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***NON-TRADITIONAL RESOURCES: SKATE FISHERY AND SURVEY RESULTS
IN DIVISION 3NO***

S. Junquera and X. Paz

Instituto Español de Oceanografía, Vigo, Spain

Since 1993 a significant increase in the skate catches from the Spanish trawlers have been reported (Durán et al. 1996; Junquera et al. 1997). It was interpreted as a shift in the fishing strategy towards the exploitation of non-regulated species. Important skate by-catches are often taken in the Greenland halibut fishery, but at present a directed, though temporary, fishery has also been established. In this paper a review of the available information on this subject is presented.

COMMERCIAL FISHERY

Since 1996 some of the Spanish trawlers are known to switch occasionally from the conventional Greenland halibut fishery to the skate one, using a larger mesh size bottom trawl. According to previous results (Durán et al. 1996), this species shows a marked seasonal pattern of aggregation, mainly in spring and summer months and the main concentrations are found in Div. 3NO. The species exploited is the thorny skate (*Raja radiata*). In 1997, one Spanish trawler monitored by a scientific observer conducted an experience to fish skate with a 220 mm mesh in September and October in those areas. The main results of this experience are listed below.

- Fishing effort, CPUE and catches.

According to the distribution pattern of the fishing effort (Table 1), it can be concluded that this resource basically concentrates in Div. 3N, and in shallow waters of less than 100. Accordingly, the best catch rates (Table 2) were obtained at depths less than 100 meters, ranging from 451.6 to 617.5 Kg/hour. At greater depths the catch rates became very small.

The total skate catch of this vessel in those two months was 555.5 tonnes, with a 10 % discarded. The main by-catch species are yellowtail flounder, American plaice and secondarily cod and Greenland halibut (Fig. 1).

- Biological data.

Both sexes appeared equally represented in the catches. Their length distributions appear in table 3. Modal length coincide for males and females in 48 – 49 cm. Adult males constituted 69 % of the total males in the catch, while this proportion in females was only 21 %. *R. radiata* is a viviparous species. In September – October most part of the adult males were in ripe condition, but females were at earlier maturity stages, without well developed uterus. Thus, the commercial fishery likely exploited at that time mating concentrations, which would occur in late summer at shallow depths.

SURVEY RESULTS

In the spring Spanish surveys carried out in Div. 3NO from 1995 to 1997 (Paz et al. 1996 and 1997), the skate appeared evenly distributed all over the surveyed area (Fig. 2). The depth range of those surveys was increased every year, going to 1400 m. in 1997. The analysis of the time series of catches by depth and catches per tow by depth (Fig.3) indicate that in spring, despite their presence in almost all the tows at any depth, the main concentrations are found both at the shallower (<200m.) and the deepest (>1100 m.) strata, and it was far less abundant at intermediate depths. In Table 4 are presented the length distributions from the 1995 to 1997 spring surveys. The same as in the commercial catches, both sexes appeared equally represented. A larger proportion of smaller fish, mainly in 1996 and 1997, compared to the commercial catches can be noted. This could be not only due to the selectivity of the gear, but also because probably juveniles are more abundant at greater depths.

According to the behaviour of the commercial fleet and the distribution pattern observed during the spring surveys, it seems likely that this species spreads over the shelf and the slope in winter and concentrate in shallow waters in summer.

REFERENCES

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Table 1.- Fishing effort in hours fishing and number of hauls. Skate fishery in Div. 3NO

Div. 3N		
DEPTH (meters)	SEPTEMBER	OCTOBER
0 – 100	424 (90)	504 (103)
101 – 200	29 (7)	5 (1)
Div. 3O		
DEPTH (meters)	SEPTEMBER	OCTOBER
0 – 100	5 (1)	-
101 – 200	-	-

Table 2.- CPUE (kg/h) by quarter in the skate fishery in Div. 3NO.

Div. 3N					
DEPTH (meters)	SEPT. 1	SEPT. 2	OCT. 1	OCT.2	TOTAL
0 - 100	565.2	451.6	549.8	617.5	537.8
101 - 200	12.6			1.9	10.9
Div. 3O					
DEPTH (meters)	SEPT. 1	SEPT. 2	OCT. 1	OCT.2	TOTAL
0 - 100	-	394.6	-	-	394.6
101 - 200	-	-	-	-	-

Table 3.- Skate (*R. radiata*) length distribution by sexes in the commercial catches in September-October 1997

LENGTH (cm)	MALES	FEMALES	TOTAL
24 - 25	0	292	292
26 - 27	189	420	609
28 - 29	58	1165	1223
30 - 31	997	1547	2544
32 - 33	1354	3091	4445
34 - 35	2443	5634	8077
36 - 37	6849	5921	12770
38 - 39	13796	13597	27393
40 - 41	15055	18836	33891
42 - 43	14169	19810	33979
44 - 45	16503	15963	32466
46 - 47	15265	20344	35609
48 - 49	19286	21542	40828
50 - 51	12520	15839	28359
52 - 53	13023	16093	29116
54 - 55	12439	17785	30224
56 - 57	11575	9145	20720
58 - 59	9633	10136	19769
60 - 61	7008	8518	15526
62 - 63	5266	8426	13692
64 - 65	6735	4822	11557
66 - 67	5576	7480	13056
68 - 69	4777	3111	7888
70 - 71	4094	2584	6678
72 - 73	3417	2110	5527
74 - 75	3252	2446	5698
76 - 77	2735	1355	4090
78 - 79	2847	1341	4188
80 - 81	3003	94	3097
82 - 83	2549	553	3102
84 - 85	991	153	1144
86 - 87	219	0	219
88 - 89	0	0	0
90 - 91	745	0	745
92 - 93	94	0	94
Number sampled	936	1041	1977
Samples	12		
Sampled catch (t)	38,7		

Table 4.- Length distributions (,000) of the skate (*Raja radiata*) from the spring Spanish survey in Div. 3NO, 1995-1997. In 1996 both sexes are combined.

Length (cm)	1995			1996	1997		
	Males	Females	Total	Total	Males	Females	Total
12-13				549	60	42	102
14-15				14244	195	88	283
16-17	0	34	34	21960	447	378	825
18-19	22	0	22	25233	135	476	610
20-21	34	101	135	30398	462	406	868
22-23	412	400	812	32393	850	592	1441
24-25	200	222	422	25459	700	754	1455
26-27	89	244	333	21127	641	582	1224
28-29	200	391	591	20843	353	888	1241
30-31	290	523	813	15924	674	542	1216
32-33	391	310	701	13251	422	763	1185
34-35	357	301	658	8709	883	1126	2009
36-37	313	411	723	7468	1293	551	1845
38-39	480	447	927	4155	790	1126	1915
40-41	356	277	633	3121	965	647	1612
42-43	279	479	757	549	698	729	1427
44-45	311	479	790	402	1151	977	2128
46-47	369	178	547	0	995	752	1747
48-49	234	501	735	0	533	375	908
50-51	176	245	421	1084	494	831	1325
52-53	267	363	630	341	433	953	1386
54-55	167	221	388	741	422	646	1068
56-57	111	111	222	0	420	679	1098
58-59	89	199	288	0	246	474	720
60-61	79	133	212	0	674	393	1067
62-63	67	111	178	0	248	685	933
64-65	44	197	242	0	396	378	773
66-67	22	200	222	0	464	474	938
68-69	89	167	256	549	254	308	563
70-71	43	212	255	0	180	403	583
72-73	22	212	234	0	207	223	431
74-75	22	201	224	402	159	414	573
76-77	89	143	231	0	0	329	329
78-79	0	111	111		120	120	239
80-81	0	43	43		150	0	150
82-83	0	56	56		60	119	179
84-85					25	0	25
86-87					113	0	113
88-89					0	0	0
TOTAL	5624	8223	13847	249453	17312	19225	36536
Fish measured	242	354	596	529	399	418	817
Sampled catch (t)		7,65		1,60		1,37	
Total catch (t)		2,08		7,98		6,42	

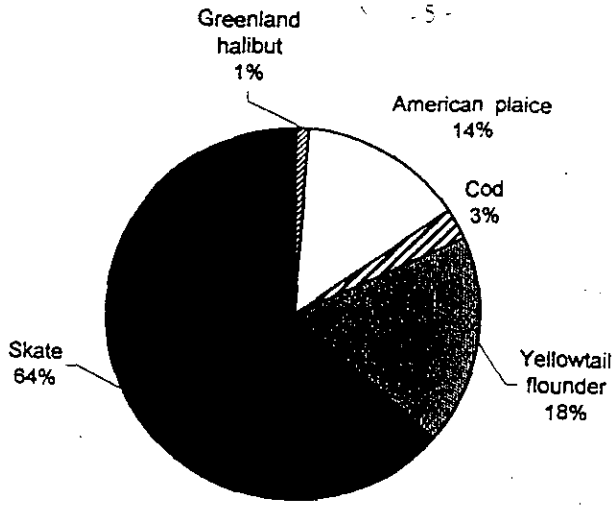


Fig. 1.- By-catch species in the skate fishery in Div. 3NO in September-October, 1997.

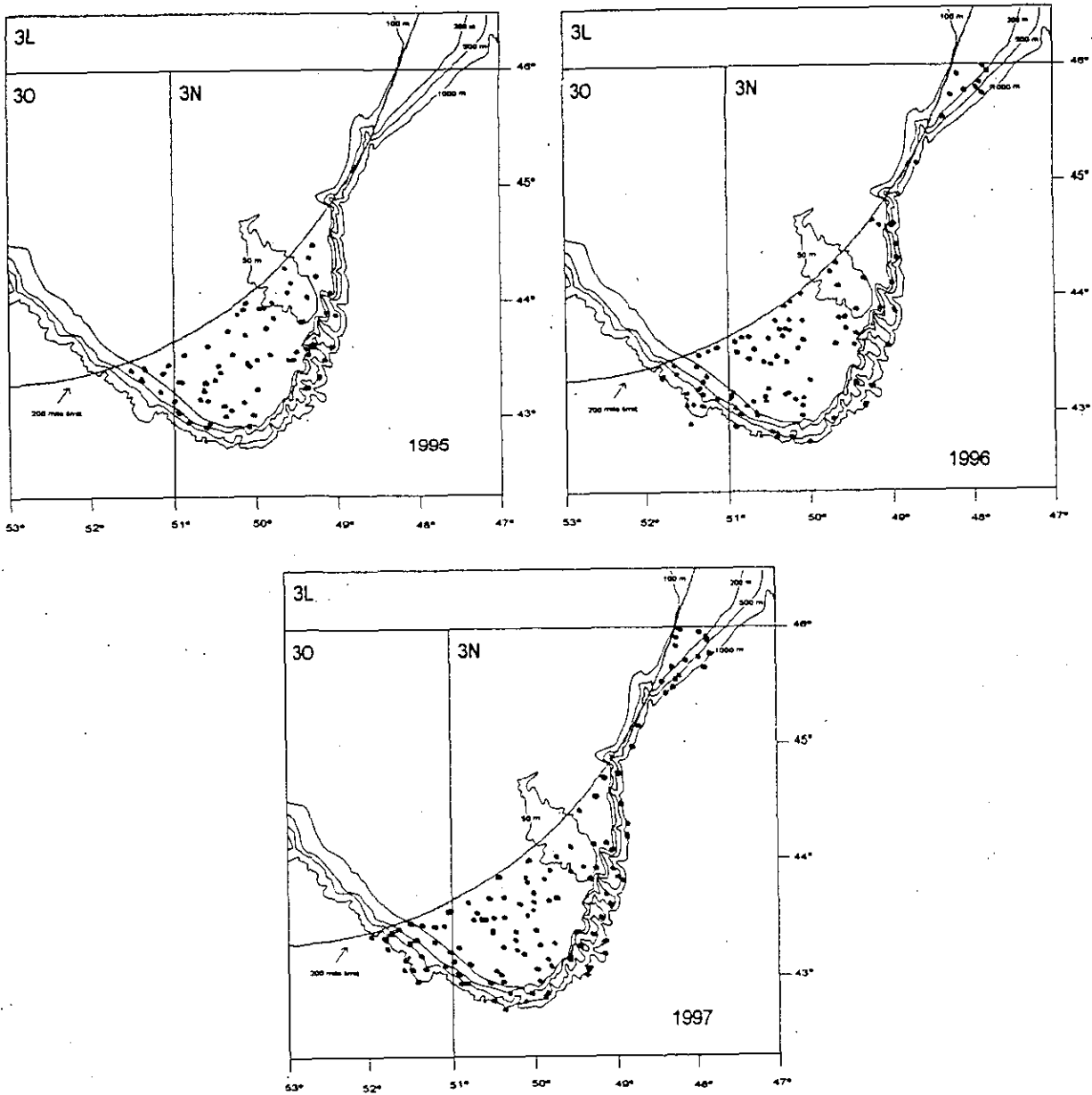


Fig. 2.- Surveyed area and distribution of the skate (*R. radiata*) in the spring Spanish surveys in Div. 3NO from 1995 to 1997.

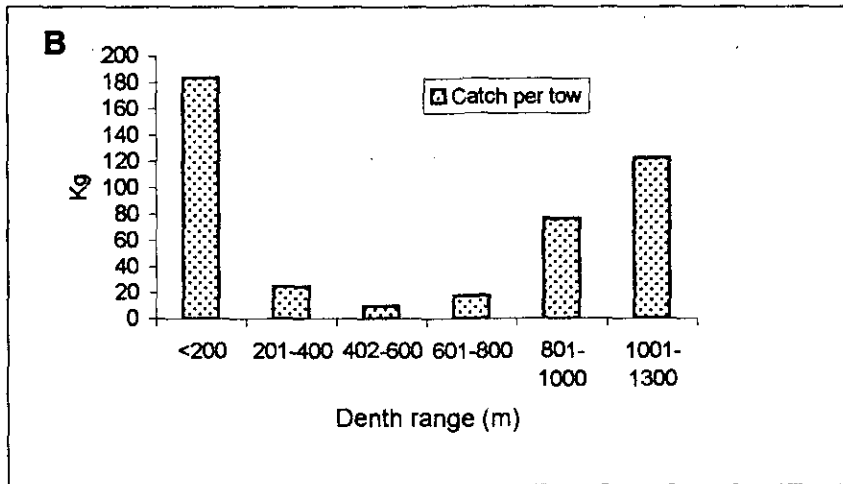
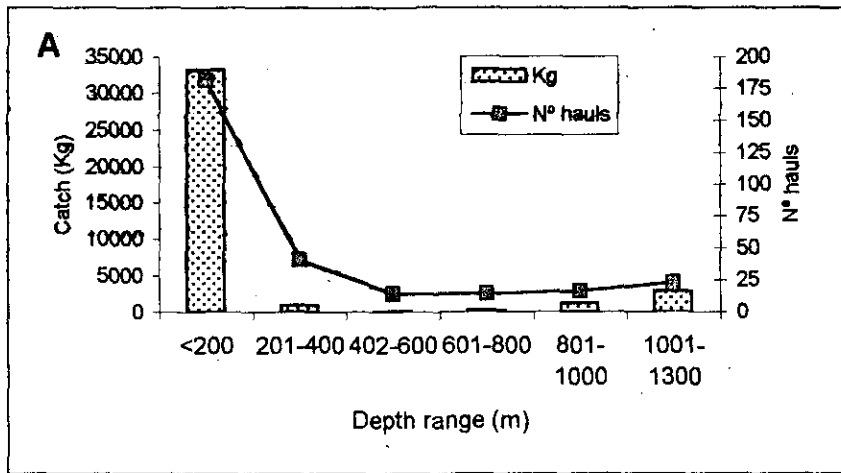


Figure 3.- Number of hauls and skate catches by depth (A) and sakte catch per tow by depth (B). Spanish spring surveys 1995-97