



Serial N. 1853  
(D.c.8)

ICNAF Res. Doc. 67/63

ANNUAL MEETING - JUNE 1967

The study of the effect of large-meshed chafer on the  
selectivity of the trawl net

by A.I. Treschev  
V.M. Naumov  
VNIRO, Moscow

At the 1966 Annual Meeting of ICNAF, the Subcommittee on Gear and Selectivity passed a recommendation urging all member countries to continue experiments on the selectivity of trawls furnished with chafers of the Soviet and Polish types.

The results of the investigations of the effect of topside chafer of the Soviet type on the selectivity, strength and durability of trawls were set out in Res. Doc. 66, (Serial No. 1534) and Res. Doc., 66/58, (Serial No. 1663) submitted to the 1965 and 1966 Annual Meetings respectively.

Newly obtained data do not change the essence of the earlier conclusions as to these chafers and therefore they are not referred to in this contribution.

The following is a short description and an account of the results of the experiments with a large-meshed chafer of the so-called Polish type which were completed on board the trawler Vitebsk in ICNAF Div. 2J (Labrador) in the period from February 2 through March 8, 1967.

A conventional trawl net with a codend made of double Kapron of 3.1 mm diameter and an inner mesh size of 110 mm was used in the experiments.

The codend was fitted with a chafer made of double twisted Kapron of 3.5 mm in diameter and with the inner mesh size about twice the size of mesh in the codend itself.

The chafer was of the same length and width as the codend and was attached to it along all four selvages and upper lacings (one central and four transverse). During the trials normal fishing conditions were observed, i.e., speed of trawl haul 3.5 - 4 knots; average duration of trawling  $1\frac{1}{2}$  hours.

In order to evaluate the selectivity of the codends, a standard cover made of Kapron webbing with the inner mesh size of 40 mm was fastened over the chafer and was 1.5 times wider and 2 $\frac{1}{2}$  longer than the codend.

Protective flaps made of used Kapron netting and bull hide were attached to the underside of the codend.

In the beginning the sizes of the meshes in the codend and chafer were measured after each trawl haul and later, after the stretching of the twine had stabilized, measurements were made after every 2 or 3 trawl hauls.

The measurements were made with the ICES gauge at a pressure of 4 kg. In all 28 measurements of meshes in the both codend and chafer were completed, and, as a result, the mean inner mesh size of the codend was determined as 107 mm and the chafer - 225 mm. The measurements are given in Table I.

Table I.

Results of Mesh Measurement (in mm)

<u>Part of trawl net</u>	<u>Average size of meshes in series</u>				<u>Mean value</u>
	<u>I</u>	<u>II</u>	<u>III</u>	<u>IV</u>	†
Codend	103.8	106.7	103.8 (110.0)	113.2	106.9 (108.4)
Chafer	223.7	225.2	225.5 (226.9)	228.6	225.8 (226.1)

The length of fishes was measured by a conventional method with rounding off to the nearest cm.

The whole catch was measured. There were 40 experimental trawl hauls completed using the Polish-type chafer. The results of trials grouped by 10 successive trawl hauls are set out in Tables 2-5. Table 6 gives the summary results of the tests and Table 7, the selection factors. The selectivity curves are shown in Fig. I.

Along with the study of the effect of the chafer on the selectivity of the trawl net, observations of the strength and durability of the codend fitted with this chafer were made.

When the mesh measurements were made, the whole codend was also examined for distortions of the meshes and damage to threads and knots. But, in the course of the 40 experimental trawl hauls no noticeable changes were observed in the codend. Later, during commercial fishing operations, this same codend with its Polish-type chafer was torn off during the eighteenth haul and was lost with its catch. Thus, a total of 58 trawl hauls were made with that codend.

At present, some trawl nets fitted with Polish-type chafers are being tested on two fishing vessels with special reference to their resistance to wear and tear.

Discussion and Conclusions

As seen from Table I the mesh size of the codend and chafer increased regularly with the number of trawl hauls with the exception, however, of the third series of tests where the mean mesh size of the codend became considerably less than that in the second series of trials, whereas the average size of the mesh of the chafer remained almost the same. This can be attributed to the fact that at the time of the third series of experiments the air temperature dropped to -10 and -15 degrees C, which caused the Kapron to shrink.

For this reason, it seemed advisable to take as actual mesh size, for the third series of tests, a mean value based on the results of preceding and following series of trials. The figures so calculated are shown in Table I in brackets.

From Tables 2-6 it may be seen that the variations in magnitude and size composition of catches are of such an extent that it appears possible to compare the results of the experiments. Moreover, due to the lack of particularly large catches (the maximum catch per haul did not exceed 4 tons), the conditions for fish escape-ment from the codend in this experiment can be considered to be favourable, and, therefore, the results obtained are evidently quite close to the actual selectivity of the codend.

The mean selection factor of the commercial trawl net using a Polish-type chafer is 3.9 in relation to the measured mesh size and 3.8 in relation to the precisely defined mesh size. It follows from this that the effect of a Polish-type chafer on the selectivity of the trawl net is negligible and within the range of experimental error.

The observations on the resistance to wear and tear also showed that the loss of the codend with chafer in the fifty-eighth haul can hardly be considered as the limit of its durability since no noticeable change was observed in its structure, and it could be destroyed when it got afoul an underwater obstacle.

Further use of such chafers will prove the limits of their application. However, data obtained to date show grounds for recommending the use of these chafers at least in the areas where moderate (3-4 tons) catches are made.

Table II

Series I  
Soviet experiment, 1967

Commercial trawl net furnished with Polish-type chafer  
Trawler "Vitebsk"

Area - Labrador, 2J	Fish species - cod			
Date - 2-7 Feb. 1967	Codend material - double Kapron			
Number of trawl hauls - 10	103, 8 mm			
	Depth of fishing - 265-400 m			
Fish length in cm.	Number of fishes in codend	Number of fishes in cover	Total number	Retention %
up to 25	1	2	3	33.3
25	-	8	8	0.0
26	-	3	3	0.0
27	-	5	5	0.0
28	-	15	15	0.0
29	-	13	13	0.0
30	19	86	105	18.1
31	9	39	48	18.8
32	14	82	96	14.6
33	13	76	89	14.6
34	10	80	90	11.1
35	42	203	245	17.1
36	29	159	188	15.4
37	47	148	195	24.1
38	41	174	215	19.1
39	59	143	202	29.2
40	254	392	646	39.3
41	107	191	298	35.9
42	236	273	509	46.4
43	205	162	367	55.8
44	247	144	391	63.2
45	552	303	855	64.6
46	473	186	659	71.8
47	359	109	468	76.7
48	506	111	617	82.0
49	382	85	467	81.8
50	970	113	1083	89.6
51	543	35	578	93.9
52	585	26	611	95.7
53	390	7	397	98.2
54	407	6	413	98.5
55	668	10	678	98.5
56	435	2	437	99.5
57	262	1	263	99.6
58	220	1	221	99.5
59	229	1	230	99.6
60	468	1	469	99.8
61	169	1	170	99.4
62	218	1	219	99.5
63	127	-	127	100.0
64	72	-	72	100.0
65	142	-	142	100.0
66	70	-	70	100.0
67	56	-	56	100.0
68	53	-	53	100.0
69	29	-	29	100.0
70	77	-	77	100.0
over 70	150	-	150	100.0
<b>Total</b>	<b>9945</b>	<b>3397</b>	<b>13342</b>	

Table III

## Series II

Soviet experiment, 1967

Commercial trawl net furnished with Polish-type chafer  
Trawler "Vitebsk"

Area - Labrador, 2J		Fish species - cod			
Date - 7-13 Feb. 1967		Codend material - double Kapron			
Number of trawlings - 10		106.7 mm			
		Depth of fishing - 220-450 m			
Fish length in cm.	Number of fishes in codend	Number of fishes in cover	Total number	Retention %	
up to 25	1	37	38	2.6	
25	2	39	41	4.9	
26	-	33	33	0.0	
27	3	45	48	6.2	
28	4	70	74	5.4	
29	4	71	75	5.3	
30	72	223	295	24.4	
31	27	163	190	14.2	
32	54	280	334	16.2	
33	23	338	361	6.4	
34	52	315	367	14.2	
35	146	490	636	23.0	
36	87	368	455	19.1	
37	97	360	457	21.2	
38	121	420	541	22.4	
39	202	380	582	34.7	
40	594	585	1179	50.4	
41	363	387	750	48.4	
42	441	438	879	50.2	
43	405	345	750	54.0	
44	493	272	765	64.4	
45	886	366	1252	70.8	
46	731	215	946	77.3	
47	661	220	881	75.0	
48	581	140	721	80.6	
49	690	116	806	85.6	
50	1103	118	1221	90.3	
51	796	40	836	95.2	
52	826	40	866	95.4	
53	539	15	554	97.3	
54	586	17	603	97.2	
55	792	22	814	97.3	
56	511	6	517	98.8	
57	435	6	441	98.6	
58	378	1	379	99.7	
59	294	-	294	100.0	
60	494	3	497	99.4	
61	211	1	212	99.5	
62	251	-	251	100.0	
63	165	2	167	98.8	
64	142	-	142	100.0	
65	172	-	172	100.0	
66	95	1	96	99.0	
67	79	-	79	100.0	
68	83	-	83	100.0	
69	48	-	48	100.0	
70	88	-	88	100.0	
over 70	172	-	172	100.0	
Total	15000	6988	21988		

ble IV.

## Series III

Soviet experiment, 1967

Commercial trawl net furnished with Polish-type chafer

Trawler "Vitebsk"

Area - Labrador, 2J  
 Date - 14-18 Feb. 1967  
 Number of trawlings - 10

Fish species - cod  
 Codend material - double Kapron  
 103.8 (110.0) mm  
 Depth of fishing - 295-375 m

Fish length in cm.	Number of fishes in codend	Number of fishes in cover	Total number	Retention %
up to 25	-	13	13	0.0
25	2	23	25	8.0
26	-	41	41	0.0
27	1	30	31	3.2
28	2	46	48	4.2
29	1	64	65	1.5
30	10	101	111	9.0
31	7	106	113	6.2
32	11	135	146	7.5
33	6	164	170	3.5
34	19	165	184	10.3
35	48	214	262	18.3
36	45	234	279	16.1
37	39	310	349	11.2
38	43	257	300	14.3
39	35	263	298	11.7
40	131	348	479	27.3
41	115	248	363	31.7
42	205	312	517	39.6
43	186	258	444	41.9
44	193	238	431	44.8
45	391	322	713	54.8
46	373	208	581	64.2
47	332	216	548	60.6
48	388	174	562	69.0
49	444	117	561	79.1
50	512	126	638	80.2
51	454	35	489	92.8
52	487	28	515	94.6
53	471	17	488	96.5
54	395	10	405	97.5
55	502	14	516	97.3
56	358	4	362	98.9
57	268	-	268	100.0
58	260	2	262	99.2
59	235	3	238	98.7
60	280	-	280	100.0
61	173	-	173	100.0
62	170	-	170	100.0
63	111	-	111	100.0
64	95	-	95	100.0
65	108	-	108	100.0
66	61	-	61	100.0
67	43	-	43	100.0
68	48	-	48	100.0
69	35	-	35	100.0
70	41	-	41	100.0
over 70	120	-	120	100.0
Total	8254	4846	13100	

Table V.

## Series IV

Soviet experiment, 1967

Commercial trawl net furnished with Polish-type chafer

Trawler "Vitebsk"

Area - Labrador, 2J  
 Date - 21-25 Feb. 1967  
 Number of trawlings - 10

Fish species - cod  
 Codend material - double Kapron  
 113.2 mm  
 Depth of fishing - 280-360 m

Fish length in cm.	Number of fishes in codend	Number of fishes in cover	Total number	Retention %
up to 25	-	5	5	0.0
25	2	7	9	22.2
26	2	7	9	22.2
27	2	7	9	22.2
28	3	20	23	13.0
29	1	29	30	3.3
30	25	61	86	29.1
31	23	77	100	23.0
32	58	154	212	27.4
33	59	150	209	28.2
34	60	166	226	26.5
35	138	267	405	34.1
36	123	258	381	32.3
37	142	297	439	32.3
38	167	263	430	38.8
39	187	247	434	43.1
40	389	332	721	54.0
41	319	269	588	54.2
42	513	352	865	59.3
43	515	269	784	65.7
44	537	190	727	73.9
45	883	286	1169	75.5
46	819	191	1010	81.1
47	796	189	985	80.8
48	786	128	914	86.0
49	803	77	880	91.2
50	1021	84	1105	92.4
51	835	35	870	96.0
52	874	35	909	96.1
53	727	25	752	96.1
54	662	8	670	98.8
55	843	12	855	98.6
56	693	5	698	99.3
57	504	2	506	99.6
58	403	1	404	99.8
59	366	2	368	99.4
60	505	-	505	100.0
61	298	-	298	100.0
62	288	-	288	100.0
63	154	-	154	100.0
64	132	-	132	100.0
65	212	-	212	100.0
66	78	-	78	100.0
67	70	-	70	100.0
68	44	-	44	100.0
69	30	-	30	100.0
70	71	-	71	100.0
over 70	83	-	83	100.0
Total	16245	4507	20752	

ble VI.

(Summary)

## Series V

Soviet experiment, 1967

Commercial trawl net furnished with Polish-type chafer

Trawler "Vitebsk"

Area - Labrador, 2J  
 Date - 2-25 Feb. 1967  
 Number of trawlings - 10

Fish species - cod  
 Codend material - double Kapron  
 106.9 (108.4) mm  
 Depth of fishing - 220-450 mm

Fish length in cm.	Number of fishes in codend	Number of fishes in cover	Total number	Retention %
up to 25	2	57	59	3.4
25	6	77	83	7.2
26	2	84	86	2.3
27	6	87	93	0.4
28	9	151	160	5.6
29	6	177	183	3.3
30	126	471	597	21.1
31	66	385	451	14.6
32	137	651	788	17.4
33	101	728	829	12.2
34	141	726	867	16.3
35	374	1174	1548	24.2
36	284	1019	1303	19.0
37	325	1115	1440	22.6
38	372	1114	1486	25.0
39	483	1033	1516	31.9
40	1368	1657	3025	45.2
41	904	1095	1999	45.2
42	1395	1375	2770	50.4
43	1311	1034	2345	55.9
44	1470	844	2314	63.5
45	2712	1277	3989	68.0
46	2396	800	3196	75.0
47	2148	734	2882	74.5
48	2261	553	2814	80.3
49	2319	395	2714	85.4
50	3606	441	4047	89.1
51	2628	145	2772 <sup>5</sup>	94.8
52	2772	129	2901	95.6
53	2127	64	2191	97.1
54	2050	41	2091	98.0
55	2805	58	2863	98.0
56	1997	17	2014	99.1
57	1469	9	1478	99.4
58	1261	5	1266	99.6
59	1124	6	1130	99.5
60	1747	4	1751	99.8
61	851	2	853	99.8
62	927	1	928	99.9
63	557	2	559	99.6
64	441	-	441	100.0
65	634	-	634	100.0
66	304	1	305	99.7
67	248	-	248	100.0
68	228	-	228	100.0
69	142	-	142	100.0
70	277	-	277	100.0
Over 70	525	-	525	100.0
Total	49444	19737	69182	

2773

Table VII.

Selection factors of Kapron codend (108.4 mm)  
with Polish-type chafer (226.1 mm)

---

	<u>Series</u>				
Selection factor	I 4.08	II 3.89	III 4.29 (4.04)	IV 3.50	Mean Value 3.92 (3.86)

---

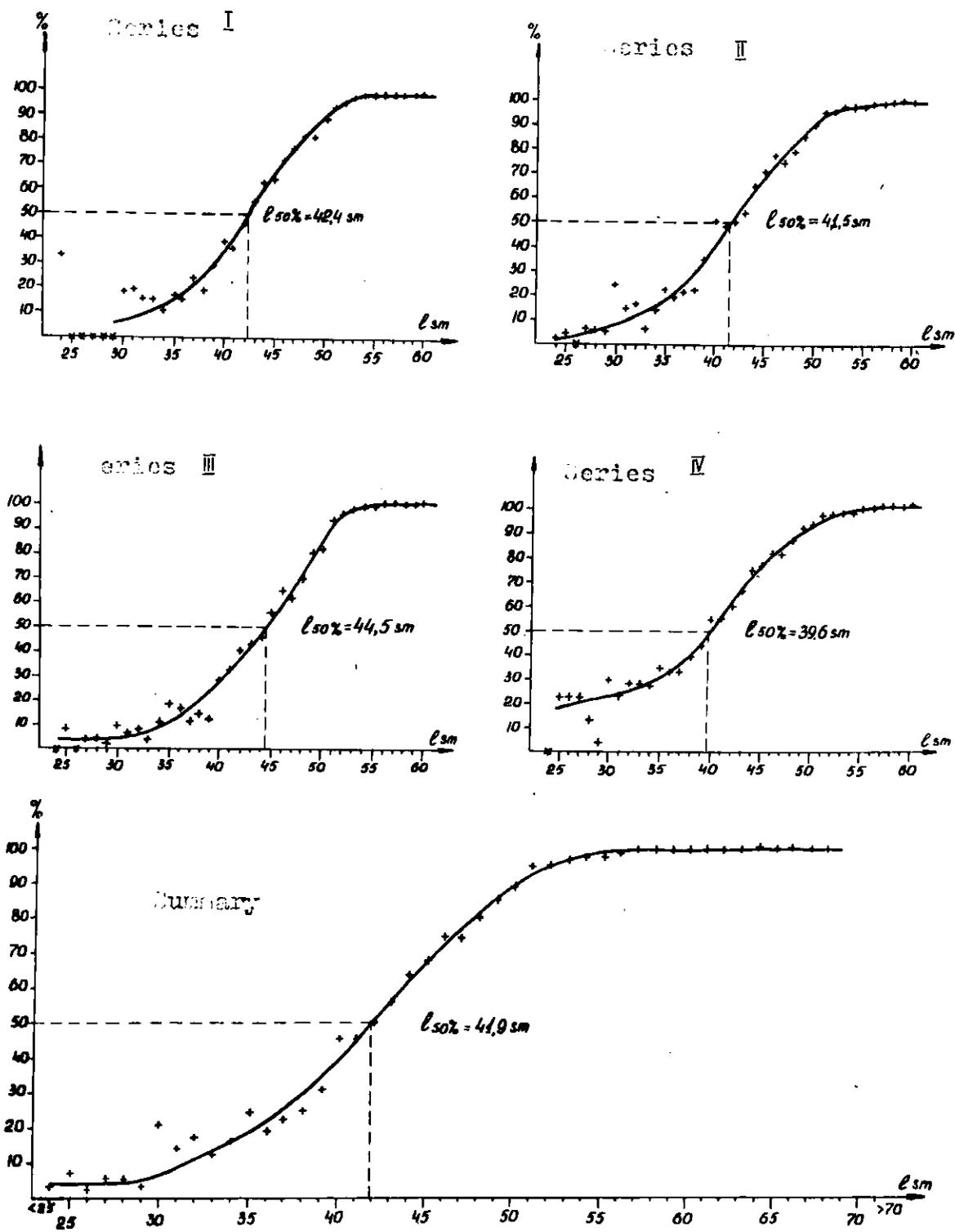


Fig. 1. Selectivity curves of Kapron codend (108.4 mm mesh size) furnished with Polish-type chafer (226.1 mm mesh size).