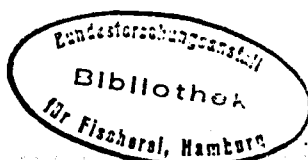


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Marine Mammal Committee

DIETS OF SMALL CETACEANS STRANDED IN SCOTLAND 1993-1995

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ABSTRACT

Diets of small cetaceans in Scottish waters were investigated using stomach contents from strandings and by-catches. From 1993-1995, a total of 55 animals were studied, including 37 harbour porpoise (*Phocoena phocoena*), 4 striped dolphin (*Stenella coeruleoalba*), 3 white-beaked dolphin (*Lagenorhynchus albirostris*), 3 Atlantic white-sided dolphin (*Lagenorhynchus acutus*), 3 Risso's dolphin (*Grampus griseus*), 2 common dolphin (*Delphinus delphis*), 1 bottlenosed dolphin (*Tursiops truncatus*), 1 Sowerby's beaked whale (*Mesoplodon bidens*) and 1 killer whale (*Orcinus orca*).

Sandeels (Ammodytidae) were the main food item in harbour porpoise stomachs. Some seasonal variation in the diet was found, with the families Gadidae and Clupeidae being most abundant in winter and Ammodytidae in summer. The striped dolphin ate mainly Gadidae (whiting and *Trisopterus* spp.) but also cephalopods, including the sepiolid *Sepietta oweniana* and the oceanic squid *Gonatus steenstrupi*. The common dolphin had eaten mainly Ammodytidae and Gadidae, but also herring (Clupeidae). White-beaked dolphin stomachs examined contained mainly Gadidae but also the octopus *Eledone cirrhosa*. Atlantic white-sided dolphins ate again Gadidae but cephalopods represented half of the diet. Of the remaining cetaceans, Risso's dolphin had been feeding mainly on cephalopods, primarily *Eledone*, while in the single killer whale stomach examined oceanic cephalopods were the only remains found, including Gonatidae and Histioteuthidae. The Sowerby's beaked whale had only large Gadidae otoliths in the stomach.

The results are consistent with feeding having taken place in coastal waters and agreed broadly with results on diets of small cetaceans stranded in Scotland in 1992-1993.

INTRODUCTION

Strandings and by-catches represent an important source of information on the feeding habits of cetaceans. There are numerous publications on cetacean diets based on examination of small numbers of carcasses of stranded or by-caught animals (e.g. Clarke, 1974; Clarke & Kristensen, 1980; Clarke & Pascoe, 1985; Würtz *et al.*, Bello, 1993) but relatively few larger scale studies. Examples of the latter include Rae's (1965, 1973), and Martin's (1995) work on porpoise diets and Santos *et al* (1994) on small cetaceans.

In Scotland, data collection from carcasses of stranded and by-caught cetaceans is co-ordinated by Scottish Agricultural Veterinary Services Division (SAC) under a contract with the UK Department of the Environment.

Since 1992 stomach contents from stranded and by-caught small cetaceans examined at SAC have been analysed at the University of Aberdeen. Results from the period 1993-1995 are presented in this study.

Most of the species studied here belonged to the family Delphinidae; the common dolphin *Delphinus delphis*, the white-beaked dolphin, *Lagenorhynchus albirostris*, the Atlantic white-sided dolphin, *L. acutus*, the striped dolphin *Stenella coeruleoalba*, the Risso's dolphin, *Grampus griseus*, the bottlenosed dolphin *Tursiops truncatus*, and the killer whale *Orcinus orca*. Two more species studied were the harbour porpoise

Phocoena phocoena, which is the more frequently stranded, and the Sowerby's beaked whale *Mesoplodon bidens*.

With the exception of the harbour porpoise and the bottlenosed dolphin in the Moray Firth, these are mainly pelagic species living in offshore waters (Leatherwood *et al.*, 1983; Santos *et al.*, 1994).

MATERIAL & METHODS

From June 1993 to May 1995, SAC examined the bodies of 112 small cetaceans from strandings and by-catches (Table 1). Fifty-five stomachs containing food were analysed at the University of Aberdeen.

All the animals were measured, weighted and sexed at SAC. The stomachs were removed and their contents stored in 70% ethanol. The prey remains consisted principally of fish otoliths, bones and lenses, and cephalopod mandibles. Few crustacean remains were present and these were not identified, due to poor state of preservation.

Fish otoliths and bones were identified using reference material and guides (Härkönen, 1986; Watt *et al.*, In Press). The number of fish was estimated from the number of otoliths. Fish sizes were estimated by measuring the otoliths, using callipers or a binocular microscope fitted with an eyepiece graticule. For stomachs in which one fish species was represented by >30 otoliths, a random sample of 30-60 was measured. Usually length was measured, except for the otoliths of herring, sprat and Gobiidae, for which width is the standard measurement (Härkönen, 1986), and for broken otoliths. Fish length was calculated from regressions on otolith size (Härkönen, 1986; J. Hislop, Unpubl. data; GJP & MBS, Unpubl. data). Further regressions were used to derive fish weight from fish length, when possible using values for the appropriate month and area (Bedford *et al.*, 1986; Coull *et al.*, 1989). If no weight-length regression was available, fish weight was estimated directly from otolith length (Härkönen, 1986; GJP & MBS, Unpubl. data). For otoliths identifiable to one of a group of species, regressions based on combined data from all the species in the group were used.

Cephalopods beaks were also identified using reference material and guides (Clarke, 1986; Pérez-Gándaras, 1986). Standard measurements (rostral length for squid and hood length for octopus and sepiolids; Clarke, 1986; Pérez-Gándaras, 1986) were taken on both upper and lower beaks using a binocular microscope. Dorsal mantle length and body weight of the animals were estimated using regressions from Clarke (1986), Pierce *et al.* (1993) and GJP & MBS (Unpubl. data).

Complete pairs of cephalopod beaks were rarely present and in all cases weight was estimated from either the upper or lower beak. For fish otoliths, all otoliths were measured and each otolith was assumed to represent 0.5 fishes. Thus, when both otoliths were present, the estimated fish weight is the average of the weights estimated from the two otoliths.

Relative importance in the diet for each prey type was estimated as (a) percentage frequency of occurrence, (b) proportion of the total number of prey, and (c) proportion of total prey weight.

RESULTS

Fifteen species of fish belonging to 7 families and 10 species of cephalopods belonging to 6 families were identified from the stomach contents.

In the harbour porpoise (Table 2) sandeels were the main prey item, making up more than half of the total weight of prey. Gadidae, mainly whiting (*Merlangius merlangus*) were also eaten. Cephalopods had a less important role and consisted mainly in small sepiolids e.g. *Sepietta oweniana*, *Sepiolo atlantica* and *Rossia macrosoma*. The only bottle-nosed dolphin stomach examined contained a few unidentifiable fish bones.

Common dolphins ate mainly sandeels; these formed half of the total weight of prey eaten, with the other half represented by Gadidae, e.g. as whiting and haddock/saithe/pollack. The striped dolphin and the Atlantic white-sided dolphin showed the biggest range of prey species. In the former the most important prey were whiting and *Trisopterus* spp., and cephalopods represented less than 1/3 of proportion by weight. In the Atlantic white-sided dolphin cephalopods constituted more than half of the total weight of prey, with the Ommastrephid *Todarodes sagittatus* being the most important prey. The family Gadidae was also important. Risso's dolphins had eaten mainly cephalopods, the octopus *Eledone cirrhosa* making up the main bulk of the diet.

Of the remaining cetaceans, the single Sowerby's beaked whale stomach examined contained only otoliths from the haddock/saithe/pollack group, while the killer whale had eaten oceanic squids such as *Gonatus steenstrupi* and *Histioteuthidae*.

The only species for which diet composition can be examined in more detail, due to the larger sample size is *Phocoena phocoena*. The harbour porpoises studied showed seasonal variation in the diet (Figure 1). In the animals that stranded in summer the main prey was sandeel, a schooling fish of coastal waters. In winter the diet composition changed to more offshore species like whiting, haddock/saithe/pollack and herring. Cephalopods played a more important role in winter also, with small offshore sepiolids and squids like *Sepietta oweniana* and *Alloteuthis subulata*.

DISCUSSION

Analysis of stomach contents of stranded cetaceans is an important source of information about their dietary habits, although some points should be considered, such as that sick or injured animals are more likely to be stranded than healthy individuals and thus the information can be biased (Sekiguchi *et al.*, 1992). Also, estimating diet using hard remains like otoliths, fish bones and cephalopod mandibles has potential biases e.g. erosion by gastric acids, different rate of erosion between different fish species (Smith & Gaskin, 1974; Pierce & Boyle, 1991), and different passage time for fish otoliths and cephalopod beaks (Harvey, 1989).

Seasonal variation was observed in the diet of the harbour porpoises studied, with bottom living coastal species in summer and more offshore species in winter. The harbour porpoise is recorded as feeding on schooling, non-spiny, fish such as herring, mackerel, sardines, pollack and whiting (Leatherwood *et al.*, 1983). Also this cetacean is reported to undertake seasonal migrations moving to offshore waters in winter but returning to inshore waters in summer (Leatherwood *et al.*, 1983). These authors also proposed that this migration could be related with prey availability. Sandeels were the most important prey for this species during the period of study; results also found by Santos *et al.* (1994) in 15 harbour porpoises stranded in the same area between 1992 and 1993. And in animals stranded in the NW coast of Spain (Santos *et al.*, 1995) during the same period of time.

The single bottlenosed dolphin stomach examined does not allow to extract many conclusions from the dietary habits of this species, although it is reported to take a wide variety of fish and invertebrates (Leatherwood *et al.*, 1983). A sample from 14 animals stranded in NW Spain (Santos *et al.*, 1994) between 1992 and 1993 had eaten mainly blue whiting but other species were also present.

Common dolphins are reported to eat fish and squid (Leatherwood *et al.*, 1983). Sandeels were the most important prey in our samples, although 41 stomachs from animals stranded in NW Spain (Santos *et al.*, 1995) contained blue whiting as the most important prey together with a wide range of other fish and cephalopod species.

Striped dolphins are known to feed mainly on cephalopods but also taking varying amounts of fish (Miyazaki *et al.*, 1973). The animals stranded in Scotland had eaten mainly whiting, but also an oceanic squid *Gonatus steenstrupi*. These results were also found in 4 striped dolphins stranded in the same area in 1992-1993 (Santos *et al.*, 1994). Three animals stranded in NW Spain had been feeding mainly on scad (Santos *et al.*, 1995).

White-beaked dolphins are reported to feed mainly on cephalopods (Leatherwood *et al.*, 1983). The octopus *Eledone cirrhosa* made up almost half of the total weight of prey in our samples. Three animals stranded in Scotland during 1992-1993 showed a different picture of the diet, with whiting as the main prey (Santos *et al.*, 1994).

Atlantic white-sided dolphins are reported to feed in squid, herring and several kinds of shrimp (Leatherwood *et al.*, 1983). The animals stranded in Scotland had eaten mainly cephalopods, the neritic and oceanic squid *Todarodes sagittatus* being the main prey. This cetacean species did not strand in NW Spain.

Risso's dolphin is known to eat mainly cephalopods (Clarke & Pascoe, 1985). The animals stranded in Scotland had been feeding mainly in the octopus *Eledone cirrhosa*. Five Risso's dolphins stranded in NW Spain had only cephalopod remains in their stomachs, mainly the octopus, *Octopus vulgaris* and *Eledone cirrhosa* (Santos *et al.*, 1995). Only one animal was analysed in Scotland from 1992-1993 and it had *Eledone cirrhosa* as the main prey (Santos *et al.*, 1994).

Sowerby's beaked whale and the killer whale were represented by only one stomach each. Little is known about the diet of the former and in the stomach analysed few otoliths were found. Another animal stranded in Scotland between 1992 and 1993 (Santos *et al.*, 1994) and this one contained silvery pout and hake otoliths. Killer whales are known to eat almost anything, from fish to cephalopods, turtles, penguins and other marine mammals (Leatherwood *et al.*, 1983). The single stomach examined contained few remains of oceanic squids e. g. *Gonatus steenstrupi* and *Histioteuthis* sp.

The present study is ongoing and it is hoped ultimately to construct a fuller picture of small cetacean diets and their possible impact on fisheries.

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Table 1. Cetaceans post-mortemed by SAC Veterinary Services, April 1993-May 1995

Numbers in bold type were animals whose stomachs contents were examined in Aberdeen.

Species: Pp = *Phocoena phocoena*, Sc = *Stenella coeruleoalba*, La = *Lagenorhynchus albirostris*, Lc = *Lagenorhynchus acutus*, Dd = *Delphinus delphis*, Gg = *Grampus griseus*, Mb = *Mesoplodon bidens*, Ba = *Balaenoptera acutorostrata*, Tt = *Tursiops truncatus*, Or = *Orcinus orca*

Ref No.	Species	Date found	Sex	Length	Location	County
M1667/93	Ba	21/07/93	Male	464	Ardersier	Inverness
M2035/93	Ba	02/09/93	Male	814	Bettyhill	Sutherland
M1190/94	Ba	08/06/94	Male	780	Off Mull	Strathclyde
M0176/94	Dd	28/01/94	Female	192	Tain	Highland
M0869/94	Dd	26/04/94	Male	157	Scapa	Orkney
M2656/94	Dd	28/12/94	Female	172	Glencaple	Dunfries
M0960/93	Gg	05/05/93	Female	313	Coll	Argyll
M1889/93	Gg	17/08/93	Male	315	Lower Sandwick	Western Isles
M2183/94	Gg	13/10/94	Female	313	Nr Dounreay	Caithness
M0610/95	Gg	03/04/95	Male	304	Sangmore Beach	Sutherland
M1843/93	Lc	04/08/93	Female	135	Braewick Eshaness	Shetland
M2117/93	Lc	10/09/93	Male	129	North Uist	Western Isles
M0676/94	Lc	04/04/94	Male	182	North Kessock	Highland
M0997/94A	Lc	12/05/94	Male	186	Scapa Beach	Orkney
M2268/94	Lc	26/10/94	Female	187	Glen Forsa Bay	Strathclyde
M0874/95	Lc	10/05/95	*	*	Kipford	Galloway
M1995/93	La	29/08/93	Male	133	Dunnet Bay	Caithness
M2100/93	La	09/09/93	Male	*	Aberdeen	Aberdeen
M2698/93	La	26/11/93	Male	206	Shetland	Shetland
M1236/94	La	17/06/94	Female	246	Reiff	Sutherland
M1471/94	La	19/07/94	Male	119	Balmedie	Grampian
M0644/95	La	05/04/95	Female	188	Clubbie Craig	Grampian
M1622/94	Mb	05/08/94	Male	472	Burghead Bay	Highland
M0784/94	Or	15/04/94	Female	550	Sandside Bay	Caithness
M2436/94	Or	16/11/94	Male	610	Catfirth Voe	Shetland
M0752/93	Ph	08/04/93	Male	102	Brora	Sutherland
M0791/93	Ph	14/04/93	*	*	Girdleness	Aberdeen
M0843/93	Ph	20/04/93	Female	145	Lossiemouth	Moray
M0822/93	Ph	21/04/93	Female	110	Graemeshall	Orkney
M0906/93	Ph	28/04/93	Male	121	Buckie	Buchan
M0930/93	Ph	30/04/93	Female	121	Findhorn	Moray
M1063/93	Ph	16/05/93	Female	141	South haven	Fair Isle
M1089/93	Ph	19/05/93	Male	127	Shandwick Bay	Ross
M1106/93	Ph	21/05/93	Male	97	Islay	Argyll
M1116/93	Ph	22/05/93	Male	148	Findhorn	Moray
M190/93	Ph	31/05/93	Male	76	Lyth.	Caithness
M1204/93	Ph	31/05/93	Male	152	Redpoint	Gairloch
M1227/93	Ph	03/06/93	Female	*	Dornoch	Sutherland
M1237/93	Ph	04/06/93	Female	102	Ardgou	Ft. William
M1248/93	Ph	06/06/93	Male	82	Findhorn	Moray
M1263/93	Ph	08/06/93	Female	156	Braewick	Shetland
M1296/93	Ph	10/06/93	Male	156	Tarbethill	Aberdeen
M1319/93	Ph	11/06/93	Male	74	East Sands	St. Andrews
M1325/93	Ph	14/06/93	Male	124	Ambulance Stn	Moray
M1346/93	Ph	14/06/93	Female	120	East Beach Lossie	Moray
M1369/93	Ph	18/06/93	Female	124	Brora	Sutherland
M1482/93	Ph	30/06/93	Female	74	Tarbet Ness	Sutherland
M1559/93	Ph	07/07/93	Male	162	Crovie	Buchan
M1592/93	Ph	12/07/93	Male	137	Lossie	Moray
M1653/93	Ph	20/07/93	Female	156	Troup Head	Buchan
M1773/93	Ph	04/08/93	Male	93	Dunnet Bay	Caithness
M1916/93	Ph	18/03/93	Female	81	Hogus Point Kirkb	Galloway
M2049/93	Ph	06/09/93	Female	166	East Sands	Fife
M2053/93	Ph	05/09/93	Female	110	Fortrose	Ross
M2204/93	Ph	21/09/93	Female	132	North Sutor	Ross

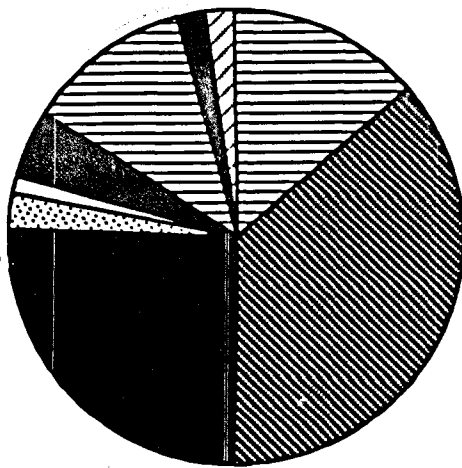
Table 1 (Continued)

M2251/93	Ph	27/09/93	Male	152	Hopeman	Moray
M2306/93	Ph	01/10/93	Female	102	Balintore	Easter Ross
M2380/93	Ph	12/10/93	Male	142	Dornoch	Sutherland
M2381/93	Ph	12/10/93	Male	137	Nairn Beach	Moray
M2558/93	Ph	03/11/93	Male	151	Lewis	Western Isles
M2626/93	Ph	14/11/93	Female	85	South Uist	Western Isles
M2627/93	Ph	14/11/93	Male	107	Weaver's Point	Western Isles
M2648/93	Ph	18/11/93	Male	c120	Cromarty Firth	Easter Ross
M0039/94	Ph	07/01/94	Female	160	Nairn	Moray Highland
M0085/94	Ph	17/01/94	Male	140	Arbroath	Angus
M0232/94	Ph	05/02/94	Female	120	Saltburn Invergor	Highland
M0254/94	Ph	06/02/94	Female	150	Ross-Shire	Highland
M0237/94	Ph	07/02/94	Female	119	Burghhead	Highland
M0266/94	Ph	08/02/94	Male	130	Ross-Shire	Highland
M0291/94	Ph	11/02/94	Male	138	Graemeshall	Orkney
M0364/94	Ph	18/02/94	Female	112	Gosford bay	Lothian
M0392/94	Ph	23/02/94	Female	101	St. Combs Beach	Grampian
M0429/94	Ph	01/03/94	Male	130	Newburgh	Grampian
M0430/94	Ph	25/02/94	Male	138	Blackness Castle	West Lothian
M0487/94	Ph	07/03/94	Male	138	Shandwick Bay	Highland
M0653/94	Ph	31/03/94	Female	112	Fortrose	Highland
M0678/94	Ph	02/04/94	Female	129	Moray	Highland
M0844/94	Ph	23/04/94	Male	106	Ardersier	Highland
M1034/94	Ph	17/05/94	Male	77	Cullen	Grampian
M1102/94	Ph	26/05/94	Male	82	Strathy Point	Sutherland
M1167/94	Ph	07/06/94	Female	75	Buckpool Buckie	Buchan
M1267/94	Ph	21/06/94	Female	77	Benb	Western Isles
M1318/94	Ph	28/06/94	Female	78.7	Lundin Links	Fife
M1348/94	Ph	01/07/94	Male	138	Strone Beach	Strathclyde
M1541/94	Ph	28/07/94	Female	154	Fortrose	Highland
M1661/94	Ph	11/08/94	Female	143	Thorntonloch	Lothian
M1710/94	Ph	22/08/94	Male	118	Cromaty	Highland
M1836/94	Ph	02/09/94	Male	102	Rosemarkie	Highland
M1951/94	Ph	16/09/94	Female	148	Balephretrish	Strathclyde
M1952/94	Ph	17/09/94	Female	150	Balintore	Highland
M1987/94	Ph	21/09/94	Female	104	Nigg	Highland
M2060/94	Ph	29/09/94	Male	122	Shandwick Bay	Highland
M2179/94	Ph	14/10/94	Male	130	Fortrose	Highland
M2250/94	Ph	23/10/94	Male	122	Saltburn Invergor	Highland
M2294/94	Ph	28/10/94	Male	142	Gourdon	Kincardine
M2297/94	Ph	28/10/94	Female	110	Barra	Western Isles
M2545/94	Ph	01/12/94	Female	121	St. Andrews	Fife
M2587/94	Ph	09/12/94	Male	104	Burghhead	Moray
M0204/95	Ph	23/01/95	*	*	Longniddry	East Lothian
M0349/95	Ph	25/02/95	Female	114	*	*
M0438/95	Ph	09/03/95	Female	161	Quarff	Shetland
M0446/95	Ph	13/03/95	Female	147	Boddam	-
M0529/95	Ph	21/03/95	Female	*	Echnaloch Bay	Orkney
M0584/95	Ph	29/03/95	Female	170	Ayr	Ayrshire
M0752/95	Ph	23/04/95	Male	123	Cullen	Grampian
M0765/95	Ph	25/04/95	Male	111	Portessie Buckie	Grampian
M0811/95	Ph	03/05/95	Male	129	Oilrig yard	Highland
M0887/95	Ph	11/05/95	Male	110	Cromarty	Highland
M1620/93	Sc	15/07/93	Male	229	Bixta Voe	Shetland
M2194/94	Sc	17/10/94	Male	179	Golspie	Shuterland
M0040/95	Sc	09/01/95	Female	146	Benbecula	Western Isles
M0325/95	Sc	23/02/95	*	*	Benbecula	Western Isles
M1186/93	Tt	31/05/93	Female	165	North Kessock	Ross
M2121/93	Tt	12/09/93	Female	148	West Beach Lossie	Moray
M2310/93	Tt	02/40/93	Female	141	Ferryton Balblair	Easter Ross
M2783/93	Tt	07/12/93	Male	145	Littleferry Golps	Shuterland
M0431/94	Tt	01/03/94	Female	322	Gare Loch	Dunbartonshire
M0882/94	Tt	23/04/94	Male	275	Inverness	Highland
M1718/94	Tt	23/08/94	Female	c250	Rosemarkie	Highland

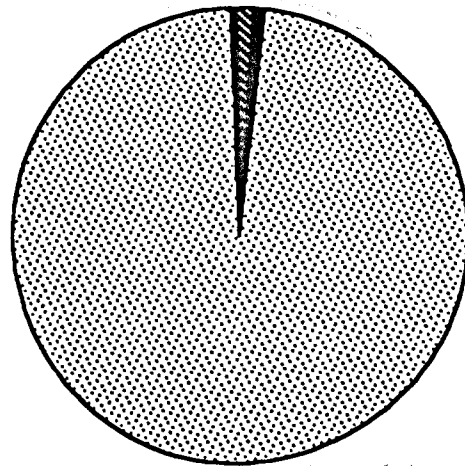
Table 2. Cetacean diets by species: % frequency, numerical proportion and % by weight.

Area Scotland	Species	Sample size	<i>Phocoena phocoena</i> Harbour porpoise (37)	<i>Tursiops truncatus</i> Bottlenose dolphin (1)	<i>Stenella coeruleoalba</i> Striped dolphin (4)	<i>Lagenorhynchus albirostris</i> White-beaked dolphin (3)	<i>Delphinus delphis</i> Common dolphin (2)	<i>Grampus griseus</i> Risso's dolphin (3)	<i>Mesoplodon bidens</i> Sowerby's beaked whale (1)	<i>Orcinus orca</i> Killer whale (1)	<i>Lagenorhynchus acutus</i> Atlantic white-sided dolphin (3)
	Fish		94.6 98.0 98.3	100 100 100	75 92.1 83.2	33.3 97.1 53.2	100 98.8 99.3	33.3 5.56 4.35	100 100 100		100 54.4 41.4
	<i>Clupea harengus</i>		10.8 1.2 3.87				50 7.28 4.34				33.3 0.59 0.08
	<i>Sprattus sprattus</i>		8.1 0.37 0.15		25 0.08 0.01		50 0.71 0.13				
	All Clupeidae		24.3 1.76 4.08		25 0.08 0.01		50 7.99 4.47				33.3 0.59 0.08
	Haddock/Pollack/Saithe		8.1 0.36 3.27			33.3 5.71 12.1	100 1.24 21.2	33.3 2.47 3.19	100 100 100		33.3 0.59 1.40
	<i>Merlangius merlangus</i>		37.8 6.66 28.6		75 47.1 65.7	33.3 17.1 14.7	100 5.33 13.0	33.3 0.62 0.62			33.3 11.2 18.5
	<i>Micromesistius poutassou</i>		5.4 0.21 0.57								
	<i>Trisopterus</i> spp.		8.1 0.34 0.35		25 30.0 12.1	33.3 1.43 0.08	50 0.18 0.07	33.3 2.47 0.54			33.3 17.7 1.22
	<i>Gadiculus argenteus thori</i>				25 0.90 0.24						
	<i>Ciliata mustela</i>				25 0.25 0.21		50 0.18 0.54				
	All Gadidae		62.2 10.8 36.0		75 89.2 82.3	33.3 94.3 52.9	100 14.6 45.7	33.3 5.56 4.35	100 100 100		33.3 48.5 36.3
	<i>Trachurus trachurus</i>		2.7 0.02 -		25 0.08 0.29						66.7 0.59 0.14
	Ammodytidae		59.5 85.1 58.2		50 0.82 0.16	33.3 2.86 0.19	100 73.9 49.1				66.7 1.78 0.24
	Gobiidae				25 0.98 0.07		100 2.31 0.03				33.3 0.59 -
	<i>Scomber scombrus</i>										33.3 0.59 4.45
	Callionymidae										33.3 0.59 0.18
	<i>Pleuronectes platessa</i>				25 0.16 0.29						
	Cephalopod		27.0 1.81 1.71		10.0 7.45 16.8	33.3 2.86 46.8	100 1.07 0.7	100 93.8 95.7		100 100 100	66.7 45.6 58.6
	<i>Rossia macrosoma</i>		2.7 0.05 0.32					33.3 2.47 0.54			
	<i>Sepiolo atlantica</i>		8.1 0.11 0.04		75 2.95 0.41		100 0.89 0.37				66.7 35.6 3.97
	<i>Sepietta oweniana</i>		16.2 1.08 1.12								33.3 1.18 0.39
	<i>Loligo forbesi</i>				25 0.08 1.32			33.3 2.47 1.03			33.3 0.59 7.78
	<i>Alloteuthis subulata</i>		2.7 0.39 0.23								
	<i>Gonatus steenstrupi</i>				50 2.21 13.0					100 83.3 98.3	
	<i>Histioteuthis</i> sp.									100 16.7 1.68	
	<i>Todaropsis eblanae</i>							66.7 1.23 0.59			
	<i>Todarodes sagittatus</i>										33.3 4.73 29.9
	<i>Eledone cirrhosa</i>				50 0.66 2.12	33.3 2.86 46.8	50 0.18 0.32	100 87.0 93.5			33.3 2.96 16.6
	Crustaceans		8.1 0.11 -		25 0.25 -			33.3 1.23 -			33.3 - -
	Polychaetes		8.1 0.07 -		50 0.16 -		50 0.18 -				

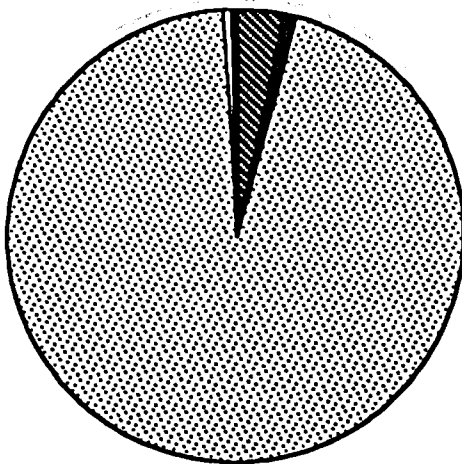
Figure 1. % by number of main prey on harbour porpoise samples



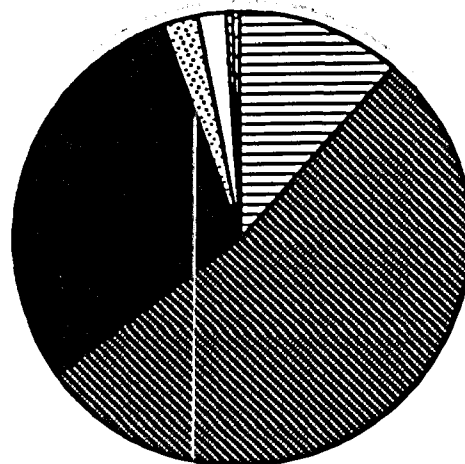
Quarter = 1, N = 8



Quarter = 2, N = 15



Quarter = 3, N = 7



Quarter = 4, N = 7

