Loligo pealei Stock Status: November 1977

by

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INTRODUCTION

Foreign fisheries for *Loligo pealei* will be regulated according to the Preliminary Management Plan (PMP) proposed by the Department of Commerce or the Fisheries Management Plan (FMP) in preparation by the Mid Atlantic Regional Fishery Management Council in cooperation with the New England and South Atlantic Regional Fishery Management Councils. These plans are based on the most recent biological data available when they were initiated. In the interim, additional data has become available. A preliminary analysis of the new data is provided in this report.

The Fishery Management Plan in preparation by the Fishery Management Councils allows a reassessment of the status of the stock and adjustment of next years optimum yield at the end of each calendar year. This report is intended to provide the most recent available data to the Councils for consideration in this regard. For a more complete description of the fishing for *Loligo* and its management, the reader is referred to the PMP, FMP, Tibbetts (1977, ICNAF Selected Papers No. 2, p. 85-110) and Sissenwine and Tibbetts (1977, ICNAF Selected Papers No. 2, p. 71-84).

Results and Discussion

The pre-recruit index (stratified mean number per tow of individuals ≤ 8 cm mantle; Table 1) from the Autumn 1976 US bottom trawl survey was higher than the previous 9 year (1967-1975) average, though it was 49% lower than 1975's. The catch/tow of Loligo of all sizes was also above the 9 year average for 1976, but lower than 1975.

Early 1977 commercial catches of Loligo were, however, less than in previous recent years. Preliminary reports of foreign catches in the first three months were 25% less than in 1976, even though total allowable catches had not been reached. USA inshore catches during the first six months of 1977 dropped 71% from 1976 catches and 16% from the previous seven year (1970-1976) average. Even though the USA directed fishery in May and June realized approximately the same landings as in May and June of 1976, the amount of effort applied to obtain this catch may have been greater (personal communication, Pat Gerrier, NMFS, New Bedford, MA). Incidental catches in earlier months and since June have been substantially lower than previously.

USA spring bottom trawl survey results for 1977 indicate a decrease in Loligo abundance in the Southern New England, Middle Atlantic and Southern Georges Bank areas from 1976 to 1977 of 85%, 86% and 28% respectively. The decreases from the 1968 to 1976 mean catch was 70, 74 and 69% respectively (Table 2). In August (July 27-August 30) the US R/V's ALBATROSS IV and DELAWARE II participated in an inshore (≤ 60 fathoms) summer bottom trawl survey from Cape Hatteras to Nova Scotia. Loligo is usually abundant in these

shallow waters during the summer. Stratified mean numbers per tow for this survey, in the standard survey strata, (15-60 fathoms) were calculated and compared with a similar survey conducted in 1969. It should be noted that the 1969 Autumn bottom trawl survey indicated that the abundance of Loligo in that year was typical of other years during which surveys were conducted.

In 1977, the stratified mean number of Loligo per tow was 54.087 (with $P(78.36 \leq \bar{y}_{st} \leq 29.81) = .95$) in the Southern New England - Mid-Atlantic area; 2.194 ($P(0.0 \leq y_{st} \leq 4.903) = .95$) on Georges Bank with none in the Gulf of Maine area. These values were about half those of 1969 (104.86, 4.36 and 0.0, respectively). Strata by strata comparison of Loligo catches in these two years show a significant (at the 0.05 level) decrease in mean catches per tow, for those strata sampled during both cruises (Table 3). There was also a substantial change in the percent composition of squid (Loligo vs. Illex) in the catches. In 1969 Illex made up 49 and 53% of the total squid catch (in numbers) in the Southern New England and Middle Atlantic respectively while the corresponding percentages were 76 and 95.5%, indicating an increase in importance of Illex in the squid biomass of these areas. In both years, Illex made up 100% of the squid caught in the Gulf of Maine.

Information from vessels which collect Loligo for biological samples for the Marine Biological Laboratory in Woods Hole indicate the possibility of late arrivals to the inshore area. Few large individuals were taken in the late spring - early summer when they are usually quite abundant, but as the summer progressed these large Loligo began to appear in great quantities, (personal communication, L. Lawday, MBL Supply Department) possibly indicating a delay in the peak spawning period from May to late July.

The USA Autumn bottom trawl survey provides the most reliable indices of abundance for Loligo and preliminary analysis of data collected thus far, from Southern New England - Middle Atlantic and Georges Bank strata (the Gulf of Maine has not been sampled yet), indicate that the number of Loligo in 1977 in the SNE - MA area is 18% greater than in 1976 but 23% less than in 1975. However, the average size of the individuals (mean weight) is much less this year than in 1976, and consequently estimates of biomass are less (Table 4). This decrease in size and, therefore, total weight may be due to later spawning. Estimates of stock size in numbers and weight were calculated by areal expansion of catch/tow data (Tibbetts 1977). These estimates are very conservative since they assume that the gear efficiency is 100%. Since Loligo migrate vertically at night and thus are less vulnerable to bottom trawl gear, a more realistic estimate of stock size can be obtained by adjusting all night tows by a factor corresponding to the fishing power of the bottom trawl gear during day relative to night. This approach will be applied to the 1977 survey data after it has been further processed.

Even the conservative estimate of stock size for 1977 indicated in Table 4 is adequate to support an Optimum Yield 44,000 tons based on the analysis described in Sissenwine and Tibbetts (1977) and repeated in Preliminary Management Plans and Fisheries Management Plans (in preparation). It is noteworthy that because of the annual small size of Loligo in the USA Autumn bottom trawl survey catch, the biomass of fishable individuals available to the winter offshore fishery may be lower than in recent years, particularly if large mesh nets are used.

Table 1. Pre-recruit indices of *Loligo* (stratified mean number per tow of *Loligo* of all sizes and of these ≤ 8 cm in mantle length in autumn bottom trawl surveys Middle Atlantic to Georges Bank.

	Loligo $\bar{\#}$/tow	
Year	All sizes	≤ 8 cm
1967	134.5	126.9
1968	176.5	159.9
1969	237.3	217.4
1970	85.6	79.3
1971	163.3	161.5
1972	271.4	258.5
1973	372.0	353.9
1974	251.7	233.3
1975	614.4	593.3
1976	410.9	302.5

Table 2. Loligo stratified mean weight per tow (1968-1977) from USA spring bottom trawl surveys.

Year	Mid Atlantic	So. New England	So. Georges Bank
1968	5.49	2.74	2.45
1969	3.82	.62	11.60
1970	2.75	2.35	1.61
1971	6.22	2.98	3.94
1972	6.69	13.08	6.11
1973	6.23	10.76	7.42
1974	6.09	2.144	.29
1975	10.71	16.73	4.49
1976	15.89	16.81	1.90
1977	2.15	2.56	1.36

Table 3. Strata mean number per tow Loligo from USA summer bottom trawl surveys. 1969 and 1977, including number of tows per strata.

	Loligo			
Strat	#/tows	$\bar{\#}$/tow 1969	#/tows	$\bar{\#}$/tow 1977
1	7	134.3	7	.6
2	7	7.6		--
3	3	0		--
4	3	0		--
5	5	47.2	5	0
6	8	0		--
7	3	0		--
8	3	0		--
9	5	1.2	5	0
10	8	0	6	0
11	3	0		--
12	3	0		--
61	4	88.8	5	173.6
62	2	120.0	2	34.5
63	2	34.0		3308.0
64	2	2.0		--
65	7	417.7	10	121.3
66	4	112.5	2	144.5
67	1	12.0		--
68	2	2.5		--
69	6	255.3	4	30.5
70	4	502.3	1	46.0
71	2	616.5		--
72	2	80.5		--
73	5	172.6	3	108.3
74	4	16.2		--
75	2	17.0		--
76	2	1.0		--
13	9	0	10	0
14	4	0		--
15	3	0		--
16	10	0	11	0
17	4	0		--
18	3	0		--
19	9	14.2	9	11.7
20	6	20.7	6	1.5
21	4	0	4	0
22	0	--	4	0
23	5	.4	5	0
24	6	0	7	0
25	0	--	4	0

Table 4. Loligo biomass estimates (mean weights in kg and mean numbers per tow by strata set) from US Autumn bottom trawl surveys.

Year	Area	#/tows	wt/tow	#/tow	Biomass estimates Wt MT	Biomass estimates # $\times 10^6$
1968	SNE-MA	124	10.86	267.57	28073	692.6
	Geo. Bank	69	.40	10.73		
	G. Maine	50	.01	.09		
1969	SNE-MA	119	13.99	347.5	37643	938.6
	Geo. Bank	73	1.56	36.7		
	G. Maine	51	.03	.40		
1970	SNE-MA	122	4.13	105.4	12095	337.9
	Geo. Bank	70	1.12	49.4		
	G. Maine	53	.05	1.46		
1971	SNE-MA	125	4.04	234.2	11752	641.4
	Geo. Bank	73	1.05	34.1		
	G. Maine	55	.03	.57		
1972	SNE-MA	114	9.41	398.9	25400	1065.1
	Geo. Bank	73	1.13	39.3		
	G. Maine	55	0.0	0.2		
1973	SNE-MA	111	14.2	542.9	42338	1460.9
	Geo. Bank	73	4.53	60.9		
	G. Maine	54	.05	.91		
1974	SNE-MA	108	11.41	355.9	32014	989.0
	Geo. Bank	74	2.21	62.07		
	G. Maine	57	.03	.78		
1975	SNE-MA	115	15.55	895.5	41912	2412.0
	Geo. Bank	73	1.80	102.56		
	G. Maine	65	.81	.81		
1976	SNE-MA	123	15.79	579.79	44935	1632.0
	Geo. Bank	67	3.14	103.52		
	G. Maine	55	.36	12.67		
1977*	SNE-MA	131	11.89	685.77	31318	1791.3
	Geo. Bank	92	.87	39.38		

*Estimates do not include the Gulf of Maine, since the 1977 survey in this area has not yet been completed.