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Assessment of the Shrimp Stock on Flemish Cap (Division 3M) for 1993

by

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Introduction

Since 1991 there has been a marked increase in the shrimp stock on Flemish Cap, Division 3M. Some assessments suggest the stock biomass went up from about 2,000 t to about 15,000 t from 1990 through 1992 (Vásquez, 1993).

Since May of this year about forty vessels of different nationalities have fished for shrimps in the area and may, according to Faroese skippers, have caught some 12,000-15,000 t within the first four months. Through these months the CPUE went down from about 100 t per week to about 40 t per week, Tab. 1 and Fig. 1.

The following area-swept assessment is done much along the lines of the first assessment of the shrimp stock in West Greenland (Subarea 1) by Hoydal (1976).

Assessment

In conversation with two Faroese shrimp vessel skippers, Kjartan Joensen and Bjarni Petersen, the following information has been disclosed.

Most Faroese shrimp trawlers use a trawl with a 70 m ground rope. Assuming, as a rule-of-thumb, the effective width of the actively fishing trawl is 60% of the length of the ground rope, this is set to 42 m. It is estimated that on average the trawl is on the bottom fishing for 20 hours of the day. The average towing speed is estimated to 2.75 knots. The extent of the present fishing area is outlined in Fig. 2 and has been calculated to 8820 km^2.

They also stress that the potential fishing ground most probably extends further beyond the present fishing area as the vessels in May-August of this year have concentrated their fishery on the deeper grounds mainly occupied with large sized shrimps, Tab. 2.

Five logbooks from five different Faroese shrimp vessels were available. They contained information on a total of 881 hauls covering the period 23 May to 22 July 1993. From these logbooks the following data were obtained for each haul: time and position when the trawl reached the bottom and left it again and total catches. For two logbooks the catches were disaggregated into commercial size groups.

The fishing area was divided into squares of 7.5 (latitude) times 10 (longitude) square nautical minutes which at 47.30 degrees north is about 174 km^2 each, Fig 3. For each haul the midpoint position of the haul was calculated and the hauls were grouped into the squares accordingly. Fig. 4 shows the extention of the squares compared with the actual fishing area. For each square the number of hauls are recorded, Fig. 5. For some squares (here marked with stars) the logbooks gave no information. Some squares had less the 5 hauls designated to them (shaded). The average density (t/km^2) was calculated for each square, Tab. 3 and Fig. 6. For the squares marked with stars an average density of 2.22 t/km^2 was assumed. For each square the biomass was calculated by multiplying the area with the density, Fig. 7. Finaly these were summed to give a total biomass of 19,300 t, Tab. 3.

Discussion

For some squares the number of hauls is very low and this may lead to an overestimation of the present actively fished area, so they were excluded from the assessment. On the other hand, though no logbook data are available for the southwestern most area, these squares were included. As a matter of fact, these to factors actually tend to out balance each other. The area of the total squares is slightly less (<2%) than estimated by the shrimp vessel skippers.

The assessment may still underestimate the the initial virgin stock as the logbook data represent the fishery as it is well into the period of deminishing CPUE values. Other factors biasing the assessment towards underestimation are the usual: 1) assuming trawl efficiency of 100% when it is actualy not, 2) disregarding vertical distribution, 3) underestimation the area and, 4) low average CPUE values from logbook due to uneven performance of the vessels.

References

Hoydal, K. 1976. An assessment of the deep sea shrimp (*Pandalus borealis)* in West Greenland waters (Subarea 1), based on Faroese catch/effort data and information on fishing areas from Faroese fishery. ICNAF Res. Doc. 76/VI/15, 5 pp.

Vásquez, A. - 1993. Results from bottom trawl survey of Flemish Cap in July 1992. NAFO SCR DOC. 93/19. 22 pp.

Table 1. Faroese catches (t) of shrimps on Flemish Cap in 1993 as reported to the Faroese Fisheries Administration.

Start of week	Week no	Total catch t	No of vessels	Catch/ vessel/ week t	Density t/km2	Density Five weeks run. avg. t/km2	Density index
24 May	21	277.211	3	92.404	3.09		
31 May	22	730.125	7	104.304	3.48		
7 June	23	521.584	7	74.512	2.49	2.51	100.0
14 June	24	472.436	8	59.055	1.97	2.17	86.5
21 June	25	413.182	9	45.909	1.53	1.83	72.7
28 June	26	334.033	8	41.754	1.39	1.58	62.9
5 July	27	365.660	7	52.237	1.74	1.43	57.1
12 July	28	301.500	8	37.688	1.26	1.39	55.3
19 July	29	298.129	8	37.266	1.24	1.42	56.4
26 July	30	312.428	8	39.054	1.30	1.35	53.7
2 August	31	367.603	8	45.950	1.53	1.37	54.4
9 August	32	337.525	8	42.191	1.41		
16 August	33	322.200	8	40.275	1.34		
	Total	5053.616					

Table 2. Percent of shrimps in weight in each commercial size group.

Size	70/90	80/100	90/120	120/150	Mix	Industry	Total
Percent	17.1	17.2	42.1	0.1	4.9	18.6	100.0

Table 3. Grouping of hauls into squares. Calculations of density, area and biomass.

Midpoint West	Midpoint North	Number of hauls	Density t/km2	Area km2	Biomass t
46.20	46.525			176.1	387.3
46.20	46.600			175.6	386.4
46.20	47.075	13	1.466	175.2	256.9
46.20	47.150	10	0.818	174.8	143.0
46.10	46.375			176.9	389.1
46.10	46.450			176.5	388.2
46.10	46.525			176.1	387.3
46.10	46.600			175.6	386.4
46.10	47.075	25	1.762	175.2	308.8
46.10	47.150	29	1.824	174.8	318.9
46.10	47.225	1	3.324		
46.00	46.375			176.9	389.1
46.00	46.450			176.5	388.2
46.00	46.525			176.1	387.3
46.00	46.600			175.6	386.4
46.00	47.075	7	2.161	175.2	378.7
46.00	47.150	11	1.835	174.8	320.8
46.00	47.225	38	2.329	174.4	406.2
46.00	47.300	15	2.389	174.0	415.7
45.50	47.225	1	1.678		
45.50	47.300	16	1.948	174.0	338.9
45.50	47.375	39	2.217	173.6	384.8
45.50	47.450	2	2.803		
45.40	47.375	17	2.223	173.6	385.9
45.40	47.450	25	2.917	173.2	505.1
45.40	47.525	14	2.834	172.8	489.6
45.30	47.525	20	2.554	172.8	441.2
45.30	47.600	15	3.019	172.3	520.3
45.30	48.075	6	1.513	171.9	260.1
45.20	47.600	7	3.163	172.3	545.1
45.20	48.075	33	3.104	171.9	533.6
45.20	48.150	12	1.518	171.5	260.3
45.10	48.075	59	3.578	171.9	615.1
45.10	48.150	32	2.809	171.5	481.8
45.00	48.075	36	2.875	171.9	494.3
45.00	48.150	46	4.342	171.5	744.7
44.50	48.075	14	2.755	171.9	473.6
44.50	48.150	27	2.162	171.5	370.8
44.40	47.600	3	3.632		
44.40	48.075	30	2.395	171.9	411.7
44.40	48.150	4	1.863		
44.30	47.600	46	2.949	172.3	508.2
44.30	48.075	5	2.369	171.9	407.3
44.20	47.450	7	1.916	173.2	331.8
44.20	47.525	20	2.052	172.8	354.5
44.20	47.600	9	1.768	172.3	304.7
44.10	47.375	6	1.502	173.6	260.7
44.10	47.450	36	2.1	173.2	363.7
44.10	47.525	8	2.537	172.8	438.3
44.00	46.600	2	0.711		
44.00	47.075	9	1.946	175.2	341.0
44.00	47.150	4	1.831		
44.00	47.225	33	1.628	174.4	283.9
44.00	47.300	18	1.738	174.0	302.4
44.00	47.375	23	2.006	173.6	348.2
44.00	47.450	5	1.203	173.2	208.3
43.50	47.075	8	1.703	175.2	298.4
43.50	47.150	18	1.608	174.8	281.1
43.50	47.225	16	2.001	174.4	349.0
43.50	47.300	1	1.304		
			Total	8687.6	19289.7
		Average density, t/km2			2.22

Figure 1. Trend in average weekly Faroese shrimp catches (t) at Flemish Cap in May - August 1993.

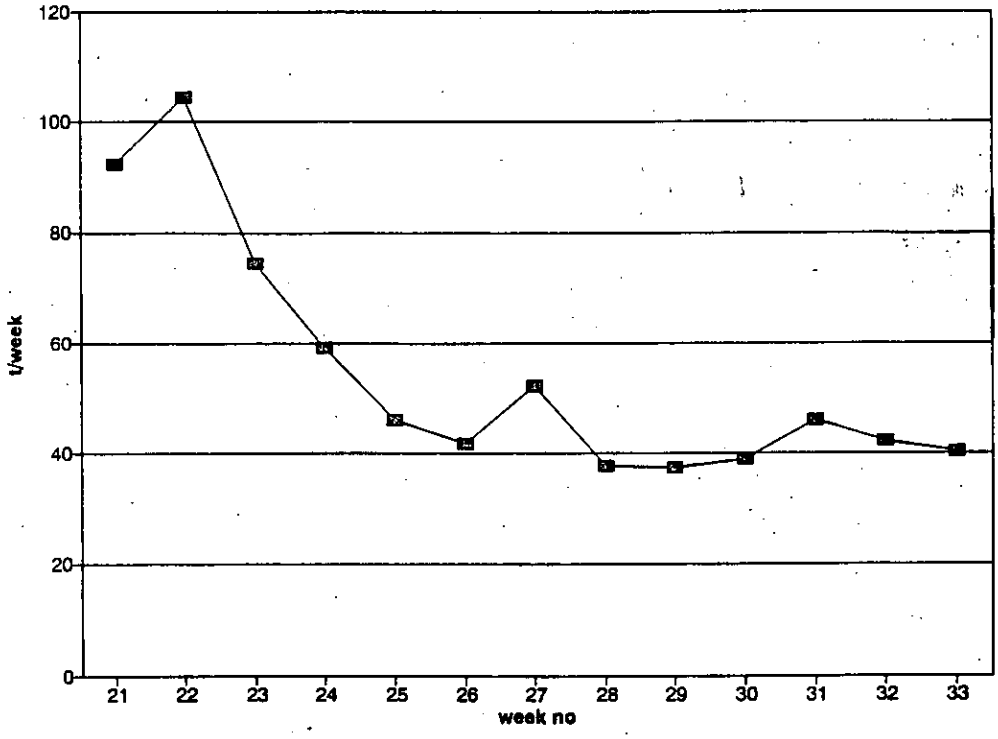

Figure 2. Main shrimp fishing area on Flemish Cap in May - August 1993, as outlined by Faroese skippers.

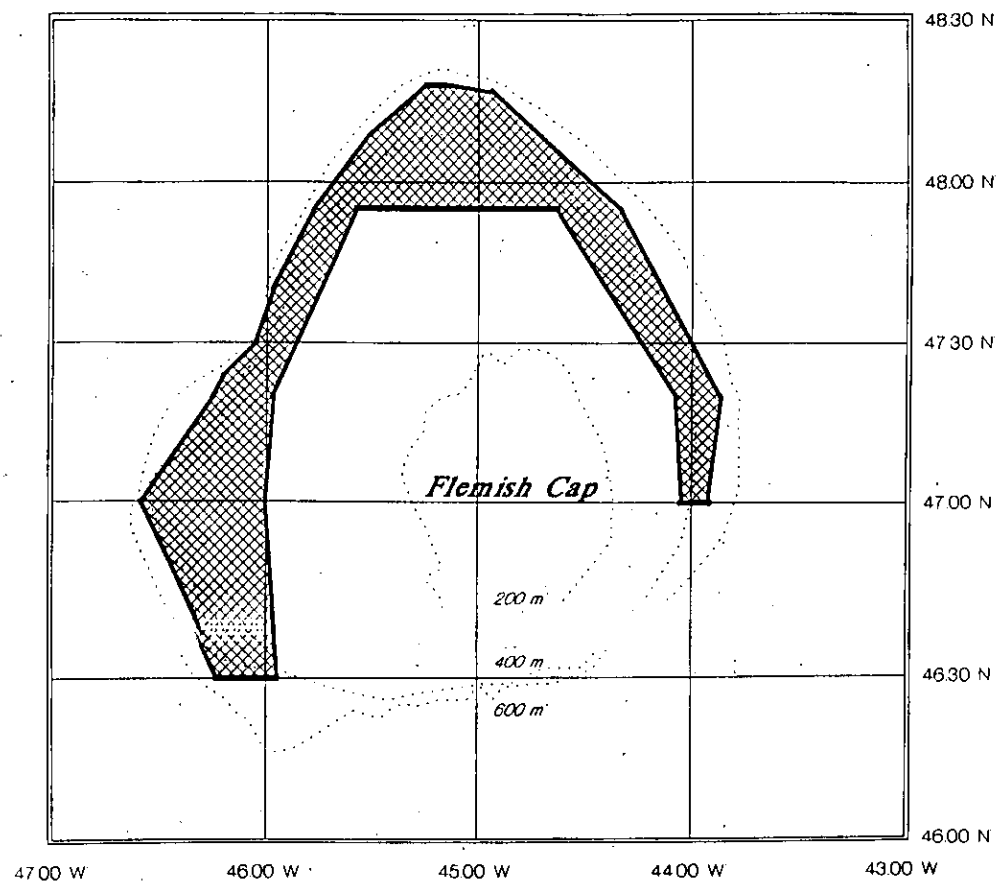

Figure 3. Fishing area divided into squares. Numbers indicate the area of each square in km².

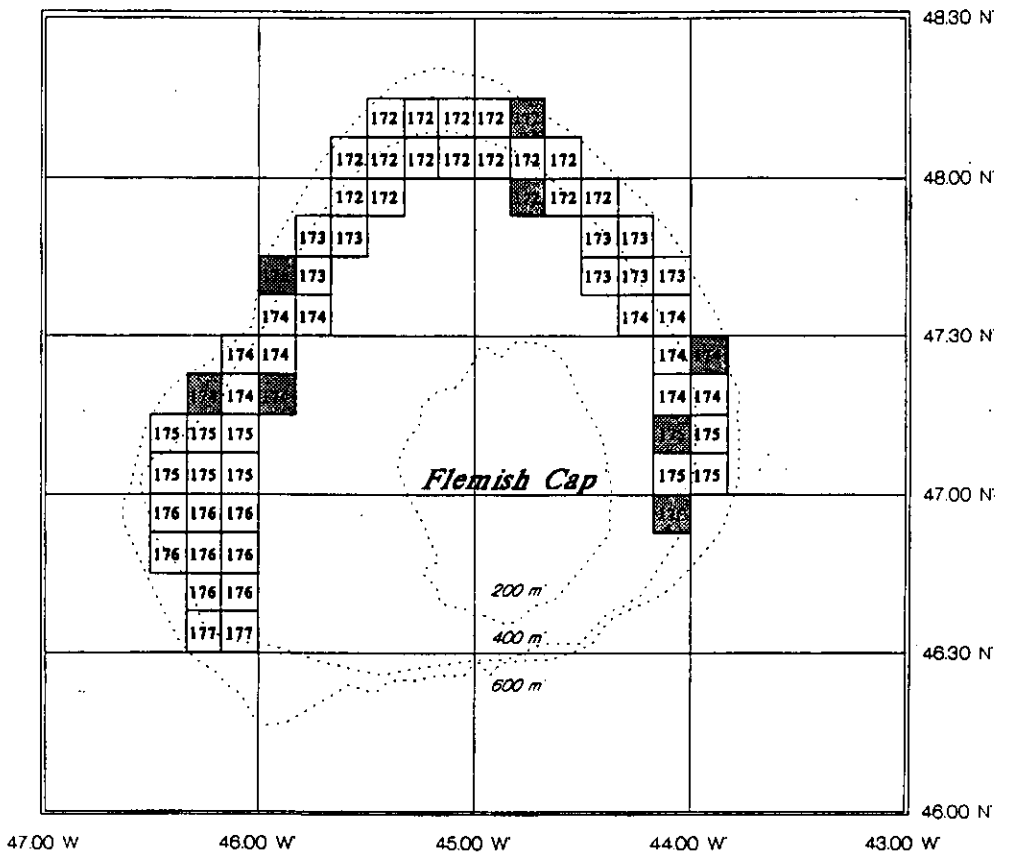

Figure 4. Comparison between outlined fishing area and the grid of squares.

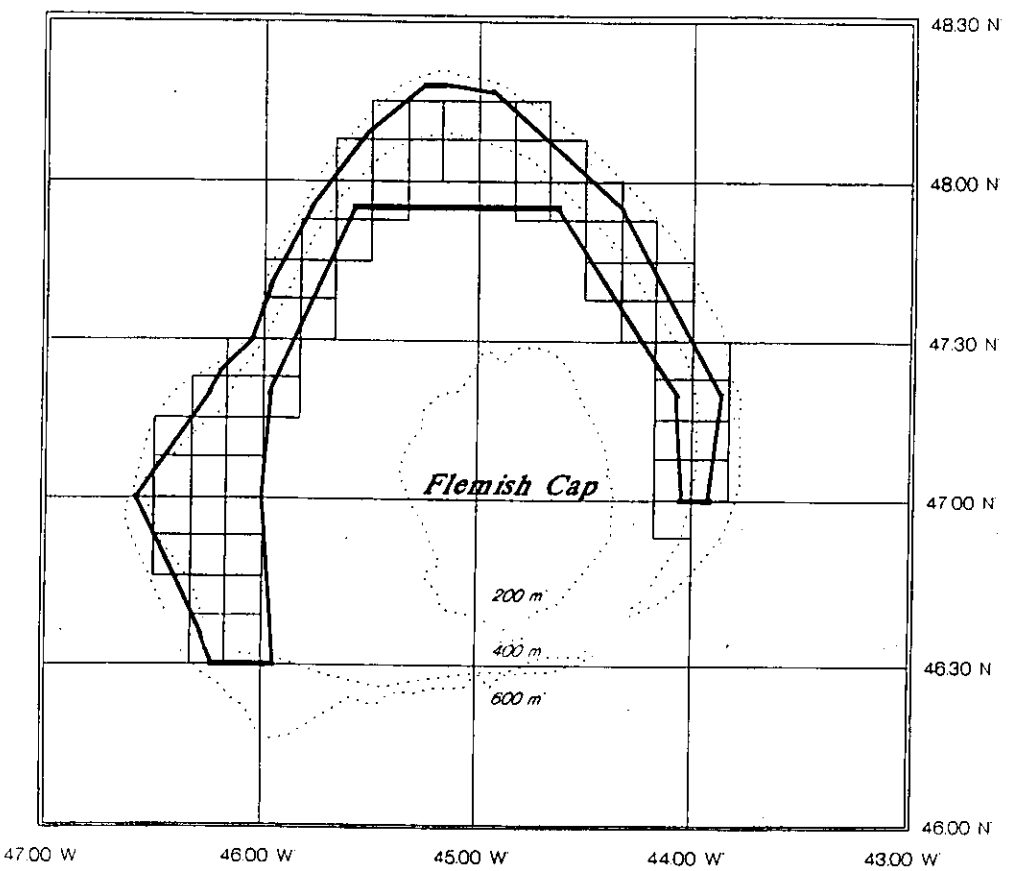

Figure 5. Fishing area divided into squares. Numbers indicate number of hauls allocated to each square. Squares marked with stars indicate that no information available from the logbooks. Squares with less then 5 hauls allocated to them are shaded.

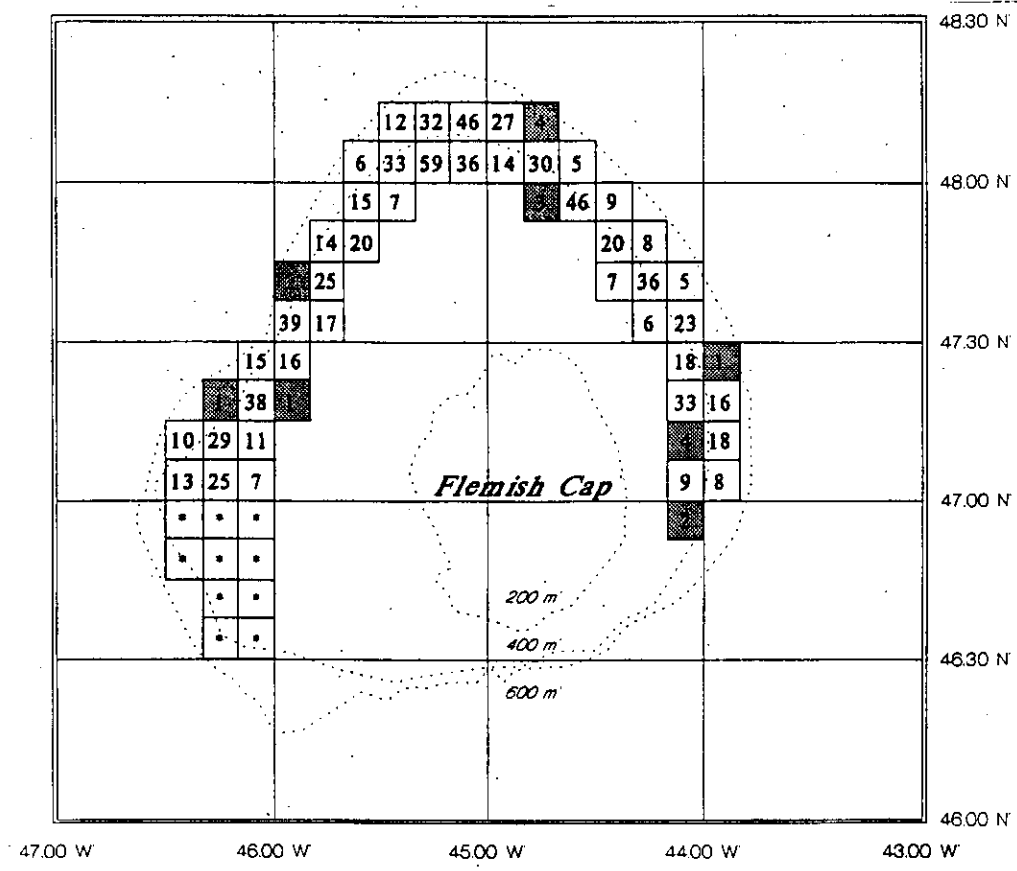

Figure 6. Fishing area divided into squares. Numbers indicate density (t/km^2) in each square.

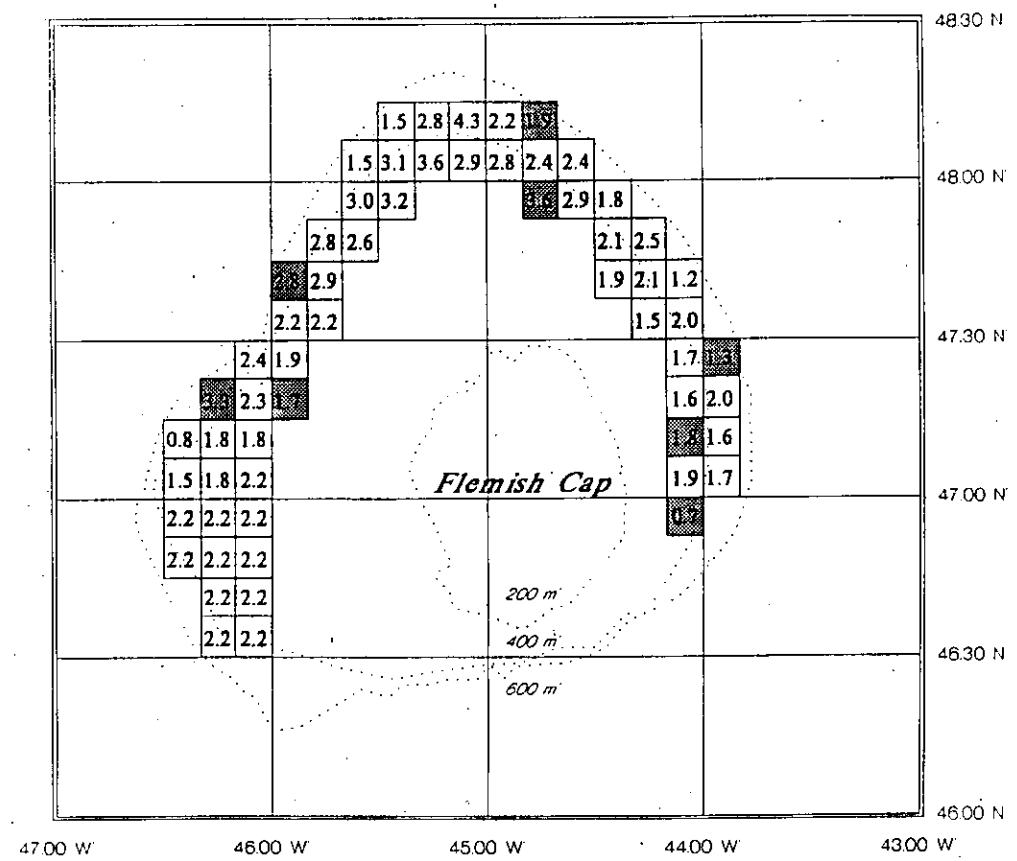

Figure 7. Fishing area divided into squares. Numbers indicate biomass (t) in each square.