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Squid (*Loligo* and *Illex*) in ICNAF Subarea 5 and Statistical Area 6,
landings effort and abundance updates

by

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The following tables and explanations are to update ICNAF Research Document 75/60, Tibbetts.

Table 2 has been updated to include Japanese 1967-1969 species landings of squid as reported in ICNAF Summary Document 76/VI/9. Also included are 1974 and 1975 species landings and estimates for countries not reporting by species. These estimates are based on species compositions of samples taken from representative vessels in the fishery, where available, or from USA bottom trawl survey percent compositions by areas, season, and depth zone (Table 4).

Table 3 contains catch effort data for the directed squid fisheries of Japan and Spain (1970-1974) as an indication of the status of the offshore squid fishery. Landings per day figures for the US squid fishery (1967-1975, based on vessel landings composed of greater than 50% squid, fishing in ICNAF SA 5Zw and 6A) are given, representing status of the inshore fishery. Overall landings per day in the offshore fishery decreased in 1974, while this index increased in 1974 and again in 1975 in the inshore fishery.

The prerecruit indices (Table 6) are calculated from stratified mean number per tow in fall surveys, of individuals less than recruited size, for each species, from the Middle Atlantic to Georges Bank. These indices showed a greater than twofold increase in 1975 over 1974 for *Loligo* and a 4.5-fold increase for *Illex*. Length frequencies from the 1975 US fall survey cruise include very high proportions of small *Loligo* in all areas, especially in the Middle Atlantic (strata 61-76) where 90% were less than or equal to 8 cm.

Stock size estimates (Table 7) from USA autumn survey cruises have been recalculated for the years 1968-1975. These estimates now include all of ICNAF SA 5 and 6 (*i.e.* survey strata 1-29, 36-40, 61-76). Estimate B_1 is obtained from direct aerial expansion of strata mean weights per tow for each species. The second estimate, B_2 , has been adjusted to take into account the higher catchability of squid in the daytime. This is from the average of the mean daytime weight per tow plus the adjusted mean nighttime weight per tow, each weighted by the corresponding number of tows. The third, and possibly more realistic estimate, B_3 , is adjusted upward for the higher efficiency of the #41 net used by *Albatross IV* in recent spring surveys. This trawl is 1.41 times as effective for *Loligo*, but also sweeps 1.15 times the area of the #36, so the expansion factor, applied to B_2 , was 1.23. These estimates show an increase of 26% and 10% in stock size for *Loligo* and *Illex* respectively, from 1974 to 1975.

Table 1. Annual squid landings in tons, 1963-1974, by country (ICNAF Areas 5+6).

Areas	Year	COUNTRY												Total		
		Canada	Bulgaria	France	FRG ¹	Japan	Italy	Spain	Poland	Romania	USSR	USA	GDR ²			
5 & 6	1963												2,105		2,105	
	1964												4	929	933	
	1965												176	1,154	1,330	
	1966												389	1,173	1,562	
	1967					6							833	1,829	2,662	
	1968					1,731							3,176	1,762	10	6,679
	1969					7,122							1,340	1,461	1	9,924
	1970					13,639		4,510					655	1,061	20	19,885
	1971		1	90		10,602		4,187					6,138	1,182		22,210
	1972			499	296	463	18,691	3,200	11,859	5,428	67		6,976	1,214	14	48,707
	1973			410	820	1,641	15,526	3,165	14,932	9,199	150		8,977	1,635	313	56,768
	1974		27	592			16,820	4,260	16,144	6,709	9		8,495	2,422		55,528
5	1963												1,210		1,210	
	1964												4	189	193	
	1965												176	387	563	
	1966												341	193	534	
	1967												330	913	1,243	
	1968					112							2,415	903	10	3,440
	1969					3,724							1,182	739	1	5,646
	1970					5,363							655	483	20	6,501
	1971		1	80		4,661		256					5,659	711		11,368
	1972			480	6	63	7,862		5,797	5,042	28		6,381	459	14	26,138
	1973			396	403	136	5,811		10,147	9,157	18		8,631	873	313	36,161
	1974		23	196			7,267	1,010	7,448	6,229	2		5,612	1,117		28,884
6	1963												895		895	
	1964												740		740	
	1965												767		767	
	1966												48	980	1,028	
	1967					6							503	916	1,425	
	1968					1,619							761	859	3,239	
	1969					3,398							158	722	4,278	
	1970					8,276							---	578	8,854	
	1971			10		5,941		3,941					479	471	10,842	
	1972			19	290	400	10,829	3,200	6,063	836	39		595	748	22,569	
	1973			14	417	1,505	9,715	3,165	4,785	42	132		346	762	20,492	
	1974		24	396			9,553	3,250	8,696	480	7		2,883	1,305	26,594	

¹ Federal Republic of Germany.

² German Democratic Republic.

Table 2. Estimated species breakdown of squid landings in ICNAF SA 5 and 6, 1963-1975.

	Can	Bulg	Fra	FRG	Jap	Ita	Spa	Pol	Rom	USSR	USA	GDR	Cuba	Total
<u>Loligo</u>														
1963											1294			1294
1964											572			576
1965										99	709			808
1966										226	722			948
1967					5 ¹					548	1125			1678
1968					177 ¹					2184	1083	5		3449
1969					7125 ¹					1080	898			9103
1970					13557		4483			482	652	10		36184
1971		50			10528		1881			3561	727			16747
1972		254	296	463	17102	2928	8165	2754	33	4045	742		7	36789
1973		410 ¹	820	1639	14396 ¹	2994	11145 ¹	5134	139 ¹	5000	1100	163		42940
1974		300	27		13493 ¹	3280 ¹	9375 ¹	1653	-	4485	2141	-		34754
1975	-	78		2	11090 ¹	3387 ¹	6886	3785 ¹	-	4295	1593 ¹	620 ¹		31736
<u>Illex</u>														
1963											810			810
1964											358			358
1965										78	444			522
1966										118	452			570
1967					2 ¹					286	704			992
1968					1655 ¹					1052	678	5		3390
1969					586 ¹					260	562	1		1409
1970					82		27			174	408	10		701
1971	1	40			48		2317			2578	455			5439
1972		245			1589	272	3694	2674	33	2927	472		7	11913
1973		-			1009 ¹	171	3784 ¹	4070	-	3976	530	156		13696
1974		293			3327 ¹	980 ¹	6769 ¹	5052	9	3945	148			20523
1975		120		20	3237 ¹	844 ¹	1618	3051 ¹	8	3706	107 ¹	278 ¹		12989

¹As reported to ICNAF.

Table 3a. Offshore squid landings per day in metric tons by area and gear (for Japan and Spain), 1970-1974.

Area	Country	Gear ¹ and tonnage class ²	Year				
			1970	1971	1972	1973	1974
5Ze	Spain	OTSN 5			14.8	9.2	6.9
		OTSN 6	22.6	6.3		16.3	15.0
	Japan ³	OTSN 5					28.7
		OTSN 7	37.3	26.3	24.4	33.6	17.9
5Zw	Spain	OTSN 5		4.0	8.5	7.6	5.5
	Japan	OTSN 6	19.7	14.9		14.1	
		OTSN 7	28.4	11.3	19.9	18.6	
6A	Spain	OTSN 5		7.8	7.9	7.1	7.0
		OTSN 6	24.3	13.8	18.7	14.4	
	Japan	OTSN 7	32.5	13.4	17.3	13.2	
6B	Spain	OTSN 5		11.9	12.3		6.9
		OTSN 6	24.88	12.9		10.0	10.3
	Japan	OTSN 7	25.3	16.2	17.2	14.4	11.9
6C	Spain	OTSN 5		8.6	12.9		7.0
		OTSN 6				16.4	15.3
	Japan	OTSN 5					12.5
		OTSN 7			15.4	14.6	16.1
TOTAL	Spain	OTSN 5		9.0	11.3	7.4	6.8
		OTSN 6	22.8	12.2	18.7	13.4	12.9
	Japan	OTSN 5					17.8
		OTSN 7	29.9	16.9	18.8	19.7	14.8

¹Gear OTSN: Otter trawl stern.

²Tonnage class: 5 - 500 to 999.9 tons
6 - 1000 to 1999.9 tons
7 - over 2000 tons

³All Japanese C/E based on 24 hours/day.

Table 3b. Inshore catch per effort for squid from USA landings per day fished (metric tons) in ICNAF Divisions 5Zw and 6A, 1967-1975.

Year	Metric tons/day	Number of trips
1967	5.6	33
1968	3.4	37
1969	5.4	120
1970	2.2	110
1971	2.6	43
1972	1.8	24
1973	1.3	46
1974	2.2	84
1975	3.2	65

¹Based on ton class 2 (0-50 tons) vessel trips in ICNAF 5Zw and 6A with squid comprising greater than 50% of the catch.

Table 4. Percent composition by weight of *ILLEX* in catches of squid from U.S.A. bottom trawl surveys, by season, area, and depth range.

Year	Country	Season	Mid-Atlantic ¹		So. New England ¹		Georges Bank ¹		TOTAL	
			<60 FM	>60 FM	<60 FM	>60 FM	<60 FM	>60 FM	<60 FM	>60 FM
1969	USA	Summer	3.0	39.0	73.0	100.0	35.0	100.0	43.0	79.0
1970	USA	Spring	1.0	14.5	.0	1.0	.0	1.2	.0	8.1
1971	USA	Spring	1.5	2.9	.6	.8	.0	1.1	.8	2.1
1972	USA	Spring	0.0	.1	.0	.2	.0	.8	0.0	.2
1973	USA	Spring	.0	1.0	.0	1.0	.0	3.8	.0	1.0
1974	USA	Spring	.1	9.9	1.3	14.9	.0	.0	.3	12.4
1975	USA	Spring	.2	2.0	.3	.5	.0	4.0	.2	1.5
1970	USA	Autumn	5.0	23.0	2.0	24.0	8.0	91.0	4.0	25.0
1971	USA	Autumn	4.0	89.0	3.0	11.0	21.0	72.0	7.0	26.0
1972	USSR	Autumn	2.0	74.0	5.0	16.0	14.0	11.8	6.0	42.0
1972	USA	Autumn	2.0	71.0	7.0	12.0	5.0	79.0	4.0	21.0
1973	USSR	Autumn	1.0	73.0	.2	6.0	26.4	-	2.1	63.0
1973	USA	Autumn	.0	14.0	.4	3.2	6.7	15.2	1.4	9.0
1974	USSR	Autumn	.5	15.0	1.0	13.0	9.0	34.0	2.5	14.6
1974	USA	Autumn	.4	25.0	.7	19.0	3.0	22.0	.9	21.6
1975	USA	Autumn	.0	10.4	2.0	18.4	3.0	76.4	.7	4.86

¹See Figure 1.

Table 5. Stratified mean Ln catches per tow (in pounds±1) and temperature for *Loligo pealei* and *Illex illecebrosus*, from U.S.A. Survey Vessel Spring and Autumn, 1967-1975.

AREA ³	Strata	Year ¹	SPRING		Temp ² °C	AUTUMN		Temp. °C
			<i>Loligo</i> Ln wt/tow	<i>Illex</i> Ln wt/tow		<i>Loligo</i> Ln wt/tow	<i>Illex</i> Ln wt/tow	
Mid-Atl.	61-76	1967	--	--	--	2.18	.16	13.3
		1968	.28	.00	5.7	2.32	.12	13.6
		1969	.14	.10	5.5	2.29	.06	15.5
		1970	.35	.04	7.5	1.46	.23	10.0
		1971	.44	.03	6.9	1.18	.21	13.1
		1972	1.47	.00	8.7	2.68	.25	16.0
		1973	.82	.01	8.0	2.62	.04	14.4
		1974	1.92	.07	10.3	2.63	.11	14.8
		1975	1.96	.04	7.7	2.99	.19	14.3
So. New Eng.	1-12	1967	--	--	--	.74	.39	9.6
		1968	.45	.04	5.0	1.92	.47	11.1
		1969	.49	.01	5.7	2.47	.13	12.1
		1970	.41	.01	6.1	1.41	.22	10.6
		1971	.76	.01	6.3	1.45	.34	10.8
		1972	.85	.00	7.0	1.48	.41	12.7
		1973	.75	.01	6.8	2.71	.12	13.0
		1974	.93	.08	8.3	2.5	.17	12.7
		1975	1.39	.02	7.2	2.5	.74	11.9
So. Georges Bank	13-15	1967	--	--	--	.66	.29	8.4
		1968	.63	.00	6.3	.57	.42	12.6
		1969	1.02	.00	6.8	1.26	.13	12.7
		1970	.36	.00	5.9	.80	.38	10.8
		1971	.63	.02	5.8	.89	.95	11.9
		1972	.89	.02	7.3	.69	.28	11.8
		1973	1.23	.09	8.9	1.81	.16	13.2
		1974	.12	.07	7.8	.99	.30	12.6
		1975	.82	.08	8.2	.23	1.16	11.8

Table 5. cont'd

AREA ³	Strata	Year ¹	SPRING		Temp ² °C	AUTUMN		Temp. °C
			<i>Loligo</i> Ln wt/tow	<i>Illex</i> Ln wt/tow		<i>Loligo</i> Ln wt/tow	<i>Illex</i> Ln wt/tow	
East Georges Bank	16-18	1967	--	--	--	.41	.05	8.2
		1968	.00	.01	3.9	.54	.50	10.3
		1969	.18	.00	5.4	.60	.08	10.1
		1970	.13	.02	4.8	.85	.18	9.2
		1971	.05	.00	4.6	.37	.20	10.8
		1972	.06	.00	5.8	.19	.14	10.2
		1973	.00	.00	6.2	1.87	.34	11.9
		1974	.00	.00	6.9	.92	.22	12.0
		1975	.19	.00	5.6	.00	.28	10.4
No. Georges Bank	19-25	1967	--	--	--	.02	.05	7.1
		1968	.00	.00	4.7	.18	.24	9.7
		1969	.00	.00	4.7	.36	.01	8.9
		1970	.00	.00	5.0	.39	.16	9.9
		1971	.00	.00	4.8	.60	.38	11.2
		1972	.00	.00	5.0	.73	.23	10.5
		1973	.00	.00	5.4	1.25	.40	11.0
		1974	.00	.00	6.6	.94	.08	10.9
		1975	.00	.00	5.7	.91	.88	9.9

¹Spring cruises since 1973 were made with a 41 trawl, instead of Yankee 36; relative abundances are not comparable.

²Mean bottom temperatures per strata set.

³See Figure 1.

Table 6. Prerecruit index (stratified mean number (less than recruited size per tow)) from fall survey cruises, for *Loligo* and *Illex* (Middle Atlantic-Georges Bank).

Year	<i>Loligo</i> (≤ 8 cm)		<i>Illex</i> (≤ 10 cm)	
	mean #/tow	mean wt/tow	mean #/tow	mean wt/tow
1967	126.9	6.8	0.7	0.1
1968	159.9	12.2	0.6	0.1
1969	217.4	16.5	0.3	0.03
1970	79.3	5.2	0.2	0.1
1971	161.5	6.1	0.6	0.05
1972	258.5	11.6	1.8	0.1
1973	353.9	19.6	0.3	0.04
1974	233.3	13.6	2.1	.03
1975	593.3	22.7	9.6	.66

Table 7. Stock size estimates¹ for squid in ICNAF Subareas 5 and 6 (in metric tons).

Year	B ₁	B ₂	B ₃	B ₁	B ₂	B ₃
1968	28,063	59,259	72,693	1,480	1,448	1,250
1969	37,586	46,788	57,395	311	4,131	5,068
1970	12,025	28,883	35,431	1,079	6,942	8,516
1971	11,694	18,013	22,097	1,351	7,602	9,325
1972	25,396	24,016	29,461	1,423	8,217	10,079
1973	42,250	63,160	77,479	883	6,059	7,432
1974	31,083	62,993	77,273	2,110	12,972	15,913
1975	41,881	79,321	97,303	4,060	14,330	17,577

¹From survey cruise, mean weight/tow, abundance indices.

B₁ = minimum estimate using total survey indices.

B₂ = estimate using weighted average of: (day-night ratio (6.372), from gear comparisons X mean nighttime weights per tow) and daytime mean weight per tow.

B₃ = B₂ X 1.23 (41:36 trawl ratio for area swept and *Loligo* catch).

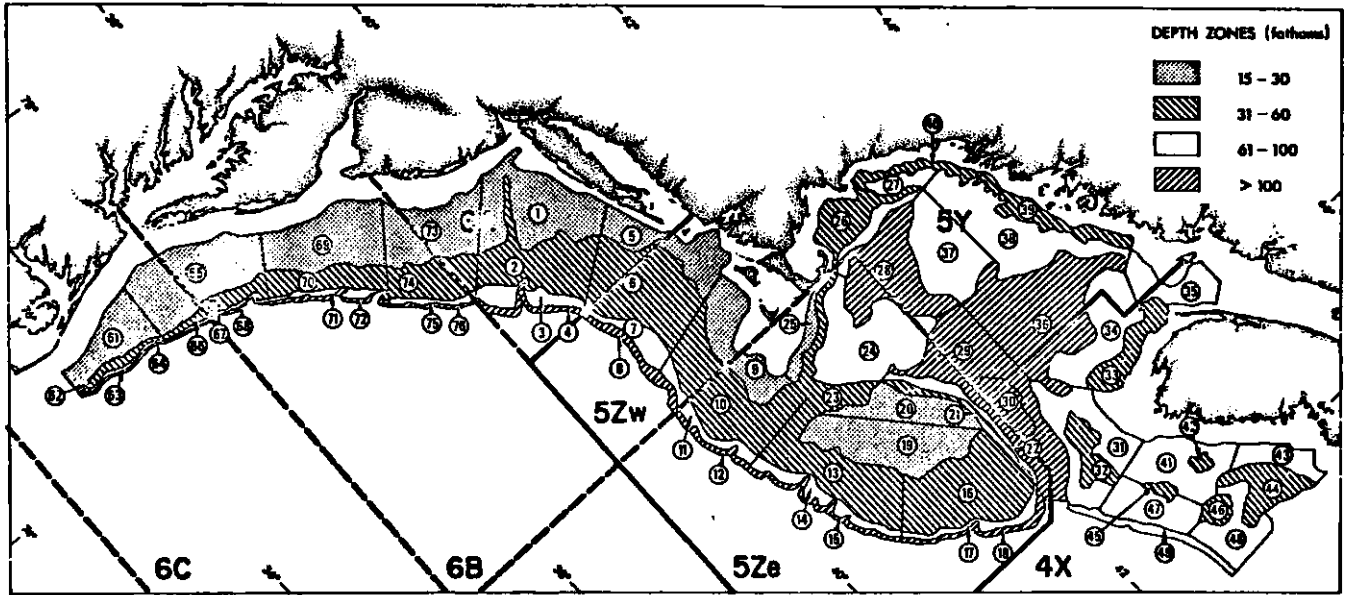


Figure 1. ICNAF Subareas 5 and Statistical Area 6, by divisions, with USA bottom trawl survey strata.

