184231

FISHERIES RESEARCH BOARD
OF CANADA
ATLANTIC BIOLOGICAL STATION
ST. ANDREWS, N. B.

FISHERIES RESEARCH BOARD

OF CANADA

MANUSCRIPT REPORTS OF THE BIOLOGICAL STATIONS

No. 286

Title

CONTENTS OF ALBACORE STOMACHS

Author

J. L. Hart

1941

17222

Contents of Albacore Stomachs

By J. L. Hart

Introduction

The albacore fishery of British Columbia is small in volume, the total catch in 1941 being less than 40 tons and the largest annual catch ever made being in the neighbourhood of 80 tons (1939). In spite of the low volume of fish handled, the value of the fishery to the Province is relatively high because (1) of the relatively high value obtained for the raw material and (2) of the large amount of labour entailed in preparing the product for market. The species has not so far attracted the attention of many British Columbia fishermen and very few have pursued it with real energy. Accordingly, the fishery has unknown economic potentialities for the Province. The present preliminary study of the food has been made in the hope that knowledge of the feeding habits of the fish might be of value to fishermen in devising lures with which to attract and hook the albacore.

Methods and Materials

The material for the study of albacore food has been obtained through the courtesy of British Columbia Packers at Kildonan. The viscera of the butchered fish were thrown into boxes in the cannery and saved for subsequent examination. The examination was carried out by macroscopic examination as soon as possible after the viscera were thawed. Two lots of stomachs were examined. The first lot consisted of fish taken in a number

of small catches made off the upper part of Vancouver island, during the latter part of the summer of 1941. The other lot consisted of stomachs taken from fish caught off the Washington coast during the summer of 1941.

The Results

The results of the examination of the stomachs are shown in the two attached tables. In the tables, the columns headed "No." indicate the number of albacore found to contain the combination of food items listed in the left-hand column in the same row. The numbers in the "Av." column indicate the average number of the food items encountered in the stomachs containing them. Where two numbers are given in the "Av." column, they refer to the average numbers of the two items listed in the left-hand column, the upper number referring to the first mentioned food organism. In the right-hand column are listed the various items found in the stomachs of albacore with a number indicating the number of stomachs in which each item occurred, regardless of whether or not it was in combination with other material.

It will be noticed that, in all, 653 stomachs were examined. Of these, 243 were found to be empty, or to contain disorganized and semi-digested matter which appeared to be beyond any identification. In some cases, this material was suspected of being digested euphausiids. In many cases fish were included under the heading of "Unidentified Fish", although it was strongly suspected that the fish were pilchards, anchovies, or herring.

Unless reasonable certainty could be maintained concerning the identification of such fish, they were listed under the heading of "Unidentified Fish". The squids were not identified to species. Many were evidently Loligo species and one was observed which was evidently Rossia species. Great variety in the size of squids found in the stomachs was observed in the samples examined from the Washington coast. The myctophids recorded in the tables were evidently Tarletonbeania crenularis. These are small deep-sea fish with luminous organs on their sides, regarded as being rare, although evidently the albacore did not find them particularly scarce.

It might be pointed out that, in general, food organisms found in the albacore stomachs were small. The largest single item found in any of the stomachs were medium sized pilchards.

Several important differences may be noted between the two areas. Most interest, perhaps, is in the difference in the proportion of stomachs containing euphausiids. The stomachs taken off the coast of Vancouver island showed euphausiids as a dominant food, whereas such was far from being the case in the food samples taken off the Washington coast. There was complementary difference in the importance of squid in the two areas. Squid were found to be much more abundant in the stomachs of the Washington coast fish. Other differences appear to be less significant, although possibly interest may be attached to the fact that anchovy could be definitely identified in the Washington coast stomachs, and young herring (?) were

encountered in considerable numbers by some of the albacore off the Washington coast. Some interest attaches to the occurrence of miscellaneous items such as bark, feathers, seaweed, etc., which suggest that the albacore strikes at any object perceived in the water.

Appendix No. I - Canning Methods

As the methods of handling albacore and preparing them for market differ considerably from those used for other species, it seems in order to give a short summary herewith.

The fish on being caught are bled by gibbing, and iced by preference. They are frozen on reaching port and held until a slack time in the cannery offers an opportunity for processing. The fish are taken from cold storage and allowed to thaw for a day or a day and a half. They are then butchered and washed. Butchering involves removing the gills and viscera. The fish are then cooked whole on trays in the retorts. This is followed by skinning, heading, and removing vertebral column and the dark flesh of the superficial lateral muscle. The "fillets" are then cut across in slices, corresponding in thickness to the height of the fish in the can, and taken to the filling tables. The filling is carried out by actually cutting pieces of the sliced albacore to fit the can. A large piece is put in first, and followed by successive smaller ones until the can is completely filled with the required amount of fish. Oil is added to the can at both top and bottom. The cans are

then vacuum sealed and retorted in the usual way. Albacore flakes are packed into the can in bulk, much as though the can were being filled with dough.

Appendix No. II - Length Distribution

Albacore from four different lots of catches were measured for length and the results follow in the accompanying table.

Table I. Summary of food of albacore taken in several small catches off the upper part of Vancouver island, for the most part, relatively close to shore. Summer 1941.

Food in Stomach	No. Fish with Stomach Contents Listed	Full No.	Full Av.	3/4 Full No.	3/4 Full Av.	1/2 Full No.	1/2 Full Av.	1/4 Full No.	1/4 Full Av.	Trace No.	Trace Av.	No. With Organism Listed
None or disorganized material	98	-	-	-	-	-	-	4	-	34	-	-
Pilchard	9	4	1.7	2	1	-	-	2	?	1	1	14 Pilchard
Pilchard and anchovy	0	-	-	-	-	-	-	-	-	-	-	-
Pilchard and saury	1	1	2	-	-	-	-	-	-	-	-	-
Pilchard and small fish with toothed jaws	1	1	6 1	-	-	-	-	-	-	-	-	-
Pilchard and unidentified fish	0	-	-	-	-	-	-	-	-	-	-	-
Pilchard and squid	2	1	1	-	-	-	-	-	-	1	-	-
Pilchard, squid and unidentified fish	1	-	-	-	-	-	-	1	-	-	-	-
Herring	1	-	-	-	-	-	-	1	1	-	-	1 Herring
Herring and squid	0	-	-	-	-	-	-	-	-	-	-	-
Herring, squid and fucus	0	-	-	-	-	-	-	-	-	-	-	-
Anchovy	0	-	-	-	-	-	-	-	-	-	-	-
Anchovy and saury	0	-	-	-	-	-	-	-	-	-	-	-
Anchovy, unidentified fish and Phyllospadix	0	-	-	-	-	-	-	-	-	-	-	1 Zostera
Saury	0	-	-	-	-	-	-	-	-	-	-	2 Saury
Saury, unidentified fish and Zostera	1	-	-	-	-	1	7	-	-	-	-	-
Myctophid	1	-	-	-	-	-	-	-	-	1	-	1 Myctophid
Myctophid and unidentified fish	0	-	-	-	-	-	-	-	-	-	-	-
Myctophid and squid	0	-	-	-	-	-	-	-	-	-	-	-
Myctophid, euphausiid and feather	0	-	-	-	-	-	-	-	-	-	-	-
Small fish with fine teeth in jaws	1	-	-	-	-	-	-	1	1	-	-	2 Small fish with fine teeth in jaws
Launce and unidentified fish	1	-	-	-	-	-	-	1	2	-	-	1 Launce
Unidentified fish	82	8	5.1	3	7.0	12	3.4	30	2.2	29	-	97 Unidentified fish
Unidentified fish and squid	5	2	8.5 1	-	-	-	-	1	2	2	-	-
Unidentified fish, squid euphausiid and feather	0	-	-	-	-	-	-	-	-	-	-	-
Unidentified fish and euphausiid	7	2	1.5 90%	1	1 95%	1	1 80%	1	1 85%	1	-	-
Unidentified fish and Phyllospadix	0	-	-	-	-	-	-	-	-	-	-	-
Unidentified fish and feather	0	-	-	-	-	-	-	-	-	-	-	-
Unidentified fish and gravel	0	-	-	-	-	-	-	-	-	-	-	-
Squid	7	-	-	-	-	1	2	4	1.8	2	-	25 Squid
Squid and euphausiid	10	2	4 50%	1	1 95%	2	1.5 80%	3	-	2	-	-
Squid and fucus	0	-	-	-	-	-	-	-	-	-	-	-
Squid and amphipod	0	-	-	-	-	-	-	-	-	-	-	-
Squid and pelagic barnacle	0	-	-	-	-	-	-	-	-	-	-	-
Euphausiid (and mysid)	82	3	∞	10	∞	20	∞	25	∞	24	-	100 Euphausiid
Euphausiid and bark	1	-	-	-	-	1	50% 1	-	-	-	-	1 Bark
Phyllospadix	0	-	-	-	-	-	-	-	-	-	-	-
Fucus	1	-	-	-	-	-	-	-	-	1	-	1 Fucus
Feather	0	-	-	-	-	-	-	-	-	-	-	-
Chip	0	-	-	-	-	-	-	-	-	-	-	-
Gravel	0	-	-	-	-	-	-	-	-	-	-	-

Table II. Summary of food of albacore taken in catches made off the Washington coast. Summer 1941.

Food in Stomach	No. fish with Stomach Contents Listed	Full No.	Full Av.	3/4 Full No.	3/4 Full Av.	1/2 Full No.	1/2 Full Av.	1/4 Full No.	1/4 Full Av.	Trace No.	Trace Av.	No. With Organism Listed	
None or disorganized material	145	-	-	-	-	-	-	-	-	57	-	-	
Pilchard	8	6	1.1	1	1	1	1	-	-	-	-	10	Pilchard
Pilchard and anchovy	1	1	2	-	-	-	-	-	-	-	-	-	
Pilchard and saury	0	-	-	-	-	-	-	-	-	-	-	-	
Pilchard and small fish with toothed jaws	0	-	-	-	-	-	-	-	-	-	-	-	
Pilchard and unidentified fish	1	-	-	-	-	-	-	1	3	-	-	-	
Pilchard and squid	0	-	-	-	-	-	-	-	-	-	-	-	
Pilchard, squid and unidentified fish	0	-	-	-	-	-	-	-	-	-	-	-	
Herring	1	1	40	-	-	-	-	-	-	-	-	4	Herring
Herring and squid	2	2	40 1	-	-	-	-	-	-	-	-	-	
Herring, squid, and fucus	1	1	50 1	-	-	-	-	-	-	-	-	-	
Anchovy	3	-	-	-	-	1	7	2	1.5	-	-	7	Anchovy
Anchovy and saury	2	2	1 45	-	-	-	-	-	-	-	-	-	
Anchovy, unidentified fish and Phyllospadix	1	-	-	1	4 4	-	-	-	-	-	-	-	
Saury	3	-	-	-	-	2	2.5	1	1	-	-	5	Saury
Saury, unidentified fish and <u>Zostera</u>	0	-	-	-	-	-	-	-	-	-	-	-	
Myctophid	5	-	-	-	-	1	5	1	8	3	1.3	14	Myctophid
Myctophid and unidentified fish	2	1	1 6	-	-	-	-	-	-	1	1 2	-	
Myctophid and squid	6	-	-	1	4 2	1	2 3	3	3 3.3	1	1	-	
Myctophid, euphausiid and feathers	1	-	-	-	-	-	-	-	-	1	1 1	-	
Small fish with fine teeth in jaws	0	-	-	-	-	-	-	-	-	-	-	-	
Launce and Unidentified fish	0	-	-	-	-	-	-	-	-	-	-	-	
Unidentified fish	29	1	20	2	4.5	5	6.4	7	3.1	14	1.8	58	Unidentified fish
Unidentified fish and squid	20	-	-	1	22 1	2	7.5 1	10	1.8 1.4	7	1.9 1	-	
Unidentified fish, squid euphausiid and feather	1	-	-	-	-	-	-	-	-	1	1	-	
Unidentified fish, and euphausiid	1	-	-	-	-	-	-	-	-	1	1	-	
Unidentified fish and Phyllospadix	1	-	-	-	-	-	-	1	8 1	-	-	-	
Unidentified fish and feather	1	-	-	-	-	-	-	-	-	1	3	-	
Unidentified fish and gravel	1	-	-	-	-	-	-	-	-	1	1	-	
Squid	85	1	1	-	-	3	3.3	26	1.9	55	2.1	123	Squid
Squid and euphausiid	4	-	-	-	-	-	-	-	-	4	1.5	-	
Squid and fucus	2	-	-	-	-	-	-	-	-	2	1.5	-	
Squid and amphipod	1	-	-	-	-	1	1	-	-	-	-	-	
Squid and pelagic barnacle	1	-	-	-	-	-	-	1	1 1	-	-	1	Pelagic barnacle
Euphausiid (and mysid)	6	-	-	-	-	1	∞	1	∞	4	-	13	Euphausiid
Euphausiid and bark	0	-	-	-	-	-	-	-	-	-	-	-	
Amphipod	1	-	-	-	-	-	-	-	-	1	-	2	Amphipod
Phyllospadix	1	-	-	-	-	-	-	-	-	1	-	3	Phyllospadix
Fucus	0	-	-	-	-	-	-	-	-	-	-	3	Fucus
Feather	1	-	-	-	-	-	-	-	-	1	-	3	Feather
Chip	1	-	-	-	-	-	-	-	-	1	-	1	Chip
Gravel	2	-	-	-	-	-	-	-	-	2	-	3	Gravel

Table III. Albacore Measurements. Summer 1941.

Length in inches.	Cape Cook	Partly Cape Cook, rest Washington Coast	Off Grays Harbour	Off Washington Coast
20	-	-	-	-
20 1/4	-	2	-	-
20 1/2	1	3	-	4
20 3/4	2	1	-	1
21	1	3	-	7
21 1/4	1	1	-	-
21 1/2	1	3	-	1
21 3/4	-	1	-	1
22	1	1	-	1
22 1/4	1	2	-	2
22 1/2	-	-	1	5
22 3/4	-	2	-	1
23	1	2	-	3
23 1/4	-	1	-	-
23 1/2	-	1	1	4
23 3/4	2	2	-	1
24	1	2	-	3
24 1/4	3	6	1	1
24 1/2	2	3	3	3
24 3/4	3	6	2	2
25	4	6	1	10
25 1/4	8	7	-	9
25 1/2	6	17	1	13
25 3/4	12	11	4	18
26	16	30	4	28
26 1/4	9	20	5	11
26 1/2	17	43	10	32
26 3/4	12	28	14	17
27	8	45	19	25
27 1/4	6	22	14	5
27 1/2	6	29	10	8
27 3/4	7	9	7	13
28	5	15	7	14
28 1/4	4	4	5	6
28 1/2	1	9	3	6
28 3/4	-	3	4	8
29	1	8	3	9
29 1/4	1	3	1	6
29 1/2	1	4	2	13
29 3/4	2	-	1	5
30	-	8	1	7
30 1/4	-	2	-	8
30 1/2	-	4	-	13
30 3/4	1	3	-	3
31	-	8	1	4
31 1/4	-	5	-	1
31 1/2	1	5	1	9
31 3/4	-	-	1	-
32	-	6	2	3
32 1/4	1	3	1	-
32 1/2	-	-	-	2
32 3/4	-	4	-	1
33	-	1	-	1
33 1/4	-	-	-	-
33 1/2	1	1	-	1
33 3/4	-	-	-	2
34	-	2	-	-
34 1/4	-	1	1	-
34 1/2	1	-	-	-
34 3/4	-	1	-	1
35	1	1	-	-
35 1/4	-	-	-	-
35 1/2	-	1	-	-
35 3/4	-	1	-	-
36	-	1	-	-