IRISH FISHERIES INVESTIGATIONS

SERIES B (Marine) No. 41 1994

Roinn na Mara

(Department of the Marine)

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DUBLIN:
PUBLISHED BY THE STATIONERY OFFICE

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MOLESWORTH STREET, DUBLIN 2

Price: £2.00

The feeding relationships of a small demersal fish community in the western Irish Sea

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ABSTRACT

The feeding relationships of seasonal and resident fishes captured on a sandy substratum in the Irish Sea, in June and in September, were investigated. Stomach content analysis of the 17 species examined indicated four main feeding types in the June sample and three in the September sample. The majority of the species analysed in both June and September showed the same food preferences in both months. Most of the fish species showed some changes in diet with increasing length (ontogenetic shift) — some became more specialized and others favoured a more varied diet. There was no evidence of competition between specialist feeders within size groups.

INTRODUCTION

Feeding relationships of fish assemblages have been studied using several methods of stomach contents analysis and Hyslop (1980) has given a critical assessment of some of these methods. He concludes that no single method of stomach analysis gives a complete picture of dietary importance. In studies attempting to describe or compare diets, the 'importance' of a food category refers to the amount (number) and bulk (volume or weight) in the diet. According to Hynes (1950) and Mann and Orr (1968) 'important' items in the diet will be obvious irrespective of the method of stomach analysis employed. The diets of some of the fish dealt with in this study have been investigated in other areas. For example, Gordon (1977) studied the food of whiting *Merlangius merlangus* in Scottish waters, using the percentage frequency of occurrence method to express the results; Kislalioglu and Gibson (1977) studied the feeding relationships of shallow water fishes in a Scottish sea loch and used the percentage points composition method of Hynes (1950); Gibson and Ezzi (1987) also used this percentage points composition method to analyze the stomach contents of a demersal fish assemblage on the west coast of Scotland; Hall et al. (1990) described the diet breadths and diet overlaps of some fish species in a Scottish sea loch using the percentage occurence, numerical abundance and biomass of prey methods. The diet of some species of fish from the Irish Sea has already been investigated, for example *Merlangius merlangus* (Patterson, 1985), gadoid species (Nagabushanam, 1965), *Trisopterus minutus, T. luscus* and *Gadus morhua* (Armstrong, 1982). The present study was directed towards elucidating the trophic relationships of a small demersal fish community, including non-commercial and commercial species, in the western Irish Sea.

MATERIALS AND METHODS

The study area is shown in Figure 1 and lies to the south of Dublin Bay, in the western Irish Sea. The area was relatively shallow (20 to 25m approximately) and the sediment was composed mainly of coarse sand and larger coarse granules. Tidal movements were the most energetic forces responsible for water movement within this area (Bowden 1980, Dickson and Boelens 1988).

The fish were sampled, in June and September, during the Department of the Marine's annual Irish Sea Young Fish Survey Programme on the RV *Lough Beltra* using an otter-trawl (3-bridled Butterfly trawl) towed for 30 minutes at each station. The main mesh of the trawl net was 35mm, and the cod end was lined with fine 8mm sprat mesh. Sampling of the catch was confined to fish of 20cm and smaller, which were frozen at −18°C immediately after capture. The relative proportions of the fish examined do not reflect their abundance in the catch, as the aim of the sampling was to obtain a minimum of thirty specimens of each species from each station.

In the laboratory defrosted fish were identified and measured to the nearest mm standard lengths. Fish were weighed (total wet weight) and the entire gut was then removed and weighed (wet weight). Prey items were identified to species level, if possible. All of the fish were aged by examination of saggital otoliths.

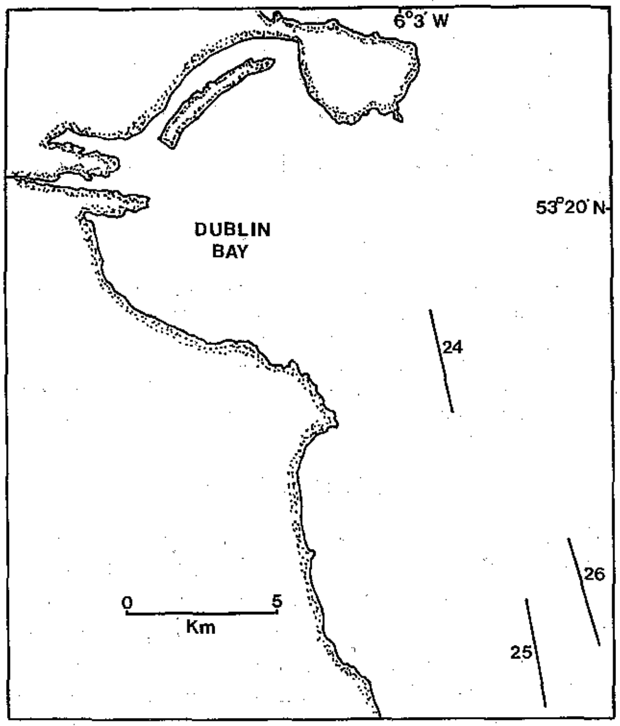

Fig. 1 Dublin Bay and adjacent areas, indicating the stations (24, 25, 26) at which the fish were recorded.

Gut content analysis

Assessment of gut contents involved a modification of the semiquantitative points method (Hynes, 1950). The gut weight was expressed as a percentage of somatic weight and this value was taken as a measure of the degree of fullness of the gut. A maximum of twenty points was awarded to a full gut.

For example:

Gut wt. as a % of somatic wt. of fish.	Points alloted to gut.
9.5 to 10.49 (full)	20
8.5 to 9.49	18
7.5 to 8.49	16 etc.

The gut contents were sorted in a petri dish and grouped into food categories. The relative volume of each food category was visually estimated using, as a guide, a sheet of 1mm graph paper placed underneath the petri dish. A proportion of the total points awarded to the gut was then allocated to each food category and expressed as a percentage of the total volume of food in each specimen. Means of these percentages were then calculated for each species and for each size class within species.

Dietary similarities were investigated using cluster analysis (Wishart, 1978). Simple cluster analysis of the data, resulting from the gut content analysis (based on the percentage points composition), groups the fish species having similar diets. To interpret the results of the classificatory analysis, the Variable Stopping Rule (Williams 1976 and Boesch 1973) was used to determine species groups. By this rule, groups are determined by proceeding down the hierarchy in the direction of increasing similarity, until the branches are subjectively determined to be relatively internally homogenous upon appeal to the original data (Boesch 1973). Nodal analysis (Boesch, 1977) is the presentation in tabular form, of the gut content analysis, with the fish species arranged into the groups identified by the cluster analysis, and thus nodal analysis serves to highlight the feeding groups present in an assemblage.

The validity of the groups and subgroups of fish species thus exhibited is assessed by the application of the significance tests of the pseudo-F test (Clifford and Stephenson, 1975). The pseudo-F test is basically an analysis of varience and it determines whether or not there is a statistical difference in the varience of each variable (food type) among groups (fish species) defined by cluster analysis. Significant prey classes are assigned as characterising one or more fish species groups with reference to their mean occurrence (using geometric mean) within the groups, making use of the 99% and 95% confidence limits.

RESULTS

Seventeen species of fish were examined and these are listed in Table 1. The catches were dominated by the dab, *Limanda limanda* (L.), the whiting *Merlangius merlangus* (L.), the dragonet *Callionymus maculatus* Rafinesque-Schmaltz, the plaice *Pleuronectes platessa* L. and the cod *Gadus morhua* L. In June *L. limanda* was the most abundant species, whilst *G. morhua* and *M. merlangus* dominated the September catches. Seven of the seventeen species studied can be regarded as resident in the area and the remaining ten are juveniles of larger species which utilize the area seasonally, as a nursery ground, prior to joining the adult stock in the deeper offshore water.

Dietary composition

The percentage (points) composition of the food items for each species of fish recorded in June and September are illustrated in Tables 2 and 3. Cluster analysis of the dietary data for June, identified four major groupings. The first group was composed primarily of decapod feeders and within this group two subgroups were indicated: a decapod-fish subgroup included the red gurnard *Aspitrigla cuculus* L. and the witch *Glyptocephalus cynoglossus* (L.), with echinoderms being an important component of the diet of the latter species; also in this subgroup were the two specimens of the long-spined sea scorpion *Taurulus bubalis* (Euphrasen), with decapods only in their guts; the second subgroup had a more varied diet, all ate decapods, amphipods, polychaetes and all but the pouting *Trisopterus luscus* (L.) ate fish. The majority of the polychaetes taken were sedentary tubiculous forms, e.g. terebellid worms, whilst most of the amphipods were free-swimming infaunal forms and decapod megalopa larvae were also consumed.

The second group fed mainly on bivalves and echinoderms: the majority of the bivalves were infaunal suspension and deposit feeders of the families Scrobiculariidae, Tellinidae and Cultellidae; the echinoderms included brittle-stars of the genus *Ophiura*. All four species ate amphipods, both active (e.g. *Melita* spp) and slow moving, epiphytic forms (e.g. *Caprella* spp) and polychaetes were an important food item for *P. platessa*.

The third group were polychaete eaters, consuming sedentary, tubiculous worms of the families Pectinariidae, Terebellidae and Sabellidae and the lemon sole *Microstomus kitt* (Walbaum) also consumed echinoderms. The fourth group fed exclusively on fish prey which included gobies and sandeels.

The cluster analyses of dietary similarity between the twelve species captured in September indicated three groups. The members of the first group fed mainly on decapods, including swimming crabs (e.g. *Liocarcinus pusillus*) and a wide range of shrimps (including, *Crangon crangon, Pandalus montagui, Palaemon serratus*); free-swimming and epiphytic amphipods were also important food items for this group.

The five species in the second group had a more varied diet of which decapods (including crangonid, pandalid and palaemonid shrimps) and fish (including sandeels, gobies and juvenile whiting) were important items. All but the john dory *Zeus faber* L. ate mysids. The polychaetes eaten were primarily free-swimming errant forms of the family Nereididae and some sedentary forms. Bivalves, amphipods and polychaetes formed the major components of the diet of the four species comprising the third group.

The significance of the various food categories for the fish groups was calculated using the pseudo-F test (Table 4). Three food types were found to be characteristic of certain fish species combinations in June: decapods positively characterized fish species from group 1, bivalves characterized group 2 and fish prey was significant to group 4. Only one food type was significant for the fish recorded in September, bivalves positively characterized group 3 .

The diet composition of each fish species at each length class was investigated and the results are presented in Table 5. The prey items taken by some species of fish, for example *G. morhua* and the poor cod *Trisopterus minutus* (L.), remained relatively unchanged as the fish increased in length. The smallest specimens of other fish species, for example *G. cynoglossus*, the common dragonet *Callionymus lyra* (L.) and the grey gurnard *Eutrigla gurnardus* (L.), had a strikingly different diet from the larger specimens.

DISCUSSION

The dietary information presented here is based on the 'points' method (Hynes, 1950) and whilst it indicates the volume or biomass of prey items in stomachs, it does not give an estimate of the percentage occurrence (frequency) or the percentage number of prey items.

The analysis of the taxonomic composition of the diet of the recorded fish species in June and in September indicated some fairly distinct feeding groups. This separation into groups, in spite of the wide range of food categories used, is an indication that food resources are partitioned among the assemblage members. The differences in the use of available resource are probably sufficient to allow the species to coexist and, as suggested by Schoener (1982), reduces interspecific competion for food.

For those species captured in both June and September it is interesting to note that the majority (60%) showed similar food preferences in both months, i.e. *G. morhua, M. merlangus, T. luscus, P. platessa, C. maculatus* and *M. kitt*. The apparent change in diet of *E. gurnardus* from 100% fish prey in June to a diet dominated by decapods in September is probably a reflection of the dietary preference of the smaller fish captured in June. Similarly, echinoderms were favoured by *C. lyra* in June but not by the single and much smaller specimen taken in September. The remaining two species, *L. limanda* and *T. minutus* showed some similarity in their June and September diets.

The data suggest that in the fish assemblage studied, similar sized categories of predator do not appear to compete with each other. For example, the flounder *Platichthys flesus* (L.) is the only species having polychaetes as the sole food item in the 15 to 18cm and 18 to 21cm length groups; *C. lyra* was the only amphipod specialist in the 12 to 15 cm length group; *A. cuculus* was the only decapod specialist in the 18 to 21cm length group, *T. bubalis* specialized in decapods in the 9 to 12 cm group and *G. cynoglossus* in the 12 to 15cm group.

A phenomenon of progressive change in diet as predator size increases has been observed in *T. minutus, T. luscus* and *G morhua* (Armstrong, 1982), in *L. piscatorius* in the northern Irish sea (Crozier, 1985) and in *G. morhua, P. platessa* and *P. flesus* in a Scottish sea loch (Kislalioglu and Gibson, 1977). In this study the four gadoid species recorded were in the 0+ and 1+ age groups, ranging in size from 9 to 21 cm. Relatively little dietary change was evident within this size range except for a noticeable increase in the amount of fish prey taken by the larger specimens of *M. merlangus*, as noted also by Gibson and Ezzi (1987) and Gordon (1977). The pleuronectids ranged in age from 1+ to 4+ and from 9 to 21 cm in length. Two of these five species showed a striking change in dietary emphasis: *L. limanda* (recorded ages 2+, 3+ and 4+) had a rather specialized diet of polychaetes (67%) supplemented by bivalves (17%) in the 9 to 12 cm length group but the larger specimens had a more varied diet containing ever decreasing amounts of polychaetes; *G. cynoglossus* (3+ age group) in the 12 to 15cm length group, ate decapods only, whilst the larger fish ate echinoderms and fish.

Among the species that can be regarded as resident in the area, three species showed some changes in diet with increasing length: the common dragonet *C. lyra* (ages 1+ and 2+) had amphipods only as prey items in the 12 to 15cm length group but had a much broader diet in the 15 to 18 cm length group; *E. gurnardus* (aged 1+ and 2+) of 9 to 12cm ate fish prey only, the larger sizes 12 to 18cm had decapods and mysids in their guts and the 18 to 21cm length fish had equal amounts of decapods and fish; *A. cuculus* (2+) also favoured decapods and fish in the 15 to 18cm length group but had decapods only in the guts of the 18 to 21cm length group. The dietary preference of small (<10cm) and large individuals of some species (*G. cynoglossus, C. lyra, E. gurnardus*) is so different that they could be regarded as different species from the dietary point of view, as suggested by Gibson and Ezzi (1987).

Two species of predator, the lesser weever *E. vipera* (Cuvier) and *E. gurnardus*, specialize, in the 9 to 12cm length, in fish prey. It was not possible to identify the fish prey but perhaps they do not compete for the same prey items, as *E. gurnardus* is an active predator like most of the other species captured and *E. vipera* is the only predator captured with a habit of burying itself on sandy bottoms, being more active during the hours of darkness (Wheeler, 1969). This type of ecological divergence is one of the mechanisms by which potentially competing species can co-exist (Gunn and Milward, 1985).

In conclusion, the fish assemblage studied included some fairly distinct feeding groups which indicated that the food resources were partitioned, allowing fish species with some dietary similarities and overlap to co-exist. For example, between-species competition was probably slight as specialist feeders of the same size had different food preferences; within-species dietary change with increasing length was noted and could serve to reduce competition. In general most of the species studied seemed to have similar diets in both June and September but with a slight change of emphasis on some food items in some fish species. According to Gibson and Ezzi (1987) fish species which have very similar diets frequently differ markedly in morphology, feeding behaviour and, to some extent, prey size. Whilst mouth dimensions of the fish and the length of the measurable prey items were noted in this study, the data available were insufficient to allow an analysis of these aspects.

ACKNOWLEDGEMENTS

We wish to express our gratitude to the Department of the Marine for our participation in their Irish Sea Young Fish Survey Programme and gratefully acknowledge the assistance of Dr. Paul Connolly, the Skipper and crew of the R.V. Lough Beltra, Dr. Pat Dineen for advice on statistics and Dr. David McGrath for assistance with amphipod identifications.

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TABLE 1. Numbers of fish analysed, numbers with empty guts, standard length and status (R = resident, S = seasonal).

Family and species	June (n)	No. empty guts	Sept. (n)	No. empty guts	Standard length (mm) June Min.	June Max.	Sept. Min.	Sept. Max.	Status R/S
Gadidae									
Gadus morhua L.	15	0	37	1	167	201	97	161	S
Merlangius merlangus (L.)	33	10	37	14	139	198	136	205	S
Trisopterus minutus (L.)	17	2	21	1	107	132	95	161	S
Trisopterus luscus (L.)	4	0	5	0	165	170	91	154	S
Pleuronectidae									
Limanda limanda (L.)	57	5	23	4	103	188	120	203	S
Pleuronectes platessa L.	32	3	27	1	119	198	122	200	S
Microstomus kitt (Walbaum)	21	0	6	0	121	198	172	203	S
Platichthys flesus (L.)	7	0	-	-	163	198	-	-	S
Glyptocephalus cynoglossus (L.)	5	0	-	-	119	165	-	-	S
Callionymidae									
Callionymus maculatus Rafinesque-Schmaltz	41	0	24	0	119	169	108	171	R
Callionymus lyra L.	5	0	1	0	146	194	-	118	R
Triglidae									
Eutrigla gurnardus (L.)	13	8	20	14	93	196	153	184	R
Aspitrigla cuculus (L.)	7	0	-	-	153	184	-	-	R
Agonidae									
Agonus cataphractus (L.)	-	-	8	1	-	-	80	96	R
Zeidae									
Zeus faber L.	-	-	2	0	-	-	164	177	S
Trachinidae									
Echiichthys vipera (Cuvier)	23	5	-	-	98	135	-	-	R
Cottidae									
Taurulus bubalis (Euphrasen)	2	0	-	-	94	100	-	-	R

TABLE 2. Nodal table illustrating the numbers of guts containing food (n) and percentage composition of contents by points method in June sample. Groups 1 to 4 delineated by classificatory analyses.

	(*n*)	Decapods	Amphipods	Polychaetes	Fish	Echinoderms	Bivalves	Gastropods	Hydroids	Unidentified	Mysids	Cumaceans
(1)												
M. merlangus	23	17.7	26.5	2.9	41.1	0.0	0.0	0.0	0.0	0.0	0.0	11.8
T. minutus	15	33.3	12.5	41.6	4.2	0.0	0.0	0.0	0.0	0.0	4.2	4.2
T. luscus	4	25.0	37.5	25.0	0.0	0.0	0.0	0.0	0.0	12.5	0.0	0.0
G. morhua	15	50.0	25.0	10.0	10.0	0.0	5.0	0.0	0.0	0.0	0.0	0.0
T. bubalis	2	100.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
A. cuculus	7	80.0	0.0	0.0	20.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
G. cynoglossus	5	25.0	0.0	0.0	25.0	50.0	0.0	0.0	0.0	0.0	0.0	0.0
(2)												
C. maculatus	41	9.8	4.9	12.2	0.0	17.0	51.2	4.9	0.0	0.0	0.0	0.0
C. lyra	5	0.0	14.3	0.0	0.0	42.8	28.6	14.3	0.0	0.0	0.0	0.0
L. limanda	52	7.1	1.8	16.0	3.6	19.7	25.0	0.0	14.3	12.4	0.0	0.0
P. platessa	29	0.0	15.0	25.0	5.0	5.0	50.0	0.0	0.0	0.0	0.0	0.0
(3)												
P. flesus	7	0.0	0.0	100.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
M. kitt	21	0.0	0.0	75.0	0.0	25.0	0.0	0.0	0.0	0.0	0.0	0.0
(4)												
E. gurnardus	5	0.0	0.0	0.0	100.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
E. vipera	18	0.0	0.0	0.0	100.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

TABLE 3. ***Nodal table illustrating the number of guts containing food (n) and percentage composition of contents by points method in September sample. Groups 1 to 3 delineated by classificatory analyses.***

	(n)	Decapods	Fish	Amphipods	Mysids	Bivalves	Cumaceans	Polychaetes	Unidentified	Pycnogonids	Echinoderms	Hydroids
(1)												
T. minutus	20	44.4	0.0	33.3	11.1	0.0	0.0	11.1	0.0	0.0	0.0	0.0
A. cataphractus	7	50.0	0.0	30.0	10.0	0.0	0.0	10.0	0.0	0.0	0.0	0.0
T. luscus	5	36.5	0.0	36.5	9.0	0.0	9.0	9.0	0.0	0.0	0.0	0.0
(2)												
G. morhua	36	50.0	12.9	14.8	7.4	3.7	0.0	7.4	1.9	0.0	0.0	1.9
L. limanda	19	15.4	3.9	19.2	7.7	19.2	0.0	23.1	0.0	0.0	0.0	11.5
M. merlangus	23	25.6	48.7	2.6	7.7	0.0	0.0	15.4	0.0	0.0	0.0	0.0
E. gurnardus	6	62.5	12.5	0.0	25.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Z. faber	2	50.0	50.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
(3)												
C. maculatus	24	17.5	0.0	22.8	3.5	29.8	0.0	19.3	0.0	1.8	5.2	0.0
C. lyra	1	33.3	0.0	33.3	0.0	33.3	0.0	0.0	0.0	0.0	0.0	0.0
P. platessa	26	0.0	0.0	16.7	2.8	44.4	0.0	33.3	0.0	0.0	0.0	2.8
M. kitt	6	0.0	0.0	12.5	0.0	12.5	0.0	75.0	0.0	0.0	0.0	0.0

TABLE 4. Results of the pseudo-F test, showing the mean occurrences of the food categories significant, at p > 0.95, for the fish groups delineated by classificatory analyses (* indicates p > 0.99). 95% confidence limits of means in parentheses.

Species groups	F-value	Group 1	Group 2	Group 3	Group 4
JUNE					
Food categories	3,11 d.f.				
Bivalves	23.8*	0.4 (0-2)	37.0 (20-66)	0	0
Decapods	19.5*	40.0 (22-72)	2.0 (0-23)	0	0
Fish	5.8	6.0 (0-30)	1.3 (0-10)	0	99.0 (99-99.9)
SEPTEMBER					
Food categories	2,9 d.f.				
Bivalves	6.43	1.5 (0-12)	1.0 (0-14)	35.4 (21-59)	

TABLE 5. Mean percentage points composition of principal taxa in diets according to size of fish. Cumaceans, gastropods, hydroids, pycnogonids and unidentified material included in 'Others'. Size classes: 1= 6 - 9cm; 2 = 9.1 - 12cm; 3 = 12.1 - 15cm; 4 = 15.1 - 18cm; 5 = 18.1 - 21cm.

	Size class	Number	Decapods	Amphipods	Polychaetes	Fish	Bivalves	Echinoderms	Mysids	Others
G. morhua	2	8	37.5	31.3	12.5	12.5	0.0	0.0	6.2	0.0
	3	17	50.0	8.3	8.3	16.7	4.2	0.0	8.3	4.2
	4	16	61.8	14.2	4.8	4.8	4.8	0.0	4.8	4.8
	5	10	46.1	23.1	7.7	15.4	7.7	0.0	0.0	0.0
M. merlangus	3	5	25.0	37.5	0.0	12.5	0.0	0.0	0.0	25.0
	4	21	17.2	20.7	6.9	48.3	0.0	0.0	0.0	6.9
	5	20	25.0	2.8	13.9	50.0	0.0	0.0	8.3	0.0
T. minutus	2	26	40.5	21.4	26.2	0.0	0.0	0.0	9.5	2.4
	3	9	33.3	33.3	22.2	11.1	0.0	0.0	0.0	0.0
T. luscus	2	4	36.3	36.3	9.1	0.0	0.0	0.0	9.1	9.1
	4	5	25.0	37.5	25.0	0.0	0.0	0.0	0.0	12.5
L. limanda	2	11	0.0	0.0	66.6	0.0	16.7	0.0	0.0	16.7
	3	30	8.6	5.7	20.0	0.0	34.3	14.3	5.7	11.4
	4	22	11.1	11.1	11.1	7.4	14.8	22.2	0.0	22.2
	5	8	14.3	7.1	7.1	7.1	14.3	0.0	0.0	50.0
P. platessa	3	22	0.0	15.3	23.1	0.0	46.2	7.7	7.7	0.0
	4	23	0.0	13.6	27.3	4.6	50.0	0.0	0.0	4.5
	5	10	0.0	19.1	38.1	0.0	42.8	0.0	0.0	0.0
M. kitt	4	17	0.0	0.0	60.0	0.0	20.0	20.0	0.0	0.0
	5	10	0.0	14.3	85.7	0.0	0.0	0.0	0.0	0.0
P. flesus	4	5	0.0	0.0	100.0	0.0	0.0	0.0	0.0	0.0
	5	2	0.0	0.0	100.0	0.0	0.0	0.0	0.0	0.0
G. cynoglossus	3	3	100.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	4	2	0.0	0.0	0.0	33.3	0.0	66.7	0.0	0.0
C. maculatus	2	5	0.0	14.3	14.3	14.3	42.8	0.0	0.0	14.3
	3	42	16.4	14.9	17.9	0.0	38.8	7.5	1.5	3.0
	4	18	12.0	16.0	12.0	0.0	36.0	20.0	4.0	0.0
C. lyra	3	1	0.0	100.0	0.0	0.0	0.0	0.0	0.0	0.0
	4	3	16.7	16.7	0.0	0.0	33.2	16.7	0.0	16.7
	5	2	0.0	0.0	0.0	0.0	50.0	50.0	0.0	0.0
E. gurnardus	2	4	0.0	0.0	0.0	100.0	0.0	0.0	0.0	0.0
	3	2	66.6	0.0	0.0	0.0	0.0	0.0	33.3	0.0
	4	4	60.6	0.0	0.0	9.1	0.0	0.0	30.3	0.0
	5	1	50.0	0.0	0.0	50.0	0.0	0.0	0.0	0.0
A. cuculus	4	6	75.0	0.0	0.0	25.0	0.0	0.0	0.0	0.0
	5	1	100.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
A. cataphractus	1	3	50.0	33.3	16.7	0.0	0.0	0.0	0.0	0.0
	2	4	50.0	25.0	0.0	0.0	0.0	0.0	25.0	0.0
Z. faber	4	2	50.0	0.0	0.0	50.0	0.0	0.0	0.0	0.0
E. vipera	2	11	0.0	0.0	0.0	100.0	0.0	0.0	0.0	0.0
	3	7	0.0	0.0	0.0	100.0	0.0	0.0	0.0	0.0
T. bubalis	2	2	100.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

Wt. P36694. 650. 7/94. Cahill. (M10894). G.30.01