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The Ecology of Pelagic Fish Species in Arctic Waters.

Some observations on Norway pout and blue whiting in ICES sub-areas I and II.

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In many areas the smaller gadoids seem to be vital links in the echosystem of the exploited stocks of more wealthy fish species. Thus Boldovsky (1939) found that the food of the cod in the Barents Sea partly consisted of young specimens of blue whiting (poutassou), while Mason (1958) emphasized the importance of Norway pout as food for whiting in the northern North Sea, and blue whiting as food for hake.

Both Norway pout and blue whiting are abundant species in some areas of the North Sea, and there have given rise to a special industrial trawl fishery, as pointed out by Johannesen, Olsen and Stålesen 1964. Our knowledge of the abundance of these species farther north along the coast of Northern-Norway, in the open Norwegian Sea and in the Barents Sea is still sparsely founded, even if it is likely to presume that both species might be of some interest to the fishing industry.

However, as Boldovsky (1939) and Baranenkova (1960) have put forth, the distribution and abundance of Norway pout and blue whiting in the Barents Sea are apparently greatly influenced by the prevalent temperature conditions.

This paper deals with some scattered observations collected during the Norwegian routine research vessel cruises in the Norwegian Sea and the Barents Sea from 1950 to 1965. It should be noted that no special surveys for Norway pout and blue whiting have been carried out in ICES sub-areas I and II for the time in question. The observations are partly based on echo-recordings identified by pelagic or bottom trawl catches, and they refer partly to the species taken occasionally as by-catches. Usually the samples have been taken by small meshed gears.

Norway pout.

Table 1 gives the records of Norway pout samples in ICES sub-areas I and II, and in fig. 1 the corresponding positions of the samples are plotted to show

the geographical distribution for pelagic and bottom trawl samples respectively. The numbers on the map indicate samples where the length-distribution, and to some extent also the age-distribution are given in table 1.

Norway pout samples have mainly been collected in February-March and in September. The distribution based on the available material (fig. 1) conveys the impression that the species is limited to the continental shelf and penetrates not very far into the Barents Sea. All the bottom trawl samples have been taken between 100 and 400 meters, mainly between 150 and 200 meters. The relation between the numbers of pelagic and bottom trawl samples might indicate that adult Norway pout lives near the bottom and seldom has a pelagic habit.

Investigations made by Wiborg (1960) show that spawning mainly takes place from April to May in the northern areas, i.e. North to the Lofoten area. Wiborg also found that the abundance of pelagic eggs and larvaes may vary fairly much from year to year, Wiborg (1954, 1956, 1960, 1961, and 1962) and Dragesund and Wiborg (1963). Norway pout has an early pelagic stage which seems to last until sometime late in the autumn or in the beginning of the winter. Pelagic larvaes of ca. 6.5 cm in length (0-group) have been found in August, while the smallest specimen catched by bottom trawl has been ca. 9 cm (I-group) taken in February (table 1). Available datas show that the temperature for pelagic trawl samples ranges from ca. 3.5° to ca. 10°C, while for bottom trawl samples the variation is from ca. 3° to ca. 7.5°C, with a mean of ca. 6.5°C.

The results from the length- and age-determinations force us to conclude that fish of different size and age usually occur together in the adult stage, and that Norway pout in the area concerned seldom reach a length of more than ca. 23 cm. The growth is probably about 11 to 13 cm in the first year of living, from 5 to 7 cm in the following year and only a few centimeters during the rest of the lifetime. It seems reasonable to put the decreasing growth after about two years of living in connection with the maturity of the gonads.

Blue whiting.

Records of blue whiting samples are given in table 2, and the corresponding positions of the samples are plotted in fig. 2, which follows the same pattern as fig. 1 (The notation pelagic trawl in fig. 2 also include one purse seine sample). Pelagic trawl samples have been collected from July to November, principally in September, while bottom trawl samples were taken in March and from August to December.

As distinct from Norway pout the distribution of blue whiting is apparently not limited to the continental shelf region as regards the Norwegian Sea, but in the Barents Sea we find similar limitations as for Norway pout. Blue whiting was found near the bottom as well as pelagic.

In the open sea pelagic schools of blue whiting frequently have been observed more or less as scattered formations, but sometimes in rather dense concentrations as pointed out by Østvedt (1961).

The temperatures for pelagic trawl samples have ranged from ca. 3° to ca. 10°C (mean ca. 7.5°C), and for bottom trawl from 3° to 7°C (mean ca. 6°C).

Apart from one larvae of 4.5 cm caught in August in the Barents Sea (Sample No. 26) very little is known about the reproduction.

Pelagic trawl samples indicate that the pelagic schools of blue whiting probably consist of individuals of about the same size or age which is often found by other semi-pelagic fish species.

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Table 1. Records of Norway pout samples.

Sample No.	Date	Position North	Position East	Gear [1]	Depth in metres	Catch of N. pout No.	Catch of N. pout Baskets	Numbers measured	Length distr. in cm Min. - Mean - Max.	Age distr. in years I II III IV V VI VII
1	22.3-50	68°11'	12°17'	F.tr.	170	?	Ca ½			
2	30.3-50	68°20'	11°36'	"	125	20-25				
3	14.3-51	68°10'	12°16'	"	50-70	6				
4	20.3-51	68°45'	14°10'	"	220	a few				
5	27.3-51	70°03'	17°00'	"	390	"				
6	28.10-51	71°42'	30°33'	"	150-200	some				
7	14.3-52	68°04'	15°00'	S.tr.	150	20				
8	4.3-53	70°01'	16°52'	P.tr.	30-35	12				
9	20.4-56	70°38'	17°30'	F.tr.	380	1				
10	7.11-56	71°27'	26°33'	"	240	?	Ca 1/3			
11	26.2-57	62°28'	04°22'	"	190	?	Ca 1			
12	- " -	- " -	- - " -	"	190	some				
13	21.3-57	72°01'	26°15'	"	250-280	?	Ca 1			
14	28.3-57	65°13'	10°21'	"	180-200	?	Ca 1			
15	- " -	67°23'	12°25'	"	185-200	?	Ca ½			
16	11.3-60	66°34'	11°10'	"	260	?	Ca ½			
17	12.3-60	65°51'	09°35'	"	315	11		11	15.0 - 20.55 -26.0	
18	14.3-60	62°05'	03°16'	"	390	1				
19	- " -	- " -	- 02°10'	"	?	?				
20	8.5-60	70°59'	29°13'	"	250	some				
21	28.9-60	63°12'	15°35'	IKMWT	25-30	12				
22	19.9-61	62°55'	06°27'	F.tr.	200	40				
23	9.10-62	71°15'	35°15'	"	160	1		1	- 17.0 -	
24	11.1-63	62°15'	03°45'	"	195	?				
25	14.1-63	64°56'	08°17'	"	210	2				
26	2.3-64	72°05'	23°55'	"	290	14				
27	- " -	72°03'	24°05'	"	200	10				
28	- " -	- " -	- 23°55'	"	290	9				
29	3.3-64	70°31'	18°05'	P.tr.	ca 25-50	34		34	11.0 - 17.03 -23.0	8 12 1 3 2 7 1
30	- " -	70°30'	17°48'	F.tr.	120	245				

Table 1. (continued).

Sample No.	Date	Position North	Position East	Gear [1]	Depth in metres	Catch of N. pout No.	Catch of N. pout Baskets	Numbers measured	Length distr. in cm Min. - Mean - Max.	Age distr. in years I II III IV V VI VII
31	6.8-64	71°46'	28°35'	P.tr.	ca 25-50	1		1	- 6.5 -	
32	7.8-64	71°25'	33°40'	"	"	1		1	- 6.7 -	
33	24.9-64	71°13'	27°36'	"	210	20				
34	6.12-64	66°40'	10°54'	S.tr.	400	?	Ca 1/6	77	16.0 - 18.42 - 21.0	16 58 1 1 1
35	17.2-65	71°07'	19°25'	F.tr.	185	22		22	11.0 - 17.86 - 23.0	7 2 5 3 3 - 2
36	- " -	71°11'	19°39'	"	190	6		6	11.0 - 18.33 - 23.0	
37	- " -	71°01'	22°57'	"	200	18		18	9.0 - 11.61 - 13.0	18
38	13.3-65	67°31'	10°43'	"	170	61		61	11.0 - 18.72 - 23.0	4 8 42 4 2 1
39	- " -	67°25'	10°50'	"	175	?	Ca 1			
40	- " -	67°30'	10°50'	"	150	?	Ca 3			
41	14.3-65	67°14'	11°23'	"	180	?	Ca 2			
42	21.8-65	70°58'	26°32'	S.tr.	135	9				
43	10.9-65	69°35'	17°57'	"	220	218				
44	15.9-65	67°04'	14°08'	"	135	21				
45	- " -	71°08'	24°00'	F.tr.	200	10				
46	17.9-65	62°35'	04°32'	S.tr.	100	284				
47	22.9-65	68°22'	13°50'	"	?	66		66	14.5 - 18.49 - 22.0	19 30 10 4 1 - 2

1) F.tr. - Fishing trawl
S.tr. - Shrimp trawl
P.tr. - Pelagic trawl
IKMWT - Isaac-Kidd midwater trawl

Table 2. Records of blue whiting samples.

Sample No.	Date	Position North	Position East	Gear[1)]	Depth in metres	Catch of blue whiting Numbers	Catch of blue whiting Baskets	Numbers measured	Length distr. in cm Min. - Mean - Max.
1	30.3-50	68°20'	11°36'	F. tr.	125	some			
2	27.3-51	70°03'	17°00'	"	390	1			
3	1.4-52	67°57'	10°32'	"	240-270	a few			
4	19.3-53	67°43'	15°14'	S. tr.	270	7			
5	28.3-53	68°00'	14°17'	P. tr.	ca. 25-50	4			
6	30.9-53	71°07'	31°06'	F, tr.	270	20-30			
7	11.11-56	69°10'	14°50'	"	?	some			
8	27.3-57	65°13'	10°21'	"	180-200	"			
9	2.11-57	69°30'	16°33'	"	190	5			
10	10.3-60	64°27'	09°05'	"	275	?	Ca $3\frac{1}{2}$	174	14.0 - 29.48 - 45.0
11	11.3-60	66°39'	11°10'	"	420	a few			
12	14.3-60	62°05'	03°16'	"	390	1			
13	- " -	62°05'	02°10'	"	410	?	Ca 1/9		
14	23.9-60	71°06'	18°54'	IKMWT	ca 25-30	11		11	16.0 - 18.09 - 20.0
15	- " -	70°47'	19°10'	"	"	1			
16	30.9-60	70°02'	10°15'	"	"	2			
17	- " -	70°25'	09°20'	"	"	1			
18	1.10-60	71°10'	15°30'	"	"	1			
19	10.10-60	71°06'	27°00'	"	"	1			
20	19.9-61	62°56'	06°38'	F. tr.	220	10			
21	- " -	62°55'	06°27'	"	200	53			
22	28.10-62	73°55'	20°00'	"	220	1			
23	6.11-62	71°41'	24°08'	P. tr.	30	22		22	15.0 - ? - 20.0
24	31.3-63	71°10'	28°44'	F. tr.	300	2			
25	19.7-64	69°49'	17°31'	P. tr.	ca 25-50	9		9	16.0 - 18.06 - 19.5
26	6.8-64	71°48'	34°08'	IKMWT	ca 25-30	1		1	- 4.5 -
27	31.8-64	70°33'	12°05'	P. tr.	40	25		25	20.0 - ? - 25.0
28	1.9-64	70°35'	11°17'	"	40	86		86	21.0 - ? - 28.0
29	- " -	72°54'	10°15'	"	40-50	8		8	16.0 - ? - 22.0
30	15.9-64	70°07'	31°21'	"	15	2			

Table 2. (continued).

Sample No.	Date	Position North	Position East	Gear[1]	Depth in metres	Catch of blue whiting Numbers	Catch of blue whiting Baskets	Numbers measured	Length distr. in cm Min. - Mean - Max.
31	16.9-64	70°03'	30°45'	F. seine	0-55	6			
32	28.9-64	70°47'	24°04'	P. tr.	25-30	1			
33	6.12-64	66°56'	09°14'	S. tr.	350	7		7	12.0 - 16.29 - 29.0
34	- " -	66°40'	10°54'	"	400	2		2	27.0 - 30.00 - 33.0
35	7.12-64	65°15'	11°15'	"	250	2			
36	21.8-65	70°58'	26°32'	"	135	68			
37	23.8-65	70°18'	26°30'	"	165	?			
38	15.9-65	71°08'	24°00'	F. tr.	200	7			

1) F. tr. - Fishing trawl
S. tr. - Shrimp trawl
P. tr. - Pelagic trawl
P. seine - Purse seine
IKMWT - Isaac-Kidd midwater trawl

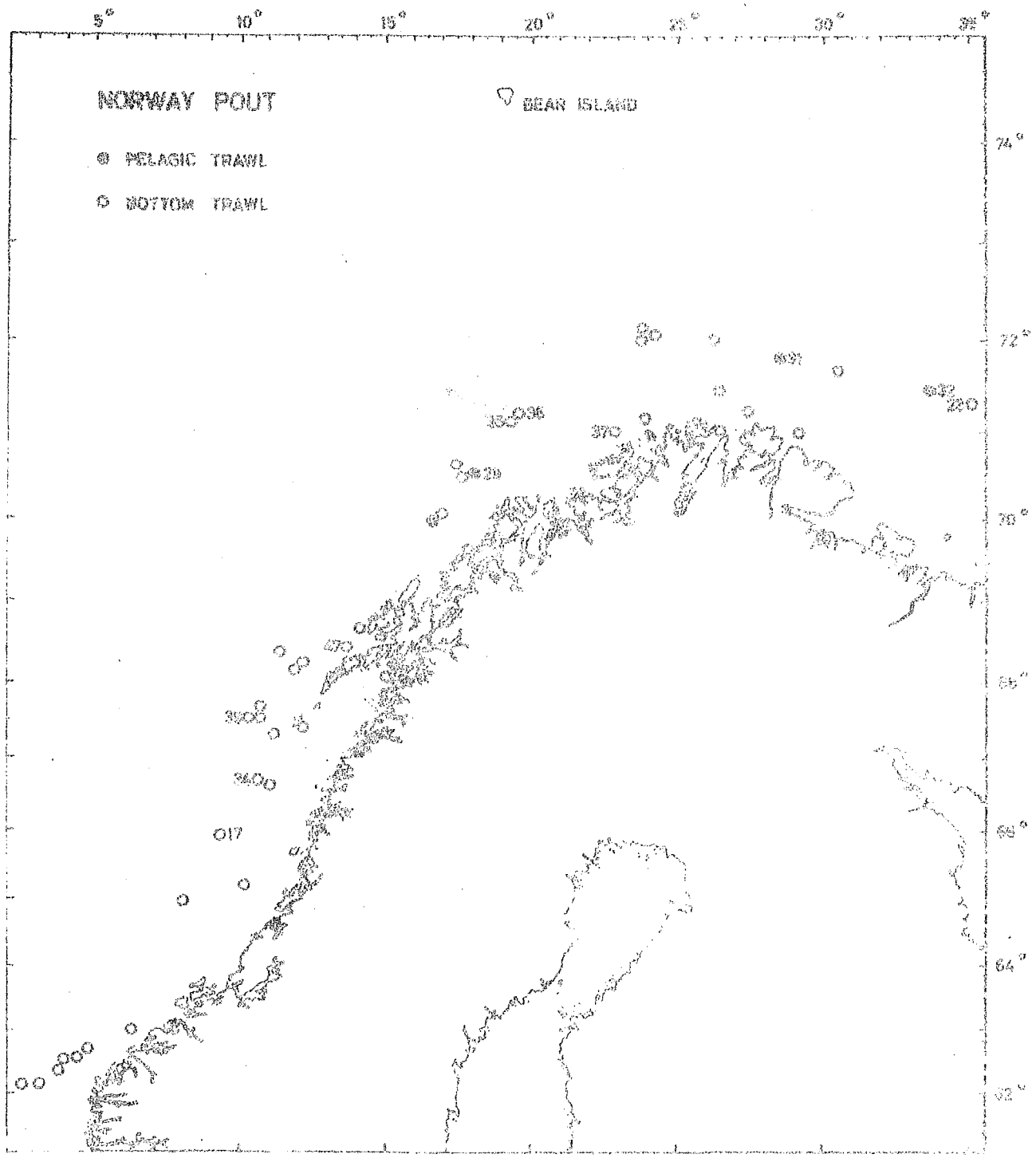

Fig. 1. Records of Norway pout samples in 1965 Sub-areas I and II from 1950 to 1965. The numbers on the map correspond with samples in table 1.

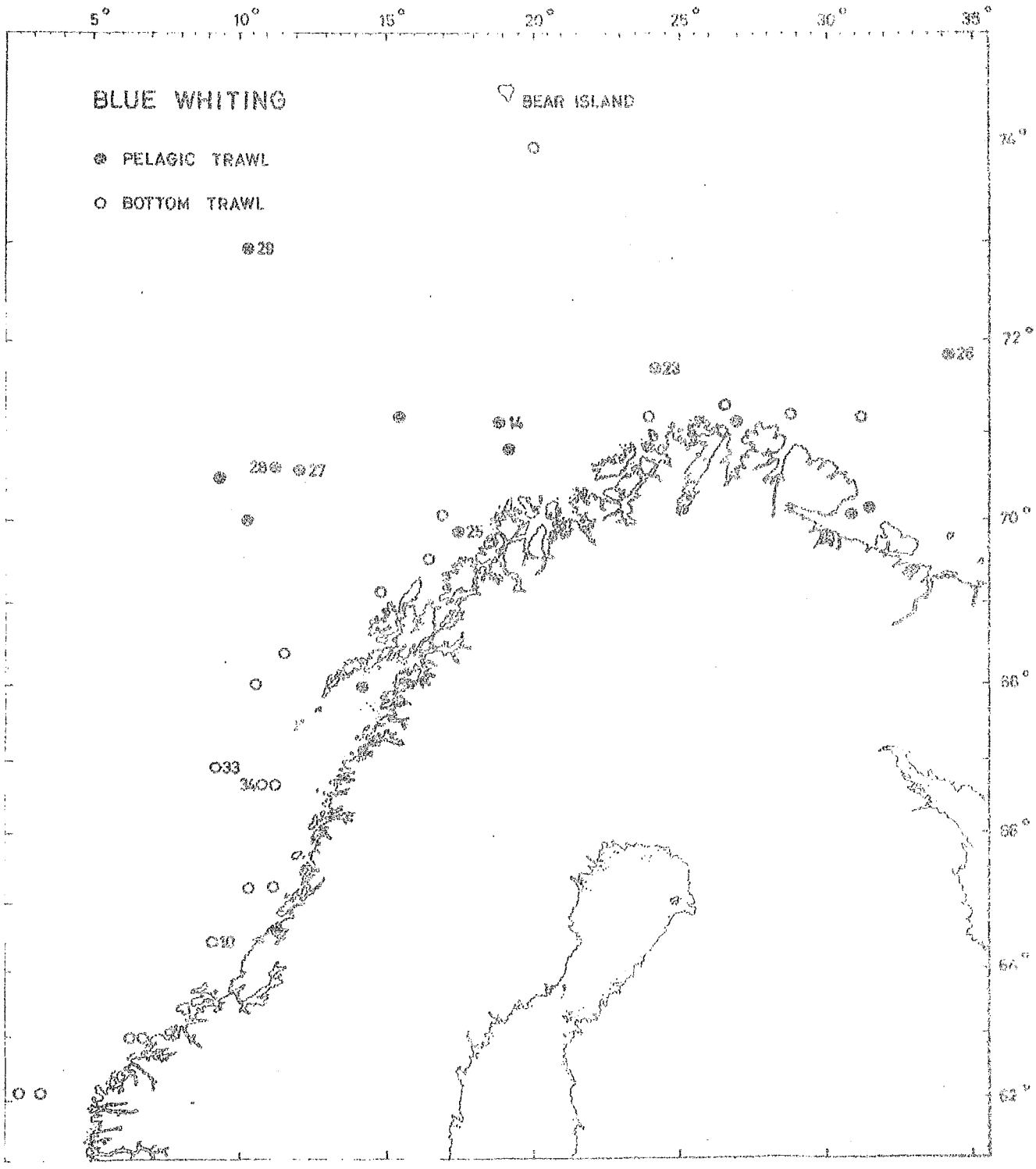

Fig. 2. Records of blue whiting samples in ICES Sub-areas I and II from 1950 to 1965. The numbers on the map correspond with samples in table 2.