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Spanish Research Report for 1986

by

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Subarea 3

A. Status of the Fisheries

During 1986 the two independent fisheries were conducted by the Spanish fleet: The traditional pair trawlers cod fishery and the recent ground fishery of freezers.

1. Pair trawl fishery of cod

Cod catches and effort data are presented in Table 1. The derived catch-rate indices are presented in Table 2. The overall fishing effort in 1986 was increased by 50% in relation to 1985. Division 3L and 3N in particular supported this increased effort and, by tonnage, PTB-4 (150-500 GRT) was the category in which the increase was highest.

By-catches are presented in Table 3. During 1986 there were five observers on board pair trawlers for periods of two months each. Sampling intensity of catch was:

	Div. 3L	Div. 3M	Div. 3N
Samples	14	65	36
Fishes measured	2977	16390	8763
Otoliths aged	393	2993	1123

Estimates of the length and age composition of the catch in month with samples are presented in Tables 4 and 5. Figure 1 shows the age composition of the catch from 1983 to 1986. The 1981 year-class was dominant in 3M catches as in 1984 and 1985.

2. Groundfish fishery of freezers

Catch and effort data are presented in Table 6. Length frequencies of several species in the catches are presented in Tables 7, 9, 10 and 11. This information was obtained by three observers in different ships. In 1986 we indicated calculations of catch-at-age of American plaice by otolith age determinations. Results are presented in Table 8 and must be considered tentative until age criteria are validated.

B. Special Research Studies

1. Conversion factors

Conversion factors for landed weight of frozen fish to the equivalent fresh fish weight were calculated, and are presented in Table 12.

In several species processing depends on fish size. Consequently the conversion factors are not constant, especially in witch flounder.

Table 1.- Cod catches (t) and effort (hours) of pair trawlers in 1986.

Month	3L				3M				3N			
	<u>PTB-4</u>		<u>PTB-5</u>		<u>PTB-4</u>		<u>PTB-5</u>		<u>PTB-4</u>		<u>PTB-5</u>	
	catch	f	catch	f	catch	f	catch	f	catch	f	catch	f
JAN -	1971	1219	2629	1971	204	154	133	257	-	74	34	93
FEB -	697	693	2548	1702	40	91	55	88	-	-	-	-
MAR -	1657	2106	1105	899	125	297	5	29	68	414	217	220
APR -	1172	2028	1779	1740	463	876	104	192	278	782	298	476
MAY -	248	329	473	605	536	810	347	644	330	1673	836	1257
JUN -	483	170	75	85	700	892	140	302	844	3747	583	922
JUL -	1987	378	54	43	160	410	79	155	5053	6882	1033	864
AUG -	332	412	8	10	441	1037	51	158	779	3596	714	1642
SEP -	901	1345	373	609	205	707	93	306	1384	3391	338	659
OCT -	86	64	412	395	115	227	22	56	5037	6234	2268	2573
NOV -	159	267	589	1252	169	314	62	228	540	832	527	1483
DEC -	157	354	1170	1447	-	-	34	69	62	217	1522	1809
Total	9850	9365	11215	10758	3158	5815	1125	2484	14375	27841	8370	11998

Table 2. Catch rate indices for cod derived from pair trawl catches.

	<u>1982</u>	<u>1983</u>	<u>1984</u>	<u>1985</u>	<u>1986</u>
3L -		1.680	1.052	1.049	1.125
3M -		0.789	1.302	1.169	0.796
3N -	0.520	0.698	1.053	0.576	0.467

Table 3. By-catches of the cod fishery (tons).

Div.:	3L	3M	3N	total
Haddock	-	-	-	-
Redfishes	123	639	1144	1906
American plaice	155	92	926	1173
Yellowtail flounder	-	-	-	-
Atlantic halibut	6	77	15	98
Wolffishes	-	8	37	45
Skates	7	22	234	263
Cod catches	21065	4283	22745	48093

Table 4. Length composition of pair trawlers cod catches ($\times 10^{-3}$).

Div.	3L		3M							3N					
Month	APR	MAY	APR	MAY	JUN	AUG	SEP	OCT	NOV	MAY	JUN	AUG	SEP	OCT	NOV
24-26							1								
27-29				1			4								
30-32				4			10								
33-35	6	22	7	19	1		11			19	1				2
36-38	9	41	17	50	3	3	6	1	1	39	6				2
39-41	50	61	31	86	9	8	6	1	1	120	26			32	41
42-44	86	74	36	77	20	10	11	2	1	188	48	1		89	9
45-47	109	30	36	77	19	10	12	3	2	141	54	1		251	31
48-50	113	25	33	65	35	12	12	3	3	87	74	2		406	41
51-53	125	24	26	47	31	16	12	3	4	85	84	2	1	395	54
54-56	115	20	19	35	31	16	12	6	5	59	58	3	1	415	58
57-59	102	19	19	28	32	26	10	6	5	44	64	3	1	348	71
60-62	97	20	18	27	33	22	9	5	3	39	39	2	1	233	71
63-65	86	5	15	26	32	23	7	7	3	14	39	3	1	196	47
66-68	76	16	13	24	36	17	7	5	3	20	31	2	1	112	35
69-71	78	9	9	18	26	17	6	3	3	11	27	3	2	81	24
72-74	51	19	8	10	15	11	4	3	4	6	19	3	1	46	15
75-77	43	8	3	6	9	7	4	3	5	9	24	3	3	40	3
78-80	25	6	3	2	8	3	3	1	3	2	12	5	6	29	9
81-83	16	5	2	2	2	2	1	1	2	3	13	10	11	14	
84-86	11	2	2	1	2		1	1	1	3	10	11	18	23	
87-89	7	3	2	1	1		1		1		4	15	18	20	3
90-92	5	2	2	1			1	1	1	1	3	25	25	20	
93-95	5		1				1	1	1			21	24	23	
96-98	2		1						1			19	23	23	
99-101	1											17	17	20	
102-104	1	2	1						1		1	11	12	17	
105-107	2								1			7	8	17	
108-110												2	5	12	
111-113	1											2	2	6	
114-116	1												1	3	
117-119		2											1		
120+	1												1		
total	1218	410	302	603	348	202	154	50	57	364	427	171	184	2859	509
n. fish measured	2708	269	2817	4678	1340	1040	5262	225	1038	824	755	1027	2605	3270	282
Catch (t)	2951	721	567	883	840	492	298	137	231	1166	1427	1493	1722	7305	1067

Table 5. Age composition of pair trawlers cod catches ($\times 10^{-3}$).

Div.	3L		3M							3N					
Month	APR	MAY	APR	MAY	JUN	AUG	SEP	OCT	NOV	MAY	JUN	AUG	SEP	OCT	NOV
age															
2	1						17		1						1
3	59	98	12	33	2	12	23	2	2	9	1			9	38
4	179	109	81	191	44	33	34	9	8	85	39	2		576	67
5	306	74	136	266	167	107	54	21	19	203	246	9	3	1149	174
6	273	49	59	102	116	43	18	15	17	53	114	10	6	639	149
7	215	36	7	8	13	7	5	2	7	14	27	18	20	279	66
8	114	25	4	2	4		2	1	2			39	47	109	13
9	33	10	2	1	1		1		1			55	61	46	1
10	22	5	1		1							30	34	29	
11	12	2										8	11	20	
12	1												1	3	
13	1	2											1		
14	1														
15															
16+	1														
total	1218	410	302	603	348	202	154	50	57	364	427	171	184	2859	509
Catch (t)	2951	721	567	883	840	492	298	137	231	1166	1427	1493	1722	7305	1067

Table 6. Catches (t) and fishing effort of freezers in 1986.

	Div.	3L	3M	3N	3O	total
Cod		784	101	578	72	1535
Redfishes		76	4	249	45	374
American plaice		2408	956	8091	302	11757
Yellowtail flounder		-	-	342	24	366
Atlantic halibut		-	-	98	21	119
Witch flounder		143	347	1379	654	2523
Skates		1506	273	7359	1540	10676
Silver hake		16	2	124	237	379
White hake		95	13	452	349	909
Haddock		23	2	41	-	66
hours fishing		7162	2548	32721	6421	48852

Table 7. Sample length frequency in freezers catch. American plaice.

sp.	American plaice											
Div.	3L											
Month	JUL		AUG		SEP		OCT		NOV		DEC	
sex	M	F	M	F	M	F	M	F	M	F	M	F
10-11							1		1	1		
12-13			1	1					3		1	1
14-15			1	1	1		1	1	3	2	1	
16-17			5	7			4	7	4	10	1	
18-19	3	2	12	16	2	2	15	15	20	23	1	4
20-21	12	7	36	48	7	9	19	23	41	42	2	3
22-23	17	12	60	86	43	18	39	24	74	49	2	2
24-25	25	21	106	139	81	46	42	30	128	106	7	5
26-27	38	31	205	195	193	107	24	28	150	132	12	8
28-29	63	44	348	275	335	182	27	21	204	192	15	20
30-31	62	54	516	455	564	375	27	29	279	213	15	21
32-33	46	54	559	576	639	441	18	33	307	306	27	26
34-35	42	60	525	639	565	513	22	27	330	392	11	34
36-37	31	52	358	658	355	495	15	30	278	363	9	27
38-39	18	41	321	622	281	436	20	37	225	404	11	29
40-41	21	35	219	505	214	394	8	42	89	323	4	23
42-43	15	35	139	494	153	424	6	57	42	324	1	12
44-45	8	26	107	543	115	417	2	28	20	251	16	
46-47	4	21	53	487	55	355		42	10	236	7	
48-49	4	19	13	359	19	273		35	5	199	5	
50-51		13		286	1	196		35	1	144	1	
52-53		12		247	1	159		19	2	94	2	
54-55		10		187		129		7		51	1	
56-57		8		165		99		3		21	1	
58-59		3		85		71		2		17		
60-61		1		67		42		1		9		
62-63				31		7				5		
64-65		1		6		5		1		7		
66-67				1				1		1		
68-69				1						1		
74-75										1		
Σ	409	562	3584	7182	3623	5196	290	578	2216	3919	120	250
Samples	5		55		45		6		22		1	
no. fishes	971		10766		8819		868		6135		370	
Catch (t)	62		1006		848		301		104		3	

sp.	American plaice											
Div.	3NO											
Month	JUL		AUG		SEP		OCT		NOV		DEC	
sex	M	F	M	F	M	F	M	F	M	F	M	F
10-11												
12-13	1	1							2	2		
14-15	1	1	1	2					11	20	4	10
16-17	3	3							44	46	14	18
18-19	14	20	4	5	1	1	1	1	70	60	18	18
20-21	27	36	17	20			2	4	139	108	51	35
22-23	39	50	28	43	3	4		1	252	208	144	122
24-25	56	68	53	75	12	7	3	1	404	332	289	261
26-27		97	106	107	25	17	2	2	557	464	431	376
28-29	120	118	237	171	43	24	1	6	618	591	438	422
30-31	122	140	328	317	68	41	7	6	483	558	336	376
32-33	113	208	358	265	80	38	3	2	285	410	228	249
34-35	126	212	313	255	69	43	10	12	190	306	133	167
36-37	100	245	204	284	67	41	8	15	114	227	89	110
38-39	77	210	175	241	45	41	6	12	78	129	69	69
40-41	51	188	120	192	36	33	2	11	53	101	36	56
42-43	40	162	86	203	17	47		6	41	92	33	37
44-45	28	137	49	201	13	62	2	11	24	69	25	41
46-47	14	160	27	195	14	63		7	15	59	10	25
48-49	11	157	8	128	8	71		16	4	53	4	32
50-51		156		106	1	52		11	7	49	1	29
52-53		158		90		33		6		37		32
54-55		124		65		22		4	1	29	1	19
56-57		96		54		20		2		11		10
58-59		54		33		15		1		11		13
60-61		37		28		12				6		2
62-63		17		17		3				3		6
64-65		9		6		1				1		1
66-67		3		1		2				1		1
68-69												
70-71				1								
Σ	1024	2867	2114	3105	502	693	47	138	3392	3983	2354	2537
Samples	23		27		6		1		90		43	
no. fishes	3891		5219		1195		185		7375		4892	
Catch (t)	846		971		1970		1349		404		746	

Table 8. Sample age frequency of American plaice in freezers catch.

sp.	American plaice			
Div.	3NO			
Month	NOV		DEC	
sex	M	F	M	F
age				
2	1	1		1
3	12	9	5	6
4	118	76	224	128
5	133	196	264	328
6	165	173	324	267
7	87	161	176	226
8	22	53	49	88
9	8	19	16	36
10	7	11	14	23
11	2	6	2	18
12	2	5	2	16
13	1	2	1	6
14		1		5
15		1		2
16+				1
total	558	714	1077	1151
catch (t)	404		746	

Table 9. Sample length frequency in freezers catch.

sp	Witch flounder				Yellowtail flounder			
Div.	3NO				3NO			
Month	NOV		DEC		OCT		DEC	
sex	M	F	M	F	M	F	M	F
10-11								
12-13					1			
14-15					1			
16-17							1	
18-19								
20-21					1			
22-23					1	3	5	7
24-25					5	3	61	55
26-27					2		73	92
28-29					12	8	39	34
30-31			2	1	22	37	75	69
32-33	2	3	3	2	23	17	42	67
34-35	7	7	4	3	7	11	16	22
36-37	20	6	8	3	11	7	17	14
38-39	25	13	12	8	14	13	15	6
40-41	29	21	20	17	6	15	18	17
42-43	20	42	22	20	1	16	3	23
44-45	17	36	19	32		7		9
46-47	12	46	14	37		3		9
48-49	10	53	11	38		2		2
50-51	5	41	1	26		2		
52-53	1	10		16				
54-55	1	10		8				
56-57		5		2				
58-59				1				
60-61								
Σ	149	293	116	214	107	144	365	426
Samples	3		2		2		4	
no. fish	442		330		251		791	
Catch (t)	427		242		41		83	

Table 10. Sample length frequency in freezers catch.

sp.	Redfish	
Div.	3NO	
Month	NOV	
sex	M	F
10-	3	3
11-	3	3
12-		
13-	1	3
14-	2	2
15-	3	
16-	10	3
17-	9	
18-	30	19
19-	34	24
20-	24	22
21-	54	49
22-	63	59
23-	72	96
24-	31	87
25-	23	51
26-	30	26
27-	13	25
28-	7	34
29-	7	41
30-	1	19
31-		12
32-		13
33-		3
34-	1	
35-		1
36		1
Σ	421	596
Samples	5	
no fishes	1017	
Catch (t)	80	

Table 11. Sample length frequency in freezers catch.

sp. ————— Skates —————									
Div.	— 3L —		— 3NO —		— 3L —		— 3NO —		
Month	NOV	DEC	NOV	DEC	NOV	DEC	NOV	DEC	
10-					57-	6	12	7	1
11-					58-	11	9	7	
12-					59-	6	7	3	1
13-		2			60-	10	13	2	3
14-	12	6			61-	1	8	2	4
15-	29	32			62-	9	17	2	2
16-	40	64		4	63-	6	17	3	2
17-	42	39		2	64-	10	6	3	4
18-	36	29		2	65-	10	7	2	1
19-	15	9			66-	10	16	4	2
20-	14	10		3	67-	10	14	2	3
21-	11	11			68-	5	20	3	1
22-	3	12		2	69-	7	20	4	2
23-	5	9		2	70-	10	11	3	4
24-	10	6	5	3	71-	14	16	2	3
25-	10	15	2	1	72-	5	25	3	1
26-	7	13	4	3	73-	7	24	4	1
27-	11	13	1	6	74-	18	20	4	2
28-	4	12		8	75-	13	17	4	5
29-		7	8	6	76-	14	27	4	3
30-	11	6	13	4	77-	18	21	2	4
31-	14	5	5	6	78-	13	21	4	3
32-	4	10	4	3	79-	9	14	2	2
33-	5	3	4	5	80-	10	24		2
34-	4	3	8	5	81-	15	5	2	1
35-	5		4	6	82-	7	16	4	1
36-	10	5	5	5	83-	7	15	2	
37-	11	7	8	2	84-	8	12	1	
38-	12	9	3	1	85-	1	7		1
39-	11	6	7	6	86-	3	9		1
40-	9	9	3	1	87-	3	4		
41-	7	8	6	4	88-	2	3		1
42-	6	8	5	10	89-	2	2		
43-	13	13	9	7	90-	1	3	1	1
44-	13	13	10	6	91-	1			
45-	11	15	12	10	92-	1			
46-	11	20	12	9	93-	1			
47-	8	14	10	8	94-				
48-	8	15	14	9	95-	1			
49-	16	13	7	5					
50-	11	11	13	10	Samples	5	6	2	2
51-	7	11	7	4	no. fish	796	1039	313	249
52-	11	22	6		Catch (t)	166	42	362	329
53-	16	16	7	3					
54-	10	9	6	5					
55-	8	14	14	4					
56-	10	22	5	7					

Table 12. Conversion factors

	Conversion factor	Sampling weight (kg)
American plaice	1.49	3523
Witch flounder	1.31	130
Skates	3.00	3200
Yellowtail flounder	1.36	74
Redfishes	2.04	33

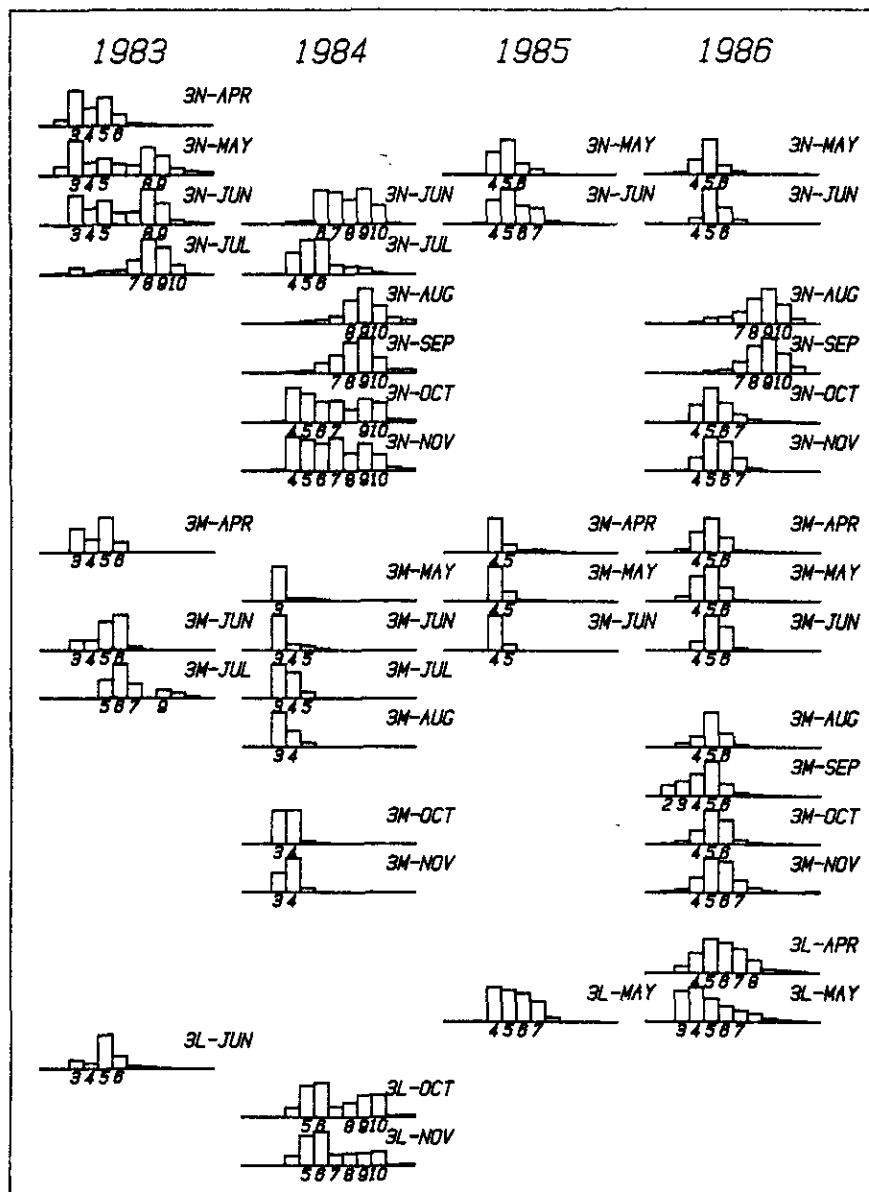


Fig. 1. Age distribution of pair trawl cod catches.