

ANNUAL MEETING - JUNE 1968Length and Age Structure of Herring Stocks
in the Bay of Fundy (Division 4X)

by

J.H. Messiah, C.D. Burnett and S.H. Tibbo
Fisheries Research Board of Canada
Biological Station, St. Andrews, N.B.

Sampling of herring landings in the Bay of Fundy has been increased considerably since 1964 in the Passamaquoddy region where the centre of "sardine" fishing industry is located and on the Nova Scotian side of the Bay where mature herring are now being much more extensively exploited. The purpose of this effort is to provide a basis for evaluating the changes in size, age and year-class composition of the catch and to assess the effect of fishing on availability and abundance of herring in the area. A summary of the size and age compositions of herring samples from these areas from 1964 through 1967 is presented here.

Length distribution. Figure 1 shows the length frequencies of combined samples from both sides of the Bay of Fundy from 1964 through 1967. Mean lengths by quarters and for each year are shown in Table I.

In general there does not appear to have been any substantial change in the sizes of herring taken during this period, although there was a five-fold increase in landings.

On the Nova Scotia side of the Bay, the mean length (annual) was slightly smaller in 1965 than for other years, but this was probably due more to an addition of younger age groups than to a decrease in the abundance of larger fish. The observed differences in length composition between New Brunswick and Nova Scotia areas reflect the type of fishery in each area. In New Brunswick the fishery

depends chiefly on herring, which are recruited at the end of their first year of life, and leave the fishery at the onset of sexual maturity. In Nova Scotia the fishery depends on spawning stocks which are usually recruited at the end of their fourth year of life.

Age distribution. Tables II and III show the age composition of herring samples from New Brunswick and Nova Scotia respectively. Mean ages and dominant year-classes are also shown.

In the New Brunswick area the fishery depends mainly on "age" 2 herring. A new year-class, after completing its first year of life, enters the fishery in the autumn, and dominates the catch during most of the following year. Near the end of each year, it is replaced by a new year-class. The relative success of the fishery therefore depends greatly on fluctuation in the abundance of a single year-class.

The age composition obtained from New Brunswick samples does not indicate any major change in the herring stocks in that area. The increase in mean age after 1964 is attributed to sampling bias. The 1964 samples were almost entirely from inshore weir-caught herring, whereas subsequently, the fishery expanded offshore and samples of larger and older seinc-caught herring were included. The age distribution obtained from Nova Scotia samples also shows that there has been no major changes that can be attributed to increased fishing. The strength of the various year-classes in that area varies considerably and a single strong year-class may dominate the catch for two or more years. The 1963 year-class, for example, was strongly represented in 1965 and dominant in 1966 and 1967. The 1960 year-class was dominant in 1964 and 1965. The 1962 and 1964 year-classes were relatively weak.

Table I. Quarterly and annual mean lengths of herring samples from Bay of Fundy (Division 4X) 1964-1967

Year		Jan.-Mar.	Apr.-June	July-Sept.	Oct.-Dec.	Total Annual
<u>New Brunswick Area</u>						
1964	\bar{X}	127	150	194	136	158
	S	15.28	32.56	40.32	47.00	47.61
	$S_{\bar{X}}$	.44	.57	.60	.77	.41
1965	\bar{X}	119	143	174	165	153
	S	17.71	33.17	44.90	36.85	41.58
	$S_{\bar{X}}$	.34	.39	.54	1.02	.31
1966	\bar{X}	112	179	193	185	183
	S	23.71	55.95	44.23	44.83	50.68
	$S_{\bar{X}}$	.83	1.11	.57	1.09	.46
1967	\bar{X}	133	172	203	148	167
	S	33.56	65.83	54.30	52.00	59.46
	$S_{\bar{X}}$	.60	1.09	.79	.89	.48
<u>Nova Scotia Area</u>						
1964	\bar{X}	-	208	279	-	261
	S	-	61.71	37.76	-	54.97
	$S_{\bar{X}}$	-	1.72	.60	-	.75
1965	\bar{X}	132	210	262	213	225
	S	20.74	61.43	55.65	39.53	41.29
	$S_{\bar{X}}$	.53	1.61	.96	1.48	.90
1966	\bar{X}	175	231	296	216	248
	S	25.16	57.48	45.76	57.32	62.69
	$S_{\bar{X}}$	.86	1.04	.60	2.93	.72
1967	\bar{X}	-	234	281	250	267
	S	-	54.74	51.74	36.12	47.51
	$S_{\bar{X}}$	-	1.38	.72	1.73	.64

\bar{X} = mean length in mm
 S = standard deviation
 $S_{\bar{X}}$ = standard error

Table II. "Age" frequency of herring samples from New Brunswick areas (Division 43) 1964-1967

Year	Number	Number of fish at various ages							Mean age	Dominant year-class	
		I	II	III	IV	V	VI	VII			
1964	Jan.-Mar.		204	16							
	Apr.-June		177	3							
	July-Sept.	35	361	223							
	Oct.-Dec.	427	126	77							
TOTAL	533	968	349						1.90	1962	
1965	Jan.-Mar.		322	1							
	Apr.-June		201	12	10	25					
	July-Sept.		719	119	163	47	2				
	Oct.-Dec.	64	169	36	11						
TOTAL	24	1,769	168	184	73	2			2.30	1963	
1966	Jan.-Mar.		265	34							
	Apr.-June		175	323	72						
	July-Sept.	110	170	226	64	31	11	1			
	Oct.-Dec.	124	100	104	6	3	3	1			
TOTAL	264	790	1,147	171	84	14	2			2.61	1963,
1967	Jan.-Mar.		857	108							
	Apr.-June		720	17	34						
	July-Sept.	77	402	131	243	7					
	Oct.-Dec.	673	173	1	6	2					
TOTAL	756	2,232	316	53	27					2.20	1965

Table III. "Age" frequency of herring samples from Nova Scotia areas (Division 4A) 1964-1967

Year	Quarter	Number of fish at various ages										Mean age	Dominant year-class		
		I	II	III	IV	V	VI	VII	VIII	VIII+	are				
1964	Jan.-Mar.	42	56	216	21	2									
	Apr.-June			7	36	5									
	July-Sept.														
	Oct.-Dec.														
	TOTAL	42	56	223	57	7								3.32	1960
1965	Jan.-Mar.	92	8												
	Apr.-June	137	15	21	309	16	11	10							
	July-Sept.	28	59	342	431	102	20	4							
	Oct.-Dec.	211	33	113	4	2	1								
	TOTAL	462	120	546	744	120	39	14						4.06	1960
1966	Jan.-Mar.	7	209	4											
	Apr.-June	12	290	81	101	22	4	2							
	July-Sept.	11	105	100	55	9									
	Oct.-Dec.		1	11	52	6									
	TOTAL	30	605	296	230	35	4	2						3.72	1963
1967	Jan.-Mar.	122	46	230	107	137	20	15	62						
	Apr.-June	6	24	165	42	130	29	11	1						
	July-Sept.														
	Oct.-Dec.														
	TOTAL	128	70	495	149	257	49	26	63					4.82	1963

Length Frequency of Herring

Bay of Fundy, ICNAF Div. 4X

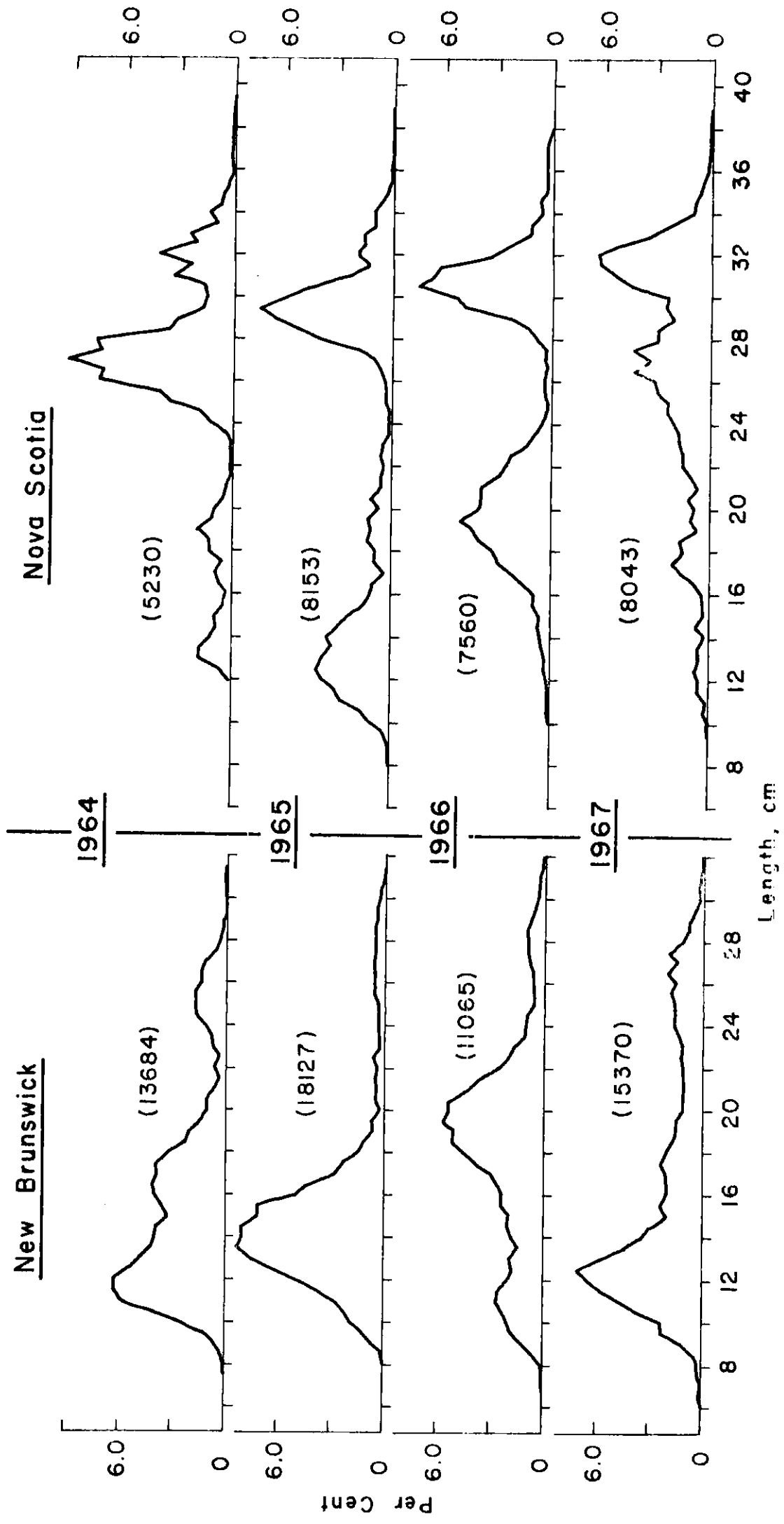


Fig. 1. Length composition of herring samples from Bay of Fundy areas (April 1-4-1967)