

Northwest Atlantic



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Cuban Research Report for 1989

by

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A. Status of the Fisheries

The Cuban Fishing Fleet operated in Subareas 3 and 4 of the Northwest Atlantic during 1989, fishing directed towards redfish, silver hake and squid. The total nominal catch was 24130.5 M.T., 7265.7 M.T. more than in 1988 and at the same level than the 1986 catch, due to the very good results obtained from the silver hake fisheries (Table 1).

Nine stern trawlers were involved in the fisheries, all of them tonnage class 7. The fishing effort totalled 884 fishing days (DF), 987 days on ground (DG), and 9205 fishing hours (HF) (Table 2).

1. Subarea 3

The directed fishery for redfish was carried out in Divs. 3M, 3N and 3O, totally outside the Canadian 200 mile zone. The total nominal catch was 6781.6 M.T., the lowest during the 1986-1989 period (Table 1). Redfish constituted 99.8 % of the total catch with a similar behavior than in 1987 and 1988 (Table 4).

The fishing effort and catch rates by division are given in Tables 2 and 3, while the nominal catches and percent also by division are shown in Table 5.

The directed fishery for redfish was carried out for June to the beginning of September. Midwater trawls were used in all divisions.

2. Subarea 4

The fisheries in this Subarea were directed towards silver hake (from the end of March to July) and squid (a very small fishery in July). The total nominal catch was 17348.9 M.T., 7507.9 more than in 1988 but lowest than in 1987 (Table 1).

The silver hake fishery presented very good catch rates from March to the end of June, when the presence of other species in

the catch affected it, with similar behavior in July. The silver hake catch was 83.8 % of the total nominal catch (Table 6). The fishing effort and catch rates for Subarea 4 are shown in Tables 2 and 3.

B. Biological Sampling

Biological samples were taken for analysis of size compositions and length-weight relationship for silver hake (Div. 4W) and redfish (Div. 3M), on board Cuban commercial vessels tonnage class 7, in May for silver hake and between June and August for redfish.

A total of 16 samples of silver hake were taken for size composition of 7415 individual measurements. These size compositions are presented by ten day periods and by sex (Table 7). Furthermore a table for the length-weight relationship of the silver hake for 281 pair of values is presented (Table 11).

A total of 50 samples of redfish were taken for size composition of 16285 individual measurements. These size compositions are presented by ten day periods and by sex for June, July and August (Tables 8, 9 and 10). A table for the length-weight relationship for 135 pairs of values is presented also (Table 12).

NOMINAL CATCH PER SUB-AREA 1986-1989 Table #1					
Year	Sub-area 3		Sub-area 4		Total
	M.T.	%	M.T.	%	
1986	7648.0	31	16907.0	69	24555.0
1987	7054.0	25	21075.0	75	28129.0
1988	7023.8	42	9841.0	58	16864.8
1989	6781.6	28	17348.9	72	24130.5

FISHING EFFORT PER SUB-AREA AND DIVISION, 1986-1989													Table #2	
		D.F.				D.G.				H.F.				
Sub-area	Div.	1986	1987	1988	1989	1986	1987	1988	1989	1986	1987	1988	1989	
3	M	57	58	126	128	61	80	140	154	424	507	952	1634	
3	N	119	95	155	125	180	137	190	144	1106	827	1200	1171	
3	O	170	128	116	72	193	164	135	91	1442	1011	743	696	
4	W	503	557	437	559	573	587	472	598	5649	5646	5017	5704	
TOTAL		849	838	834	884	1007	968	937	987	8623	7989	7912	9205	

CATCH PER UNIT EFFORT PER SUB-AREA AND DIVISION, 1986-1989 Table #3									
		Catch/D.F.				Catch/D.G.			
Sub-Area	Div.	1986	1987	1988	1989	1986	1987	1988	1989
3	M	31.0	42.0	14.0	13.8	29.0	30.5	12.6	11.5
3	N	21.7	18.5	16.1	23.0	14.3	12.8	13.1	20.0
3	O	19.3	22.3	23.9	29.7	17.1	17.4	20.5	23.5
4	W	33.6	37.8	22.5	31.2	29.5	35.9	20.8	29.3

NOMINAL CATCH PER SPECIES FOR SUB-AREA 3, 1986-1989. TABLE #4								
	1986		1987		1988		1989	
SPECIES	M.T.	%	M.T.	%	M.T.	%	M.T.	%
Atlantic cod	49.0	1.0	.1	-	11.3	.2	.8	-
Haddock	1.0	-	--	-	--	-	--	-
Atlantic redfishes	7199.0	94.0	7048.0	99.9	6995.4	99.6	6771.1	99.8
Silver hake	280.0	4.0	--	-	--	-	--	-
Red hake	4.0	-	.3	-	3.6	.1	--	-
Pollock	2.0	-	--	-	--	-	--	-
American plaice	7.0	-	--	-	3.5	.1	--	-
Witch flounder	46.0	.6	--	-	2.7	-	--	-
Yellowtail flounder	4.0	-	--	-	--	-	--	-
Atlantic halibut	36.0	.4	--	-	--	-	--	-
Flatfishes nei	8.0	-	--	-	--	-	--	-
White hake	--	-	--	-	.5	-	--	-
Groundfishes nei	8.0	-	--	-	.9	-	--	-
Atlantic mackerel	--	-	--	-	--	-	--	-
Argentines	2.0	-	--	-	3.2	-	--	-
American angler	2.0	-	--	-	2.7	-	--	-
Granadier	--	-	4.0	.1	--	-	--	-
Squid(Illex)	--	-	1.6	-	--	-	9.7	.2
TOTAL	7648.0	100.0	5054.0	100.0	7023.8	100.0	6781.6	100.0

CATCH PER DIVISION, SUB-AREA 3 1986-1989 Table #5						
	3M		3N		3O	
YEAR	M.T.	%	M.T.	%	M.T.	%
1986	1770.0	23.1	2582.0	33.8	3296.0	43.1
1987	2438.0	34.6	1757.0	24.9	2859.0	40.5
1988	1762.4	25.1	2493.5	35.5	2767.9	39.4
1989	1765.0	26.0	2877.1	42.4	2139.5	31.6

NOMINAL CATCH PER SPECIES FOR SUB-AREA 4, 1986-1989. TABLE #6								
	1986		1987		1988		1989	
SPECIES	M.T.	%	M.T.	%	M.T.	%	M.T.	%
Atlantic cod	2.0	-	28.9	.1	10.2	.1	33.3	.2
Haddock	78.0	.5	153.3	.7	98.3	1.0	175.3	1.0
Atlantic redfishes	4.0	-	13.4	.1	14.0	.1	38.9	.2
Silver hake	16041.0	95.0	20219.0	95.9	9014.4	91.6	14540.9	83.8
Red hake	125.0	1.0	194.6	.9	52.2	.5	146.1	.9
Pollock	387.0	2.0	341.5	1.6	225.4	2.3	567.9	3.3
American plaice	23.0	.1	7.3	.1	9.2	.1	4.5	-
Witch flounder	--	-	4.9	-	.7	-	--	-
Yellowtail flounder	--	-	--	-	.7	-	--	-
Atlantic halibut	5.0	-	2.6	-	.1	-	1.0	-
Flatfishes nei	8.0	-	2.5	-	.1	-	.1	-
American angler	33.0	.2	19.7	.1	.8	-	2.3	-
Cusk	4.0	-	8.6	-	7.0	.1	--	-
White hake	--	-	15.1	.1	--	-	4.7	-
Wolfishes	--	-	.2	-	--	-	--	-
Groundfishes nei	3.0	-	.4	-	.1	-	21.6	.1
Atlantic herring	53.0	.3	36.9	.2	81.4	.8	446.9	2.6
Atlantic mackerel	80.0	.6	18.1	.1	143.9	1.5	113.6	.7
Argentines	53.0	.3	5.7	-	26.1	.3	4.9	-
Skates nei	--	-	--	-	.3	-	--	-
Squid(Illex)	4.0	-	2.8	-	156.0	1.6	1246.9	7.2
Dogfish sharks nei	--	-	--	-	.1	-	--	-
TOTAL	16907.0	100.0	21075.0	100.0	9841.0	100.0	17348.9	100.0

LENGTH FREQUENCES REPORTED BY THE FLOTA CUBANA DE PESCA															Table #7
Species: Silver Hake			Region: Northwest Atlantic Ocean			Division: 4W			Gear: Bottom						
Exploratory or commercial fishing: Commercial			Catches or landings: Catches			Mesh Size: 60 mm									
Method of measuring fish			Length: Total			To the nearest cm			Reported by: S. Valle						
Length group			01-10/05/89 (1)			11-20/05/89 (2)			21-31/05/89 (3)			May/89			
1 cm	2 cm	.5 cm	1	2	total	1	2	total	1	2	total	1	2	total	NOTE:
15									2	3	5	2	3	5	1 2
16									17	13	30	17	13	30	= =
17			1	2	3	1	1	2	32	18	50	34	21	55	M F
18			--	3	3	--	1	1	25	5	30	25	9	34	A E
19			1	2	3	5	2	7	25	7	32	31	11	42	L M
20			2	1	3	5	3	8	16	11	27	23	15	38	E A
21			3	4	7	3	3	6	14	11	25	20	18	38	L
22			1	--	1	4	4	8	12	10	22	17	14	31	E
23			4	2	6	10	6	16	12	5	17	26	13	39	
24			8	2	10	31	8	39	60	14	74	99	24	123	
25			26	13	39	56	28	84	121	54	175	203	95	298	
26			29	23	52	40	29	69	119	58	177	188	110	298	
27			97	30	127	44	24	68	126	69	195	267	123	390	
28			239	51	290	68	19	87	222	93	318	532	163	695	
29			248	106	354	112	22	134	356	127	483	716	255	971	
30			333	192	525	145	65	210	361	180	541	839	437	1276	
31			192	195	387	68	111	179	227	301	528	487	607	1094	
32			105	237	342	39	79	118	98	289	387	242	605	847	
33			53	133	186	20	51	71	44	230	274	117	414	531	
34			17	57	74	5	38	43	8	125	133	30	220	250	
35			5	55	60	--	16	16	2	72	74	7	143	150	
36			2	18	20	1	8	9	--	29	29	3	55	58	
37			--	20	20	1	6	7	--	12	12	1	38	39	
38			--	12	12	--	5	5	--	11	11	0	28	28	
39			1	7	8	--	1	1	--	7	7	1	15	16	
40			--	10	10	--	--	--	--	4	4	--	14	14	
41			--	9	9	--	1	1	--	1	1	--	11	11	
42			--	1	1	--	1	1	--	--	--	--	2	2	
43			--	3	3	--	--	--	--	1	1	--	4	4	
44			--	1	1	--	--	--	--	--	--	--	1	1	
45			--	5	5	--	--	--	--	--	--	--	5	5	
46			--	--	--	--	--	--	--	--	--	--	0	0	
47			--	2	2	--	--	--	--	--	--	--	2	2	
TOTAL			1367	1196	2563	658	532	1190	1902	1760	3662	3927	3488	7415	
No. of samples			5			2			9			16			
Mean Length			29.47	31.45	30.39	28.45	30.37	29.32	28.02	30.49	29.21	28.6	30.81	29.64	
Mean Weight (g)			197.7	226.5	211.2	162.6	214.3	185.7	178.8	217.0	197.2	182.7	219.8	200.2	

LENGTH FREQUENCES REPORTED BY THE FLOTA CUBANA DE PESCA															Table #8
Species: Red Fish			Region: Northwest Atlantic Ocean			Division: 3M			Gear: Midwater						
Exploratory or commercial fishing: Commercial			Catches or landings: Catches			Mesh Size: 60 mm									
Method of measuring fish			Length: Total			To the nearest cm			Reported by: S. Valle						
Length group			01-10/06/89 (1)			11-20/06/89 (2)			21-30/06/89 (3)			June/89			
1 cm	2 cm	.5 cm	1	2	total	1	2	total	1	2	total	1	2	total	NOTE:
16									1		1	1	--	1	1 2
17						2	1	3	8	5	13	10	6	16	= =
18						2	2	4	11	8	19	13	10	23	M F
19			3	--	3	11	2	13	15	21	36	29	23	52	A E
20			7	2	9	22	7	29	69	54	123	98	63	161	L M
21			8	3	11	64	27	91	246	181	427	318	211	529	E A
22			25	7	32	123	103	226	360	361	721	508	471	979	L
23			60	25	85	155	125	280	519	495	1014	734	645	1379	E
24			45	40	85	141	150	291	310	419	729	496	609	1105	
25			47	55	102	99	160	259	227	377	604	373	592	965	
26			22	56	78	111	86	197	127	218	345	260	360	620	
27			11	36	47	74	43	117	89	167	256	174	246	420	
28			2	23	25	44	44	88	22	139	161	68	206	274	
29			1	20	21	2	46	48	10	127	137	13	193	206	
30			1	14	15	4	40	44	5	109	114	10	163	173	
31			--	8	8	7	17	24	4	56	60	11	81	92	
32			--	3	3	--	19	19	--	29	29	--	51	51	
33			--	3	3	--	11	11	--	13	13	--	27	27	
34			--	1	1	--	4	4	--	9	9	--	14	14	
35			--	--	--	--	8	8	--	7	7	--	15	15	
36			--	--	--	--	2	2	--	6	6	--	8	8	
37			--	--	--	--	1	1	--	4	4	--	5	5	
38			--	--	--	--	--	--	--	3	3	--	3	3	
39			--	--	--	--	--	--	--	1	1	--	1	1	
40			--	--	--	--	--	--	--	--	--	--	--	--	
41			--	--	--	--	--	--	--	--	--	--	--	--	
TOTAL			232	296	528	861	898	1759	2023	2809	4832	3116	4003	7119	
No. of samples				2			8			11			21		
Mean Length (cm)			23.85	26.06	25.09	24.68	25.30	24.69	23.25	24.74	24.12	23.51	24.96	24.23	
Mean Weight (g)			211.2	293.9	257.6	290.0	296.1	294.5	181.4	210.5	198.3	215.8	234.7	226.4	

LENGTH FREQUENCIES REPORTED BY THE FLOTA CUBANA DE PESCA															Table 49
Species: Red Fish			Region: Northwest Atlantic Ocean			Division: 3M			Gear: Midwater						
Exploratory or commercial fishing: Commercial			Catches or landings: Catches			Mesh Size: 60 mm									
Method of measuring fish			Length: Total			To the nearest cm			Reported by: S. Valle						
Length group			01-10/07/89 (1)			11-20/07/89 (2)			21-31/07/89 (3)			July/89			
1 cm	2 cm	.5 cm	1	2	total	1	2	total	1	2	total	1	2	total	NOTE:
17						1	1	2	3	3	6	4	4	8	1 2
18			3	1	4	4	4	8	0	1	1	7	6	13	0 =
19			4	4	8	5	17	22	0	0	0	9	21	30	M F
20			15	6	21	29	35	64	0	1	1	44	42	86	A E
21			25	32	57	76	58	134	0	0	0	101	90	191	L M
22			115	88	203	144	135	279	3	5	8	262	228	490	E A
23			159	160	319	131	151	282	11	11	22	301	322	623	L E
24			142	154	296	90	106	186	40	37	77	262	297	559	
25			135	154	289	59	83	142	95	94	189	289	331	620	
26			147	96	243	45	37	82	157	169	326	349	302	651	
27			104	60	164	38	35	73	213	241	454	355	336	691	
28			45	59	104	33	39	72	267	289	556	345	387	732	
29			22	47	69	25	44	69	184	219	403	231	310	541	
30			16	81	97	16	37	53	135	145	280	167	263	430	
31			8	64	72	8	16	24	56	90	146	72	170	242	
32			0	42	42	7	11	18	30	54	84	37	107	144	
33			0	21	21	4	7	11	47	35	82	51	63	114	
34			1	9	10	2	4	6	35	41	76	38	54	92	
35			--	6	6	1	5	6	27	38	65	28	49	77	
36			--	7	7	2	7	9	26	57	83	28	71	99	
37			--	6	6	2	6	8	15	43	58	17	55	72	
38			--	2	2	1	2	3	4	18	22	5	22	27	
39			--	--	--	3	4	7	7	8	15	10	12	22	
40			--	--	--	--	--	--	2	8	10	2	8	10	
41			--	--	--	--	--	--	1	0	1	1	0	1	
42			--	--	--	--	--	--	--	5	5	--	5	5	
43			--	--	--	--	--	--	--	--	--	--	--	--	
44			--	--	--	--	--	--	--	--	--	--	--	--	
45			--	--	--	--	--	--	--	2	2	--	2	2	
TOTAL			941	1099	2040	716	844	1560	1358	1614	2972	3015	3557	6572	
No. of samples			5			5			9			19			
Mean Length (cm)			24.67	26.11	25.45	24.47	24.73	24.45	28.58	29.14	28.89	26.30	27.61	26.77	
Mean Weight (g)			263.5	266.6	265.2	214.0	233.4	224.5	343.5	366.9	355.9	287.4	301.5	295.0	

[illegible]

LENGHT-WEIGHT RELATIONSHIP FOR SILVER HAKE, DIV. 4W NAFO 1989. Table #11					
INDEX	NAME	MEAN	STD.DEV.		
1	LOGLENGTH	1.4722	.0722		
DEP.VAR.	LOGWEIGHT	2.2729	.2732		
VAR.	REGR.COEF.	STD.ERROR	T(DF=279)	PROB.	
LOGLENGTH	3.7023	.0468	79.037	.00000	
CONSTANT	-3.1777				
STD. ERROR OF EST. = .0566					
r SQUARED = .9572					
r = .9784					
ANALYSIS OF VARIANCE TABLE					
SOURCE	SUM OF SQUARES	D.F	MEAN SQUARE	F.RATIO	PROB.
REGRESSION	20.0023	1	20.0023	6246.872	.000
RESIDUAL	.8934	279	.0032		
TOTAL	20.8957	280			
EXPECTED WEIGHTS					
LENGTH	WEIGHT	LENGTH	WEIGHT	LENGTH	WEIGHT
12	6.53	25	98.89	38	465.99
13	8.78	26	114.34	39	513.03
14	11.56	27	131.49	40	563.44
15	14.92	28	150.44	41	617.38
16	18.95	29	171.31	42	674.99
17	23.72	30	194.22	43	736.43
18	29.30	31	219.29	44	801.86
19	35.80	32	246.64	45	871.43
20	43.28	33	276.40	46	945.31
21	51.85	34	308.70	47	1023.65
22	61.60	35	343.67	48	1106.63
23	72.62	36	381.45	49	1194.42
24	85.02	37	422.18	50	1287.18

LENGHT-WEIGHT RELATIONSHIP FOR REDFISH, DIV. 3M NAFO 1989. Table #12					
INDEX	NAME	MEAN	STD.DEV.		
1	LOGLENGTH	1.4482	.0718		
DEP.VAR.	LOGWEIGHT	2.4780	.2024		
VAR.	REGR.COEF.	STD.ERROR	T(DF=279)	PROB.	
LOGLENGTH	2.7771	.0414	67.035	.00000	
CONSTANT	-1.5438				
STD. ERROR OF EST. = .0344					
r SQUARED = .9713					
r = .9855					
ANALYSIS OF VARIANCE TABLE					
SOURCE	SUM OF SQUARES	D.F	MEAN SQUARE	F.RATIO	PROB.
REGRESSION	5.3295	1	5.3295	4493.705	.000
RESIDUAL	.1577	133	.0012		
TOTAL	5.4872	134			
EXPECTED WEIGHTS					
LENGTH	WEIGHT	LENGTH	WEIGHT	LENGTH	WEIGHT
12	28.39	25	217.98	38	697.29
13	35.46	26	243.06	39	749.45
14	43.56	27	269.92	40	804.04
15	52.76	28	298.61	41	861.11
16	63.12	29	329.17	42	920.71
17	74.69	30	361.67	43	982.89
18	87.54	31	396.15	44	1047.69
19	101.72	32	432.66	45	1115.15
20	117.31	33	471.26	46	1185.34
21	134.32	34	511.99	47	1258.29
22	152.84	35	554.92	48	1334.06
23	172.92	36	600.08	49	1412.67
24	194.62	37	647.52	50	1494.21