |       |             |       |       |
| All size classes                |  | 0.09                   | 0.32  | 0.17  | 0.34        | 0.53  | 0.98        | 0.39  |       |

APPENDIX 2 AVERAGE PREY WEIGHTS.

Appendix 2-B. Average prey weight (g) at time of ingestion for HADDOCK by age class of prey and predator by quarter for the total North Sea.

| PREDATOR : HADD            |   | Area | : TOTAL NORTH SEA |       |       | YEAR : 1991 | QUARTER : 1 |    |
|----------------------------|---|------|-------------------|-------|-------|-------------|-------------|----|
| Age class                  |   | 0    | 1                 | 2     | 3     | 4           | 5           | 6+ |
| PREY : ALL SPECIES         |   |      |                   |       |       |             |             |    |
| All size classes           |   | 0.05 | 0.11              | 0.19  | 0.24  | 0.28        | 0.40        |    |
| PREY : TRISOPTERUS ESMARKI |   |      |                   |       |       |             |             |    |
| Age class                  | 1 | 8.31 | 8.36              | 8.85  | 8.63  | 9.00        | 10.18       |    |
|                            | 2 |      | 19.58             | 19.31 | 21.90 | 21.66       | 21.72       |    |
| Total                      |   | 8.31 | 8.43              | 8.65  | 8.24  | 8.98        | 9.99        |    |
| PREY : CLUPEA HARENGUS     |   |      |                   |       |       |             |             |    |
| Age class                  | 1 |      |                   | 63.79 |       | 63.79       | 63.79       |    |
|                            | 2 |      |                   | 63.79 |       | 63.79       | 63.79       |    |
|                            | 3 |      |                   | 63.79 |       | 63.79       | 63.79       |    |
| Total                      |   |      |                   | 63.79 |       | 63.79       | 63.79       |    |
| PREY : AMMODYTIDAE         |   |      |                   |       |       |             |             |    |
| Age class                  | 1 | 1.58 | 1.60              | 1.63  | 1.44  | 1.39        | 1.33        |    |
|                            | 2 | 3.54 | 4.40              | 4.13  | 3.75  | 3.85        | 3.44        |    |
| Total                      |   | 1.58 | 1.60              | 1.63  | 1.44  | 1.39        | 1.33        |    |
| PREY : OTHER               |   |      |                   |       |       |             |             |    |
| All size classes           |   | 0.05 | 0.10              | 0.16  | 0.20  | 0.22        | 0.35        |    |

Appendix 2-B. Average prey weight (g) at time of ingestion for HADDOCK by age class of prey and predator by quarter for the total North Sea.

|                            |  |                        |      |             |       |             |       |       |
|----------------------------|--|------------------------|------|-------------|-------|-------------|-------|-------|
| PREDATOR : HADD            |  | Area : TOTAL NORTH SEA |      | YEAR : 1991 |       | QUARTER : 2 |       |       |
| Age class                  |  | 0                      | 1    | 2           | 3     | 4           | 5     | 6+    |
| PREY : ALL SPECIES         |  |                        |      |             |       |             |       |       |
| All size classes           |  | 0.01                   | 0.02 | 0.01        | 0.02  | 0.04        | 0.05  | 0.05  |
| PREY : TRISOPTERUS ESMARKI |  |                        |      |             |       |             |       |       |
| Age class                  |  |                        |      |             |       |             |       |       |
| 1                          |  |                        |      |             | 3.32  | 15.39       | 17.27 | 22.91 |
| 2                          |  |                        |      |             | 3.32  | 15.39       | 17.27 | 22.91 |
| Total                      |  |                        | 0.22 | 0.22        | 3.32  | 15.39       | 17.27 | 22.91 |
| PREY : CLUPEA HARENGUS     |  |                        |      |             |       |             |       |       |
| Age class                  |  |                        |      |             |       |             |       |       |
| Total                      |  |                        |      |             |       |             | 24.12 | 24.12 |
| PREY : SPRATTUS SPRATTUS   |  |                        |      |             |       |             |       |       |
| Age class                  |  |                        |      |             |       |             |       |       |
| 1                          |  |                        |      |             | 11.64 | 11.64       | 11.64 | 11.64 |
| 2                          |  |                        |      |             | 11.64 | 11.64       | 11.64 | 11.64 |
| Total                      |  |                        |      |             | 11.64 | 11.64       | 11.64 | 11.64 |
| PREY : AMMODYTIDAE         |  |                        |      |             |       |             |       |       |
| Age class                  |  |                        |      |             |       |             |       |       |
| 0                          |  | 0.16                   | 0.50 | 0.48        | 0.51  | 0.58        | 0.61  | 0.53  |
| 1                          |  |                        | 1.65 | 2.19        | 2.88  | 2.78        | 2.81  | 2.24  |
| 2                          |  |                        | 4.14 | 17.88       | 17.95 | 17.99       | 16.10 | 11.73 |
| 3                          |  |                        | 4.14 | 20.40       | 19.84 | 22.59       | 17.67 | 12.26 |
| 4                          |  |                        |      | 20.58       | 19.65 | 21.93       | 17.50 | 12.21 |
| 5                          |  |                        |      | 21.77       | 22.02 | 34.66       | 19.56 | 12.81 |
| 6                          |  |                        |      | 21.77       | 22.02 | 34.66       | 19.56 | 12.81 |
| Total                      |  | 0.16                   | 0.52 | 0.54        | 0.70  | 0.85        | 0.77  | 0.64  |
| PREY : OTHER               |  |                        |      |             |       |             |       |       |
| All size classes           |  | 0.00                   | 0.01 | 0.01        | 0.02  | 0.03        | 0.03  | 0.04  |

Appendix 2-B. Average prey weight (g) at time of ingestion for HADDOCK by age class of prey and predator by quarter for the total North Sea.

|                                 |  |                        |      |       |             |       |             |       |
|---------------------------------|--|------------------------|------|-------|-------------|-------|-------------|-------|
| PREDATOR : HADD                 |  | Area : TOTAL NORTH SEA |      |       | YEAR : 1991 |       | QUARTER : 3 |       |
| Age class                       |  | 0                      | 1    | 2     | 3           | 4     | 5           | 6+    |
| PREY : ALL SPECIES              |  |                        |      |       |             |       |             |       |
| All size classes                |  | 0.01                   | 0.04 | 0.12  | 0.41        | 0.36  | 0.40        | 0.64  |
| PREY : GADUS MORHUA             |  |                        |      |       |             |       |             |       |
| 0                               |  |                        |      |       |             | 1.55  | 1.55        | 1.55  |
| Total                           |  |                        |      |       |             | 1.55  | 1.55        | 1.55  |
| PREY : MELANOGRAMMUS AEGLEFINUS |  |                        |      |       |             |       |             |       |
| 0                               |  |                        | 6.71 | 6.84  | 18.09       | 21.30 | 21.19       | 24.88 |
| 1                               |  |                        |      | 25.53 | 25.53       | 25.53 | 25.53       | 25.53 |
| Total                           |  |                        | 6.71 | 6.87  | 19.03       | 21.94 | 21.86       | 25.00 |
| PREY : TRISOPTERUS ESMARKI      |  |                        |      |       |             |       |             |       |
| 0                               |  | 0.69                   | 4.40 | 4.58  | 4.53        | 2.94  | 3.62        | 2.32  |
| 1                               |  |                        |      |       |             |       |             | 31.66 |
| Total                           |  | 0.69                   | 4.40 | 4.58  | 4.53        | 2.94  | 3.62        | 25.85 |
| PREY : AMMODYTIDAE              |  |                        |      |       |             |       |             |       |
| 0                               |  | 1.23                   | 2.18 | 1.76  | 1.81        | 1.42  | 1.52        | 1.40  |
| 1                               |  |                        | 3.21 | 5.67  | 4.42        | 4.24  | 4.30        | 3.62  |
| 2                               |  |                        | 1.51 | 10.85 | 6.33        | 6.32  | 5.37        | 3.65  |
| 3                               |  |                        | 1.51 | 16.24 | 13.13       | 14.66 | 11.15       | 3.65  |
| 4                               |  |                        | 1.51 | 17.04 | 17.45       | 18.14 | 16.38       | 3.65  |
| 5                               |  |                        | 1.51 | 17.27 | 19.48       | 19.48 | 19.48       |       |
| 6                               |  |                        | 1.51 | 17.27 | 19.48       | 19.48 | 19.48       |       |
| Total                           |  | 0.02                   | 0.16 | 0.72  | 1.87        | 1.44  | 1.56        | 1.41  |
| PREY : OTHER                    |  |                        |      |       |             |       |             |       |
| All size classes                |  | 0.01                   | 0.02 | 0.06  | 0.17        | 0.15  | 0.17        | 0.19  |

Appendix 2-B. Average prey weight (g) at time of ingestion for HADDOCK by age class of prey and predator by quarter for the total North Sea.

|                                 |  |                        |      |       |             |       |             |       |       |
|---------------------------------|--|------------------------|------|-------|-------------|-------|-------------|-------|-------|
| PREDATOR : HADD                 |  | Area : TOTAL NORTH SEA |      |       | YEAR : 1991 |       | QUARTER : 4 |       |       |
| Age class                       |  | 0                      | 1    | 2     | 3           | 4     | 5           | 6+    |       |
| PREY : ALL SPECIES              |  |                        |      |       |             |       |             |       |       |
| All size classes                |  | 0.02                   | 0.15 | 0.30  | 0.45        | 0.63  | 0.79        | 1.35  |       |
| PREY : MELANOGRAMMUS AEGLEFINUS |  |                        |      |       |             |       |             |       |       |
| Age class                       |  | 0                      |      |       | 35.22       | 35.22 | 35.22       | 35.22 |       |
| Total                           |  |                        |      |       | 35.22       | 35.22 | 35.22       | 35.22 |       |
| PREY : TRISOPTERUS ESMARKI      |  |                        |      |       |             |       |             |       |       |
| Age class                       |  | 0                      | 1.70 | 8.93  | 10.84       | 10.25 | 11.33       | 8.30  | 7.73  |
|                                 |  | 1                      |      | 21.05 | 21.05       | 28.13 | 27.90       | 27.47 | 27.39 |
| Total                           |  |                        | 1.70 | 8.93  | 10.85       | 10.46 | 11.66       | 8.96  | 8.03  |
| PREY : CLUPEA HARENGUS          |  |                        |      |       |             |       |             |       |       |
| Age class                       |  | 0                      |      | 0.64  | 0.64        |       |             |       |       |
| Total                           |  |                        |      | 0.64  | 0.64        | 65.60 | 65.60       | 65.60 | 65.60 |
| PREY : AMMODYTIDAE              |  |                        |      |       |             |       |             |       |       |
| Age class                       |  | 0                      | 0.97 | 1.92  | 2.02        | 1.57  | 1.44        | 1.73  | 2.22  |
|                                 |  | 1                      |      | 5.01  | 4.53        | 3.60  | 3.37        | 3.64  | 4.03  |
|                                 |  | 2                      |      | 6.83  | 5.48        | 4.68  | 5.41        | 4.70  |       |
|                                 |  | 3                      |      | 6.83  | 3.99        | 4.68  | 8.21        | 7.31  |       |
|                                 |  | 4                      |      | 6.83  | 5.48        | 4.68  | 5.41        | 4.70  |       |
| Total                           |  |                        | 0.97 | 2.05  | 2.18        | 1.65  | 1.50        | 1.81  | 2.24  |
| PREY : OTHER                    |  |                        |      |       |             |       |             |       |       |
| All size classes                |  | 0.02                   | 0.11 | 0.20  | 0.32        | 0.43  | 0.57        | 0.82  |       |

APPENDIX 2 AVERAGE PREY WEIGHTS.

Appendix 2-C. Average prey weight (g) at time of ingestion for WHITING by age class of prey and predator by quarter for the total North Sea.

| PREDATOR : WHIT                 |   | Area : TOTAL NORTH SEA |       | YEAR : 1981 |       | QUARTER : 1 |       |       |
|---------------------------------|---|------------------------|-------|-------------|-------|-------------|-------|-------|
| Age class                       |   | 0                      | 1     | 2           | 3     | 4           | 5     | 6+    |
| PREY : ALL SPECIES              |   |                        |       |             |       |             |       |       |
| All size classes                |   | 0.03                   | 0.24  | 0.19        | 0.15  | 0.14        | 0.32  |       |
| PREY : GADUS MORHUA             |   |                        |       |             |       |             |       |       |
| Age class                       | 1 | 9.98                   | 11.29 | 11.57       |       |             |       | 85.12 |
|                                 | 2 |                        |       |             |       |             |       | 85.12 |
| Total                           |   | 9.98                   | 11.29 | 11.57       |       |             |       | 85.12 |
| PREY : MELANOGRAMMUS AEGLEFINUS |   |                        |       |             |       |             |       |       |
| Age class                       | 1 | 8.27                   | 5.55  | 11.70       | 12.36 | 12.84       | 13.56 |       |
|                                 | 2 |                        | 13.60 | 13.59       | 13.06 | 12.14       | 9.12  |       |
| Total                           |   | 8.27                   | 5.65  | 11.86       | 12.43 | 12.77       | 12.75 |       |
| PREY : MERLANGIUS MERLANGUS     |   |                        |       |             |       |             |       |       |
| Age class                       | 1 |                        | 13.40 | 15.20       | 16.34 | 19.74       | 18.19 |       |
|                                 | 2 |                        | 33.97 | 34.08       | 34.58 | 35.87       | 36.23 |       |
| Total                           |   |                        | 13.48 | 15.33       | 16.49 | 19.88       | 18.32 |       |
| PREY : TRISOPTERUS ESMARKI      |   |                        |       |             |       |             |       |       |
| Age class                       | 0 | 0.96                   | 1.03  | 1.06        |       |             |       |       |
|                                 | 1 | 4.85                   | 5.86  | 7.17        | 8.33  | 9.64        | 9.93  |       |
|                                 | 2 | 8.17                   | 8.43  | 11.42       | 13.47 | 14.54       | 15.57 |       |
|                                 | 3 |                        | 7.87  | 17.36       | 22.24 | 24.89       | 27.96 |       |
| Total                           |   | 4.79                   | 6.40  | 8.66        | 10.50 | 12.04       | 12.71 |       |
| PREY : CLUPEA HARENGUS          |   |                        |       |             |       |             |       |       |
| Age class                       | 1 |                        | 13.42 | 10.63       | 8.71  | 14.86       | 13.24 |       |
|                                 | 2 |                        | 35.03 | 35.03       | 35.03 | 35.03       | 35.03 |       |
| Total                           |   |                        | 13.43 | 10.71       | 8.81  | 15.11       | 13.35 |       |
| PREY : SPRATTUS SPRATTUS        |   |                        |       |             |       |             |       |       |
| Age class                       | 1 | 1.99                   | 3.37  | 3.05        | 3.32  | 3.37        | 3.04  |       |
|                                 | 2 | 6.34                   | 9.84  | 10.01       | 9.48  | 9.05        | 6.98  |       |
|                                 | 3 | 8.94                   | 18.29 | 15.71       | 12.19 | 14.76       | 12.66 |       |
|                                 | 4 | 8.94                   | 18.29 | 15.71       | 12.19 | 14.76       | 12.66 |       |
| Total                           |   | 2.54                   | 5.46  | 5.69        | 6.54  | 5.90        | 4.70  |       |
| PREY : AMMOODYTIDAE             |   |                        |       |             |       |             |       |       |
| Age class                       | 0 | 0.30                   | 0.88  | 1.02        | 1.03  | 0.90        | 0.56  |       |
|                                 | 1 | 1.82                   | 2.23  | 2.37        | 2.51  | 2.79        | 3.25  |       |
|                                 | 2 | 5.30                   | 8.43  | 9.55        | 11.84 | 12.52       | 13.92 |       |
|                                 | 3 |                        | 32.30 | 36.79       | 36.57 | 35.61       | 32.34 |       |
|                                 | 4 |                        | 32.30 | 36.79       | 36.57 | 35.61       | 32.34 |       |
|                                 | 5 |                        | 32.30 | 36.79       | 36.57 | 35.61       | 32.34 |       |
|                                 | 6 |                        | 32.30 | 36.79       | 36.57 | 35.61       | 32.34 |       |
| Total                           |   | 1.89                   | 2.58  | 3.49        | 5.42  | 6.91        | 7.26  |       |
| PREY : OTHER                    |   |                        |       |             |       |             |       |       |
| All size classes                |   | 0.02                   | 0.13  | 0.09        | 0.06  | 0.05        | 0.10  |       |

Appendix 2-C. Average prey weight (g) at time of ingestion for WHITING by age class of prey and predator by quarter for the total North Sea.

| PREDATOR : WHIT                 |   | Area : TOTAL NORTH SEA |       | YEAR : 1981 |       | QUARTER : 3 |       |       |
|---------------------------------|---|------------------------|-------|-------------|-------|-------------|-------|-------|
| Age class                       |   | 0                      | 1     | 2           | 3     | 4           | 5     | 6+    |
| PREY : ALL SPECIES              |   |                        |       |             |       |             |       |       |
| All size classes                |   | 0.11                   | 0.27  | 0.48        | 0.89  | 0.47        | 0.64  | 0.57  |
| PREY : GADUS MORHUA             |   |                        |       |             |       |             |       |       |
| Age class                       | 0 | 5.92                   | 5.03  |             |       |             |       |       |
| Total                           |   | 5.92                   | 3.95  | 2.22        | 2.22  |             |       |       |
| PREY : MELANOGRAMMUS AEGLEFINUS |   |                        |       |             |       |             |       |       |
| Age class                       | 0 | 10.46                  | 5.99  | 8.76        | 8.11  | 6.93        | 7.24  | 6.14  |
|                                 | 1 |                        | 26.25 | 25.86       | 22.03 | 16.13       | 16.01 | 16.73 |
| Total                           |   | 10.46                  | 6.01  | 8.80        | 8.14  | 6.94        | 7.26  | 6.15  |
| PREY : MERLANGIUS MERLANGUS     |   |                        |       |             |       |             |       |       |
| Age class                       | 0 |                        | 4.09  | 3.41        | 3.15  | 5.42        | 6.36  | 7.02  |
| Total                           |   |                        | 4.09  | 3.41        | 3.15  | 5.42        | 6.36  | 7.02  |
| PREY : TRISOPTERUS ESMARKI      |   |                        |       |             |       |             |       |       |
| Age class                       | 0 | 0.96                   | 2.56  | 2.39        | 2.66  | 3.34        | 3.09  | 4.05  |
|                                 | 1 |                        |       | 35.78       | 35.68 | 34.94       | 33.04 | 32.93 |
| Total                           |   | 0.96                   | 2.57  | 2.40        | 2.69  | 3.40        | 3.12  | 4.08  |
| PREY : CLUPEA HARENGUS          |   |                        |       |             |       |             |       |       |
| Age class                       | 0 |                        | 10.36 | 12.39       | 14.62 | 15.76       | 19.89 | 15.62 |
| Total                           |   |                        | 10.36 | 12.39       | 14.62 | 15.76       | 19.89 | 15.62 |
| PREY : SPRATTUS SPRATTUS        |   |                        |       |             |       |             |       |       |
| Age class                       | 0 |                        | 3.67  | 2.93        | 6.21  | 9.69        | 9.65  | 9.57  |
|                                 | 1 |                        | 9.24  | 15.17       | 18.57 | 22.12       | 22.54 | 23.37 |
|                                 | 2 |                        | 10.50 | 22.39       | 23.74 | 24.62       | 24.85 | 25.38 |
|                                 | 3 |                        | 12.74 | 24.89       | 25.08 | 25.08       | 25.27 | 25.73 |
| Total                           |   |                        | 8.69  | 14.65       | 19.03 | 22.50       | 22.90 | 23.69 |
| PREY : AMMODYTIDAE              |   |                        |       |             |       |             |       |       |
| Age class                       | 0 | 7.47                   | 2.05  | 1.64        | 1.40  | 1.62        | 1.53  | 1.58  |
|                                 | 1 |                        | 36.76 | 21.84       | 16.72 | 14.83       | 14.47 | 15.18 |
|                                 | 2 |                        | 33.07 | 19.84       | 15.37 | 13.39       | 13.01 | 12.75 |
|                                 | 3 |                        | 37.45 | 22.21       | 16.96 | 15.10       | 14.73 | 15.68 |
|                                 | 4 |                        | 37.45 | 22.21       | 16.96 | 15.10       | 14.73 | 15.68 |
| Total                           |   | 0.68                   | 2.14  | 2.93        | 2.64  | 1.88        | 1.98  | 1.89  |
| PREY : OTHER                    |   |                        |       |             |       |             |       |       |
| All size classes                |   | 0.10                   | 0.14  | 0.15        | 0.23  | 0.10        | 0.13  | 0.12  |

Appendix 2-C. Average prey weight (g) at time of ingestion for WHITING by age class of prey and predator by quarter for the total North Sea.

| PREDATOR : WHIT      Area : TOTAL NORTH SEA      YEAR : 1981      QUARTER : 2 |       |       |       |       |       |       |    |
|-------------------------------------------------------------------------------|-------|-------|-------|-------|-------|-------|----|
| Age class                                                                     | 0     | 1     | 2     | 3     | 4     | 5     | 6+ |
| PREY : ALL SPECIES                                                            |       |       |       |       |       |       |    |
| All size classes                                                              | 0.03  | 0.09  | 0.27  | 0.27  | 1.17  | 0.82  |    |
| PREY : GADUS MORHUA                                                           |       |       |       |       |       |       |    |
| Age class 0                                                                   | 0.43  | 0.73  | 1.08  | 0.67  | 1.13  | 1.12  |    |
| Total                                                                         | 0.43  | 0.73  | 1.08  | 0.67  | 1.13  | 1.12  |    |
| PREY : MELANOGRAMMUS AEGLEFINUS                                               |       |       |       |       |       |       |    |
| Age class 0                                                                   | 2.21  | 2.08  | 2.26  | 2.61  | 2.80  | 3.79  |    |
| 1                                                                             |       | 8.06  | 14.97 | 19.13 | 19.00 | 18.03 |    |
| 2                                                                             |       | 9.89  | 18.13 | 31.30 | 28.42 | 25.49 |    |
| Total                                                                         | 2.21  | 2.63  | 4.33  | 5.36  | 6.08  | 9.65  |    |
| PREY : MERLANGIUS MERLANGUS                                                   |       |       |       |       |       |       |    |
| Age class 0                                                                   |       | 19.31 | 19.31 | 19.31 | 19.31 | 19.31 |    |
| 1                                                                             | 20.19 | 7.52  | 7.26  | 10.59 | 12.17 | 8.49  |    |
| Total                                                                         | 20.19 | 7.52  | 7.27  | 10.59 | 12.18 | 8.50  |    |
| PREY : TRISOPTERUS ESMARKI                                                    |       |       |       |       |       |       |    |
| Age class 0                                                                   | 1.65  | 1.64  | 1.25  | 1.16  | 1.19  | 1.19  |    |
| 1                                                                             | 1.58  | 6.51  | 7.71  | 7.79  | 8.20  | 9.32  |    |
| 2                                                                             |       | 10.16 | 12.88 | 17.09 | 17.79 | 16.03 |    |
| 3                                                                             |       | 10.02 | 14.07 | 22.03 | 22.53 | 18.93 |    |
| Total                                                                         | 1.64  | 3.95  | 7.90  | 8.34  | 8.92  | 9.91  |    |
| PREY : CLUPEA HARENGUS                                                        |       |       |       |       |       |       |    |
| Age class 1                                                                   | 0.87  | 0.77  | 0.78  | 0.79  | 0.62  | 0.62  |    |
| Total                                                                         | 0.87  | 1.38  | 3.24  | 1.75  | 0.62  | 0.62  |    |
| PREY : SPRATTUS SPRATTUS                                                      |       |       |       |       |       |       |    |
| Age class 0                                                                   | 3.15  | 5.68  | 6.06  | 7.16  | 7.83  | 7.22  |    |
| 1                                                                             | 9.81  | 8.36  | 6.98  | 8.33  | 8.65  | 8.17  |    |
| 2                                                                             | 17.65 | 10.85 | 10.77 | 11.81 | 11.64 | 11.95 |    |
| 3                                                                             | 19.38 | 14.15 | 18.15 | 15.92 | 14.16 | 15.62 |    |
| Total                                                                         | 5.16  | 7.59  | 7.49  | 8.85  | 9.33  | 8.99  |    |
| PREY : AMMOOYTIDAE                                                            |       |       |       |       |       |       |    |
| Age class 0                                                                   | 0.52  | 0.88  | 0.93  | 0.89  | 0.89  | 0.92  |    |
| 1                                                                             | 2.44  | 3.06  | 3.13  | 4.71  | 3.77  | 3.98  |    |
| 2                                                                             | 5.81  | 6.33  | 8.78  | 10.83 | 8.91  | 8.46  |    |
| 3                                                                             | 7.65  | 9.70  | 12.84 | 14.70 | 13.06 | 12.17 |    |
| 4                                                                             | 7.13  | 8.93  | 11.99 | 13.83 | 12.10 | 11.25 |    |
| 5                                                                             | 11.80 | 13.50 | 16.49 | 18.92 | 17.91 | 17.48 |    |
| 6                                                                             | 11.80 | 13.50 | 16.49 | 18.92 | 17.91 | 17.48 |    |
| Total                                                                         | 0.70  | 1.89  | 2.52  | 2.94  | 2.75  | 2.73  |    |
| PREY : OTHER                                                                  |       |       |       |       |       |       |    |
| All size classes                                                              | 0.01  | 0.03  | 0.07  | 0.09  | 0.75  | 0.28  |    |

- Appendix 2-C. Average prey weight (g) at time of ingestion for WHITING by age class of prey and predator by quarter for the total North Sea.

| PREDATOR : WHIT                 |   | Area | : TOTAL NORTH SEA |       |       | YEAR : 1981 |       | QUARTER : 4 |
|---------------------------------|---|------|-------------------|-------|-------|-------------|-------|-------------|
| Age class                       |   | 0    | 1                 | 2     | 3     | 4           | 5     | 6+          |
| PREY : ALL SPECIES              |   |      |                   |       |       |             |       |             |
| All size classes                |   | 0.16 | 0.10              | 0.14  | 0.19  | 0.44        | 0.63  | 0.57        |
| PREY : GADUS MORHUA             |   |      |                   |       |       |             |       |             |
| Age class                       | 0 |      | 7.31              | 8.91  | 8.19  | 7.61        | 8.75  | 8.51        |
| Total                           |   |      | 7.31              | 8.91  | 8.19  | 7.61        | 8.75  | 8.51        |
| PREY : MELANOGRAMMUS AEGLEFINUS |   |      |                   |       |       |             |       |             |
| Age class                       | 0 | 7.47 | 9.34              | 8.51  | 8.69  | 10.02       | 11.79 | 11.54       |
|                                 | 1 |      | 14.24             | 14.26 | 17.55 | 28.31       | 26.73 | 27.75       |
| Total                           |   | 7.47 | 9.43              | 8.58  | 8.81  | 10.30       | 12.17 | 11.96       |
| PREY : MERLANGIUS MERLANGUS     |   |      |                   |       |       |             |       |             |
| Age class                       | 0 | 2.04 | 8.82              | 12.04 | 10.46 | 11.31       | 12.23 | 13.83       |
| Total                           |   | 3.05 | 8.82              | 12.04 | 10.46 | 11.31       | 12.23 | 13.83       |
| PREY : TRISOPTERUS ESMARKI      |   |      |                   |       |       |             |       |             |
| Age class                       | 0 | 3.24 | 6.35              | 5.93  | 6.45  | 6.69        | 6.16  | 5.76        |
|                                 | 1 |      | 9.98              | 11.55 | 13.35 | 16.65       | 24.49 | 26.52       |
|                                 | 2 |      | 9.98              | 11.55 | 13.35 | 16.65       | 24.49 | 26.52       |
| Total                           |   | 3.24 | 6.58              | 6.30  | 7.06  | 7.68        | 7.57  | 7.63        |
| PREY : CLUPEA HARENGUS          |   |      |                   |       |       |             |       |             |
| Age class                       | 0 | 5.94 | 6.28              | 8.19  | 9.00  | 12.76       | 16.25 | 60.66       |
|                                 | 1 |      | 9.50              | 9.50  | 33.91 | 57.87       | 59.24 | 60.66       |
|                                 | 2 |      |                   |       | 60.66 | 60.66       | 60.66 | 60.66       |
| Total                           |   | 5.94 | 6.28              | 8.20  | 9.12  | 14.59       | 19.33 | 60.66       |
| PREY : SPRATTUS SPRATTUS        |   |      |                   |       |       |             |       |             |
| Age class                       | 1 | 4.07 | 6.21              | 5.82  | 7.84  | 8.17        | 9.10  | 11.56       |
|                                 | 2 | 4.33 | 7.17              | 5.66  | 7.82  | 8.37        | 13.23 | 14.03       |
|                                 | 3 | 9.17 | 7.57              | 5.47  | 7.83  | 8.59        | 15.51 | 15.08       |
|                                 | 4 | 9.17 | 7.57              | 5.47  | 7.83  | 8.59        | 15.51 | 15.08       |
| Total                           |   | 4.20 | 6.64              | 5.73  | 7.83  | 8.28        | 10.07 | 12.69       |
| PREY : AMMODYTIDAE              |   |      |                   |       |       |             |       |             |
| Age class                       | 0 | 0.98 | 1.92              | 2.09  | 1.76  | 2.04        | 3.79  | 1.50        |
|                                 | 1 |      | 24.24             | 24.50 | 22.07 | 23.27       | 15.59 | 21.70       |
|                                 | 2 |      | 24.24             | 24.50 | 22.07 | 23.27       | 15.59 | 21.70       |
|                                 | 3 |      | 24.24             | 24.50 | 22.07 | 23.27       | 15.59 | 21.70       |
|                                 | 4 |      | 24.24             | 24.50 | 22.07 | 23.27       | 15.59 | 21.70       |
| Total                           |   | 0.98 | 2.01              | 3.30  | 4.55  | 6.35        | 10.00 | 8.59        |
| PREY : OTHER                    |   |      |                   |       |       |             |       |             |
| All size classes                |   | 0.13 | 0.04              | 0.05  | 0.06  | 0.15        | 0.24  | 0.24        |

APPENDIX 2 AVERAGE PREY WEIGHTS.

Appendix 2-C. Average prey weight (g) at time of ingestion for WHITING by age class of prey and predator by quarter for the total North Sea.

| PREDATOR : WHIT                 |   | Area : TOTAL NORTH SEA |       | YEAR : 1985 |       | QUARTER : 1 |       |    |
|---------------------------------|---|------------------------|-------|-------------|-------|-------------|-------|----|
| Age class                       |   | 0                      | 1     | 2           | 3     | 4           | 5     | 6+ |
| PREY : ALL SPECIES              |   |                        |       |             |       |             |       |    |
| All size classes                |   | 0.07                   | 0.79  | 3.30        | 4.83  | 5.83        | 5.96  |    |
| PREY : GADUS MORHUA             |   |                        |       |             |       |             |       |    |
| Age class                       | 1 |                        |       | 42.98       | 42.98 | 42.98       | 42.98 |    |
| Total                           |   |                        |       | 42.98       | 42.98 | 42.98       | 42.98 |    |
| PREY : MELANOGRAMMUS AEGLEFINUS |   |                        |       |             |       |             |       |    |
| Age class                       | 1 |                        | 16.95 | 14.78       | 13.63 | 14.37       | 13.03 |    |
|                                 | 2 |                        | 17.43 | 16.58       | 16.46 | 16.51       | 16.41 |    |
| Total                           |   |                        | 16.95 | 14.79       | 13.63 | 14.38       | 13.04 |    |
| PREY : MERLANGIUS MERLANGUS     |   |                        |       |             |       |             |       |    |
| Age class                       | 1 | 15.58                  | 16.28 | 16.26       | 17.61 | 16.41       | 17.62 |    |
|                                 | 2 |                        | 52.88 | 65.23       | 73.59 | 88.92       | 90.89 |    |
|                                 | 3 |                        |       | 91.95       | 91.95 | 91.95       | 91.95 |    |
| Total                           |   | 15.58                  | 16.44 | 16.78       | 22.15 | 29.91       | 36.23 |    |
| PREY : TRISOPTERUS ESMARKI      |   |                        |       |             |       |             |       |    |
| Age class                       | 0 |                        | 1.72  | 1.71        | 1.76  | 1.72        | 1.81  |    |
|                                 | 1 | 6.90                   | 9.45  | 9.61        | 9.41  | 9.63        | 10.01 |    |
|                                 | 2 | 9.28                   | 15.15 | 15.50       | 14.99 | 15.10       | 15.08 |    |
|                                 | 3 | 6.50                   | 18.97 | 31.70       | 31.95 | 31.43       | 32.63 |    |
|                                 | 4 | 6.50                   | 16.30 | 38.93       | 34.90 | 33.15       | 33.03 |    |
| Total                           |   | 7.06                   | 10.33 | 10.67       | 10.39 | 10.67       | 11.03 |    |
| PREY : CLUPEA HARENGUS          |   |                        |       |             |       |             |       |    |
| Age class                       | 1 | 1.16                   | 1.58  | 1.74        | 1.51  | 1.39        | 1.16  |    |
|                                 | 2 | 6.08                   | 10.82 | 14.21       | 16.22 | 18.31       | 20.24 |    |
|                                 | 3 |                        | 35.72 | 46.73       | 50.52 | 32.48       | 32.81 |    |
|                                 | 4 |                        | 62.21 | 55.57       | 38.56 | 22.52       | 18.27 |    |
| Total                           |   | 5.87                   | 10.27 | 13.84       | 16.06 | 18.30       | 20.45 |    |
| PREY : SPRATTUS SPRATTUS        |   |                        |       |             |       |             |       |    |
| Age class                       | 1 | 1.37                   | 1.89  | 1.98        | 1.95  | 2.04        | 1.98  |    |
|                                 | 2 | 3.12                   | 4.12  | 4.55        | 4.66  | 4.47        | 4.60  |    |
|                                 | 3 | 7.50                   | 11.62 | 13.98       | 9.63  | 9.67        | 12.20 |    |
|                                 | 4 | 7.78                   | 12.32 | 14.26       | 10.88 | 10.60       | 13.48 |    |
|                                 | 5 | 7.71                   | 13.27 | 18.21       | 26.55 | 19.47       | 28.00 |    |
|                                 | 6 | 9.52                   | 15.58 | 26.50       | 42.87 | 36.09       | 43.07 |    |
| Total                           |   | 1.67                   | 3.24  | 4.26        | 4.97  | 4.75        | 4.83  |    |
| PREY : AMMODYTIDAE              |   |                        |       |             |       |             |       |    |
| Age class                       | 1 | 1.23                   | 2.30  | 4.25        | 4.70  | 4.82        | 4.22  |    |
|                                 | 2 | 5.34                   | 8.14  | 7.00        | 7.45  | 7.73        | 7.65  |    |
|                                 | 3 | 14.84                  | 14.42 | 12.74       | 10.71 | 10.60       | 10.94 |    |
|                                 | 4 | 14.69                  | 14.31 | 13.08       | 10.24 | 9.26        | 9.04  |    |
|                                 | 6 |                        | 34.50 | 32.30       | 31.74 | 31.66       | 32.13 |    |
| Total                           |   | 1.52                   | 3.60  | 5.10        | 6.09  | 6.10        | 5.28  |    |
| PREY : OTHER                    |   |                        |       |             |       |             |       |    |
| All size classes                |   | 0.05                   | 0.31  | 0.62        | 0.90  | 0.99        | 1.03  |    |

Appendix 2-C. Average prey weight (g) at time of ingestion for WHITING by age class of prey and predator by quarter for the total North Sea.

| PREDATOR : WHIT                 |   | Area : TOTAL NORTH SEA |       |       | YEAR : 1985 |       | QUARTER : 3 |       |
|---------------------------------|---|------------------------|-------|-------|-------------|-------|-------------|-------|
| Age class                       |   | 0                      | 1     | 2     | 3           | 4     | 5           | 6+    |
| PREY : ALL SPECIES              |   |                        |       |       |             |       |             |       |
| All size classes                |   | 0.01                   | 0.22  | 0.24  | 0.31        | 0.33  | 1.61        | 1.74  |
| PREY : GADUS MORHUA             |   |                        |       |       |             |       |             |       |
| Age class                       | 0 |                        | 3.90  | 5.66  | 6.54        | 6.41  | 5.18        |       |
| Total                           |   |                        | 3.90  | 5.66  | 6.54        | 6.41  | 5.18        |       |
| PREY : MELANOGRAMMUS AEGLEFINUS |   |                        |       |       |             |       |             |       |
| Age class                       | 0 | 3.20                   | 3.91  | 4.25  | 4.95        | 5.46  | 5.73        | 5.78  |
|                                 | 1 |                        |       | 19.94 | 19.94       | 19.94 | 19.94       | 19.94 |
| Total                           |   | 3.20                   | 3.91  | 4.25  | 4.95        | 5.46  | 5.73        | 5.78  |
| PREY : MERLANGIUS MERLANGUS     |   |                        |       |       |             |       |             |       |
| Age class                       | 0 | 2.66                   | 4.47  | 0.56  | 0.17        | 0.28  | 0.19        | 0.23  |
| Total                           |   | 2.66                   | 4.47  | 0.56  | 0.17        | 0.28  | 0.19        | 0.23  |
| PREY : TRISOPTERUS ESMARKI      |   |                        |       |       |             |       |             |       |
| Age class                       | 0 | 0.99                   | 1.94  | 3.61  | 5.24        | 7.31  | 11.96       | 13.19 |
|                                 | 1 |                        |       | 24.18 | 24.20       | 24.76 | 24.57       | 24.74 |
|                                 | 2 |                        |       | 24.53 | 24.33       | 24.78 | 24.59       | 24.75 |
|                                 | 3 |                        |       | 25.16 | 25.08       | 25.20 | 25.25       | 25.27 |
| Total                           |   | 0.99                   | 1.94  | 6.34  | 15.34       | 19.66 | 21.42       | 22.30 |
| PREY : CLUPEA HARENGUS          |   |                        |       |       |             |       |             |       |
| Age class                       | 0 |                        | 2.66  | 4.08  | 4.72        | 5.05  | 4.10        | 5.67  |
|                                 | 1 |                        | 7.83  | 12.02 | 15.66       | 15.76 | 17.20       | 17.46 |
|                                 | 2 |                        | 20.84 | 25.67 | 30.97       | 36.88 | 33.33       | 33.62 |
|                                 | 4 |                        |       |       | 56.43       | 56.56 |             | 56.59 |
| Total                           |   |                        | 6.19  | 11.80 | 16.10       | 18.61 | 20.26       | 22.15 |
| PREY : SPRATTUS SPRATTUS        |   |                        |       |       |             |       |             |       |
| Age class                       | 0 | 3.28                   | 6.28  | 5.58  | 6.10        | 6.66  | 6.88        | 6.95  |
|                                 | 1 |                        | 4.26  | 8.60  | 13.80       | 15.50 | 18.31       | 17.28 |
|                                 | 2 |                        | 4.26  | 8.14  | 12.91       | 15.05 | 18.41       | 17.35 |
|                                 | 3 |                        | 4.26  | 8.14  | 12.91       | 15.05 | 18.41       | 17.35 |
| Total                           |   | 3.28                   | 5.61  | 6.24  | 7.38        | 8.12  | 8.12        | 8.09  |
| PREY : AMMODYTIDAE              |   |                        |       |       |             |       |             |       |
| Age class                       | 0 | 0.60                   | 1.60  | 1.96  | 1.95        | 1.97  | 1.79        | 2.13  |
|                                 | 1 | 10.06                  | 9.75  | 8.73  | 15.71       | 16.25 | 23.66       | 24.09 |
|                                 | 2 |                        | 6.75  | 6.92  | 13.17       | 12.56 | 19.79       | 19.42 |
|                                 | 3 |                        | 5.59  | 15.19 | 22.22       | 21.54 | 22.73       | 22.33 |
|                                 | 4 |                        |       | 23.35 | 24.22       | 24.19 | 23.99       | 23.27 |
|                                 | 5 |                        |       | 23.35 | 24.22       | 24.19 | 23.99       | 23.27 |
|                                 | 6 |                        |       | 23.35 | 24.22       | 24.19 | 23.99       | 23.27 |
| Total                           |   | 0.60                   | 1.97  | 2.93  | 3.70        | 3.84  | 3.98        | 5.50  |
| PREY : OTHER                    |   |                        |       |       |             |       |             |       |
| All size classes                |   | 0.00                   | 0.10  | 0.12  | 0.10        | 0.10  | 0.18        | 0.33  |

Appendix 2-C. Average prey weight (g) at time of ingestion for WHITING by age class of prey and predator by quarter for the total North Sea.

| PREDATOR : WHIT                 |   | Area : TOTAL NORTH SEA |       | YEAR : 1986 |       | QUARTER : 1 |       |    |
|---------------------------------|---|------------------------|-------|-------------|-------|-------------|-------|----|
| Age class                       |   | 0                      | 1     | 2           | 3     | 4           | 5     | 6+ |
| PREY : ALL SPECIES              |   |                        |       |             |       |             |       |    |
| All size classes                |   | 0.12                   | 0.32  | 1.40        | 4.76  | 5.81        | 6.77  |    |
| PREY : GADUS MORHUA             |   |                        |       |             |       |             |       |    |
| Age class                       | 1 | 2.78                   | 12.66 | 7.22        | 6.21  | 5.50        | 6.66  |    |
| Total                           |   | 2.78                   | 12.66 | 7.22        | 6.21  | 5.50        | 6.66  |    |
| PREY : MELANOGRAMMUS AEGLEFINUS |   |                        |       |             |       |             |       |    |
| Age class                       | 1 | 9.09                   | 31.09 | 33.71       | 33.01 | 33.53       | 31.47 |    |
| Total                           |   | 9.09                   | 31.09 | 33.71       | 33.01 | 33.53       | 31.47 |    |
| PREY : MERLANGIUS MERLANGUS     |   |                        |       |             |       |             |       |    |
| Age class                       | 1 | 6.50                   | 18.67 | 15.38       | 11.57 | 11.83       | 10.28 |    |
|                                 | 2 |                        |       | 7.45        | 7.45  | 7.45        | 7.45  |    |
| Total                           |   | 6.50                   | 18.67 | 15.12       | 11.18 | 11.65       | 10.17 |    |
| PREY : TRISOPTERUS ESMARKI      |   |                        |       |             |       |             |       |    |
| Age class                       | 0 | 3.76                   | 0.65  |             |       |             |       |    |
|                                 | 1 | 7.94                   | 8.86  | 11.88       | 12.46 | 13.11       | 13.61 |    |
|                                 | 2 | 15.23                  | 17.75 | 19.46       | 22.06 | 23.23       | 25.98 |    |
|                                 | 3 |                        | 22.76 | 21.70       | 23.03 | 25.85       | 31.18 |    |
|                                 | 4 |                        | 22.74 | 21.62       | 22.80 | 25.52       | 30.76 |    |
| Total                           |   | 5.52                   | 8.94  | 12.16       | 12.95 | 13.61       | 14.25 |    |
| PREY : CLUPEA HARENGUS          |   |                        |       |             |       |             |       |    |
| Age class                       | 1 | 2.35                   | 5.58  | 4.51        | 4.57  | 4.53        | 5.55  |    |
|                                 | 2 | 3.84                   | 4.83  | 8.65        | 10.02 | 10.06       | 9.00  |    |
|                                 | 3 | 5.27                   | 5.00  | 19.01       | 28.06 | 27.10       | 32.11 |    |
| Total                           |   | 3.56                   | 4.92  | 8.00        | 9.64  | 9.64        | 9.01  |    |
| PREY : SPRATTUS SPRATTUS        |   |                        |       |             |       |             |       |    |
| Age class                       | 1 | 2.27                   | 1.61  | 1.56        | 1.87  | 1.88        | 1.88  |    |
|                                 | 2 | 5.82                   | 6.08  | 6.67        | 7.02  | 6.72        | 6.69  |    |
|                                 | 3 | 5.37                   | 8.48  | 9.93        | 9.96  | 9.75        | 9.59  |    |
|                                 | 4 | 5.91                   | 11.43 | 16.09       | 15.51 | 16.66       | 16.57 |    |
|                                 | 5 | 5.19                   | 9.44  | 11.10       | 11.06 | 10.86       | 10.56 |    |
|                                 | 6 | 14.48                  | 14.54 | 11.73       | 11.33 | 11.24       | 10.92 |    |
| Total                           |   | 3.97                   | 4.72  | 6.60        | 7.57  | 6.40        | 4.69  |    |
| PREY : AMMODYTIDAE              |   |                        |       |             |       |             |       |    |
| Age class                       | 1 | 1.69                   | 2.80  | 3.12        | 3.35  | 4.09        | 4.87  |    |
|                                 | 2 | 2.27                   | 6.08  | 7.30        | 7.95  | 8.09        | 8.69  |    |
|                                 | 3 |                        |       | 5.83        | 5.82  | 5.81        | 5.71  |    |
|                                 | 4 |                        |       | 5.83        | 5.82  | 5.81        | 5.71  |    |
| Total                           |   | 1.73                   | 2.91  | 3.40        | 3.86  | 4.50        | 5.31  |    |
| PREY : OTHER                    |   |                        |       |             |       |             |       |    |
| All size classes                |   | 0.06                   | 0.08  | 0.33        | 1.81  | 2.15        | 2.44  |    |

Appendix 2-C. Average prey weight (g) at time of ingestion for WHITING by age class of prey and predator by quarter for the total North Sea.

| PREDATOR : WHIT                 |   | Area  | : TOTAL NORTH SEA |       |       | YEAR : 1986 | QUARTER : 3 |       |
|---------------------------------|---|-------|-------------------|-------|-------|-------------|-------------|-------|
| Age class                       |   | 0     | 1                 | 2     | 3     | 4           | 5           | 6+    |
| PREY : ALL SPECIES              |   |       |                   |       |       |             |             |       |
| All size classes                |   | 0.12  | 0.20              | 0.71  | 1.03  | 2.01        | 2.91        | 4.18  |
| PREY : GADUS MORHUA             |   |       |                   |       |       |             |             |       |
| Age class                       | 0 | 1.23  | 1.03              | 3.18  | 2.93  | 2.72        | 2.71        | 2.64  |
| Total                           |   | 1.23  | 1.29              | 3.17  | 2.93  | 2.72        | 2.71        | 2.64  |
| PREY : MELANOGRAMMUS AEGLEFINUS |   |       |                   |       |       |             |             |       |
| Age class                       | 0 | 1.80  | 2.71              | 3.33  | 3.34  | 3.47        | 3.75        | 3.52  |
|                                 | 1 |       | 22.60             | 16.13 | 12.78 | 13.02       | 12.53       | 9.96  |
| Total                           |   | 1.80  | 2.71              | 3.33  | 3.43  | 3.68        | 4.24        | 3.52  |
| PREY : MERLANGIUS MERLANGUS     |   |       |                   |       |       |             |             |       |
| Age class                       | 0 | 1.16  | 2.44              | 3.02  | 3.77  | 4.26        | 5.21        | 2.62  |
|                                 | 1 |       |                   | 29.28 | 28.52 | 38.37       | 38.37       |       |
| Total                           |   | 1.16  | 2.44              | 3.02  | 3.78  | 4.29        | 5.26        | 2.62  |
| PREY : TRISOPTERUS ESMARKI      |   |       |                   |       |       |             |             |       |
| Age class                       | 0 | 1.15  | 2.50              | 3.88  | 4.73  | 5.46        | 4.98        | 4.82  |
|                                 | 1 |       | 9.93              | 14.70 | 18.19 | 19.65       | 19.98       | 16.84 |
|                                 | 2 |       |                   | 17.12 | 17.32 | 25.65       | 21.17       | 37.34 |
|                                 | 3 |       |                   | 15.98 | 16.15 | 16.14       | 16.16       |       |
|                                 | 4 |       |                   | 15.98 | 16.15 | 16.14       | 16.16       |       |
| Total                           |   | 1.15  | 2.54              | 4.40  | 6.13  | 8.22        | 8.17        | 8.41  |
| PREY : CLUPEA HARENGUS          |   |       |                   |       |       |             |             |       |
| Age class                       | 0 |       | 2.87              | 2.60  | 2.02  | 3.58        | 3.45        | 7.47  |
|                                 | 1 | 2.20  | 6.59              | 8.15  | 10.61 | 12.67       | 13.76       | 26.34 |
|                                 | 2 |       | 31.73             | 35.10 | 31.87 | 36.52       | 44.68       | 31.94 |
| Total                           |   | 2.20  | 5.56              | 7.01  | 9.15  | 13.39       | 18.14       | 25.78 |
| PREY : SPRATTUS SPRATTUS        |   |       |                   |       |       |             |             |       |
| Age class                       | 0 |       | 4.66              | 3.42  | 3.61  | 4.80        | 6.35        | 2.86  |
|                                 | 1 |       | 5.38              | 6.66  | 7.77  | 4.88        | 4.12        | 3.83  |
|                                 | 2 |       | 8.10              | 10.94 | 14.43 | 14.54       | 13.50       | 8.62  |
|                                 | 3 |       | 8.10              | 10.94 | 14.43 | 14.54       | 13.50       | 8.62  |
| Total                           |   |       | 5.26              | 4.65  | 5.73  | 6.49        | 7.14        | 2.87  |
| PREY : AMMODYTIDAE              |   |       |                   |       |       |             |             |       |
| Age class                       | 0 | 1.50  | 2.32              | 2.64  | 2.74  | 3.22        | 2.87        | 2.82  |
|                                 | 1 | 14.93 | 9.10              | 9.97  | 9.53  | 11.86       | 11.19       | 11.03 |
|                                 | 2 |       | 9.50              | 10.91 | 10.63 | 13.03       | 12.23       | 25.83 |
|                                 | 3 |       | 13.19             | 14.19 | 14.12 | 16.07       | 15.17       | 14.85 |
|                                 | 4 |       | 13.19             | 13.13 | 12.57 | 13.95       | 15.17       | 14.85 |
|                                 | 5 |       |                   | 32.50 | 31.56 | 34.08       |             |       |
| Total                           |   | 1.50  | 2.74              | 3.71  | 4.23  | 5.24        | 4.68        | 3.07  |
| PREY : OTHER                    |   |       |                   |       |       |             |             |       |
| All size classes                |   | 0.09  | 0.07              | 0.26  | 0.57  | 0.68        | 1.03        | 0.48  |

Appendix 2-C. Average prey weight (g) at time of ingestion for WHITING by age class of prey and predator by quarter for the total North Sea.

| PREDATOR : WHIT                 |   | Area  | : TOTAL NORTH SEA |       | YEAR : 1987 |       | QUARTER : 1 |    |
|---------------------------------|---|-------|-------------------|-------|-------------|-------|-------------|----|
| Age class                       |   | 0     | 1                 | 2     | 3           | 4     | 5           | 6+ |
| PREY : ALL SPECIES              |   |       |                   |       |             |       |             |    |
| All size classes                |   | 0.12  | 1.35              | 2.95  | 4.13        | 5.37  | 5.02        |    |
| PREY : GADUS MORHUA             |   |       |                   |       |             |       |             |    |
| PREY : MELANOGRAMMUS AEGLEFINUS |   |       |                   |       |             |       |             |    |
| Age class                       | 1 | 11.54 | 10.70             | 10.42 | 13.23       | 16.66 | 19.06       |    |
| Total                           |   | 11.54 | 10.70             | 10.42 | 13.23       | 16.66 | 19.06       |    |
| PREY : MERLANGIUS MERLANGUS     |   |       |                   |       |             |       |             |    |
| Age class                       | 1 | 5.49  | 8.11              | 8.11  | 9.62        | 12.73 | 12.95       |    |
|                                 | 2 |       | 48.99             | 48.99 | 48.99       | 48.99 | 48.99       |    |
| Total                           |   | 5.49  | 8.11              | 8.12  | 9.66        | 12.78 | 13.08       |    |
| PREY : TRISOPTERUS ESMARKI      |   |       |                   |       |             |       |             |    |
| Age class                       | 1 | 7.14  | 9.02              | 10.25 | 9.82        | 9.49  | 9.44        |    |
|                                 | 2 | 9.24  | 16.96             | 34.73 | 40.42       | 38.03 | 41.95       |    |
|                                 | 3 |       | 45.20             | 48.73 | 48.72       | 49.02 | 49.02       |    |
| Total                           |   | 7.14  | 9.03              | 10.33 | 9.99        | 9.62  | 9.69        |    |
| PREY : CLUPEA HARENGUS          |   |       |                   |       |             |       |             |    |
| Age class                       | 1 | 1.02  | 1.85              | 2.03  | 2.41        |       |             |    |
|                                 | 2 | 6.34  | 9.94              | 12.96 | 19.24       | 19.45 | 21.10       |    |
|                                 | 3 |       | 45.34             | 32.76 | 28.19       | 26.97 | 26.57       |    |
| Total                           |   | 4.63  | 9.93              | 13.55 | 20.14       | 20.42 | 21.70       |    |
| PREY : SPRATTUS SPRATTUS        |   |       |                   |       |             |       |             |    |
| Age class                       | 1 | 0.96  | 1.67              | 1.78  | 1.72        | 1.30  | 1.69        |    |
|                                 | 2 | 3.03  | 4.39              | 8.00  | 9.08        | 9.15  | 5.51        |    |
|                                 | 3 | 14.59 | 17.74             | 16.66 | 14.66       | 13.89 | 12.65       |    |
|                                 | 4 | 16.80 | 18.18             | 17.83 | 16.31       | 15.37 | 9.38        |    |
|                                 | 5 | 16.18 | 17.85             | 16.80 | 14.64       | 14.16 | 13.88       |    |
| Total                           |   | 1.65  | 3.66              | 8.20  | 8.52        | 8.99  | 6.45        |    |
| PREY : AMMODYTIDAE              |   |       |                   |       |             |       |             |    |
| Age class                       | 0 | 0.00  |                   |       |             |       |             |    |
|                                 | 1 | 1.60  | 1.61              | 1.45  | 1.61        | 2.16  | 1.88        |    |
|                                 | 2 | 3.23  | 4.30              | 4.71  | 5.50        | 7.38  | 7.70        |    |
|                                 | 3 | 13.67 | 16.20             | 14.28 | 14.71       | 15.11 | 14.82       |    |
|                                 | 4 |       | 14.14             | 14.64 | 15.57       | 15.67 | 15.62       |    |
| Total                           |   | 1.68  | 2.47              | 2.30  | 2.76        | 4.34  | 4.51        |    |
| PREY : OTHER                    |   |       |                   |       |             |       |             |    |
| All size classes                |   | 0.06  | 0.38              | 0.73  | 0.90        | 0.91  | 0.93        |    |

Appendix 2-C. Average prey weight (g) at time of ingestion for WHITING by age class of prey and predator by quarter for the total North Sea.

| PREDATOR : WHIT                 |   | Area | : TOTAL NORTH SEA |       |       | YEAR : 1987 |       | QUARTER : 3 |  |
|---------------------------------|---|------|-------------------|-------|-------|-------------|-------|-------------|--|
| Age class                       |   | 0    | 1                 | 2     | 3     | 4           | 5     | 6+          |  |
| PREY : ALL SPECIES              |   |      |                   |       |       |             |       |             |  |
| All size classes                |   | 0.01 | 0.05              | 0.45  | 1.25  | 1.73        | 2.39  | 2.10        |  |
| PREY : GADUS MORHUA             |   |      |                   |       |       |             |       |             |  |
| Age class                       | 0 |      |                   |       | 10.50 | 9.81        | 8.49  | 10.56       |  |
| Total                           |   |      |                   |       | 10.50 | 9.81        | 8.49  | 10.56       |  |
| PREY : MELANOGRAMMUS AEGLEFINUS |   |      |                   |       |       |             |       |             |  |
| Age class                       | 0 | 1.24 | 1.71              | 3.00  | 4.64  | 5.51        | 6.65  | 6.88        |  |
|                                 | 1 |      |                   | 80.31 | 75.87 | 79.09       | 77.43 | 23.47       |  |
| Total                           |   | 1.24 | 1.71              | 3.10  | 5.30  | 7.84        | 8.32  | 6.90        |  |
| PREY : MERLANGIUS MERLANGUS     |   |      |                   |       |       |             |       |             |  |
| Age class                       | 0 | 0.67 | 3.01              | 2.84  | 3.41  | 4.53        | 6.30  | 5.87        |  |
|                                 | 1 |      |                   | 8.98  | 8.99  | 9.67        | 9.62  | 9.56        |  |
| Total                           |   | 0.67 | 3.01              | 2.84  | 3.43  | 4.63        | 6.43  | 5.93        |  |
| PREY : TRISOPTERUS ESMARKI      |   |      |                   |       |       |             |       |             |  |
| Age class                       | 0 | 4.29 | 1.70              | 7.05  | 9.69  | 10.12       | 10.27 | 10.90       |  |
|                                 | 1 |      | 3.81              | 16.01 | 20.48 | 21.24       | 21.26 | 22.29       |  |
|                                 | 2 |      | 38.66             | 34.43 | 33.00 | 33.26       | 32.80 | 32.74       |  |
| Total                           |   | 4.29 | 1.99              | 9.24  | 12.83 | 13.45       | 13.64 | 14.58       |  |
| PREY : CLUPEA HARENGUS          |   |      |                   |       |       |             |       |             |  |
| Age class                       | 0 |      | 2.75              | 2.75  |       |             |       |             |  |
|                                 | 1 |      | 1.51              | 5.63  | 9.12  | 12.63       | 15.79 | 10.63       |  |
|                                 | 2 |      | 11.69             | 25.64 | 34.58 | 34.10       | 38.17 | 38.50       |  |
| Total                           |   |      | 1.56              | 5.80  | 9.78  | 13.65       | 17.11 | 11.38       |  |
| PREY : SPRATTUS SPRATTUS        |   |      |                   |       |       |             |       |             |  |
| Age class                       | 0 |      | 3.60              | 4.91  | 4.69  | 4.31        | 4.11  | 4.44        |  |
|                                 | 1 |      | 8.91              | 5.59  | 5.88  | 5.21        | 4.84  | 4.91        |  |
|                                 | 2 |      | 11.17             | 11.42 | 12.44 | 11.23       | 11.42 | 10.44       |  |
|                                 | 3 |      | 11.17             | 11.38 | 12.11 | 11.22       | 11.39 | 10.48       |  |
|                                 | 4 |      | 11.17             | 11.17 | 11.17 | 11.17       | 11.17 | 11.17       |  |
| Total                           |   |      | 5.97              | 6.80  | 7.01  | 6.37        | 5.70  | 6.25        |  |
| PREY : AMMODYTIDAE              |   |      |                   |       |       |             |       |             |  |
| Age class                       | 0 | 1.01 | 4.39              | 5.63  | 5.64  | 5.44        | 4.85  | 5.18        |  |
|                                 | 1 | 5.21 | 7.98              | 10.04 | 10.58 | 9.99        | 9.62  | 10.14       |  |
|                                 | 2 |      | 8.31              | 9.02  | 9.66  | 10.03       | 10.21 | 10.38       |  |
|                                 | 3 |      | 13.61             | 15.73 | 17.32 | 17.09       | 17.27 | 16.04       |  |
|                                 | 4 |      | 13.61             | 15.73 | 17.32 | 17.09       | 17.27 | 16.04       |  |
|                                 | 5 |      | 13.61             | 15.73 | 17.32 | 17.09       | 17.27 | 16.04       |  |
| Total                           |   | 1.03 | 5.92              | 6.73  | 6.98  | 7.71        | 7.73  | 8.37        |  |
| PREY : OTHER                    |   |      |                   |       |       |             |       |             |  |
| All size classes                |   | 0.01 | 0.02              | 0.10  | 0.22  | 0.40        | 0.53  | 0.72        |  |

APPENDIX 2 AVERAGE PREY WEIGHTS.

Appendix 2-C. Average prey weight (g) at time of ingestion for WHITING by age class of prey and predator by quarter for the total North Sea.

| PREDATOR : WHIT                 |   | Area : TOTAL NORTH SEA |       | YEAR : 1991 |       | QUARTER : 1 |       |       |
|---------------------------------|---|------------------------|-------|-------------|-------|-------------|-------|-------|
| Age class                       |   | 0                      | 1     | 2           | 3     | 4           | 5     | 6+    |
| PREY : ALL SPECIES              |   |                        |       |             |       |             |       |       |
| All size classes                |   | 0.03                   | 0.24  | 1.33        | 2.66  | 2.56        | 6.00  |       |
| PREY : MELANOGRAMMUS AEGLEFINUS |   |                        |       |             |       |             |       |       |
| Age class                       | 1 |                        | 8.69  | 5.51        | 6.40  | 6.11        | 12.61 |       |
|                                 | 2 |                        |       | 27.84       | 27.84 | 27.84       |       |       |
| Total                           |   |                        | 8.69  | 5.51        | 6.41  | 6.11        | 12.61 |       |
| PREY : MERLANGIUS MERLANGUS     |   |                        |       |             |       |             |       |       |
| Age class                       | 0 |                        |       | 0.01        | 0.01  | 0.01        | 0.01  | 0.01  |
|                                 | 1 |                        | 0.54  | 6.19        | 8.94  | 9.54        | 9.93  | 14.75 |
|                                 | 2 |                        |       | 33.49       | 29.79 | 20.92       | 25.08 | 33.47 |
| Total                           |   |                        | 0.54  | 6.19        | 8.97  | 9.57        | 9.99  | 14.83 |
| PREY : TRISOPTERUS ESMARKI      |   |                        |       |             |       |             |       |       |
| Age class                       | 1 |                        | 4.65  | 6.94        | 8.04  | 11.36       | 10.33 | 15.34 |
|                                 | 2 |                        | 6.73  | 1.72        | 3.30  | 9.15        | 11.42 | 22.87 |
|                                 | 3 |                        | 5.66  | 6.69        | 13.17 | 15.10       | 15.37 | 15.54 |
| Total                           |   |                        | 4.65  | 6.89        | 8.00  | 11.32       | 10.36 | 15.45 |
| PREY : CLUPEA HARENGUS          |   |                        |       |             |       |             |       |       |
| Age class                       | 1 |                        | 8.17  | 10.47       | 10.77 | 11.29       | 10.49 | 8.93  |
|                                 | 2 |                        |       |             | 46.50 | 46.50       | 46.50 | 46.50 |
| Total                           |   |                        | 8.17  | 10.47       | 10.77 | 11.29       | 10.49 | 8.94  |
| PREY : SPRATTUS SPRATTUS        |   |                        |       |             |       |             |       |       |
| Age class                       | 1 |                        | 4.02  | 8.71        | 13.51 | 10.15       | 10.39 | 5.48  |
|                                 | 2 |                        | 8.42  | 15.81       | 17.53 | 16.79       | 17.25 | 14.13 |
|                                 | 3 |                        | 8.46  | 12.03       | 15.97 | 19.41       | 18.61 | 19.71 |
|                                 | 4 |                        | 17.53 | 22.72       | 23.06 | 23.10       | 22.13 | 21.28 |
|                                 | 5 |                        | 17.53 | 22.07       | 22.69 | 22.77       | 21.07 | 19.96 |
| Total                           |   |                        | 4.11  | 9.65        | 14.37 | 11.25       | 11.46 | 5.88  |
| PREY : AMMODYTIDAE              |   |                        |       |             |       |             |       |       |
| Age class                       | 1 |                        | 1.79  | 1.88        | 2.02  | 1.94        | 2.07  | 2.41  |
|                                 | 2 |                        | 5.26  | 13.15       | 10.55 | 10.06       | 8.92  | 6.21  |
|                                 | 3 |                        | 8.48  | 13.56       | 11.22 | 10.65       | 10.24 | 6.59  |
|                                 | 4 |                        | 8.07  | 13.52       | 11.12 | 10.54       | 9.95  | 6.57  |
|                                 | 5 |                        | 10.18 | 13.58       | 11.33 | 10.76       | 10.59 | 9.90  |
|                                 | 6 |                        | 10.18 | 13.58       | 11.33 | 10.76       | 10.59 | 9.91  |
| Total                           |   |                        | 1.79  | 2.10        | 2.28  | 2.37        | 2.31  | 2.46  |
| PREY : OTHER                    |   |                        |       |             |       |             |       |       |
| All size classes                |   | 0.02                   | 0.09  | 0.32        | 1.07  | 0.98        | 1.55  |       |

Appendix 2-C. Average prey weight (g) at time of ingestion for WHITING by age class of prey and predator by quarter for the total North Sea.

| PREDATOR : WHIT                 |   | Area | TOTAL NORTH SEA |       |       | YEAR : 1991 |       | QUARTER : 2 |      |
|---------------------------------|---|------|-----------------|-------|-------|-------------|-------|-------------|------|
| Age class                       |   |      | 0               | 1     | 2     | 3           | 4     | 5           | 6+   |
| PREY : ALL SPECIES              |   |      |                 |       |       |             |       |             |      |
| All size classes                |   |      | 0.01            | 0.02  | 0.02  | 0.02        | 0.02  | 0.03        | 0.03 |
| PREY : GADUS MORHUA             |   |      |                 |       |       |             |       |             |      |
| Age class                       | 0 |      | 1.48            | 1.55  | 1.67  | 2.40        | 3.22  | 0.83        |      |
| Total                           |   |      | 1.48            | 1.55  | 1.67  | 2.40        | 3.22  | 2.81        |      |
| PREY : MELANOGRAMMUS AEGLEFINUS |   |      |                 |       |       |             |       |             |      |
| Age class                       | 0 |      | 0.19            | 0.20  | 0.21  | 0.21        | 0.21  | 0.21        |      |
| Total                           |   |      | 0.19            | 0.20  | 0.21  | 0.21        | 0.20  | 0.21        |      |
| PREY : MERLANGIUS MERLANGUS     |   |      |                 |       |       |             |       |             |      |
| Age class                       | 0 |      | 0.33            | 0.28  | 0.45  | 1.27        | 1.53  | 1.62        |      |
|                                 | 1 |      | 10.95           | 12.45 | 11.91 | 12.73       | 13.39 | 15.05       |      |
| Total                           |   |      | 0.50            | 2.60  | 5.08  | 7.56        | 7.29  | 7.40        |      |
| PREY : TRISOPTERUS ESMARKI      |   |      |                 |       |       |             |       |             |      |
| Age class                       | 0 |      | 0.28            | 0.66  | 1.54  | 1.68        | 2.56  | 4.64        |      |
|                                 | 1 |      | 9.47            | 11.24 | 12.07 | 12.97       | 13.00 | 13.53       |      |
|                                 | 2 |      | 8.95            | 10.55 | 11.99 | 16.75       | 20.86 | 19.95       |      |
|                                 | 3 |      | 6.15            | 8.91  | 11.63 | 17.33       | 23.22 | 22.27       |      |
|                                 | 4 |      | 9.49            | 15.41 | 18.18 | 24.81       | 29.07 | 29.34       |      |
| Total                           |   |      | 1.26            | 3.98  | 7.96  | 10.09       | 12.00 | 13.09       |      |
| PREY : CLUPEA HARENGUS          |   |      |                 |       |       |             |       |             |      |
| Age class                       | 0 |      | 4.17            | 7.33  | 7.37  | 7.50        | 7.72  | 11.11       |      |
|                                 | 1 |      | 12.20           | 23.34 | 17.68 | 19.96       | 20.68 | 19.59       |      |
|                                 | 2 |      | 10.62           | 21.44 | 21.44 | 21.44       | 21.44 | 21.44       |      |
| Total                           |   |      | 6.27            | 12.32 | 12.82 | 15.02       | 15.46 | 18.73       |      |
| PREY : SPRATTUS SPRATTUS        |   |      |                 |       |       |             |       |             |      |
| Age class                       | 0 |      | 0.71            | 1.20  | 1.28  | 1.28        | 1.28  | 1.28        |      |
|                                 | 1 |      | 4.77            | 5.50  | 6.38  | 6.71        | 6.56  | 6.17        |      |
|                                 | 2 |      | 13.27           | 12.15 | 10.65 | 11.02       | 11.96 | 13.30       |      |
|                                 | 3 |      | 14.67           | 14.26 | 13.26 | 16.07       | 17.54 | 18.98       |      |
|                                 | 4 |      | 14.80           | 14.79 | 14.52 | 15.56       | 15.29 | 16.57       |      |
|                                 | 5 |      | 14.79           | 14.54 | 13.47 | 13.19       | 13.00 | 13.87       |      |
|                                 | 6 |      | 8.54            | 8.51  | 8.49  | 8.48        | 8.46  | 8.53        |      |
| Total                           |   |      | 5.04            | 5.87  | 6.64  | 7.06        | 6.97  | 6.74        |      |
| PREY : AMMODYTIDAE              |   |      |                 |       |       |             |       |             |      |
| Age class                       | 0 |      | 0.47            | 0.39  | 0.42  | 0.59        | 0.70  | 0.61        |      |
|                                 | 1 |      | 3.85            | 4.39  | 4.02  | 3.98        | 4.27  | 3.82        |      |
|                                 | 2 |      | 8.80            | 11.28 | 11.94 | 11.16       | 10.62 | 11.44       |      |
|                                 | 3 |      | 15.73           | 17.15 | 17.72 | 17.07       | 16.36 | 17.40       |      |
|                                 | 4 |      | 16.10           | 17.38 | 17.85 | 17.25       | 16.73 | 17.41       |      |
|                                 | 5 |      | 17.85           | 18.91 | 18.74 | 17.57       | 16.90 | 17.90       |      |
|                                 | 6 |      | 17.52           | 19.17 | 19.11 | 19.68       | 19.31 | 18.85       |      |
| Total                           |   |      | 0.70            | 0.61  | 0.64  | 1.10        | 1.29  | 1.04        |      |
| PREY : OTHER                    |   |      |                 |       |       |             |       |             |      |
| All size classes                |   |      | 0.01            | 0.00  | 0.01  | 0.00        | 0.01  | 0.01        |      |

Appendix 2-C. Average prey weight (g) at time of ingestion for WHITING by age class of prey and predator by quarter for the total North Sea.

|                                 |   |                        |       |             |       |             |       |       |
|---------------------------------|---|------------------------|-------|-------------|-------|-------------|-------|-------|
| PREDATOR : WHIT                 |   | Area : TOTAL NORTH SEA |       | YEAR : 1991 |       | QUARTER : 3 |       |       |
| Age class                       |   | 0                      | 1     | 2           | 3     | 4           | 5     | 6+    |
| PREY : ALL SPECIES              |   |                        |       |             |       |             |       |       |
| All size classes                |   | 0.01                   | 0.05  | 0.23        | 0.33  | 0.71        | 0.74  | 0.63  |
| PREY : GADUS MORHUA             |   |                        |       |             |       |             |       |       |
| Age class                       | 0 |                        | 3.18  | 4.14        | 3.27  | 4.20        | 3.91  | 5.96  |
| Total                           |   |                        | 3.18  | 4.14        | 3.27  | 4.20        | 3.91  | 5.96  |
| PREY : MELANOGRAMMUS AEGLEFINUS |   |                        |       |             |       |             |       |       |
| Age class                       | 0 | 1.50                   | 6.67  | 5.35        | 6.11  | 6.15        | 6.27  | 13.34 |
| Total                           |   | 1.50                   | 6.67  | 5.35        | 6.11  | 6.15        | 6.27  | 13.34 |
| PREY : MERLANGIUS MERLANGUS     |   |                        |       |             |       |             |       |       |
| Age class                       | 0 | 0.71                   | 2.13  | 3.58        | 4.57  | 4.55        | 4.85  | 9.30  |
|                                 | 1 |                        | 66.26 | 38.26       | 23.97 | 38.74       | 11.84 | 34.56 |
|                                 | 2 |                        |       |             | 29.95 | 46.53       |       | 35.15 |
|                                 | 3 |                        |       |             | 29.95 | 46.53       |       | 35.15 |
|                                 | 4 |                        |       |             | 29.95 | 46.53       |       | 35.15 |
| Total                           |   | 0.71                   | 2.13  | 3.66        | 4.58  | 4.62        | 5.08  | 9.44  |
| PREY : TRISOPTERUS ESMARKI      |   |                        |       |             |       |             |       |       |
| Age class                       | 0 | 2.57                   | 3.44  | 4.39        | 4.11  | 4.53        | 4.57  | 5.81  |
|                                 | 1 |                        | 12.75 | 29.47       | 32.32 | 29.83       | 31.31 | 28.18 |
|                                 | 2 |                        | 14.60 | 43.34       | 43.66 | 41.76       | 42.34 | 38.05 |
|                                 | 3 |                        | 14.60 | 33.44       | 36.53 | 36.99       | 37.06 | 36.53 |
| Total                           |   | 2.57                   | 3.45  | 4.74        | 6.36  | 6.61        | 7.22  | 11.06 |
| PREY : CLUPEA HARENGUS          |   |                        |       |             |       |             |       |       |
| Age class                       | 0 |                        | 4.41  | 20.28       | 20.53 | 19.45       | 22.33 | 17.60 |
|                                 | 1 |                        | 24.00 | 43.57       | 61.08 | 61.13       | 60.77 | 70.07 |
| Total                           |   |                        | 4.48  | 22.46       | 29.41 | 28.04       | 36.65 | 30.44 |
| PREY : SPRATTUS SPRATTUS        |   |                        |       |             |       |             |       |       |
| Age class                       | 0 | 4.18                   | 2.96  | 3.49        | 3.50  | 3.71        | 3.89  | 6.29  |
|                                 | 1 |                        | 5.58  | 8.92        | 10.82 | 12.34       | 10.55 | 12.87 |
|                                 | 2 |                        | 10.09 | 14.52       | 15.17 | 15.51       | 16.79 | 16.16 |
|                                 | 3 |                        | 19.82 | 17.84       | 17.81 | 17.91       | 18.69 | 16.28 |
|                                 | 4 |                        | 16.25 | 16.01       | 16.42 | 16.29       | 16.12 | 16.20 |
|                                 | 5 |                        | 16.25 | 16.01       | 16.42 | 16.29       | 16.12 | 16.20 |
| Total                           |   | 4.18                   | 5.29  | 7.14        | 9.13  | 10.74       | 8.68  | 13.43 |
| PREY : AMMODYTIDAE              |   |                        |       |             |       |             |       |       |
| Age class                       | 0 | 0.73                   | 1.59  | 1.84        | 2.47  | 2.00        | 1.89  | 2.51  |
|                                 | 1 | 4.71                   | 8.50  | 7.20        | 7.76  | 7.53        | 7.62  | 8.10  |
|                                 | 2 |                        | 13.55 | 14.55       | 8.65  | 13.97       | 11.01 | 11.29 |
|                                 | 3 |                        | 9.47  | 11.51       | 11.62 | 15.56       | 12.91 | 13.70 |
|                                 | 4 |                        | 13.51 | 15.89       | 16.26 | 19.85       | 17.24 | 17.89 |
|                                 | 5 |                        | 13.51 | 15.92       | 16.67 | 20.01       | 17.47 | 18.35 |
|                                 | 6 |                        | 19.94 | 21.01       | 20.96 | 21.14       | 19.41 | 18.35 |
| Total                           |   | 0.73                   | 1.66  | 2.21        | 3.39  | 2.98        | 2.42  | 2.96  |
| PREY : OTHER                    |   |                        |       |             |       |             |       |       |
| All size classes                |   | 0.00                   | 0.02  | 0.06        | 0.05  | 0.15        | 0.13  | 0.07  |

Appendix 2-C. Average prey weight (g) at time of ingestion for WHITING by age class of prey and predator by quarter for the total North Sea.

| PREDATOR : WHIT                 |   | Area  | : TOTAL NORTH SEA |       |       | YEAR : 1991 |       | QUARTER : 4 |  |
|---------------------------------|---|-------|-------------------|-------|-------|-------------|-------|-------------|--|
| Age class                       |   | 0     | 1                 | 2     | 3     | 4           | 5     | 6+          |  |
| PREY : ALL SPECIES              |   |       |                   |       |       |             |       |             |  |
| All size classes                |   | 0.05  | 0.18              | 0.29  | 1.15  | 0.50        | 0.58  | 0.47        |  |
| PREY : GADUS MORHUA             |   |       |                   |       |       |             |       |             |  |
| Age class                       | 0 | 11.73 | 6.32              | 4.43  | 4.28  | 4.28        | 4.28  | 4.28        |  |
| Total                           |   | 11.73 | 6.32              | 4.43  | 4.28  | 4.28        | 4.28  | 4.28        |  |
| PREY : MELANOGRAMMUS AEGLEFINUS |   |       |                   |       |       |             |       |             |  |
| Age class                       | 0 | 9.75  | 14.92             | 17.13 | 17.76 | 12.02       | 16.52 | 16.37       |  |
|                                 | 1 |       |                   | 5.73  | 5.82  | 6.74        | 7.03  | 7.80        |  |
| Total                           |   | 9.75  | 14.92             | 17.13 | 17.76 | 12.02       | 16.52 | 16.37       |  |
| PREY : MERLANGIUS MERLANGUS     |   |       |                   |       |       |             |       |             |  |
| Age class                       | 0 | 1.03  | 7.96              | 10.79 | 11.97 | 11.61       | 14.34 | 13.91       |  |
| Total                           |   | 0.98  | 7.96              | 10.81 | 11.97 | 11.62       | 14.34 | 13.91       |  |
| PREY : TRISOPTERUS ESMARKI      |   |       |                   |       |       |             |       |             |  |
| Age class                       | 0 | 3.74  | 5.35              | 5.81  | 5.90  | 5.89        | 6.09  | 6.39        |  |
|                                 | 1 | 8.12  | 20.76             | 25.36 | 21.73 | 29.95       | 16.71 | 18.78       |  |
|                                 | 2 |       | 11.04             | 36.70 | 40.53 | 49.70       | 10.42 | 13.13       |  |
|                                 | 3 |       | 11.04             | 11.42 | 12.61 | 18.45       | 21.50 | 25.63       |  |
| Total                           |   | 3.74  | 5.39              | 6.19  | 6.19  | 6.83        | 6.34  | 7.12        |  |
| PREY : CLUPEA HARENGUS          |   |       |                   |       |       |             |       |             |  |
| Age class                       | 0 | 10.85 | 12.92             | 11.67 | 10.75 | 13.03       | 9.81  | 10.08       |  |
|                                 | 1 |       | 26.17             | 26.17 | 26.17 | 26.17       | 26.17 | 26.17       |  |
| Total                           |   | 10.85 | 13.55             | 12.31 | 10.85 | 13.79       | 10.52 | 10.27       |  |
| PREY : SPRATTUS SPRATTUS        |   |       |                   |       |       |             |       |             |  |
| Age class                       | 0 | 2.55  | 3.52              | 4.38  | 5.15  | 4.57        | 4.70  | 4.42        |  |
|                                 | 1 | 5.09  | 10.23             | 10.17 | 9.98  | 9.65        | 9.33  | 9.26        |  |
|                                 | 2 | 10.78 | 16.78             | 17.47 | 19.53 | 18.32       | 17.63 | 18.04       |  |
|                                 | 3 |       | 22.67             | 21.41 | 21.02 | 19.55       | 18.47 | 18.32       |  |
|                                 | 4 |       | 24.46             | 24.20 | 24.18 | 23.89       | 24.41 | 24.01       |  |
| Total                           |   | 2.61  | 3.88              | 5.00  | 6.34  | 5.65        | 5.55  | 5.44        |  |
| PREY : AMMOODYTIDAE             |   |       |                   |       |       |             |       |             |  |
| Age class                       | 0 | 1.92  | 4.01              | 3.42  | 2.15  | 3.01        | 2.73  | 2.86        |  |
|                                 | 1 | 5.00  | 15.55             | 17.68 | 25.47 | 18.50       | 14.15 | 20.72       |  |
|                                 | 2 | 5.05  | 18.50             | 19.89 | 24.03 | 19.23       | 13.99 | 17.83       |  |
|                                 | 3 | 6.76  | 17.88             | 14.52 | 18.14 | 13.62       | 13.98 | 19.87       |  |
|                                 | 4 | 9.81  | 26.47             | 25.93 | 33.27 | 25.24       | 21.31 | 29.80       |  |
|                                 | 5 | 13.47 | 29.71             | 29.16 | 34.69 | 28.28       | 24.66 | 32.47       |  |
|                                 | 6 | 13.47 | 30.81             | 30.33 | 35.07 | 29.45       | 26.11 | 33.26       |  |
| Total                           |   | 2.32  | 5.50              | 5.87  | 5.73  | 5.77        | 4.23  | 5.15        |  |
| PREY : OTHER                    |   |       |                   |       |       |             |       |             |  |
| All size classes                |   | 0.03  | 0.07              | 0.07  | 0.18  | 0.15        | 0.22  | 0.15        |  |

APPENDIX 2 AVERAGE PREY WEIGHTS.

Appendix 2-D. Average prey weight (g) at time of ingestion for SAITHE by age class of prey and predator by quarter for the total North Sea.

PREDATOR : SAIT Area : TOTAL NORTH SEA YEAR : 1981 QUARTER : 1

Age class 3 4 5 6 7 8 9+

PREY : ALL SPECIES

All size classes 1.65 1.87 2.36 2.46 3.81 4.05

Age class PREY : MELANOGRAMMUS AEGLEFINUS

1 0.82 0.97 1.85 36.02 28.45 27.43

2 32.48 39.27 59.46 105.60 118.81

3 222.24 222.24 222.24

4 222.24 222.24 222.24

Total 0.82 0.98 1.93 37.13 30.42 29.49

Age class PREY : MERLANGIUS MERLANGUS

1 46.50 46.50 46.60

2 112.39 112.39 112.77

3 112.39 112.39 113.64

4 119.09

5 119.09

Total 77.94 77.94 79.01

Age class PREY : TRISOPTERUS ESMARKI

0 1.44 1.44 1.44

1 8.08 8.54 10.10 11.56 14.00 14.34

2 8.08 25.67 23.55 21.13 20.59 20.60

3 29.22 32.64 40.97 35.93 35.63

4 81.49

Total 8.08 10.80 13.77 14.61 16.72 17.00

Age class PREY : CLUPEA HARENGUS

1 55.69 55.69 55.69

2 96.45 96.45 96.45

3 127.68 127.68 127.68

Total 69.95 69.95 69.95

Age class PREY : SPRATTUS SPRATTUS

1 14.40 14.40 14.47 19.60 19.60

2 14.40 14.40 14.47 19.60 19.60

3 14.40 14.40 14.47 19.60 19.60

4 14.40 14.40 14.47 19.60 19.60

Total 14.40 14.40 14.47 19.60 19.60

Age class PREY : AMMODYTIDAE

1 2.45 2.54 2.62 3.06 4.00 4.23

2 5.00 5.41 5.83 6.55 4.00 4.23

Total 2.58 2.70 2.84 3.46 4.00 4.23

PREY : OTHER

All size classes 1.32 1.40 1.36 0.72 1.03 1.09

Appendix 2-D. Average prey weight (g) at time of ingestion for SAITHE by age class of prey and predator by quarter for the total North Sea.

| PREDATOR : SAIT                 |   | Area : TOTAL NORTH SEA |       | YEAR : 1981 |       | QUARTER : 2 |      |    |
|---------------------------------|---|------------------------|-------|-------------|-------|-------------|------|----|
| Age class                       |   | 3                      | 4     | 5           | 6     | 7           | 8    | 9+ |
| PREY : ALL SPECIES              |   |                        |       |             |       |             |      |    |
| All size classes                |   | 1.26                   | 0.89  | 0.49        | 0.60  | 0.75        | 1.16 |    |
| PREY : GADUS MORHUA             |   |                        |       |             |       |             |      |    |
| Age class                       | 0 | 2.40                   | 2.21  | 1.04        | 0.83  | 0.86        | 0.92 |    |
| Total                           |   | 2.40                   | 2.21  | 1.04        | 0.83  | 0.86        | 0.92 |    |
| PREY : MELANOGRAMMUS AEGLEFINUS |   |                        |       |             |       |             |      |    |
| Age class                       | 0 | 2.71                   | 2.71  | 2.47        | 1.18  | 0.94        |      |    |
|                                 | 1 | 67.20                  | 67.20 | 67.20       | 67.20 | 67.20       |      |    |
| Total                           |   | 5.83                   | 5.83  | 5.22        | 1.73  | 1.06        |      |    |
| PREY : TRISOPTERUS ESMARKI      |   |                        |       |             |       |             |      |    |
| Age class                       | 0 |                        |       |             | 0.49  | 0.49        | 0.54 |    |
|                                 | 1 | 34.50                  | 34.50 | 33.09       | 26.80 | 30.50       |      |    |
|                                 | 2 | 60.45                  | 60.45 | 59.48       | 51.48 | 41.17       |      |    |
|                                 | 3 | 61.92                  | 61.92 | 61.12       | 54.17 | 41.99       |      |    |
| Total                           |   | 47.46                  | 47.46 | 42.47       | 23.45 | 32.13       |      |    |
| PREY : SPRATTUS SPRATTUS        |   |                        |       |             |       |             |      |    |
| Age class                       | 0 | 0.96                   | 0.96  | 0.96        |       |             |      |    |
|                                 | 1 | 0.96                   | 0.96  | 0.96        |       |             |      |    |
| Total                           |   | 0.96                   | 0.96  | 0.96        |       |             |      |    |
| PREY : AMMODYTIDAE              |   |                        |       |             |       |             |      |    |
| Age class                       | 0 | 2.65                   | 2.65  | 2.65        | 1.03  | 1.03        | 1.03 |    |
|                                 | 1 | 3.50                   | 3.50  | 3.52        | 2.16  | 1.95        | 1.94 |    |
|                                 | 2 | 20.17                  | 20.17 | 19.79       | 5.32  | 5.35        | 5.35 |    |
|                                 | 3 | 22.71                  | 22.71 | 22.62       | 5.32  | 5.35        | 5.35 |    |
|                                 | 4 | 22.47                  | 22.46 | 22.34       | 5.32  | 5.35        | 5.35 |    |
|                                 | 5 | 23.31                  | 23.31 | 23.31       |       |             |      |    |
|                                 | 6 | 23.31                  | 23.31 | 23.31       |       |             |      |    |
| Total                           |   | 6.66                   | 6.66  | 6.65        | 1.92  | 1.67        | 1.66 |    |
| PREY : OTHER                    |   |                        |       |             |       |             |      |    |
| All size classes                |   | 0.47                   | 0.46  | 0.43        | 0.56  | 0.53        | 0.44 |    |

Appendix 2-D. Average prey weight (g) at time of ingestion for SAITHE by age class of prey and predator by quarter for the total North Sea.

|                    |  |                                 |       |             |        |             |        |    |
|--------------------|--|---------------------------------|-------|-------------|--------|-------------|--------|----|
| PREDATOR : SAIT    |  | Area : TOTAL NORTH SEA          |       | YEAR : 1981 |        | QUARTER : 3 |        |    |
| -----              |  |                                 |       |             |        |             |        |    |
| Age class          |  | 3                               | 4     | 5           | 6      | 7           | 8      | 9+ |
| -----              |  |                                 |       |             |        |             |        |    |
| PREY : ALL SPECIES |  |                                 |       |             |        |             |        |    |
| All size classes   |  | 0.09                            | 0.11  | 0.21        | 0.95   | 0.76        | 0.63   |    |
| -----              |  |                                 |       |             |        |             |        |    |
| Age class          |  | PREY : GADUS MORHUA             |       |             |        |             |        |    |
| 0                  |  |                                 |       | 2.36        | 2.36   | 2.36        | 2.36   |    |
| Total              |  |                                 |       | 2.36        | 2.36   | 2.36        | 2.36   |    |
| -----              |  |                                 |       |             |        |             |        |    |
| Age class          |  | PREY : MELANOGRAMMUS AEGLEFINUS |       |             |        |             |        |    |
| 0                  |  | 4.46                            | 5.06  | 7.46        | 25.66  | 13.60       | 6.12   |    |
| 1                  |  |                                 | 9.86  | 36.46       | 36.55  | 37.27       | 40.53  |    |
| 2                  |  |                                 |       |             | 112.93 | 112.35      | 111.75 |    |
| Total              |  | 4.46                            | 5.06  | 8.38        | 28.93  | 17.61       | 8.06   |    |
| -----              |  |                                 |       |             |        |             |        |    |
| Age class          |  | PREY : MERLANGIUS MERLANGUS     |       |             |        |             |        |    |
| 0                  |  |                                 | 3.47  | 5.58        | 24.95  | 28.68       | 28.68  |    |
| 1                  |  |                                 |       | 24.46       | 24.46  | 24.46       | 24.46  |    |
| Total              |  |                                 | 3.47  | 6.00        | 24.86  | 27.78       | 27.78  |    |
| -----              |  |                                 |       |             |        |             |        |    |
| Age class          |  | PREY : TRISOPTERUS ESMARKI      |       |             |        |             |        |    |
| 0                  |  | 2.70                            | 1.68  | 1.71        | 3.92   | 7.06        | 12.14  |    |
| 1                  |  |                                 | 14.35 | 45.01       | 41.53  | 39.06       | 38.20  |    |
| 2                  |  |                                 |       | 51.53       | 46.02  | 40.97       | 39.41  |    |
| Total              |  | 2.70                            | 1.68  | 1.75        | 4.68   | 9.45        | 16.33  |    |
| -----              |  |                                 |       |             |        |             |        |    |
| Age class          |  | PREY : CLUPEA HARENGUS          |       |             |        |             |        |    |
| 0                  |  |                                 | 1.38  | 1.38        | 1.49   | 13.50       | 13.50  |    |
| 1                  |  |                                 |       |             | 42.67  | 42.67       | 42.67  |    |
| 2                  |  |                                 |       |             | 72.76  | 72.76       | 72.76  |    |
| 3                  |  |                                 |       |             |        |             | 222.72 |    |
| Total              |  |                                 | 1.38  | 1.38        | 2.40   | 34.90       | 84.60  |    |
| -----              |  |                                 |       |             |        |             |        |    |
| Age class          |  | PREY : AMMOODYTIDAE             |       |             |        |             |        |    |
| 0                  |  | 1.09                            | 1.09  | 1.09        | 1.28   | 1.33        | 1.33   |    |
| Total              |  | 1.09                            | 1.09  | 1.09        | 1.28   | 1.33        | 1.33   |    |
| -----              |  |                                 |       |             |        |             |        |    |
| PREY : OTHER       |  |                                 |       |             |        |             |        |    |
| All size classes   |  | 0.04                            | 0.06  | 0.10        | 0.30   | 0.36        | 0.42   |    |
| -----              |  |                                 |       |             |        |             |        |    |

Appendix 2-D. Average prey weight (g) at time of ingestion for SAITHE by age class of prey and predator by quarter for the total North Sea.

PREDATOR : SAIT Area : TOTAL NORTH SEA YEAR : 1981 QUARTER : 4

| Age class | 3 | 4 | 5 | 6 | 7 | 8 | 9+ |
|-----------|---|---|---|---|---|---|----|
|-----------|---|---|---|---|---|---|----|

PREY : ALL SPECIES

|                  |      |      |      |      |      |      |
|------------------|------|------|------|------|------|------|
| All size classes | 0.48 | 0.43 | 0.50 | 5.70 | 4.63 | 3.36 |
|------------------|------|------|------|------|------|------|

Age class PREY : MELANOGRAMMUS AEGLEFINUS

|   |       |       |       |       |       |
|---|-------|-------|-------|-------|-------|
| 0 | 18.27 | 16.45 | 39.30 | 38.86 | 32.44 |
|---|-------|-------|-------|-------|-------|

|   |  |  |  |  |       |
|---|--|--|--|--|-------|
| 1 |  |  |  |  | 24.70 |
|---|--|--|--|--|-------|

|   |  |  |  |  |       |
|---|--|--|--|--|-------|
| 2 |  |  |  |  | 26.08 |
|---|--|--|--|--|-------|

|       |       |       |       |       |       |
|-------|-------|-------|-------|-------|-------|
| Total | 18.27 | 16.45 | 39.30 | 38.86 | 32.36 |
|-------|-------|-------|-------|-------|-------|

Age class PREY : MERLANGIUS MERLANGUS

|   |  |  |  |  |       |
|---|--|--|--|--|-------|
| 1 |  |  |  |  | 13.11 |
|---|--|--|--|--|-------|

|   |  |  |  |  |       |
|---|--|--|--|--|-------|
| 2 |  |  |  |  | 13.11 |
|---|--|--|--|--|-------|

|       |  |  |  |  |       |
|-------|--|--|--|--|-------|
| Total |  |  |  |  | 13.11 |
|-------|--|--|--|--|-------|

Age class PREY : TRISOPTERUS ESMARKI

|   |      |      |      |      |      |
|---|------|------|------|------|------|
| 0 | 6.88 | 6.43 | 6.41 | 7.11 | 8.03 |
|---|------|------|------|------|------|

|   |       |       |       |       |       |
|---|-------|-------|-------|-------|-------|
| 1 | 12.70 | 15.40 | 17.28 | 18.32 | 18.91 |
|---|-------|-------|-------|-------|-------|

|   |       |       |       |       |       |
|---|-------|-------|-------|-------|-------|
| 2 | 24.37 | 25.90 | 27.41 | 28.96 | 29.67 |
|---|-------|-------|-------|-------|-------|

|       |      |      |      |       |       |
|-------|------|------|------|-------|-------|
| Total | 8.37 | 8.78 | 9.72 | 11.78 | 13.74 |
|-------|------|------|------|-------|-------|

Age class PREY : CLUPEA HARENGUS

|   |       |       |       |       |       |
|---|-------|-------|-------|-------|-------|
| 0 | 22.03 | 22.03 | 19.12 | 19.03 | 13.11 |
|---|-------|-------|-------|-------|-------|

|   |       |       |       |       |       |
|---|-------|-------|-------|-------|-------|
| 1 | 22.03 | 22.03 | 19.12 | 19.07 | 14.66 |
|---|-------|-------|-------|-------|-------|

|       |       |       |       |       |       |
|-------|-------|-------|-------|-------|-------|
| Total | 22.03 | 22.03 | 19.12 | 19.03 | 13.13 |
|-------|-------|-------|-------|-------|-------|

Age class PREY : SPRATTUS SPRATTUS

|   |  |  |       |       |       |
|---|--|--|-------|-------|-------|
| 1 |  |  | 15.76 | 15.76 | 15.76 |
|---|--|--|-------|-------|-------|

|   |  |  |       |       |       |
|---|--|--|-------|-------|-------|
| 2 |  |  | 15.76 | 15.76 | 15.76 |
|---|--|--|-------|-------|-------|

|   |  |  |       |       |       |
|---|--|--|-------|-------|-------|
| 3 |  |  | 15.76 | 15.76 | 15.76 |
|---|--|--|-------|-------|-------|

|   |  |  |       |       |       |
|---|--|--|-------|-------|-------|
| 4 |  |  | 15.76 | 15.76 | 15.76 |
|---|--|--|-------|-------|-------|

|       |  |  |       |       |       |
|-------|--|--|-------|-------|-------|
| Total |  |  | 15.76 | 15.76 | 15.76 |
|-------|--|--|-------|-------|-------|

Age class PREY : AMMODYTIDAE

|   |  |  |      |      |      |
|---|--|--|------|------|------|
| 0 |  |  | 2.79 | 2.79 | 2.79 |
|---|--|--|------|------|------|

|       |  |  |      |      |      |
|-------|--|--|------|------|------|
| Total |  |  | 2.79 | 2.79 | 2.79 |
|-------|--|--|------|------|------|

PREY : OTHER

|                  |      |      |      |      |      |      |
|------------------|------|------|------|------|------|------|
| All size classes | 0.43 | 0.39 | 0.37 | 0.87 | 1.36 | 1.87 |
|------------------|------|------|------|------|------|------|

APPENDIX 2 AVERAGE PREY WEIGHTS.

Appendix 2-D. Average prey weight (g) at time of ingestion for SAITHE by age class of prey and predator by quarter for the total North Sea.

|                                 |  |                        |        |             |        |             |             |
|---------------------------------|--|------------------------|--------|-------------|--------|-------------|-------------|
| PREDATOR : SAIT                 |  | Area : TOTAL NORTH SEA |        | YEAR : 1986 |        | QUARTER : 3 |             |
| Age class                       |  | 3                      | 4      | 5           | 6      | 7           | 8 9+        |
| PREY : ALL SPECIES              |  |                        |        |             |        |             |             |
| All size classes                |  | 3.35                   | 4.10   | 8.98        | 12.52  | 7.07        | 22.61 32.28 |
| PREY : GADUS MORHUA             |  |                        |        |             |        |             |             |
| Age class                       |  |                        |        |             |        |             |             |
| Total                           |  | 15.00                  | 15.00  | 15.00       | 15.00  | 15.00       | 15.00       |
| PREY : MELANOGRAMMUS AEGLEFINUS |  |                        |        |             |        |             |             |
| Age class                       |  |                        |        |             |        |             |             |
| Total                           |  | 4.54                   | 4.73   | 5.03        | 5.04   | 7.77        | 7.72 7.84   |
| PREY : MERLANGIUS MERLANGUS     |  |                        |        |             |        |             |             |
| Age class                       |  |                        |        |             |        |             |             |
| Total                           |  | 6.26                   | 6.75   | 7.77        | 7.86   | 7.86        | 7.86 382.08 |
| PREY : TRISOPTERUS ESMARKI      |  |                        |        |             |        |             |             |
| Age class                       |  |                        |        |             |        |             |             |
| Total                           |  | 5.60                   | 8.34   | 18.21       | 18.39  | 27.45       | 27.32 27.62 |
| PREY : CLUPEA HARENGUS          |  |                        |        |             |        |             |             |
| Age class                       |  |                        |        |             |        |             |             |
| Total                           |  |                        | 211.11 | 211.11      | 211.11 | 211.11      | 160.83      |
| PREY : SPRATTUS SPRATTUS        |  |                        |        |             |        |             |             |
| PREY : AMMODYTIDAE              |  |                        |        |             |        |             |             |
| Age class                       |  |                        |        |             |        |             |             |
| Total                           |  | 18.73                  | 14.93  | 3.40        | 0.72   | 5.53        | 5.51 5.55   |
| PREY : OTHER                    |  |                        |        |             |        |             |             |
| All size classes                |  | 2.37                   | 2.94   | 7.71        | 10.66  | 4.00        | 21.06 21.89 |

## APPENDIX 2

Appendix 2-D. Average prey weight (g) at time of ingestion for SAITHE by age class of prey and predator by quarter for the total North Sea.

|                            |   |       |       |                   |        |             |       |             |  |
|----------------------------|---|-------|-------|-------------------|--------|-------------|-------|-------------|--|
| PREDATOR : SAITHE          |   | Area  |       | : TOTAL NORTH SEA |        | YEAR : 1991 |       | QUARTER : 1 |  |
| Age class                  |   | 3     | 4     | 5                 | 6      | 7           | 8     | 9+          |  |
| PREY : ALL SPECIES         |   |       |       |                   |        |             |       |             |  |
| All size classes           |   | 0.26  | 1.00  | 4.80              | 6.73   | 10.09       | 15.10 | 63.29       |  |
| PREY : TRISOPTERUS ESMARKI |   |       |       |                   |        |             |       |             |  |
| Age class                  | 1 | 6.29  | 6.95  | 6.52              | 9.78   | 11.63       | 11.82 | 14.23       |  |
|                            | 2 | 9.57  | 15.43 | 22.33             | 26.53  | 29.87       | 35.59 | 42.10       |  |
|                            | 3 | 7.35  | 16.78 | 30.36             | 39.48  | 54.11       | 74.66 | 98.11       |  |
|                            | 4 |       |       | 37.58             | 36.80  | 38.20       | 42.23 | 47.11       |  |
| Total                      |   | 6.98  | 8.98  | 15.57             | 23.49  | 28.36       | 29.52 | 37.38       |  |
| PREY : CLUPEA HARENGUS     |   |       |       |                   |        |             |       |             |  |
| Age class                  | 1 | 2.81  | 2.21  | 2.71              | 3.71   | 5.13        | 8.23  | 69.44       |  |
|                            | 2 | 62.90 | 51.48 | 45.96             | 36.28  | 34.54       | 31.70 | 70.51       |  |
|                            | 3 | 62.90 | 53.53 | 53.38             | 46.08  | 54.58       | 65.72 | 76.70       |  |
|                            | 4 | 62.90 | 53.65 | 56.96             | 158.09 | 70.70       | 79.04 | 98.06       |  |
|                            | 5 | 62.90 | 58.80 | 114.26            | 124.77 | 115.88      | 95.63 | 116.35      |  |
| Total                      |   | 24.18 | 43.43 | 34.22             | 26.59  | 32.78       | 37.43 | 81.79       |  |
| PREY : AMMODYTIDAE         |   |       |       |                   |        |             |       |             |  |
| Age class                  | 1 | 1.35  | 1.00  | 0.75              | 0.72   | 0.72        | 3.08  | 3.08        |  |
|                            | 2 | 4.24  | 5.45  | 4.62              | 4.50   |             | 3.85  | 3.85        |  |
|                            | 3 | 4.24  | 5.45  | 4.62              | 4.50   |             | 3.91  | 3.91        |  |
|                            | 4 | 4.24  | 5.45  | 4.62              | 4.50   |             | 3.91  | 3.91        |  |
| Total                      |   | 1.36  | 1.02  | 0.75              | 0.72   | 0.72        | 3.10  | 3.10        |  |
| PREY : OTHER               |   |       |       |                   |        |             |       |             |  |
| All size classes           |   | 0.10  | 0.33  | 1.00              | 1.42   | 2.04        | 3.50  | 19.10       |  |

Appendix 2-D. Average prey weight (g) at time of ingestion for SAITHE by age class of prey and predator by quarter for the total North Sea.

| PREDATOR : SAITHE               |   | Area : TOTAL NORTH SEA |        |        | YEAR : 1991 |        | QUARTER : 2 |        |
|---------------------------------|---|------------------------|--------|--------|-------------|--------|-------------|--------|
| Age class                       |   | 3                      | 4      | 5      | 6           | 7      | 8           | 9+     |
| PREY : ALL SPECIES              |   |                        |        |        |             |        |             |        |
| All size classes                |   | 0.26                   | 0.33   | 0.67   | 1.05        | 1.53   | 1.96        | 2.96   |
| PREY : MELANOGRAMMUS AEGLEFINUS |   |                        |        |        |             |        |             |        |
| Age class                       | 1 | 30.56                  | 30.56  | 30.56  | 30.56       | 151.39 | 151.39      | 97.68  |
|                                 | 2 |                        |        |        |             | 253.21 | 253.21      | 240.04 |
|                                 | 3 |                        |        |        |             | 257.30 | 257.30      | 257.30 |
| Total                           |   | 30.56                  | 30.56  | 30.56  | 30.56       | 175.23 | 175.23      | 110.68 |
| PREY : MERLANGIUS MERLANGUS     |   |                        |        |        |             |        |             |        |
| Age class                       | 1 |                        |        |        |             | 80.49  | 80.50       | 130.09 |
|                                 | 2 |                        |        | 17.09  | 17.09       | 115.54 | 119.73      | 127.42 |
|                                 | 3 |                        |        | 17.09  | 17.09       | 91.12  | 94.34       | 116.72 |
|                                 | 4 |                        |        | 17.09  | 17.09       | 69.99  | 71.12       | 100.03 |
|                                 | 5 |                        |        | 17.09  | 17.09       | 47.82  | 48.00       | 75.69  |
|                                 | 6 |                        |        | 17.09  | 17.09       | 54.40  | 54.93       | 93.26  |
| Total                           |   |                        |        | 17.09  | 17.09       | 94.47  | 97.17       | 120.89 |
| PREY : TRISOPTERUS ESMARKI      |   |                        |        |        |             |        |             |        |
| Age class                       | 0 | 0.15                   | 0.39   | 0.13   | 0.07        |        |             |        |
|                                 | 1 | 2.04                   | 3.08   | 15.12  | 20.49       | 21.32  | 19.80       | 19.92  |
|                                 | 2 | 15.94                  | 18.36  | 24.37  | 27.19       | 32.48  | 30.07       | 26.39  |
|                                 | 3 | 47.76                  | 25.21  | 25.62  | 28.02       | 34.80  | 34.67       | 36.90  |
|                                 | 4 | 47.82                  | 25.17  | 25.42  | 31.26       | 35.07  | 34.79       | 36.90  |
| Total                           |   | 0.79                   | 2.82   | 10.49  | 18.02       | 23.32  | 21.19       | 20.34  |
| PREY : CLUPEA HARENGUS          |   |                        |        |        |             |        |             |        |
| Age class                       | 1 | 31.55                  | 64.55  | 67.31  | 81.15       | 69.07  | 66.57       |        |
|                                 | 2 | 33.43                  | 71.37  | 88.72  | 80.33       | 36.35  | 33.70       |        |
|                                 | 3 | 41.83                  | 97.73  | 140.72 | 122.65      | 86.59  | 78.40       |        |
|                                 | 4 | 50.00                  | 118.40 | 164.04 | 112.29      | 74.92  | 63.60       |        |
|                                 | 5 | 52.60                  | 124.16 | 169.06 | 172.39      | 146.61 | 125.45      |        |
| Total                           |   | 5.20                   | 37.75  | 85.70  | 121.38      | 105.10 | 50.19       | 44.09  |
| PREY : AMMODYTIDAE              |   |                        |        |        |             |        |             |        |
| Age class                       | 0 | 1.21                   | 1.78   | 1.45   | 1.45        | 1.17   | 0.80        | 0.74   |
|                                 | 1 | 2.61                   | 3.29   | 2.86   | 2.74        | 2.21   | 1.78        | 1.72   |
|                                 | 2 | 15.79                  | 25.38  | 19.14  | 16.93       | 15.18  |             |        |
|                                 | 3 | 19.16                  | 30.73  | 21.09  | 18.43       | 16.18  |             |        |
|                                 | 4 | 18.74                  | 30.07  | 20.89  | 18.38       | 16.04  |             |        |
|                                 | 5 | 23.98                  | 38.48  | 24.77  | 21.00       | 18.33  |             |        |
|                                 | 6 | 23.98                  | 38.48  | 24.77  | 21.00       | 18.33  |             |        |
| Total                           |   | 2.31                   | 2.74   | 1.82   | 1.83        | 1.40   | 0.92        | 0.85   |
| PREY : OTHER                    |   |                        |        |        |             |        |             |        |
| All size classes                |   | 0.23                   | 0.25   | 0.34   | 0.57        | 0.77   | 0.78        | 0.68   |

## APPENDIX 2

Appendix 2-D. Average prey weight (g) at time of ingestion for SAITHE by age class of prey and predator by quarter for the total North Sea.

|                                 |   |        |                   |       |       |             |             |        |
|---------------------------------|---|--------|-------------------|-------|-------|-------------|-------------|--------|
| PREDATOR : SAITHE               |   | Area   | : TOTAL NORTH SEA |       |       | YEAR : 1991 | QUARTER : 3 |        |
| Age class                       |   | 3      | 4                 | 5     | 6     | 7           | 8           | 9+     |
| PREY : ALL SPECIES              |   |        |                   |       |       |             |             |        |
| All size classes                |   | 1.84   | 3.02              | 3.64  | 3.57  | 12.90       | 10.96       | 13.51  |
| PREY : MELANOGRAMMUS AEGLEFINUS |   |        |                   |       |       |             |             |        |
| Age class                       | 0 | 14.49  | 14.32             | 11.60 | 12.32 | 15.60       | 16.57       | 17.22  |
| Total                           |   | 14.49  | 14.32             | 11.60 | 12.32 | 15.60       | 16.57       | 17.22  |
| PREY : MERLANGIUS MERLANGUS     |   |        |                   |       |       |             |             |        |
| Age class                       | 0 | 6.26   | 6.50              | 5.82  | 5.18  | 6.62        | 10.30       | 8.97   |
| Total                           |   | 6.26   | 6.50              | 5.82  | 5.18  | 6.62        | 10.30       | 8.97   |
| PREY : TRISOPTERUS ESMARKI      |   |        |                   |       |       |             |             |        |
| Age class                       | 0 | 4.20   | 2.80              | 3.05  | 5.36  | 8.08        | 8.94        | 9.05   |
|                                 | 1 | 26.77  | 15.88             | 15.88 | 20.64 | 29.49       | 29.12       | 30.42  |
|                                 | 2 | 30.30  | 15.76             | 20.41 | 38.34 | 43.57       | 43.79       | 40.91  |
|                                 | 3 | 30.29  | 15.64             | 20.15 | 38.34 | 43.57       | 43.79       | 40.91  |
| Total                           |   | 5.18   | 4.52              | 6.53  | 18.44 | 22.53       | 20.96       | 19.99  |
| PREY : CLUPEA HARENGUS          |   |        |                   |       |       |             |             |        |
| Age class                       | 1 |        |                   | 20.74 | 19.41 | 46.47       | 53.57       | 62.08  |
|                                 | 2 | 110.52 | 108.08            | 32.49 | 27.26 | 147.02      | 190.31      | 188.47 |
|                                 | 3 | 110.52 | 108.08            | 47.95 | 38.53 | 175.47      | 207.94      | 215.86 |
|                                 | 4 | 110.52 | 108.08            | 69.38 | 56.23 | 200.71      | 221.89      | 238.47 |
|                                 | 5 | 110.52 | 108.08            | 75.37 | 61.67 | 228.51      | 248.71      | 266.33 |
| Total                           |   | 110.52 | 108.08            | 47.37 | 38.08 | 172.03      | 200.41      | 213.17 |
| PREY : SPRATTUS SPRATTUS        |   |        |                   |       |       |             |             |        |
| Age class                       | 0 | 5.76   | 5.76              |       |       |             |             |        |
| Total                           |   | 5.76   | 5.76              |       |       |             |             |        |
| PREY : AMMODYTIDAE              |   |        |                   |       |       |             |             |        |
| Age class                       | 0 | 1.55   | 1.65              | 1.73  |       | 3.43        | 3.43        | 3.43   |
|                                 | 1 |        |                   |       |       | 4.41        | 4.41        | 4.41   |
| Total                           |   | 1.55   | 1.65              | 1.73  |       | 3.48        | 3.48        | 3.48   |
| PREY : OTHER                    |   |        |                   |       |       |             |             |        |
| All size classes                |   | 0.39   | 0.69              | 0.59  | 0.35  | 2.11        | 2.10        | 2.32   |

## APPENDIX 2

Appendix 2-D. Average prey weight (g) at time of ingestion for SAITHE by age class of prey and predator by quarter for the total North Sea.

| PREDATOR : SAITHE               |  | Area : TOTAL NORTH SEA |       |       | YEAR : 1991 |        | QUARTER : 4 |       |
|---------------------------------|--|------------------------|-------|-------|-------------|--------|-------------|-------|
| Age class                       |  | 3                      | 4     | 5     | 6           | 7      | 8           | 9+    |
| PREY : ALL SPECIES              |  |                        |       |       |             |        |             |       |
| All size classes                |  | 6.21                   | 8.84  | 16.66 | 28.89       | 40.35  | 41.41       | 38.99 |
| PREY : MELANOGRAMMUS AEGLEFINUS |  |                        |       |       |             |        |             |       |
| Age class                       |  |                        |       |       |             |        |             |       |
| 0                               |  | 17.99                  | 22.57 | 22.67 | 21.06       | 21.27  | 22.02       | 21.64 |
| 1                               |  | 35.80                  | 36.03 | 36.32 | 36.32       |        |             |       |
| Total                           |  | 18.00                  | 22.57 | 22.68 | 21.07       | 21.27  | 22.02       | 21.64 |
| PREY : MERLANGIUS MERLANGUS     |  |                        |       |       |             |        |             |       |
| Age class                       |  |                        |       |       |             |        |             |       |
| 0                               |  | 17.35                  | 16.16 | 15.25 | 17.82       | 16.06  | 10.56       | 9.90  |
| Total                           |  | 17.35                  | 16.16 | 15.25 | 17.82       | 16.06  | 10.56       | 9.90  |
| PREY : TRISOPTERUS ESMARKI      |  |                        |       |       |             |        |             |       |
| Age class                       |  |                        |       |       |             |        |             |       |
| 0                               |  | 7.02                   | 7.47  | 8.19  | 9.47        | 9.88   | 8.38        | 9.73  |
| 1                               |  | 24.51                  | 39.27 | 39.27 | 43.80       | 52.58  | 52.58       | 18.51 |
| 2                               |  | 31.61                  | 44.25 | 43.30 | 49.36       | 62.85  | 62.85       |       |
| 3                               |  | 31.61                  | 44.25 | 43.30 | 49.36       | 62.85  | 62.85       |       |
| Total                           |  | 7.28                   | 9.11  | 12.54 | 16.09       | 15.23  | 9.04        | 10.07 |
| PREY : CLUPEA HARENGUS          |  |                        |       |       |             |        |             |       |
| Age class                       |  |                        |       |       |             |        |             |       |
| 0                               |  | 0.84                   | 0.68  | 1.13  | 1.21        |        |             | 44.49 |
| 1                               |  | 12.24                  | 16.62 | 33.14 | 38.43       | 39.89  | 39.92       | 45.69 |
| 2                               |  | 16.48                  | 22.53 | 44.45 | 51.93       | 53.47  | 52.98       | 54.22 |
| 3                               |  | 20.90                  | 38.24 | 76.74 | 102.87      | 102.56 | 95.11       | 93.55 |
| 4                               |  | 20.90                  | 38.24 | 76.74 | 102.87      | 102.56 | 95.11       | 93.55 |
| 5                               |  | 20.90                  | 38.24 | 76.74 | 102.87      | 102.56 | 95.11       | 93.55 |
| Total                           |  | 17.37                  | 27.57 | 56.44 | 70.04       | 71.84  | 69.63       | 66.79 |
| PREY : AMMODYTIDAE              |  |                        |       |       |             |        |             |       |
| Age class                       |  |                        |       |       |             |        |             |       |
| 0                               |  | 0.91                   | 1.82  | 3.02  |             |        |             |       |
| Total                           |  | 0.91                   | 1.82  | 3.02  |             |        |             |       |
| PREY : OTHER                    |  |                        |       |       |             |        |             |       |
| All size classes                |  | 1.38                   | 4.20  | 8.93  | 16.10       | 18.74  | 3.55        | 3.15  |

APPENDIX 2 AVERAGE PREY WEIGHTS.

Appendix 2-E. Average prey weight (g) at time of ingestion for MACKEREL by age class of prey and predator by quarter for the total North Sea.

PREDATOR : MACK Area : TOTAL NORTH SEA YEAR : 1991 QUARTER : 1

Age class 0 1 2 3 4 5 6+

PREY : ALL SPECIES

All size classes 0.02 0.24 1.11 1.11 1.11 0.39

Age class PREY : AMMODYTIDAE

1 2.21 2.21 2.21 2.21  
Total 2.21 2.21 2.21 2.21

PREY : OTHER

All size classes 0.02 0.24 0.05 0.05 0.05 0.39

Appendix 2-E. Average prey weight (g) at time of ingestion for MACKEREL by age class of prey and predator by quarter for the total North Sea.

PREDATOR : MACK Area : TOTAL NORTH SEA YEAR : 1991 QUARTER : 2

| Age class | 0 | 1 | 2 | 3 | 4 | 5 | 6+ |
|-----------|---|---|---|---|---|---|----|
|-----------|---|---|---|---|---|---|----|

PREY : ALL SPECIES

|                  |      |      |      |      |      |      |      |
|------------------|------|------|------|------|------|------|------|
| All size classes | 0.04 | 0.02 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 |
|------------------|------|------|------|------|------|------|------|

Age class PREY : GADUS MORHUA

|       |      |      |      |      |      |      |
|-------|------|------|------|------|------|------|
| 0     | 2.08 | 2.20 | 2.36 | 2.31 | 2.25 | 3.38 |
| Total | 2.03 | 2.13 | 2.36 | 2.29 | 2.25 | 3.38 |

Age class PREY : MELANOGRAMMUS AEGLEFINUS

|       |      |      |      |
|-------|------|------|------|
| 0     | 2.22 | 2.22 | 2.22 |
| Total | 2.22 | 2.22 | 2.22 |

Age class PREY : TRISOPTERUS ESMARKI

|       |      |       |       |       |       |       |
|-------|------|-------|-------|-------|-------|-------|
| 0     | 2.32 | 1.68  | 1.29  | 1.20  | 1.10  | 2.94  |
| 1     |      | 11.84 | 11.84 | 11.84 | 11.84 | 11.84 |
| Total | 2.32 | 1.69  | 1.43  | 1.68  | 1.99  | 4.63  |

Age class PREY : CLUPEA HARENGUS

|       |       |       |       |       |       |
|-------|-------|-------|-------|-------|-------|
| 0     | 14.43 | 14.01 | 13.55 | 12.68 | 11.96 |
| 1     | 18.77 | 25.67 | 21.22 | 25.05 | 24.55 |
| Total | 14.59 | 18.28 | 14.46 | 18.08 | 17.36 |

Age class PREY : SPRATTUS SPRATTUS

|       |      |       |       |       |       |       |
|-------|------|-------|-------|-------|-------|-------|
| 1     | 2.34 | 5.62  | 6.82  | 9.71  | 10.88 | 10.27 |
| 2     |      | 16.64 | 19.14 | 19.60 | 19.87 | 17.22 |
| 3     |      | 20.10 | 20.04 | 20.02 | 20.01 | 18.29 |
| 4     |      | 20.10 | 20.04 | 20.02 | 20.01 | 18.29 |
| 5     |      | 20.10 | 20.04 | 20.02 | 20.01 | 18.29 |
| 6     |      |       |       |       |       | 23.68 |
| Total | 2.18 | 6.90  | 9.06  | 12.66 | 13.94 | 13.48 |

Age class PREY : AMMODYTIDAE

|       |      |       |       |       |       |       |
|-------|------|-------|-------|-------|-------|-------|
| 0     | 0.89 | 1.09  | 1.50  | 1.55  | 1.58  | 1.56  |
| 1     | 3.11 | 2.99  | 2.60  | 2.96  | 2.91  | 3.84  |
| 2     | 5.32 | 5.50  | 6.03  | 11.16 | 11.26 | 11.35 |
| 3     | 5.32 | 29.58 | 27.41 | 26.14 | 28.12 | 12.76 |
| 4     |      | 29.74 | 27.51 | 26.48 | 29.64 | 13.02 |
| 5     |      | 29.70 | 27.50 | 26.42 | 29.13 | 12.90 |
| 6     |      | 29.76 | 27.53 | 26.57 | 29.94 | 13.14 |
| Total | 1.04 | 1.92  | 2.95  | 2.56  | 2.74  | 4.21  |

PREY : OTHER

|                  |      |      |      |      |      |      |
|------------------|------|------|------|------|------|------|
| All size classes | 0.03 | 0.02 | 0.01 | 0.01 | 0.00 | 0.00 |
|------------------|------|------|------|------|------|------|

Appendix 2-E. Average prey weight (g) at time of ingestion for MACKEREL by age class of prey and predator by quarter for the total North Sea.

PREDATOR : MACK Area : TOTAL NORTH SEA YEAR : 1991 QUARTER : 3

Age class 0 1 2 3 4 5 6+

PREY : ALL SPECIES

All size classes 0.02 0.02 0.02 0.02 0.01 0.01

Age class PREY : GADUS MORHUA

0 2.38 2.23 2.16 2.25 2.79  
Total 2.38 2.23 2.16 2.25 2.79

Age class PREY : MERLANGIUS MERLANGUS

0 1.19 1.69 2.60 2.69 2.73  
Total 1.19 1.69 2.60 2.69 2.73

Age class PREY : TRISOPTERUS ESMARKI

0 1.14 1.61 1.73 2.44 2.29 2.84  
1 17.87 18.00 17.87 18.06  
Total 1.14 1.61 1.73 2.52 2.35 2.92

Age class PREY : CLUPEA HARENGUS

0 4.16 4.84 5.70 9.82 12.26  
Total 0.05 1.16 3.77 4.99 9.60 12.01

Age class PREY : SPRATTUS SPRATTUS

0 0.73 0.73 0.73 0.73 0.73  
1 12.13 12.13 12.13 12.13 12.13  
Total 1.33 4.56 10.15 11.75 12.08

Age class PREY : AMMOOYTIDAE

0 0.98 1.45 1.44 1.42 1.17 1.57  
1 4.90 4.48 9.18 9.16 22.16  
2 11.89 21.17 12.53 18.51 23.97  
3 19.02 21.17 19.29 20.95 22.69  
4 20.65 21.17 20.73 21.12 21.61  
5 21.17 21.17 21.17 21.17 21.40  
6 21.17 21.17 21.17 21.17 21.26  
Total 0.98 1.45 1.45 1.47 1.31 2.41

PREY : OTHER

All size classes 0.02 0.02 0.02 0.01 0.01 0.01

Appendix 2-E. Average prey weight (g) at time of ingestion for MACKEREL by age class of prey and predator by quarter for the total North Sea.

PREDATOR : MACK Area : TOTAL NORTH SEA YEAR : 1991 QUARTER : 4

| Age class | 0 | 1 | 2 | 3 | 4 | 5 | 6+ |
|-----------|---|---|---|---|---|---|----|
|-----------|---|---|---|---|---|---|----|

|                    |      |      |      |      |      |      |      |
|--------------------|------|------|------|------|------|------|------|
| PREY : ALL SPECIES |      |      |      |      |      |      |      |
| All size classes   | 0.05 | 0.00 | 0.01 | 0.00 | 0.00 | 0.00 | 0.00 |

| Age class | PREY : TRISOPTERUS ESMARKI |      |      |      |      |      |  |
|-----------|----------------------------|------|------|------|------|------|--|
| 0         | 7.70                       | 6.24 | 6.96 | 7.21 | 7.35 | 7.36 |  |
| Total     | 7.70                       | 6.24 | 6.96 | 7.21 | 7.35 | 7.36 |  |

| Age class | PREY : CLUPEA HARENGUS |      |      |      |      |      |  |
|-----------|------------------------|------|------|------|------|------|--|
| 0         | 7.04                   | 7.01 | 7.00 | 6.94 | 6.85 | 8.93 |  |
| Total     | 7.04                   | 7.01 | 7.00 | 6.94 | 6.85 | 8.93 |  |

| Age class | PREY : SPRATTUS SPRATTUS |       |       |       |       |       |       |
|-----------|--------------------------|-------|-------|-------|-------|-------|-------|
| 0         | 1.35                     | 4.97  | 5.83  | 6.99  | 7.18  | 7.40  | 8.10  |
| 1         |                          | 11.99 | 13.68 | 13.87 | 14.58 | 14.92 | 14.66 |
| 2         |                          | 14.50 | 16.68 | 16.78 | 17.07 | 17.17 | 17.47 |
| 3         |                          |       | 18.43 | 18.43 | 18.43 | 18.43 | 19.18 |
| 4         |                          |       | 18.43 | 18.43 | 18.43 | 18.43 | 19.18 |
| Total     | 1.35                     | 5.50  | 7.83  | 9.40  | 10.69 | 11.68 | 12.70 |

| Age class | PREY : AMMODYTIDAE |      |      |      |      |      |       |
|-----------|--------------------|------|------|------|------|------|-------|
| 0         | 0.83               | 1.22 | 3.88 | 3.99 | 3.99 | 3.99 | 4.02  |
| 1         |                    |      | 4.39 | 4.52 | 4.52 | 4.52 | 4.55  |
| 6         |                    |      |      |      |      |      | 21.04 |
| Total     | 0.83               | 1.22 | 3.92 | 4.03 | 4.03 | 4.03 | 4.28  |

|                  |      |      |      |      |      |      |      |
|------------------|------|------|------|------|------|------|------|
| PREY : OTHER     |      |      |      |      |      |      |      |
| All size classes | 0.04 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |