which theoretically allows for a maximum of twelve vessels in the Convention Area at any given time. Regarding the TAC for trial fishing vessels, the United States suggested that, given the small amount of pollock caught during recent trial fishing efforts and the requirement that only two vessels per Party may engage in trial fishing at any one time, then a TAC is not necessary at this time. The United States proposed that the S&T approve the same trial fishing terms and conditions for 2001 as had been in place in 2000, with a two-week notification period.

5.1.6. The United States noted, however, that changing this period to two weeks would not change the Convention requirement to submit a trial fishing plan no later than the Annual Meeting. The purpose of the trial fishing plan is to notify all other Parties of the submitting Party's intent to conduct trial fishing. This notification allows Parties to plan for placement of scientific observers on that trial fishing vessel. At the same time, applying terms and conditions on trial fishing operations helps familiarize fishermen with the types of management measures that will be applied when a commercial fishery resumes.

5.1.7. The S&T agreed to recommend to the Annual Conference that the revised Trial Fishing Terms and Conditions for Pollock Fishing for 2000 be applied to the 2001 trial fishing operations, if trial fishing is established.

5.2. Number and Priority Placement of Observers Required by Article XI

5.2.1. The Chair of the Enforcement/Management Group, Captain J.V. O'Shea (U.S.) summarized the observer issue regarding the placement of Article XI observers once fishing is resumed in the Convention Area. This has been a difficult topic. It was discussed at the S&T of last year's Annual Conference and during the July 2000 Workshop with no progress.

5.2.2. There was no consensus on this issue and the Parties agreed to table the discussion for this meeting.

5.3. Methods to Determine Catch Weight

At the Third Annual Conference, the Parties reached consensus that until the best method to determine catch weight is decided, scales or volumetrics (calibrated bins and codends) would be used.

5.4. Components of a Management System

5.4.1. The United States reported that during the Fourth Annual Conference two issues were left unresolved: the length of the fishing season and the reallocation of unused quota. The United States reported that in it's view, in light of the discussions at this meeting, it would seem premature to set a fishing season at this time. The United States recommended that a decision on this subject be delayed until such a time when the science cruises could provide sufficient data to make a decision regarding the fishing season.

5.4.2. Japan agreed that a decision on deciding the length of the fishing season was not appropriate at this time, although Japan is in favor of a year round fishery.

5.4.3. Reallocation of unused quota. This part of the discussion followed from an earlier proposal by Japan that after a three year time period, unused quota could be redistributed to the other Parties. There are some concerns that this proposal may not comport with Article VIII-1 of the Convention, which states that, "INQ shall not be transferred to any other Party or non-Party to this Convention." The United States recommended that further discussion of this issue be postponed until such a time that fishing would be resumed in the Convention Area.

5.4.4. **The S&T agreed to postpone further discussion of these issues of a fishing season and the reallocation of unused quota until such a time that fishing would be resumed in the Convention Area.**

6. Other Matters and Recommendations.

6.1. The United States suggested that it would be helpful to compile details of historical catch data for the Donut Hole fisheries and asked cooperation from the other Parties to provide these details. These details could be extracted from fishing vessel logs, observer records from fishing vessels, and research cruises. The period 1984 to 1991 when the fisheries developed and declined would be an important period to focus on. The United States will contact the Parties to determine how these details could be compiled.

6.2. Russia reported that Japanese driftnet fishing boats reported pollock catches as early as the 1950s from oral reports and that it would be useful to determine if such data were still available.

6.3. Japan agreed to relay this request to the proper officials upon return to Japan.

7. Report of the S&T to the Annual Conference.

The Parties **adopted** the report and **recommended** the Annual Conference accept its recommendations

8. Closing Remarks.

The Chair closed the meeting at 1430 on Wednesday, 8 November 2000.

List of Attachments

1. S&T Agenda
2. List of S&T participants
3. Russian Biomass Estimates of Pollock in the WBS 1996-2000
4. Report on Republic of Korea Trial Fishing in 2000
5. Poland August 1999 Trial Fishing Report
6. Report on China Trial Fishing in 2000
7. U.S. Bogoslof Pollock Abundance Report for March 2000
8. Russia Pollock Stock Assessment for 2000
9. Japan Cruise Plan for Mid-Water Trawl Survey for Pollock Oct-Nov 2000
10. Republic of Korea Report of 2000 Research Cruise
11. July 2000 Pollock Workshop Report on Effects of Moratorium
12. Japan Proposal for ABC of 2001 in the Convention Area
13. Korean Precautionary Approach as New AHL Proposal
14. Russia Precautionary Approach Proposal
15. Japan 2002 Research Vessel Cruise Plan
16. Comprehensive Research Plan Proposal
17. Letters Regarding VMS Transponders on Trial Fishing Vessels

S&T Attachment 1

FIFTH ANNUAL CONFERENCE OF THE PARTIES TO THE CONVENTION ON THE CONSERVATION AND MANAGEMENT OF POLLOCK RESOURCES IN THE CENTRAL BERING SEA

NOVEMBER 6 – 10, 2000
SHANGHAI, THE PEOPLE'S REPUBLIC OF CHINA

Agenda
Scientific and Technical Committee

1. Opening Remarks
2. Appointment of Rapporteur
3. Adoption of Agenda
4. Discussion of Science Issues
   - 4.1 Update catch and effort statistics
   - 4.2 Year 2000 Results of Trial Fishing
   - 4.3 Review Results of 1999/2000 Research Cruises
   - 4.4 Review the Status of Aleutian Basin Pollock Stocks
   - 4.5 Factors Affecting Recover of the Stock
   - 4.6 The Effects of the Moratorium and its Continuation
   - 4.7 Methodologies to Determine Allowable Harvest Level (AHL)
   - 4.8 Comprehensive Research Plan
5. Discussion of Enforcement and Management Issues
   - 5.1 Trial Fishing Terms and Conditions for 2001
   - 5.2 Number and Priority Placement of Observers Required by Article XI
   - 5.3 Methods to Determine Catch Weight
   - 5.4 Components of a Management System
6. Other Matters and Recommendations
7. Report to the Annual Conference
8. Closing Remarks

FIFTH ANNUAL CONFERENCE

OF THE PARTIES TO THE CONVENTION ON THE

CONSERVATION AND MANAGEMENT

OF POLLOCK RESOURCES

IN THE CENTRAL BERING SEA

NOVEMBER 6 — 10

SHANGHAI, CHINA

DELEGATION

THE PEOPLE'S REPUBLIC OF CHINA

Mr. Deli Xin (Head)	Director for the Distant Water Fisheries Bureau of Fisheries Ministry of Agriculture
Mr. Qianfei Liu	Official Ministry of Agriculture
Mr. Yingqi Zhou	President Shanghai Seafood University
Mr. Jinfa Zhang	Permanent Vice General Manager Shanghai Deep Sea Fisheries Company
Mr. Zulian Zhang	Vice General Manager Shanghai Deep Sea Fisheries Company
Mr. Xianbiao Zhou	Vice General Manager CNFC Oversea Fisheries co., Ltd
Mr. Changhong Shi	Manager of the Sales Department CNFC Oversea Fisheries Co., Ltd
Mr. Xianshi Jin	Specialist Yellow Sea Fisheries Research

FIFTH ANNUAL CONFERENCE
OF THE PARTIES TO THE CONVENTION ON THE
CONSERVATION AND MANAGEMENT
OF POLLOCK RESOURCES
IN THE CENTRAL BERING SEA

NOVEMBER 6 — 10

SHANGHAI, CHINA

DELEGATION

JAPAN

Ichiro Kanto Mr.(Head)	Fisheries Agency of Japan
Nobuya Kaneko Mr.	Fisheries Agency of Japan
Noriaki Takagi Mr.	Japan Deep Sea Trawlers Association
Takashi Yanagimoto Mr.	Hokkaido National Fisheries Research Institute
Akira Nishimura Mr.	Hokkaido National Fisheries Research Institute
Akiko Tomita Ms.	Interpreter
Midori Ota Ms.	Interpreter

FIFTH ANNUAL CONFERENCE

OF THE PARTIES TO THE CONVENTION ON THE

CONSERVATION AND MANAGEMENT

OF POLLOCK RESOURCES

IN THE CENTRAL BERING SEA

NOVEMBER 6 — 10

SHANGHAI, CHINA

DELEGATION

REPUBLIC OF KOREA

Yoo Sang-Jung Mr. (Head)	Director International Cooperation Division Ministry of maritime & fisheries
Kim Jin-Yeong Dr.	Distant-Water Fisheries Resources Division Director National Fisheries Research and Development Institute
Seok Gwan-Choi Mr.	Distant-Water Fisheries Resources Division Vice-Director National Fisheries Research and Development Institute
Lim Woo-Kun Mr.	Chairman North-Pacific Trawl Fishery Committee of Korea Deep Sea Fisheries Association
Chung Sung-Ho Mr.	President HaeGil Co., Ltd
Lee Chang-Soon Mr.	Director KeukDong Moolsan Co., Ltd
Kim Tae-Won Mr.	General Manager

FIFTH ANNUAL CONFERENCE

OF THE PARTIES TO THE CONVENTION ON THE

CONSERVATION AND MANAGEMENT

OF POLLOCK RESOURCES

IN THE CENTRAL BERING SEA

NOVEMBER 6 — 10

SHANGHAI, CHINA

DELEGATION

REPUBLIC OF POLAND

Lidia Kacalska Bienkowska Mrs. (Head)	Director Fisheries Department, the Ministry of Agriculture and Rural Development
Jerzy Janusz Mr.	Sea Fisheries Institute

FIFTH ANNUAL CONFERENCE

OF THE PARTIES TO THE CONVENTION ON THE

CONSERVATION AND MANAGEMENT

OF POLLOCK RESOURCES

IN THE CENTRAL BERING SEA

NOVEMBER 6 — 10

SHANGHAI, CHINA

DELEGATION

THE RUSSIAN FEDERATION

Boris N. Kotenev Mr.	Director VNIRO
Vadim L. Minin Mr.	Division Chief Fisheries Committee
Vadim M. Nikolaev Mr.	Representative of the Fisheries Committee in The Republic of Korea
Mikhail A. Stepanenko Mr.	Sector Chief, TINRO-center
Elena V. Stakhanova Mrs.	Division Chief Fisheries Committee

FIFTH ANNUAL CONFERENCE OF THE PARTIES TO THE CONVENTION ON THE CONSERVATION AND MANAGEMENT OF POLLOCK RESOURCES IN THE CENTRAL BERING SEA

November 6-10, 2000
Shanghai, China

DELEGATION

THE UNITED STATES

Dr. Richard Marasco (Head of Delegation)
Director, Resource Ecology and Fishery Management Division
Alaska Fisheries Science Center, National Marine Fisheries Service (NMFS)

Dr. Loh-Lee Low
Resource Ecology and Fishery Management Division
Alaska Fisheries Science Center, NMFS

Dr. Neal Williamson
Resource Assessment and Conservation Engineering Division
Alaska Fisheries Science Center, NMFS

William P. Hines
International Negotiations, Alaska Region, NMFS

Gary Gailbreath
Office for Law Enforcement, Alaska Region, NMFS

Paul E. Niemeier
International Fisheries Division, Office of Sustainable Fisheries
Silver Spring, Maryland

Stetson Tinkham
Office of Marine Conservation, U.S. Department of State

Captain Vincent O'Shea
Chief, Planning and Policy
U.S. Coast Guard, 17th District, Juneau, Alaska

CDR Michael Cerne
Chief, Living Marine Resources Division, Office of Law Enforcement
U.S. Coast Guard, Washington, D.C.

LCDR Dwight Mathers
U.S. Coast Guard Liaison Officer
U.S. Department of State, Washington, D.C.

ADVISORS

Dennis Austin - Washington State Department of Fisheries and Wildlife

David Benson - Trident Seafoods

Gordon Blue - Alaska Crab Coalition

Alvin Burch - Alaska Draggers Association

Kevin Duffy - Deputy Commissioner, Alaska Department of Fish and Game

Paul MacGregor - At-Sea Processor Association

Brent Paine - United Catcher Boats

Thorton Smith - North Pacific Longline Association

Biomass estimates of pollock in the Western Bering Sea in 1996-2000 ths.m.t. (BT and EI survey data).

	To east 176^{0}00 E (Navarin area)			To west 176^{0}00 E (Western area)		
Year	**BT**	**EI**	**Total**	**BT**	**EI**	**Total**
1996	**390.4**	**257.0**	**647.4**	**217.5**	**108.5**	**326.0**
1997	**300.0**	**285.0**	**585.0**	**-**	**79.6**	**-**
1998	**320.3**	**87.8**	**408.1**	**119.2**	**48.0**	**167.2**
1999	**250.3**	**83.0**	**333.6**	**61.7**	**18.0**	**79.7**
2000	**-**	**118.0[1]**		**-**	**N/A**	**-**

)[1] - preliminary data

Catch of pollock and CPUE in the Navarin area (to the east from $176^{0}00$) in 1997-2000

Year	Vessel class	CPUE, t		Catch, ths.t
		t/per/day	t/per tow	
1997	Factory trawler	**79.9**	**26.1**	**680.0**
	catcher/processor	**42.5**	**19.8**	
1998	Factory trawler	**56.3**	**18.8**	**643.6**
	catcher/processor	**24.7**	**13.0**	
1999	Factory trawler	**48.4**	**19.9**	**632.7**
	catcher/processor	**11.2**	**6.8**	
2000*	Factory trawler	**44.7**	**19.4**	**317.2**
	catcher/processor	**11.9**	**7.4**	

)* - Preliminary data, November 1

Catch of pollock and CPUE (factory trawlers) in the Western Bering Sea (to west from 176 °00 E) in 1981-2000

Year	CPUE, t		Month	Catch, ths. t
	t/per day	t/tow		
1981	71,8	16,7	II-XII	151,8
1982	74,8	18,6	I-XII	48,4
1983	75,8	20,0	I, III, XII	36,0
1984	68,2	19,6	II-XII	88,3
1985	83,5	23,1	I-XII	133,2
1986	69,4	18,9	I, V-VIII	138,5
1987	86,2	24,5	II-XII	151,6
1988	82,3	24,4	I-XI	171,3
1989	86,1	26,0	I, II, IV, VI-XII	181,5
1990	76,0	23,9	VII-X	56,5
1991	89,9	28,2	I-X	246,4
1993	65,7	23,0	VI-XII	37,5
1994	73,6	25,4	I, IV-XII	119,4
1995	65,2	24.7	I, IV-VI	11,1
1996	46,5	16,9	VII-IX	35,0
1997	46,6	22,6	I-V	43,2
1999	61,4	22,8	I, II, IV-IX	32,7
2000	67,4	33,5	VI-X	51,7

Attachment 4

KOREA

Report on the Korean trial fishing on walleye pollock in the Convention area of the Bering Sea in 2000.

The trial fishing in the convention area of the Bering Sea (Donut hole) was conducted two times by Korean commercial vessel in 2000. First, it was conducted by Korean stern trawler, her name is ORIENTAL DISCOVERER (Length-97.8m, tonnage-4,443 G/T), in the Convention area during 23 days (Jan. 12- Feb. 3, 2000). Second, ORIENTAL ANGEL (Length-103.59m, tonnage-5,210 G/T) of stern trawler conducted in the Convention area during 8 days (May 11-20, 2000). The main purpose of the trial fishing was to determine the geographical distribution of walleye pollock in the Convention area and to collect biological data of walleye pollock

Fig. 1 and Fig. 2 were presented the hydroacoustic tracklines and haul positions during first time and second time.

First time conducted 7 hauls using the midwater trawl net of Green Netex 1120 (codend mesh size-100㎜) and Stimul Net system (codend mesh size-100 ㎜). In haul no. 2, some fish and squids caught; Salmon-6 fish(2.61kg), Hairtail-1 fish(5.1kg), Jelly fish-7 fish(10.2kg), smooth lumpsucker-15 fish(9.93kg), Sharks-2 fish(22.0kg), and Squids-2 fish(1.7kg). Haul no. 5 were caught 69 fish(35.3kg) of smooth lumpsucker, 8 fish(5.1kg) of Jelly fish, and 13 fish(2.21kg) of Squids. The other hauls caught none. Also, walleye pollock were never caught in the Convention area. The depth of trawl gear was 122m to 370m, the hauling time was 3 hour to 6 hour. The temperature of gear depth was 1.2℃ in depth of 122m, 3.0℃ in 215m, 3.8℃ in 250m, and 3.5℃ in 370m (Table 1).

Second time conducted 2 hauls using the midwater trawl net of TMT-3P-90 (codend mesh size-110㎜). None of fish were caught. The trawl of gear depth were 150m and 450m the hauling time were 8 hour and 3 hour. The water temperature of sea surface was 2~3℃, deep water was 3~4℃ (Table 1).

Table 1. Detail information of hauls conducted by Korean trial fishing in the Convention area in January and May, 2000

Vessel name	Date	Gear type	Set Position	Hauling Position	Hauling Time	Depth of gear (m)
ORIENTAL DISCOVERER	Jan. 15	Green Netex 1120	N57° 18′ W177° 05′	N57° 28′ W177° 03′	4h 30min	165
	Jan. 17	Stimul Net system	N56° 54′ W179° 28′	N56° 43′ W179° 10′	1h 30min	215
	Jan. 19	Green Netex 1120	N58° 51′ W179° 32′	N58° 51′ W179° 10′	3h	122
	Jan. 26	Green Netex 1120	N58° 53′ E177° 32′	N58° 50′ E177° 50′	4h 20min	127
	Jan. 27	Green Netex 1120	N57° 52′ E177° 52′	N57° 35′ E178° 02′	5h 20min	370
	Jan. 28	〃	N56° 40′ E179° 03′	N56° 28′ E179° 20′	4h	270
	Jan. 30	〃	N56° 06′ W177° 10′	N56° 17′ W177° 06′	3h 20min	250
ORIENTAL ANGEL	May 13	TMT-3P -90	N56° 40′ E179° 00′	N56° 37′ E179° 02′	8h 05min	150
	May 18	〃	N56° 35′ E174° 56′	N56° 35′ E175° 16′	3h	450

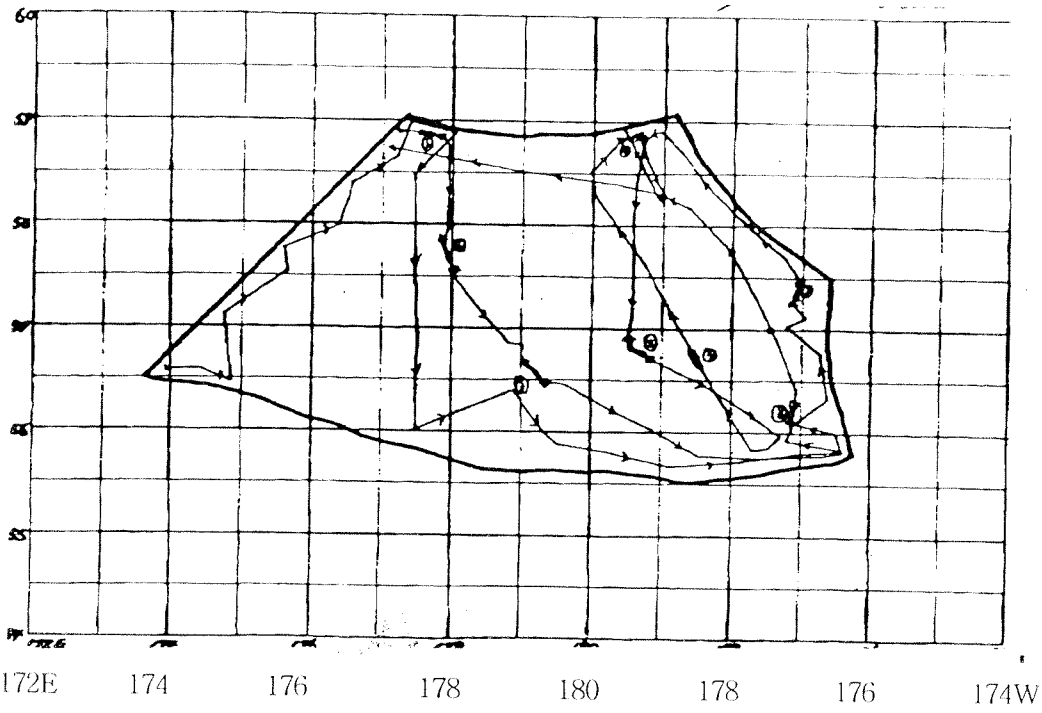


Fig. 1. Hydroacoustic trackline and haul positions (thick line) of M/T ORIENTAL DISCOVERER during trial fishing in Convention area in January.

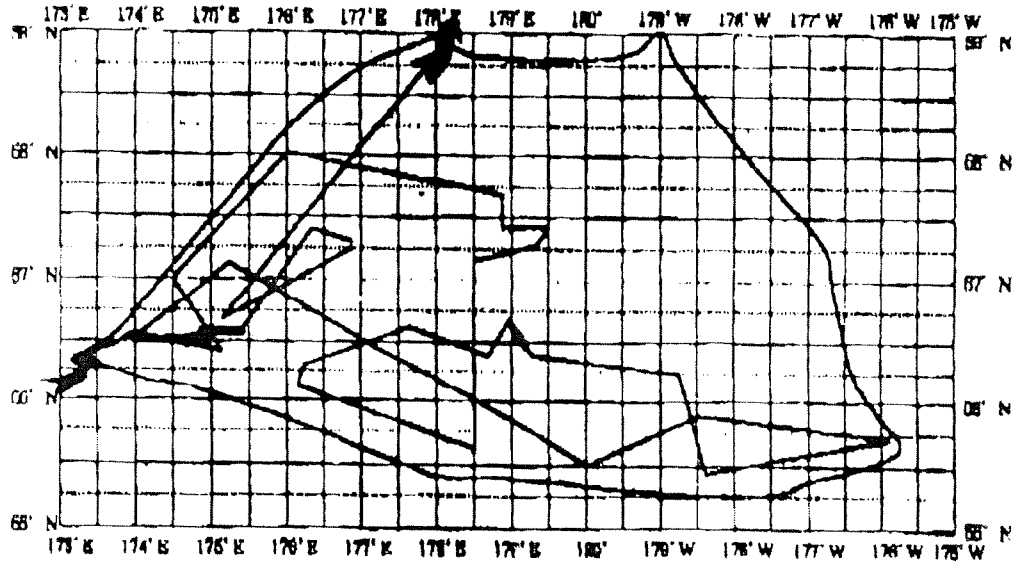


Fig. 2. Hydroacoustic trackline and haul positions (thick line) of M/T ORIENTAL ANGEL during trial fishing in Convention area in May.

Attachment 5

POLAND

REPORT ON THE POLISH TRIAL OPERATION ON POLLOCK IN THE BERING SEA CONVENTION AREA IN AUGUST 1999

In 1999 a second trial fishing cruise in the Bering Sea Convention area (Donut hole) was conducted by a Polish vessel in summer 1999.

Trial fishing was carried out by the stern trawler HOMAR (length – 95 m, tonnage – 3708 GRT) in the period from August 17 through August 30, 1999. The main purpose of the trial was to determine the geographical distribution of pollock in the Convention area and to collect biological data. A scientific observer was placed on board of the vessel.

During the searching time, about 1700 Nm of hydroacoustic trackline were followed (Fig. 1).

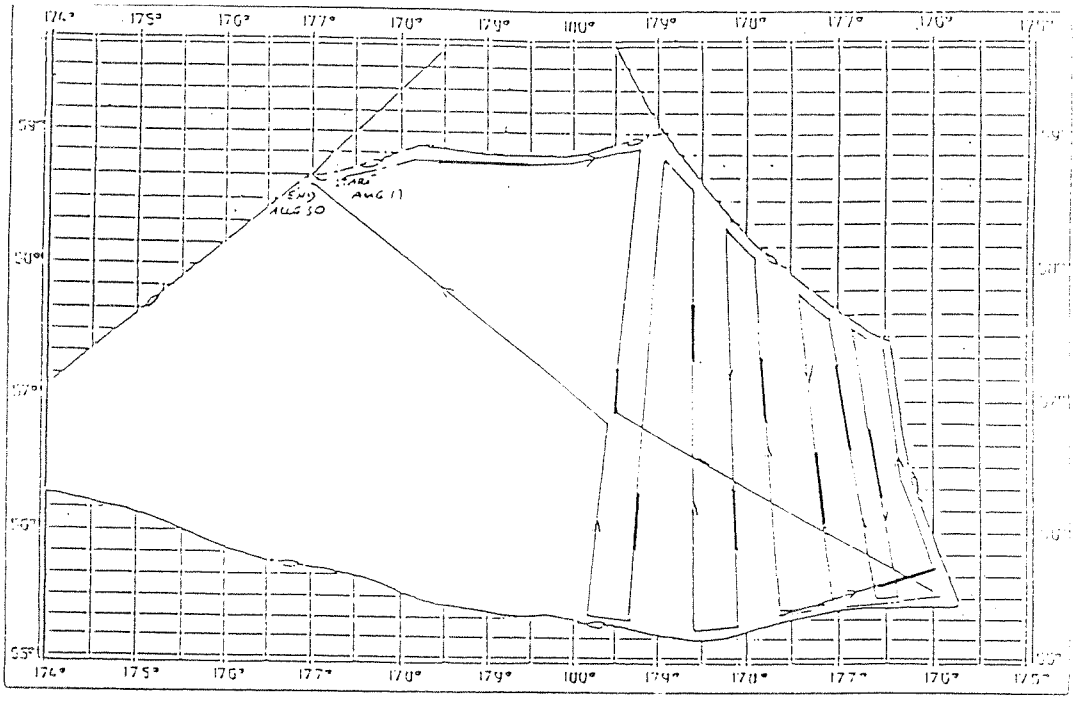


Fig. 1. Hydroacoustic trackline and the site of hauls (solid line) of m/t HOMAR During trial fishing i the Convention Area of Bering Sea (summer 1999)

During the echosounding, there were no indications of pollock. At depths of 80 – 180m, a layer of small indications was observed (Fig. 2). It consisted mainly of lanternfish (Myctophide), which were found in the mesh of the codend.

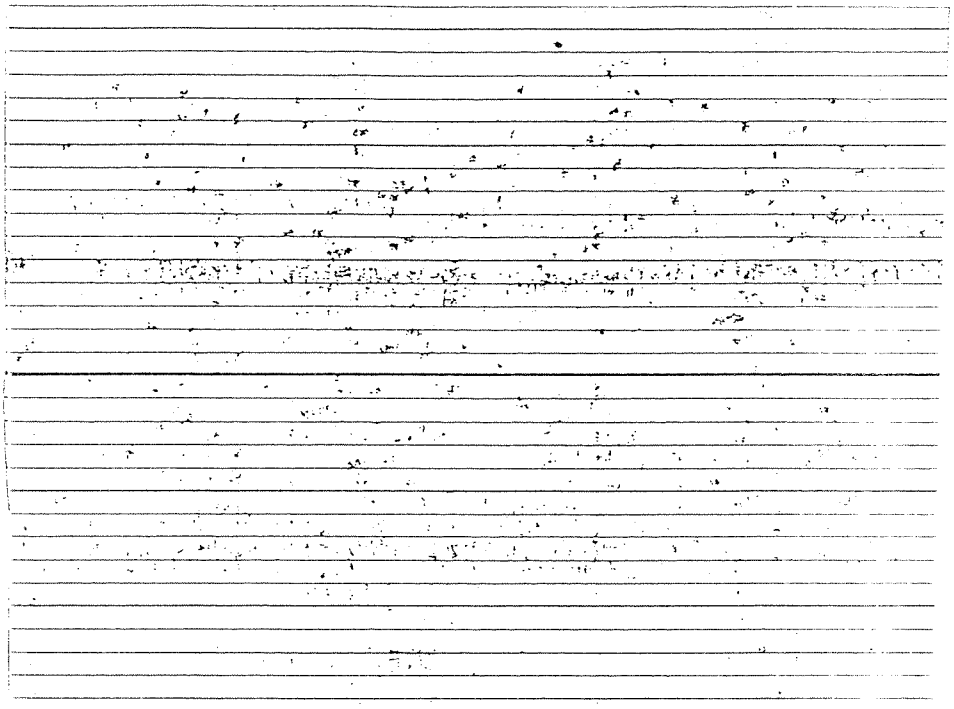


Fig. 2. Fragment of typical print-out from net sounder recorder

Ten hauls were performed at depths between 30 and 180m, and 31.4 kg of fish were caught. Only two specimens of pollock (*Theragra chalcogramma*) were caught in the central-eastern (hauls 6 and7) part of the Donut hole. The pollock specimens measured 55.0 and 47.0 cm in length. Both were male.

In the last two hauls (9 and 10), 23 specimens of sockeye salmon (*Oncorhynchus nerka*) were caught.

The sea surface temperature of the water varied from 8.0°C to 9.0°C.

The data forms were completed by the scientific observer and are attached to the report.

Jerzy Janusz
Sea Fisheries Institute
Kollataja 1, 81-332 Gdynia, Poland

HAUL SUMMARY FORM

OBSERVER NATION
1 2 3 ④ 5

VESSEL NATION
1 2 3 ④ 5

OBSERVER NAME: WOLICKI WIESŁAW

VESSEL NAME: M/T HOMAR

CRUISE #		VESSEL CODE					YEAR	
2	3	4	5	6	7	8	9	10
2	0	S	N	V	X		9	9

DATE							HAUL POSITION			FISHING TIMES IN GMT									
MONTH		DAY		HAUL #	GEAR TYPE	GEAR PERFORMANCE	LATITUDE (NORTH)	1/2	LONGITUDE	NETS AT DEPTH	BEGIN RETRIEVAL	FISHING DURATION IN MINUTES	AVERAGE FISHING DEPTH	AVG. SPEED KNOTS	OBSERVER TOTAL CATCH ESTIMATE (MT)	VESSEL TOTAL CATCH ESTIMATE (MT)	SEA SURFACE TEMP. (C)	FISHING DEPTH TEMP. (C)	SEA STATE
11	12	13	14	15 - 17	18	19	20 - 23	24	25 - 29	30 - 33	34 - 37	38 - 40	41 - 43	44-45	46 - 50	51 - 55	56 - 59	60 - 63	64
0	8	1	7	1	1	1	5847	1	17930	08.10	14.30	380	30	5,0	.	0.	8,3		3
0	8	2	0	2	1	1	5653	2	17945	00.30	03.30	180	150	4.5	.	0.	8,3		6
0	8	2	1	3	1	1	5544	2	17600	20.30	01.50	320	180	4,5	.	0.	8,6		4
0	8	2	2	4	1	1	5617	2	17635	02.30	08.30	360	150	4,5	.	0.	8,4		3
0	8	2	4	5	1	1	5715	2	17705	00.50	08.10	440	80	5,0	.	0.	8,0		2
0	8	2	4	6	1	1	5558	2	17717	21.50	02.30	285	120	4,2	0.001	0.	9,0		2
0	8	2	5	7	1	1	5733	2	17752	20.00	02.10	370	120	4,1	0.001	0.	8,8		2
0	8	2	6	8	1	1	5552	2	17815	19.45	01.30	345	100	4,1	.	0.	8,5		2
0	8	2	7	9	1	1	5743	2	17845	19.40	01.30	350	90-120	4,1	0.024	0.	8,2		3-2
0	8	2	8	10	1	1	5552	2	17910	19,45	01.30	345	80-120	4,1	0.005	0.	8,1		2
															.	.			
															.	.			
															.	.			
															.	.			
															.	.			
															.	.			
															.	.			
															.	.			
															.	.			

SPECIES COMPOSITION FORM

Observer Name NOLICKI WIESŁAW

Observer Nation 1 2 3 (4) 5

Vessel Name M/T HOMAR

Vessel Nation 1 2 3 (4) 5

Species:						
Wt. of above:						
No. weighed:						
Avg. weight:						

CRUISE #			VESSEL CODE					YEAR		MONTH		DAY	
1	2	3	4	5	6	7	8	9	10	11	12	13	14
-	2	0		S	N	V	X	9	9	0	8	2	4

ST = Sampling Type
(1) = whole haul
2 = partial haul
3 = weighed sample

Haul (15 - 18)	Species name	Species code	ST	Number	Species weight in kg. w/ decimal	Sample weight in kg. w/ decimal
		19 - 21	22	23 - 28	29 - 37	38 - 46
6	(keypunch check)	999	X			X
	T. chalcogramma	30	1	1	1,3	1,3

Haul (15 - 18)	Species name	Species code	ST	Number	Species weight in kg. w/ decimal	Sample weight in kg. w/ decimal
		19 - 21	22	23 - 28	29 - 37	38 - 46
7	(keypunch check)	999	X			X
	T. chalcogramma	30	1	1	1,0	1,1

SPECIES COMPOSITION FORM

Observer Name WOLICKI WIESŁAW

Observer Nation 1 2 3 4 5

Vessel Name M/T HOMAR

Vessel Nation 1 2 3 4 5

Species:						
Wt. of above:						
No. weighed:						
Avg. weight:						

CRUISE #			VESSEL CODE					YEAR		MONTH		DAY	
1	2	3	4	5	6	7	8	9	10	11	12	13	14
	2	0		S	N	V	X	9	9	0	8	2	7

ST = Sampling Type
1 = whole haul
2 = partial haul
3 = weighed sample

Haul (15 - 18)	Species name	Species code	ST	Number	Species weight in kg. w/ decimal	Sample weight in kg. w/ decimal
		19 - 21	22	23 - 28	29 - 37	38 - 46
9	(keypunch check)	999	X			X
	Oncorhynchus nerka	20	1	19	24,40	24,40

Haul (15 - 18)	Species name	Species code	ST	Number	Species weight in kg. w/ decimal	Sample weight in kg. w/ decimal
		19 - 21	22	23 - 28	29 - 37	38 - 46
10	(keypunch check)	999	X			X
	Oncorhynchus nerka	20	1	4	4,65	4,65

LENGTH FREQUENCY FORM

CRUISE #			VESSEL CODE					YEAR		MONTH		DAY	
1	2	3	4	5	6	7	8	9	10	11	12	13	14
-	2	0	S	N	V	X		9	9	0	8	2	4

OBSERVER NATION
1 2 3 4 5

OBSERVER NAME
WOLICKI WIESŁAW

VESSEL NATION
1 2 3 4 5

VESSEL NAME
H/T HOMAR

5 mm SIZE GROUPS:

0-5 mm rounded down to 0 mm
5-10 mm rounded down to 5 mm

SPECIES NAME	SPECIES CODE	HAUL NUMBER	SEX CODE	SUM OF ROW	LENGTH	NUMBER	LENGTH	NUMBER	LENGTH	NUMBER	LENGTH	NUMBER	LENGTH	NUMBER	LENGTH	NUMBER	LENGTH	NUM
	15-16	17 - 19	20	21 - 24	25-28	29-31	32-35	36-38	39-42	43-45	46-49	50-52	53-56	57-59	60-63	64-66	67-70	71-
T. chalcogramma	30	6	1		550	1												
T. chalcogramma	30	7	1		470	1												

BIOLOGICAL SAMPLE FORM

OBSERVER NATION 1 2 3 4 5 OBSERVER NAME WOLICKI WIESŁAW PAGE 1 OF 2

CRUISE #			VESSEL CODE					YEAR		MONTH		DAY	
1	2	3	4	5	6	7	8	9	10	11	12	13	14
-	2	0	S	N	V	X		9	9	0	8	2	3

VESSEL NATION 1 2 3 4 5 VESSEL NAME M/T HOMAR

	SPECIES NAME	SPECIES CODE	HAUL NUMBER	SEX CODE	SPECIMEN NUMBER	SPECIMEN TYPE	SAMPLING SYSTEM	LENGTH	WEIGHT (kg)	MATURITY CODE	REMARKS
		15-16	17 - 19	20	21 - 24	25	26	27 - 30	31 - 34	35	
1	T. chalcogramma	30	6	1	1	1		550	1.30	3	
2	T. chalcogramma	30	7	1	1	1		470	1.01	3	
3									.		
4									.		
5									.		
6									.		
7									.		
8									.		
9									.		
10									.		
11									.		
12									.		
13									.		
14									.		
15									.		
16									.		
17									.		
18									.		
19									.		

Attachment 6

CRUISE REPORT OF THE TRAWLER "KAI CHUANG" FOR PELAGIC POLLOCK SURVEY IN THE INTERNATIONAL WATERS OF THE BERRING SEA, 2000

Shanghai Deep Sea Fisheries Company, China

Deep Sea Fisheries Division & International Cooperation Division of Fisheries Bureau,

According to the spirit of the Forth Annual Conference of the Parties to the Convention on the Conversation and Management of Pollock Resources in the Central Bering Sea, and with the premise of not affecting the normal North Pacific fishing operation, the trawler "Kai Chuang" was dispatched to conduct pollock survey in the international waters of the Bering Sea. Herein we report the result as follows

"Kai Chuang" set out at 14:30 on May 8th, 2000 from Shanghai harbour and arrived in the southwest of Donut hole at 12:00 local time on May 20th. It cruised 3 nautical miles northward from the southwest boundary and eastward to the eastern boundary, but there were no fish shoals reflected by the fish detector.

10:00, May 30th: itinerate from 57°05'N to 177°40'W, no fish shoals were detected

10:30, June 3rd: sailed to 57° 05'N/179° 45'W along 340° clockwise and then surveyed from east to west (refer to draft 1 for details).

08:00-15:30, June 8th: between 58°05'N and 58°03'. The first haul was put down between 179°34'W and 179°54' and last 7.5 hours; trawling depth was 40m-190m; water temperature 2.9~3.2℃; net type 1152. After drawing the net, totally 34 pollocks were fished with the fork length of 45~56cm and average length 48.99cm.

June 11th: sailed to 61°20' for oil replenishment (refer to draft 2 for details, in which the solid line is trawling line and the spotted line is survey route). Returned to the international waters of Bering sea on the same day.

08:00, June 12th: put down the trawl. Hauled westwards from 59° 20'N/179° 22'W and drew the trawl at 59° 20'N/179° 17'E. The whole duration was 10 hours with the haul of 4 pollocks, trawling depth 150-190m and water temperature 2.9℃.

June 13th: put down the trawl at 58° 51'/178° 32', trawling 6 hours to 178° 42' with no fish at all. Trawling depth 40m; water temperature 2.2℃.

05:00, June 25th: put down the trawl at 57° 17'N/177° 39'. Drew at 09:00 at 57° 23'N/177° 40'W with haul of 5 pollocks, trawling depth 40-100m and water temperature 28~31℃(refer to draft 3 for details).

June 28th: finished the survey and transferred to Russian EEZ, west Bering Sea

The result of Kai Chuang's survey is not so satisfactory due to the following factors:

1. The time of survey is too early. According the operation experience in the international waters of Bering Sea, pollock abound from the beginning of approximately August.
2. To carry out the survey by single trawler renders the limit of scale.

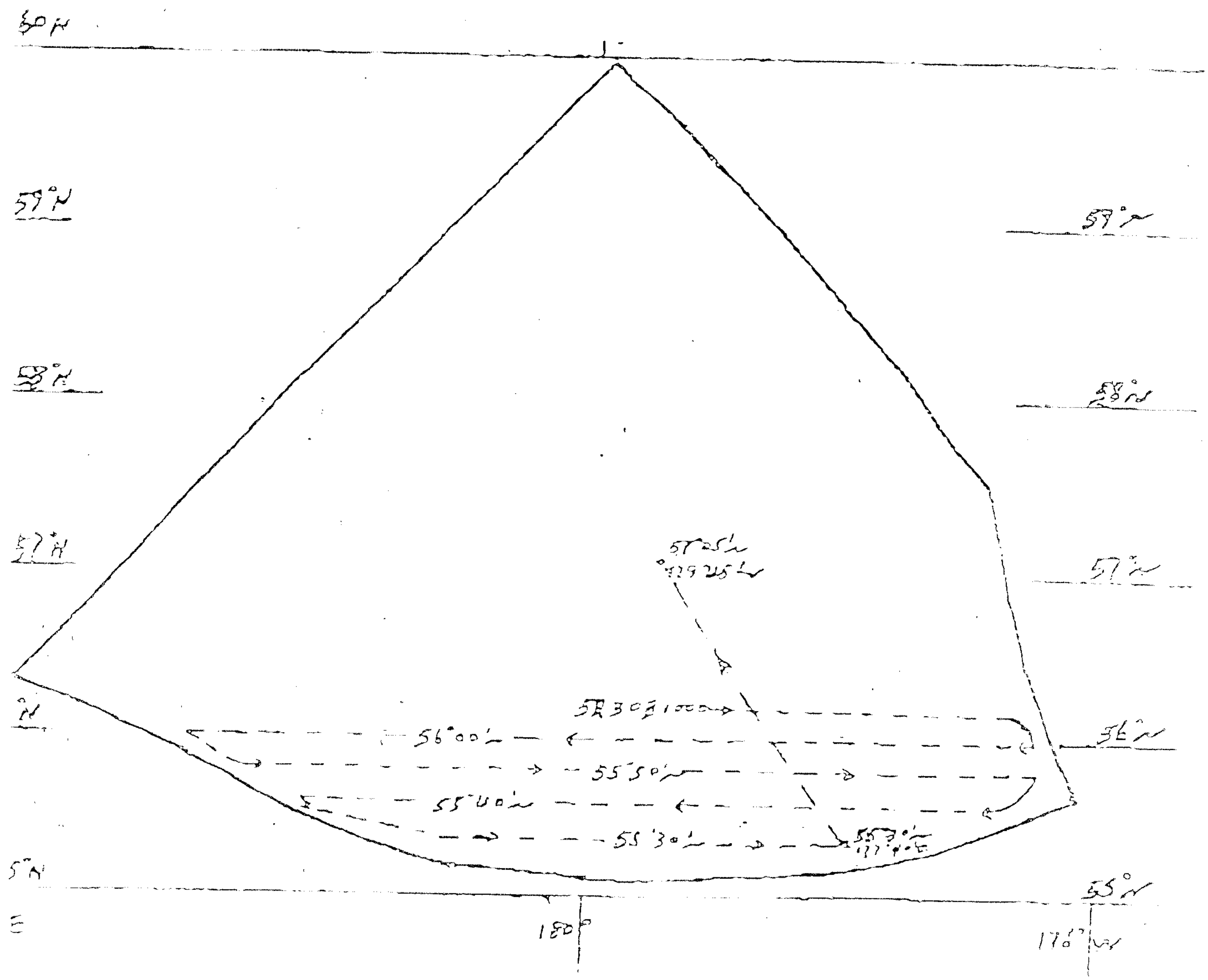
According to the above situation, we think that, survey activity is very important for large processing trawlers to expand the operation range and the survey result of a single trawler is not so objective to duly reflect the resource situation. If it is allowed, we would consider a more comprehensive survey in the Donut Hole by several trawlers in proper time of August or September so that more progress can be made by the survey.

Best regards.

Secretariat of North Pacific Work Team
Shanghai Deep Sea Fisheries Company

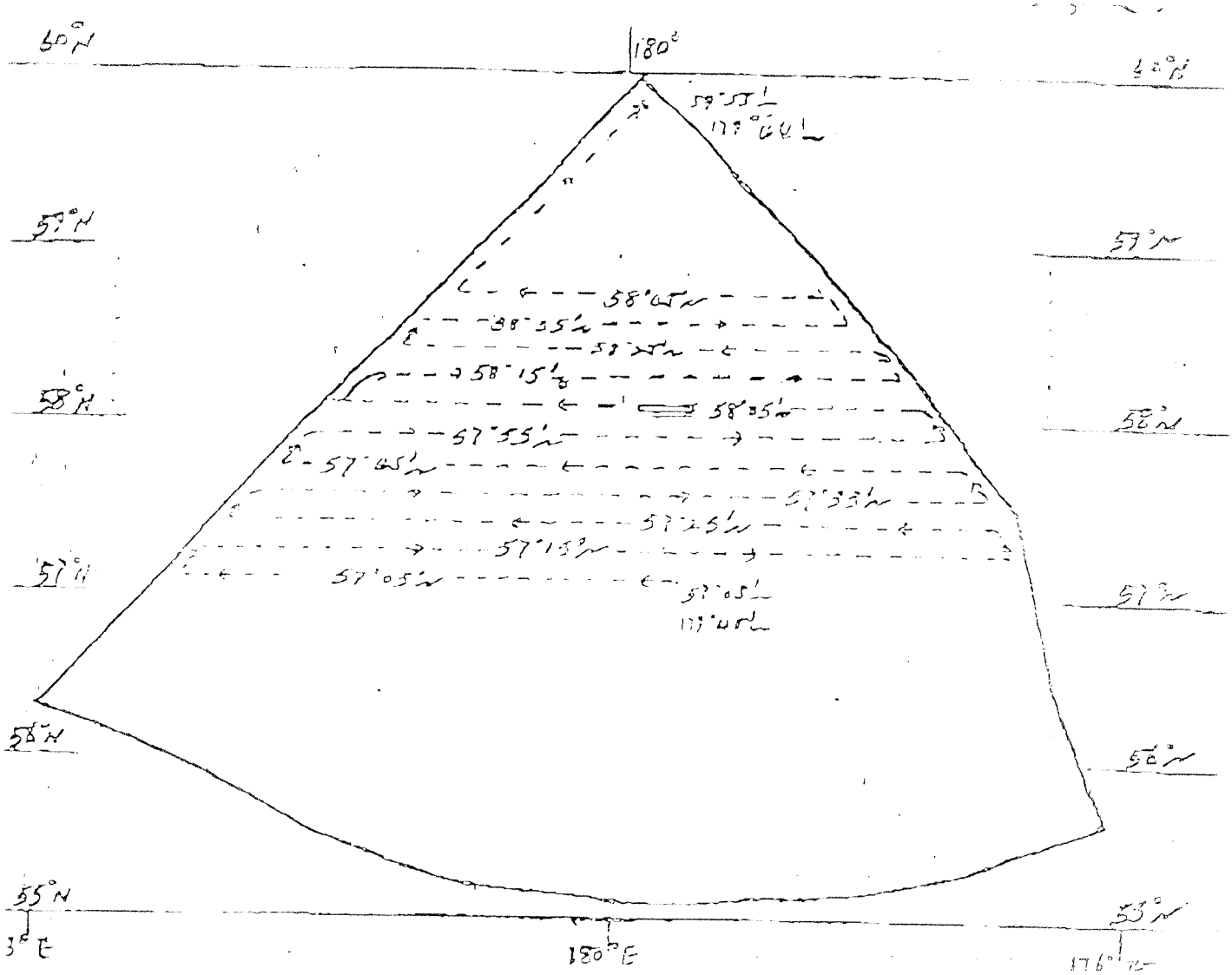
5月30日－6月3日

航測草図 1



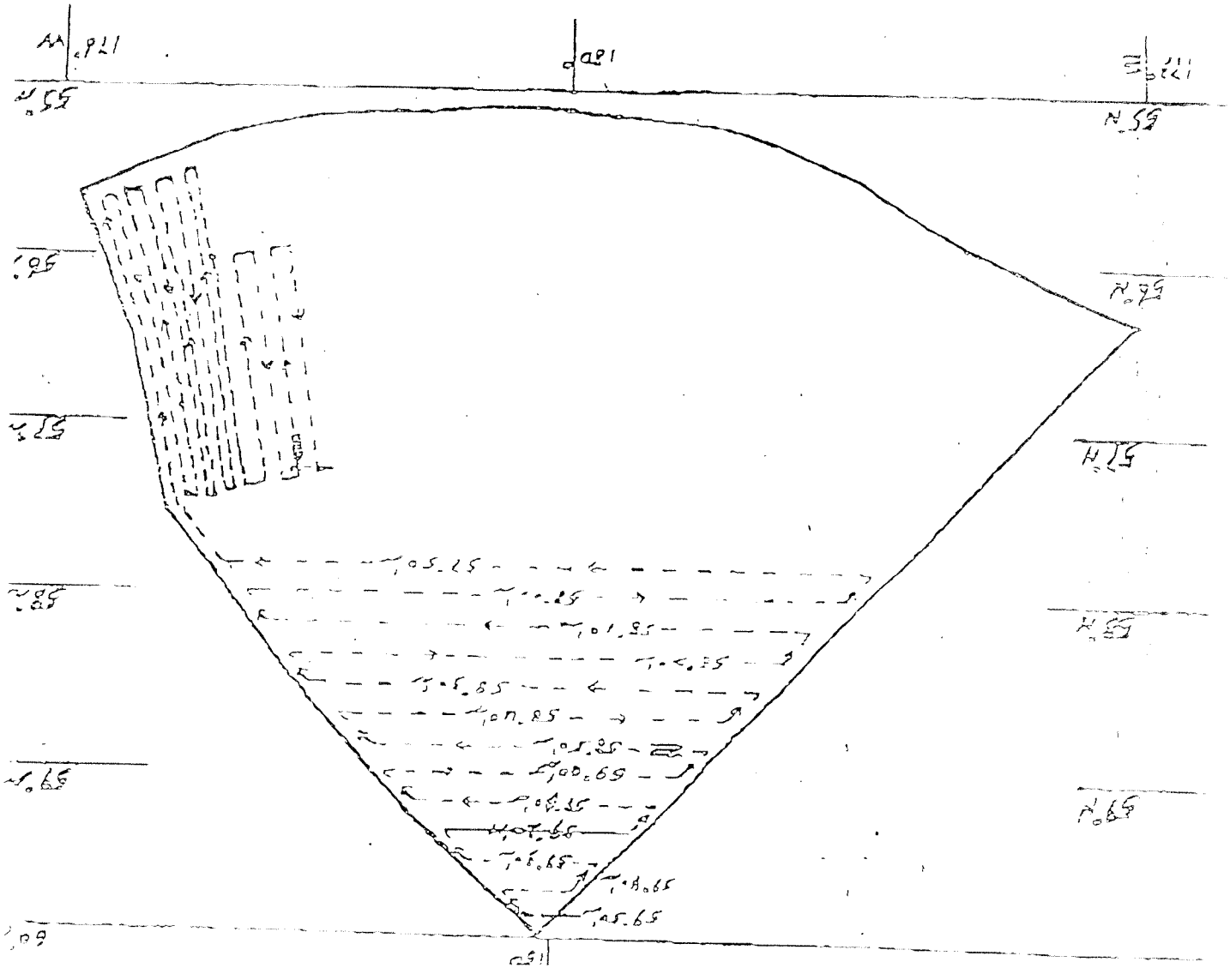
6月3日 — 6月9日

禁漁区



6月12日 — 6月28日

草圖 3



APPENDIX 1

Walleye Pollock (*Theragra chalcogramma*) abundance on the southeastern Bering Sea shelf and in the Aleutian Basin near Bogoslof Island in February and March, 2000

by Taina Honkalehto and Steve de Blois

INTRODUCTION

Scientists from the RACE division of the Alaska Fisheries Science Center conduct annual research surveys of Bering Sea walleye pollock (*Theragra chalcogramma*) to estimate distribution and abundance. In summer, pollock abundance information is derived from annual bottom trawl surveys and biennial echo integration-trawl (EIT) surveys on the eastern Bering Sea shelf. In winter, EIT surveys are used to survey pre-spawning pollock in selected years in ice-free shelf areas, and each year in the southeast Aleutian Basin near Bogoslof Island (Honkalehto and Williamson 1995, 1996). Results presented here are from EIT surveys carried out from February 27-March 2, 2000 on the southeastern Bering Sea shelf, and between March 2 and 12, 2000, between Akutan Island and the Islands of Four Mountains, Alaska. The primary cruise objectives were to determine the distribution and abundance of pollock. Originally scheduled to last for two weeks and cover an area between Cape Rozhnof on the Alaska Peninsula and St. George Island, the Bering Sea shelf survey was scaled down to four days because of heavy January sea ice cover and forecasts of continued severe ice conditions. Data collected during the shelf survey were used to estimate the abundance of pollock inhabiting the eastern portion of the Steller sea lion conservation area (SCA). The U.S. has conducted spawning surveys of Bogoslof area pollock annually (except 1990) since 1988. In 1999 Japan Fisheries Agency conducted the survey while the U.S. research vessel was in dry dock for repairs. The biomass estimate for pollock inside U.S. management area 518 obtained during these surveys provides an index of Aleutian Basin pollock abundance which is discussed at each year's Central Bering Sea Convention meeting.

METHODS

Acoustic data were collected with a Simrad EK 500[1] quantitative echo-sounding system (Bodholt et al. 1989, Bodholt and Solli 1992) on the NOAA ship *Miller Freeman*, a 66-m stern trawler equipped for fisheries and oceanographic research. Two split-beam transducers (38 kHz and 120 kHz) were mounted on the bottom of the vessel's centerboard extending 9 m below the water surface. System electronics were housed inside the vessel in a permanent laboratory space dedicated to acoustics. Data from the echo sounder were processed using Simrad BI500 echo integration and target strength analysis software (Foote et al. 1991, Simrad 1993) on a SUN workstation. Results presented here are based on the 38 kHz data. Midwater echo sign was sampled using an Aleutian Wing 30/26 trawl (AWT), a polyethylene nor'eastern high-opening

---

[1] Reference to trade names or commercial firms does not constitute U.S. Government endorsement.

bottom trawl (PNE), and 5 m^2 "Fishbuster" doors (1,250 kg). Near-bottom echosign was sampled with the PNE. Vertical and horizontal net opening and depth were monitored with a WesMar third wire netsounder system attached to the headrope on most hauls. On some occasions a Furuno netsounder system was used.

Physical oceanographic data were collected throughout the cruise. Temperature/depth profile data were obtained with a micro bathythermograph (MBT) attached to the headrope during each trawl. Conductivity-temperature-depth (CTD) data were collected with a Seabird CTD system at calibration sites and other selected locations. Sea surface temperature, salinity, and other environmental data were collected using the *R/V Miller Freeman's* Scientific Collection System (SCS). Ocean current profile data were obtained using the vessel's centerboard-mounted acoustic Doppler current profiler system operating continuously in water-profiling mode.

The southeast Bering Sea shelf survey was limited to four days, and because it was not part of an annual time series, no recent winter survey information was available to provide a basis for the transect pattern. Pollock fishery observer data for January through March of the last several years were examined to estimate past and present locations of major pollock catches. Based on patterns observed from these data, eight east-west parallel transects totaling about 400 nautical miles (nmi) were positioned to cover the eastern shelf area where fishing occurred inside the SCA (Fig. 1). Western transect endpoints were bounded by approximately 166° W (a southward continuation of the SCA boundary north of 55° 30' N). Eastern transect endpoints were at bottom depths of approximately 85-95 m or were limited by Unimak Island; if possible they were extended eastward until fish sign disappeared. Transect spacing was 12.5 nmi.

The Bogoslof EIT survey covered about 1300 nautical miles (nmi) with 33 north-south transects beginning at about 166° W and ending near 170° 15' W (Fig. 1). Transect spacing at the eastern end and offshore in deeper basin waters was 10 nmi. Spacing near shore west of 167° W was 5 nmi, decreasing to 2.5 nmi northeast of Umnak Island and between Umnak Island and the Islands of Four Mountains. Southern transect endpoints were at bottom depths of approximately 100 m on the Aleutian shelf but varied depending on bottom depth and fish echo sign.

Echo integration and trawl data were collected 24 hours per day at an average vessel speed of 11.1 kts on the shelf, and 11.6 kts in the basin. Acoustic system settings used during the collection were based on results from standard sphere calibrations (Table 1) and on experience from prior surveys. Acoustic data collected between 14 m from the surface and 0.5 m off the bottom or to 1000 m, depending on bottom depth, were scrutinized for pollock and stored in an Ingres database. Estimates of pollock backscattering strength in the area represented by each transect were generated. These values were then summed and scaled using a previously derived relationship between target strength and fish length (TS = 20 Log FL - 66; Traynor 1996), with size compositions and a length-weight relationship derived from trawl catch information, to estimate the numbers and weight of pollock for each length category. Bogoslof spawning pollock are highly aggregated and stratified by sex (Honkalehto and Williamson 1995; 1996)

therefore it is often difficult to obtain a representative sex ratio. Although we caught more females than males in Bogoslof, we assumed a 50:50 sex ratio for population size composition. Size compositions used to scale acoustic data in the Bogoslof area were obtained using a weighting procedure described in Honkalehto and Williamson (1996). For both the shelf and Bogoslof, a combined male and female length-weight relationship was obtained by pooling trawl data and minimizing the sum of squares using an iterative non-linear function in Microsoft Excel.

Numbers and biomass of pollock were estimated for the entire geographic area covered by each survey. On the Bering Sea shelf, pollock echosign and haul information were aggregated into a single stratum. Echosign data from eight transects (101-108, Fig. 1) were combined with averaged haul information from hauls 2-9 (Fig 2a) to estimate pollock abundance. In Bogoslof, differences in echo sign and pollock length characteristics led to classification into three strata and two echo sign types (Fig 2b-e). Stratum 1, the "east" Bogoslof area (transects 1.0-5.5, hauls 10-12) consisted of typical, deep-water, Bogoslof pollock echo sign, and on transect 1.0, tightly schooled, shallow, pollock echo sign. All remaining echo sign was classified as the typical, deep-water sign. Stratum 2, "Umnak" (transects 6.0-10.0, hauls 13 and 20), and stratum 3 "Samalga" area pollock (transects 10.5-16.0, hauls 14-19) differed in average size and were separated by about 40 miles of very low pollock density. Hauls 21-23 and 25 targeted atka mackerel and were not used in these analyses. Due to different domestic and international requirements for defining the Bogoslof area, acoustic and biomass data were analyzed in two ways. In addition to estimates for the whole area, estimates were made for pollock inside U.S. management area 518, which is equivalent to the "Specific Area" as it is defined in the Central Bering Sea Convention[2] and will be referred to as "area 518/CBS convention area". This includes transects between 167° W- 170° W (5-14.5 and half of transect 15), and excludes all of 1-4, 15.5, 16, and the northern 6.0 nmi of transect 5.0 (Fig. 1). EIT survey and biomass estimation methods are discussed in more detail in Honkalehto and Williamson (1996).

Error bounds on the acoustic data were derived using two different approaches, a one-dimensional (1D) geostatistical approach described in Petitgas (1993), Williamson and Traynor (1996), and Rivoirard et al. (2000), and a random sample variance approach. The 1D method requires equal spacing between transects, and no fewer than 10 transects (Petitgas, pers. comm.). Despite having a small sample size (8 transects), we chose the 1D approach to compute error (± 2 relative estimation error) for the Bering Sea shelf survey because we felt the approach accounted for the spatial structure observed and thus provided a more realistic estimate of error than the random sample variance approach. For the Bogoslof survey, we computed variances and estimation error on a subset of the total area, focusing on three transect groups of equal spacing that together accounted for 93% of the total acoustic return. We analyzed 2.5 nmi-spaced transects in the Samalga Pass (t 11.3-14.5) and Umnak (t 6.5-7.5) areas, and 10 nmi-spaced,

---

[2] The "specific area" is defined in the Annex to the Convention on the Conservation and Management of Pollock Resources in the Central Bering Sea as "the area south of a straight line between a point at 55° 46' N lat. and 170° W long. and a point at 54° 30' N lat., 167° W long. and between the meridian 167° W long. and the meridian 170° W long. and the north of the Aleutian Islands and straight lines between the islands connecting the following coordinates in the order listed: 52° 49.2 N 169° 40.4 W, 52° 49.8 N 169° 06.3 W, 53° 23.8 N 167° 50.1 W, 53° 18.7 N 167° 51.4 W.

eastern transects (t 1-4). We were able to calculate error using the 1D approach on the Samalga Pass area. Umnak and eastern transects 1-4 had too few samples (5 and 4, respectively) to apply the 1D method, so a conservative error bound ($\pm$ 2 sqrt (var/n)/mean) was computed using the random sample variance. Although computed using two different methods, variances from the three areas were added to compute an overall error bound for Bogoslof. Sampling error bounds on the acoustic data can be used to provide error bounds on the point estimate of biomass. These error bounds quantify only acoustic data sampling variability; other sources of error (e.g. target strength, trawl sampling, error associated with ageing error) are not included. The potential impact of these additional sources of error is discussed in an earlier report (Honkalehto and Williamson 1996). These sampling error estimates should be treated as preliminary. Methods employed will be reviewed and revised (if necessary) in future reports.

RESULTS

Oceanographic

Temperature profiles showed a well-mixed water column. Average temperature by 50-m depth bins ranged between 2.5-3.3° C on the Bering Sea shelf between the surface and 150 m (Fig. 3). In the Bogoslof area, average temperature ranged between 3.4-3.7° C between the surface and 550 m. Surface temperatures (Fig. 4) ranged from about 1.5 to 3.8° C. Coldest surface temperatures encountered during the survey were on the shelf north of Unimak Island. Near-shore areas west of 167° 30' W (where most Bogoslof pollock were observed, as will be shown) had warmer surface temperatures than regions farther offshore or east of 167° 30' W.

Southeastern Bering Sea shelf

Pollock were observed from near the start of transect 101 to near the end of transect 108 (Fig. 5). On the first several transects, they formed dense, near-bottom aggregations at depths between 95-100 m. These aggregations often extended for several miles. Dense pollock aggregations were found adjacent to Unimak Island beginning at a bottom depth of about 50 m; some continued westward to bottom depths >150 m. Highest densities were observed on transects 103, 104, and 106.

Walleye pollock caught in hauls 2-9 on the shelf had lengths ranging from 30 to 73 cm. The average fork length of females was 1 cm larger than the average length of males. Size-based population estimates for pollock indicated that their average length was 44 cm (Fig. 6a). Catch sex ratios ranged from 42-70% female, and averaged 51% female. Pollock maturities observed on the shelf showed similar proportions of developing and pre-spawning females (43% vs. 48%), but a much higher proportion of pre-spawning males (19% vs. 74%) (Fig. 7a). Among females, 50% maturity occurred at 43-44 cm fork length (Fig. 8). No spawning fish were observed. The mean gonadosomatic index (GSI) for pre-spawning females on the shelf was 0.08 (Fig. 9a).

Abundance estimates for pollock in the Bering Sea shelf survey area between 14 m below the surface and 0.5 m off-bottom were 1.363 billion fish and 0.816 million metric tons. The biomass error bound was 0.601-1.031 million tons. Age data are not yet available.

Bogoslof Island area

Pollock distribution (Fig. 4) was somewhat similar to that observed by the Japan Fisheries Agency during their 1999 pollock survey of this area aboard the *Kaiyo maru*. Echo sign appearance varied from small, dense schools in shallow water on transect 1, to diffuse near-bottom layers on north ends of eastern transects, to faint layers of single fish throughout most of the survey area, to dense spawning aggregations near the Islands of Four Mountains. On the south end of transect 7 northeast of Umnak Island, a large pollock aggregation was encountered in nearly the same location as in previous years. Farther west, very few pollock were observed until transect 11.5 (about 169° W). As in previous Bogoslof area surveys, most pollock (about 72% of total biomass) were concentrated in Samalga Pass between Umnak Island and the Islands of Four Mountains (about 169°-170° W). They were distributed in spawning aggregations that continued for about 3-14 nmi of transect, and extended 150-300 m vertically between 300-700 m in the water column.

Pollock sampled in hauls 10-20 and 24 in the Bogoslof area ranged between 39 and 68 cm in length (Fig. 6b). Results from population-at-length analyses show that mean length increased from east to west (Fig. 10). In the east area, aggregations categorized by haul 24 had an average length of 47 cm, and aggregations categorized by hauls 10-12 had an average length of 51 cm. Pollock lengths in the Umnak portion of the population averaged 54 cm. In the Samalga Pass area, population average length was 57 cm. Fork lengths of females averaged 3 cm larger than males overall. Sex ratios by haul ranged from 35-79% female and averaged 62% female, but as explained in the methods (above), this was most likely due to difficulty sampling in concentrated spawning aggregations; overall sex ratio was assumed to be 50:50. Ninety-five percent of males and 94% of females were pre-spawning (Fig. 7b). Only 4% of males and 1% of females were actively spawning. The mean gonadosomatic index (GSI) for pre-spawning females was 0.17 (Fig. 9b), more than twice that observed on the shelf, implying an earlier spawning date for Bogoslof pollock.

Pollock biomass estimated for the entire Bogoslof survey area was 301 thousand tons (Table 2). The biomass error bound was 215-387 thousand tons. Numbers of pollock were estimated to be 229 million. Inside the area 518/CBS convention area, pollock biomass was 270 thousand tons, representing 195 million fish. Pollock otoliths collected during this cruise have not yet been aged and thus estimates of age composition are not available.

Since 1988, Bogoslof pollock have gradually declined in abundance (Fig. 11), although no directed domestic fishery has existed on this spawning population since 1991. From 1988 through 1993, increasing average fish length indicated an aging population with little recruitment (Table 3, Figs. 12 and 13). Examination of recruitment patterns from strong pollock year classes suggests that recruitment to the Bogoslof spawning population peaks at about ages 6-8 (Fig. 14).

The 1978 year class was the strongest year class present in Bogoslof since we began tracking the population in 1988. In 1994, a relatively strong 1989 year class began to recruit to the population as five-year olds; their recruitment peaked at age 6 in 1995 (Table 4, Fig. 14). Recruitment of the 1992 year class still appeared to be increasing at age 7 in 1999, the last survey-year for which ages are available. During the last 12 years, geographic distribution of the main spawning aggregations has shifted westward, from deeper basin waters near Bogoslof Island to slope waters in Samalga Pass near the Islands of Four Mountains. This shift appeared to coincide with recruitment of the 1989 year class in 1994. In 2000, as in 1998 and 1999, pollock were highly concentrated in Samalga Pass (73% of biomass in 1998 and 72% in 2000), but they were sparsely distributed elsewhere.

REFERENCES

Bodholt, H., H. Nes, and H. Solli. 1989. A new echo sounder system. Proceedings of the Institute of Acoustics 11(3):123-130.

Bodholt, H. and H. Solli. 1992. Split beam techniques used in Simrad EK500 to measure target strength. World Fisheries Congress, May 1992, Athens, Greece. pp. 16-31.

Foote, K.G., H. P.Knudsen, R. J. Korneliussen, P. E. Nordbo, and K. Roang. 1991. Postprocessing system for echo sounder data. J. Acoust. Soc. Am. 90:37-47.

Honkalehto, T. and N. Williamson. 1995. Echo integration-trawl survey of walleye pollock (*Theragra chalcogramma*) in the southeast Aleutian Basin during February and March, 1994 U.S. Dep. Commer., NOAA Tech. Memo. NMFS-AFSC-52, 39 p.

Honkalehto, T. and N. Williamson. 1996. Echo integration-trawl survey of walleye pollock (*Theragra chalcogramma*) in the southeastern Aleutian Basin during February and March, 1995. U.S. Dep. Commer., NOAA Tech. Memo. NMFS-AFSC-65, 57 p.

Petitgas, P. 1993. Geostatistics for fish stock assessments: a review and an acoustic application. ICES Journal of Marine Science, 50: 285-298.

Rivoirard, J., J. Simmonds, K.G. Foote, P. Fernandez, and N. Bez. 2000. Geostatistics for estimating fish abundance. Blackwell Science Ltd., Osney Mead, Oxford OX2 0EL, England. 206 p.

Simrad. 1993. Simrad BI500 post-processing system reference manuals V5.20. Simrad Subsea A/S, Strandpromenenaden 50, Box 111, N-3191 Horten, Norway.

Traynor, J. J. 1996. Target strength measurements of walleye pollock (*Theragra chalcogramma*) and pacific whiting (*Merluccius productus*). ICES Journal of Marine Science, 53: 253-258.

Williamson, N. and J. Traynor. 1996. Application of a one-dimensional geostatistical procedure to fisheries acoustic surveys of Alaskan pollock. ICES Journal of Marine Science, 53 423-428.

Table 1. Summary of results of sphere calibrations conducted before, during, and after the winter 2000 pollock echo integration-trawl survey of the southeast Bering Sea shelf and Bogoslof Island areas.

Date (2000)	Location	Freq (kHz)	Water Temp (deg. C) at Transducer*	Water Temp (deg. C) at Sphere	Sphere Range from Transducer (m)	TS Gain (dB)	SV Gain (dB)	Along 3 dB Beam Width (deg.)	Angle Offset Along	Angle Offset Athwart
27 Jan	Port Susan, WA	38	9.4	9.8	31.3	25.8	25.5	6.91	-0.09	0.03
		120	9.4	9.9	25.9	26.0	26.1	--	--	--
27 Feb	Captains Bay, AK	38	2.8	3.0	29.1	25.8	25.6	6.92	-0.08	0.03
		120	2.8	3.0	23.5	25.3	25.4	7.11	-0.12	-0.21
13 Mar	Captains Bay, AK	38	2.9	3.1	30.3	25.9	25.5	--	--	--
		120	2.9	3.1	28.7	25.0	25.3	--	--	--
27 Mar	Uyak Bay, AK	38	4.0	4.0	29.4	25.8	25.5	6.92	-0.08	-0.01
		120	4.0	4.0	23.9	24.9	24.9	7.32	0.04	0.47
Feb-Mar	System settings during surveys	38	--	--	--	25.7	25.5	6.9	-0.08	-0.01#
		120	--	--	--	25.3	25.4	7.1	-0.12	-0.21

* The transducer was located approximately 9 m below the water surface.

Angle offset athwart was 0.03 during MF2000-04 (Mar 15-28).

Note: Gain and beam pattern terms are defined in the "Operator Manual for Simrad EK500 Scientific Echo Sounder (1993)" available from Simrad Subsea A/S , Strandpromenaden 50, P.O. Box 111 N-3191 Horten, Norway Acoustic data were stored at an Sv threshold of -69 dB.

Table 2 Estimates of pollock biomass in the entire Bogoslof Island region and inside the Central Bering Sea Convention area (U.S. fisheries management area 518) from echo integration-trawl surveys between 1988-2000. No survey was conducted in 1990.

	Entire Bogoslof Survey Area					CBS Convention area/ U.S. area 518			
Year	Biomass* (million t)	Acoustic Return (Sm)	95% CI's (+-%)	Biomass estimate bounds (million t) lower	upper	Biomass inside	Biomass outside	Proportion inside	Proportion outside
1988	2.396	--	--	--	--	2.396	0.000	1.00	0.00
1989	2.126	--	--	--	--	2.084	0.042	0.98	0.02
1990	--	--	--	--	--	--	--	--	--
1991	1.289	11063	23.3	0.989	1.589	1.283	0.006	1.00	0.00
1992	0.940	7914	40.8	0.557	1.324	0.888	0.052	0.94	0.06
1993	0.635	5134	18.4	0.518	0.752	0.631	0.005	0.99	0.01
1994	0.490	3020	23.2	0.376	0.604	0.490	0.000	1.00	0.00
1995	1.104	8236	21.4	0.868	1.340	1.020	0.084	0.92	0.08
1996	0.682	5604	39.2	0.415	0.950	0.582	0.100	0.85	0.15
1997	0.392	2985	28.0	0.283	0.502	0.342	0.051	0.87	0.13
1998	0.492	3829	38.0	0.305	0.680	0.432	0.060	0.88	0.12
1999	0.475	--	--			0.393	0.083	0.83	0.17
2000	0.301	2200	28.5	0.215	0.387	0.270	0.032	0.90	0.10

* The 1999 survey was conducted by Japan Fisheries Agency

$Sm = \sum_{1}^{n} Sa * A_n / 1000$, where n is the number of 0.5 nmi intervals along the transect, Sa is meters^2 of pollock backscattering per nmi^2 and $A_n = 0.5 * w$, where w is the width assigned to the interval and varies depending on transect spacing

Table 3. Estimates of population at length (millions of fish) from February-March echo integration-trawl surveys* of spawning pollock in the Bogoslof Island area. No survey was conducted in 1990.

Length	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000
10	0	0	--	0	0	0	0	<1	0	0	0	0	0
11	0	0	--	0	0	0	0	<1	0	0	0	0	0
12	0	0	--	0	0	0	0	1	0	0	0	0	0
13	0	0	--	0	0	0	0	<1	0	0	0	0	0
14	0	0	--	0	0	0	0	<1	0	0	0	0	0
15	0	0	--	0	0	0	0	0	0	0	0	0	0
16	0	0	--	0	0	0	0	0	0	0	0	0	0
17	0	0	--	0	0	0	0	0	0	0	0	0	0
18	0	0	--	0	0	0	0	0	0	0	0	0	0
19	0	0	--	0	0	0	0	0	0	0	0	0	0
20	0	0	--	0	0	0	0	0	0	0	0	0	0
21	0	0	--	0	0	0	0	0	0	0	0	0	0
22	0	0	--	<1	0	0	0	0	0	0	0	0	0
23	0	0	--	2	0	0	0	0	0	0	0	0	0
24	0	0	--	1	0	0	0	0	0	0	0	0	0
25	0	0	--	0	0	0	0	0	0	0	0	0	0
26	0	0	--	<1	0	0	0	0	0	0	0	0	0
27	0	0	--	0	0	0	0	0	0	0	0	0	0
28	0	0	--	0	0	0	0	0	0	0	0	0	0
29	0	0	--	0	0	0	0	0	0	0	0	0	0
30	0	0	--	0	0	0	0	0	0	0	0	0	0
31	0	0	--	0	<1	0	0	0	0	0	0	0	0
32	0	0	--	0	<1	0	0	0	0	0	0	0	0
33	0	0	--	0	<1	0	0	0	0	0	0	0	0
34	0	0	--	0	0	0	0	<1	<1	0	<1	0	0
35	0	0	--	0	0	0	0	<1	0	<1	0	0	0
36	0	0	--	0	<1	0	0	<1	<1	<1	<1	0	0
37	9	3	--	<1	0	0	0	<1	<1	<1	<1	0	0
38	6	0	--	2	<1	1	0	1	1	<1	1	0	0
39	16	4	--	5	0	2	<1	4	1	1	3	<1	<1
40	24	3	--	7	1	4	3	12	4	1	7	1	<1
41	27	4	--	19	3	5	6	20	8	2	9	6	1
42	48	23	--	23	7	7	9	40	14	3	11	8	1
43	118	33	--	31	14	6	14	40	17	4	11	13	3
44	179	54	--	36	18	7	21	41	21	5	10	13	3
45	329	159	--	46	28	8	21	50	23	7	9	17	4
46	488	177	--	55	32	13	21	53	31	10	11	19	5
47	547	389	--	79	42	22	18	40	36	14	9	14	6
48	476	434	--	130	68	28	17	55	36	15	12	11	6
49	389	431	--	168	102	46	16	47	37	18	15	10	5
50	248	366	--	205	129	69	39	52	40	21	20	16	6
51	162	279	--	189	144	76	46	58	45	24	23	11	8
52	80	168	--	160	118	73	52	78	52	26	28	20	10

Table 3. continued.

Length	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000
53	48	85	--	122	106	73	49	81	52	26	35	17	13
54	19	50	--	63	67	66	43	88	53	31	41	21	16
55	12	13	--	40	41	50	37	81	48	28	38	33	21
56	4	5	--	17	27	29	26	69	40	24	35	38	20
57	3	8	--	8	13	14	17	58	37	22	30	33	24
58	1	1	--	4	6	9	10	47	28	17	27	36	23
59	0	0	--	1	5	3	6	31	19	13	18	23	16
60	0	0	--	1	1	1	3	17	12	12	13	15	13
61	2	0	--	1	<1	1	2	7	6	6	8	18	10
62	0	0	--	<1	<1	<1	1	4	2	3	5	13	7
63	0	0	--	0	0	0	<1	2	1	1	3	4	4
64	0	0	--	0	1	<1	0	1	<1	1	1	3	2
65	0	0	--	<1	0	0	0	<1	<1	<1	1	1	1
66	0	0	--	0	0	0	0	<1	0	<1	1	<1	<1
67	0	0	--	0	0	0	0	0	0	0	0	1	<1
68	0	0	--	0	0	0	0	1	0	0	<1	0	<1
Totals	3236	2687	--	1419	975	613	478	1081	666	337	435	416	229

* Echo integration-trawl surveys were conducted in 1988-2000 by the Alaska Fisheries Science Center, Seattle, USA. The 1999 survey was conducted by Japan Fisheries Agency

Table 4 Estimates of population at age (millions of fish) from February-March echo integration-trawl surveys* of spawning pollock near Bogoslof Island. No survey was conducted in 1990.

Age	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999
0	0	0	--	0	0	0	0	0	0	0	0	0
1	0	0	--	0	0	0	0	1	0	0	0	0
2	0	0	--	4	0	0	0	0	0	0	0	0
3	0	0	--	0	1	1	0	2	0	0	0	0
4	0	6	--	2	2	33	21	6	<1	<1	<1	2
5	28	15	--	12	27	17	56	75	6	4	11	5
6	327	58	--	46	54	44	26	278	96	16	61	29
7	247	363	--	213	97	46	38	105	187	55	34	77
8	164	147	--	93	74	48	36	68	85	88	70	34
9	350	194	--	160	71	42	36	80	40	38	77	50
10	1201	91	--	44	55	28	17	53	37	28	32	75
11	288	1105	--	92	57	51	27	54	24	16	25	29
12	287	222	--	60	33	25	23	19	24	16	21	27
13	202	223	--	373	34	27	13	59	12	13	19	25
14	89	82	--	119	142	42	9	32	36	7	18	16
15	27	90	--	41	164	92	45	12	18	13	9	12
16	17	30	--	38	59	47	36	31	4	5	15	10
17	7	60	--	29	8	25	28	103	16	4	5	8
18	3	0	--	32	15	11	16	60	35	12	8	6
19	0	0	--	56	22	11	4	18	26	12	10	3
20	0	0	--	4	42	11	4	5	12	7	15	4
21	0	0	--	2	13	10	8	5	3	2	4	3
22	0	0	--	0	3	1	2	6	2	1	1	2
23	0	0	--	0	1	1	2	6	1	<1	0	<1
24	0	0	--	0	0	0	1	2	0	1	0	0
25	0	0	--	0	0	0	0	0	0	0	0	0
Totals	3236	2687	--	1419	975	613	478	1081	666	336	435	416

* Echo integration-trawl surveys in 1988-1998 were conducted by the Alaska Fisheries Science Center, Seattle, USA. The 1999 survey was conducted by Japan Fisheries Agency

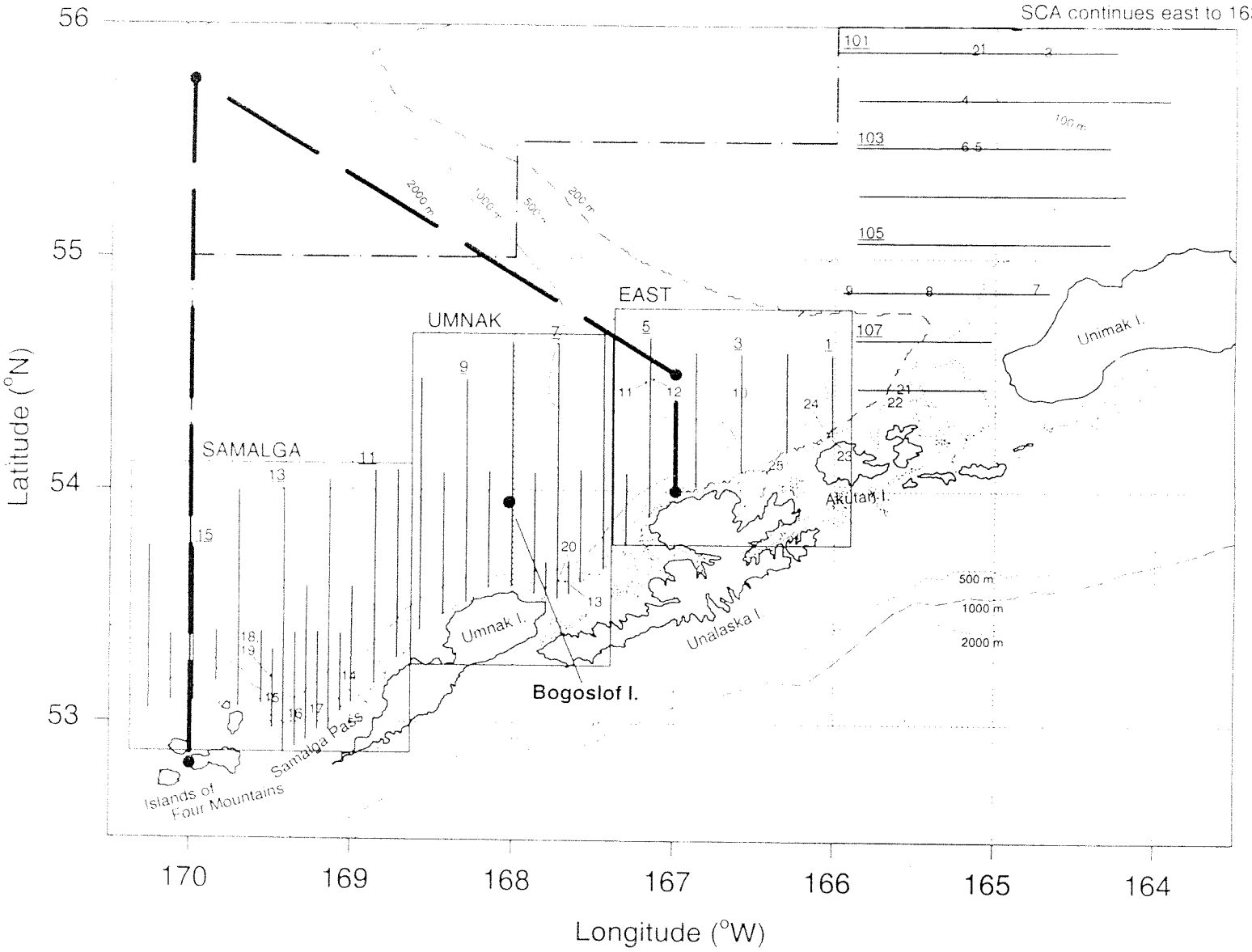
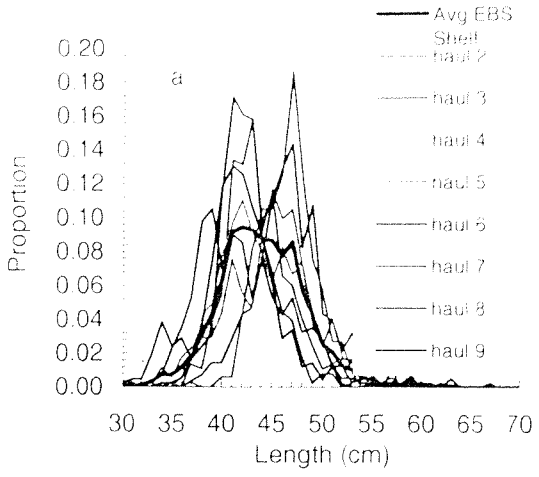
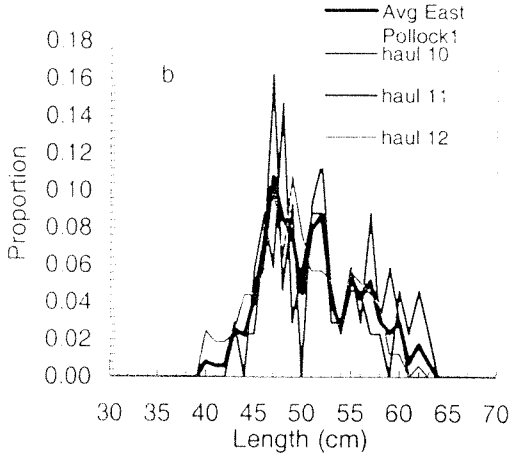
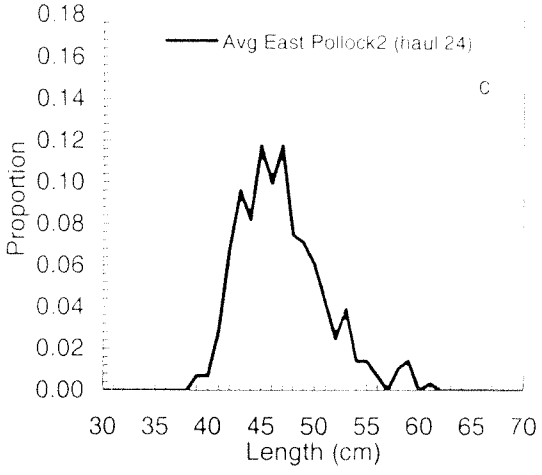


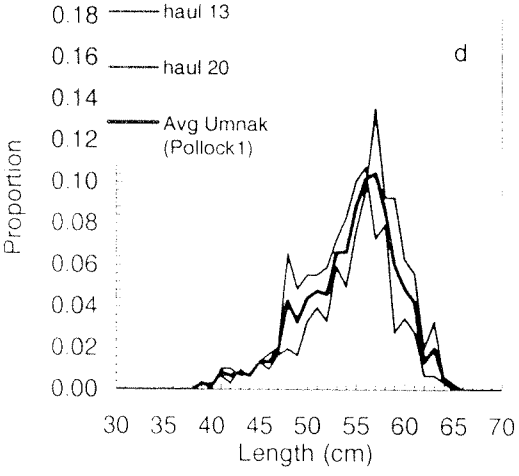
Figure 1. Trackline and haul locations from the winter 2000 echo integration-trawl survey of the southeast Bering Sea shelf and Bogoslof Island areas. Transect numbers are underlined. Dash-dotted line indicates boundary of the sea lion Conservation Area (SCA), and heavy dashed line outlines U.S. management

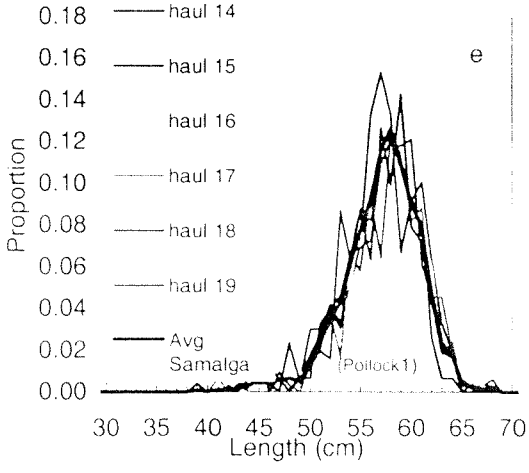
Figure 2 Pollock proportions by length from raw haul data, and haul data averaged by length stratum for the southeastern Bering Sea shelf (a), and Bogoslof Island area (b-e) surveys. In Bogoslof, length strata were weighted to equalize numbers of males and females and average length stratum curves were combined with acoustic data to produce population at length number and biomass estimates.











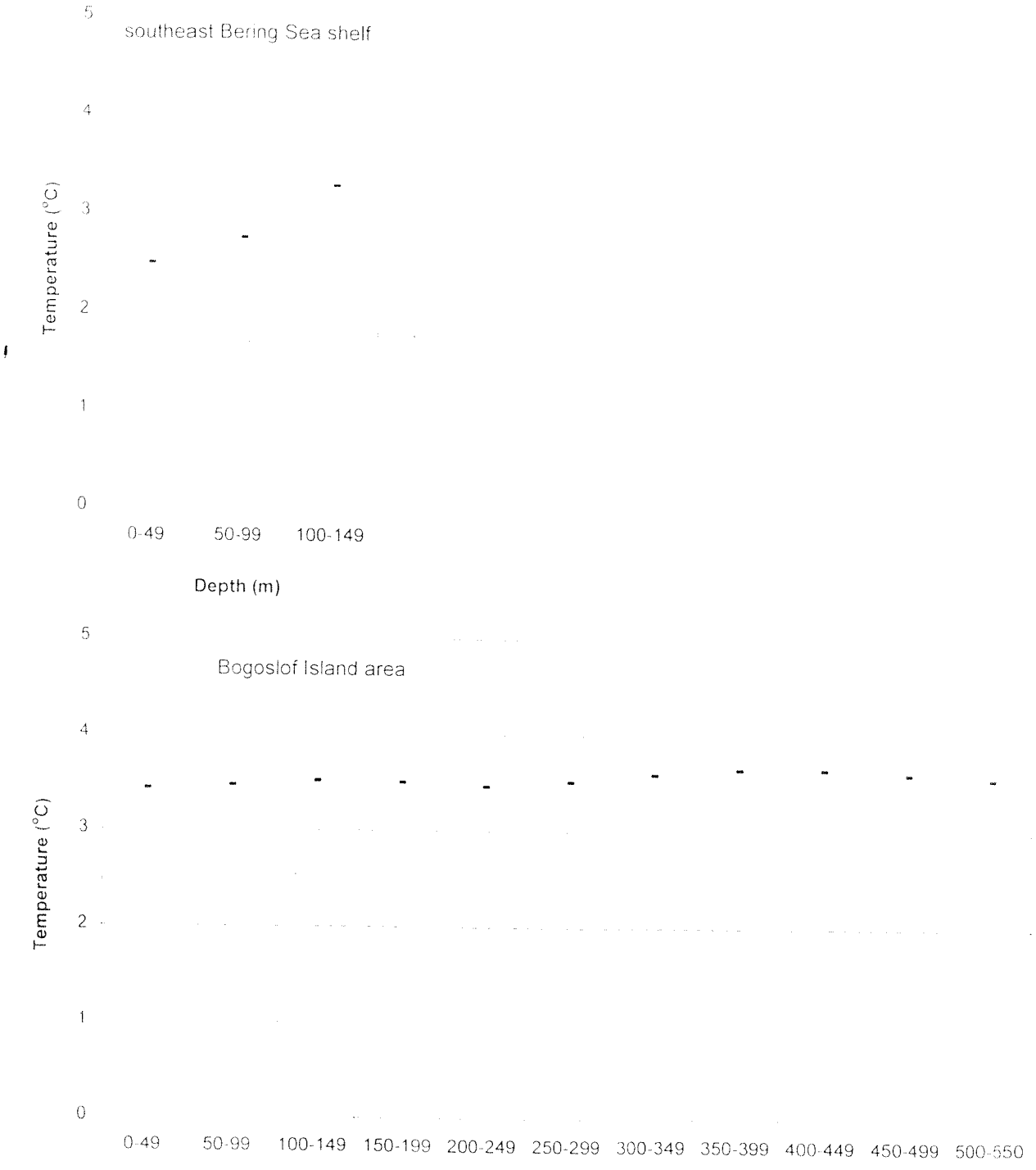


Figure 3. Average temperature (°C) (-) and range (vertical bars) by 50-m depth bins observed during the winter 2000 pollock echo integration-trawl s rvey of the southeast Bering Sea shelf and Bogoslof Island areas. Data compiled from MBT and CTD casts.

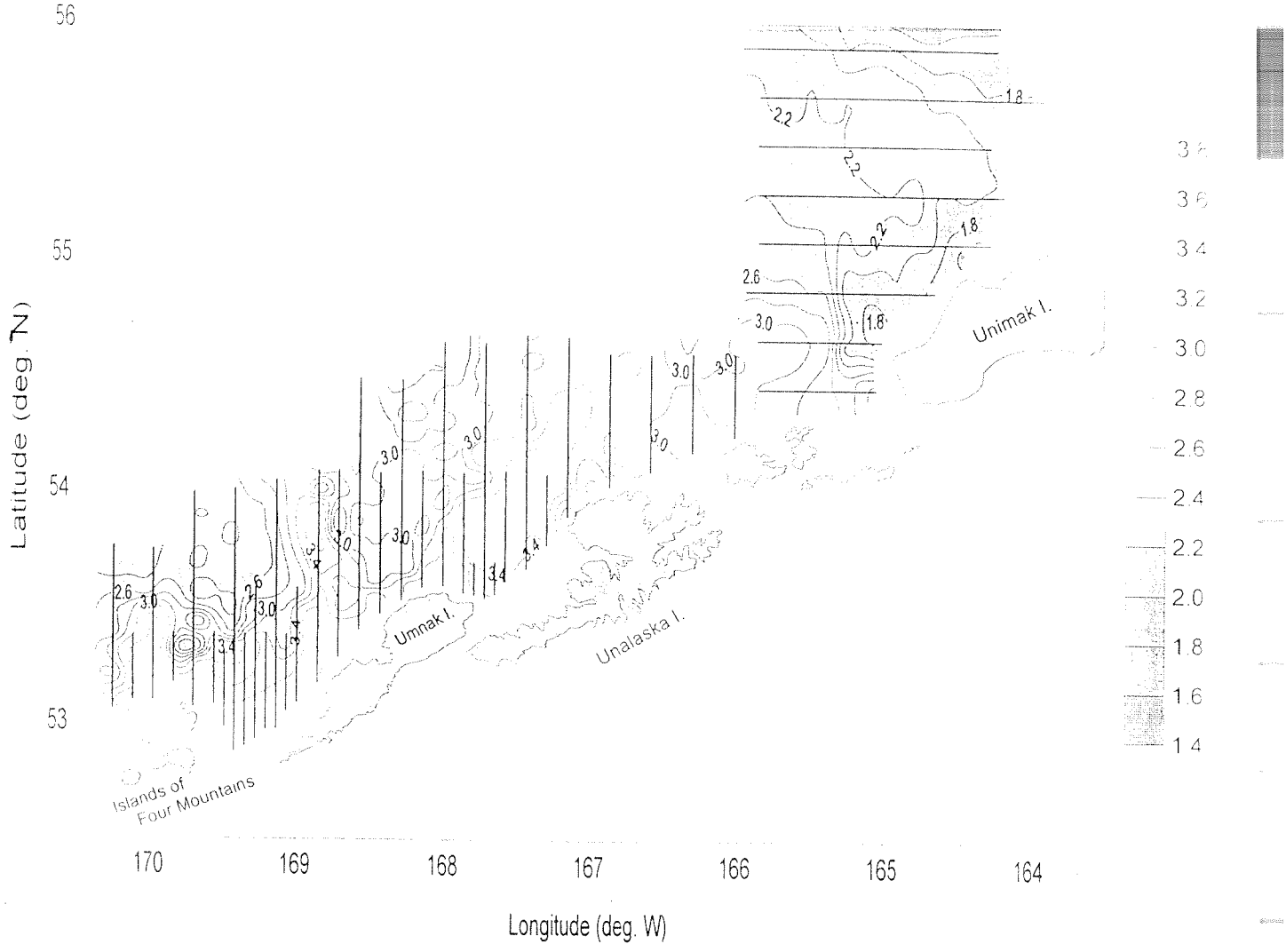


Figure 4. Transect lines with surface temperature contours (in degrees C) during the winter 2000 echo integration-trawl survey of the southeast Bering Sea shelf and Bogoslof Island areas.

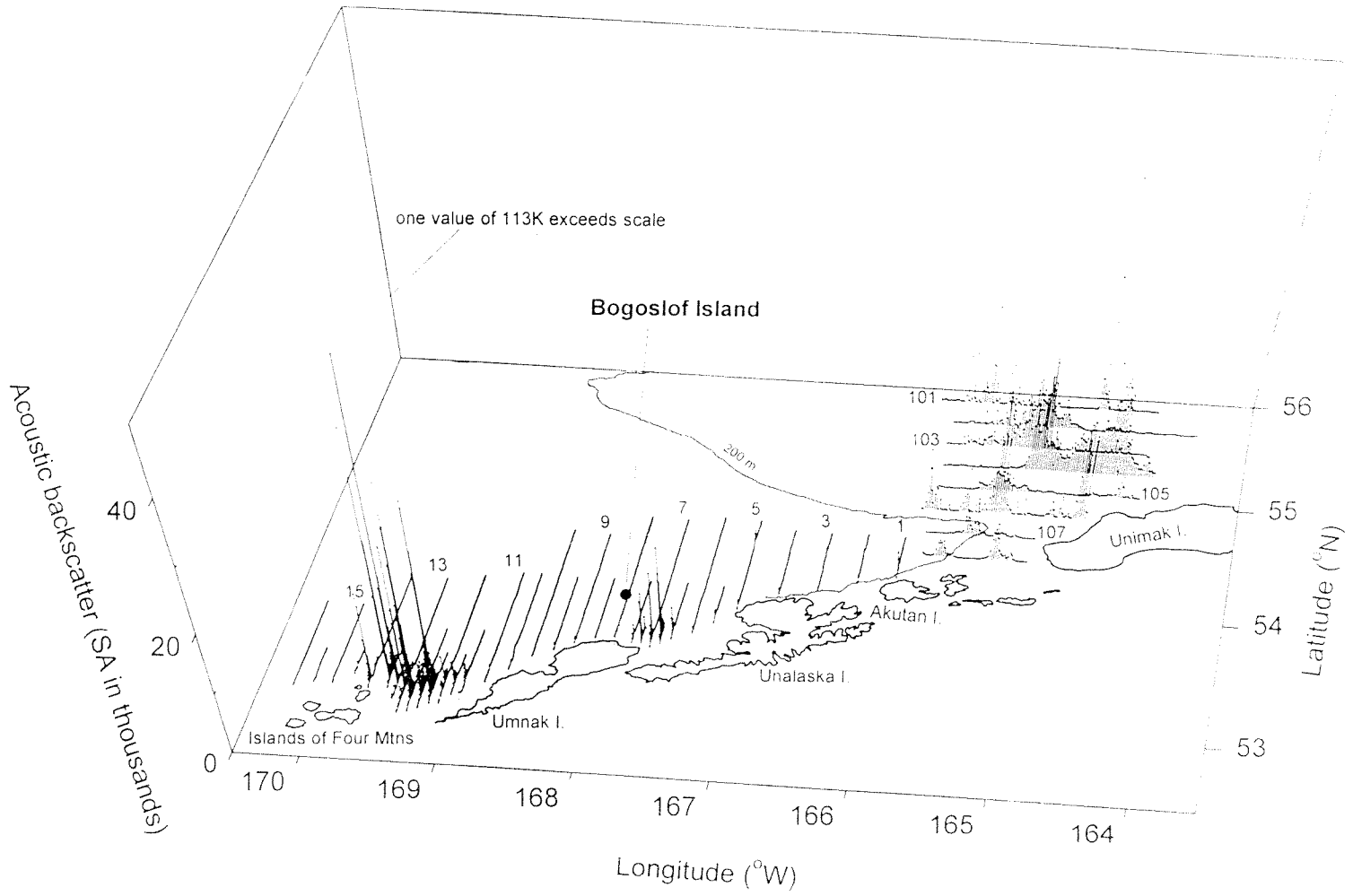


Figure 5. Pollock acoustic backscatter along trackline from the winter 2000 echo integration-trawl survey of the southeast Bering Sea shelf and Bogoslof Island areas. Transect numbers are indicated.

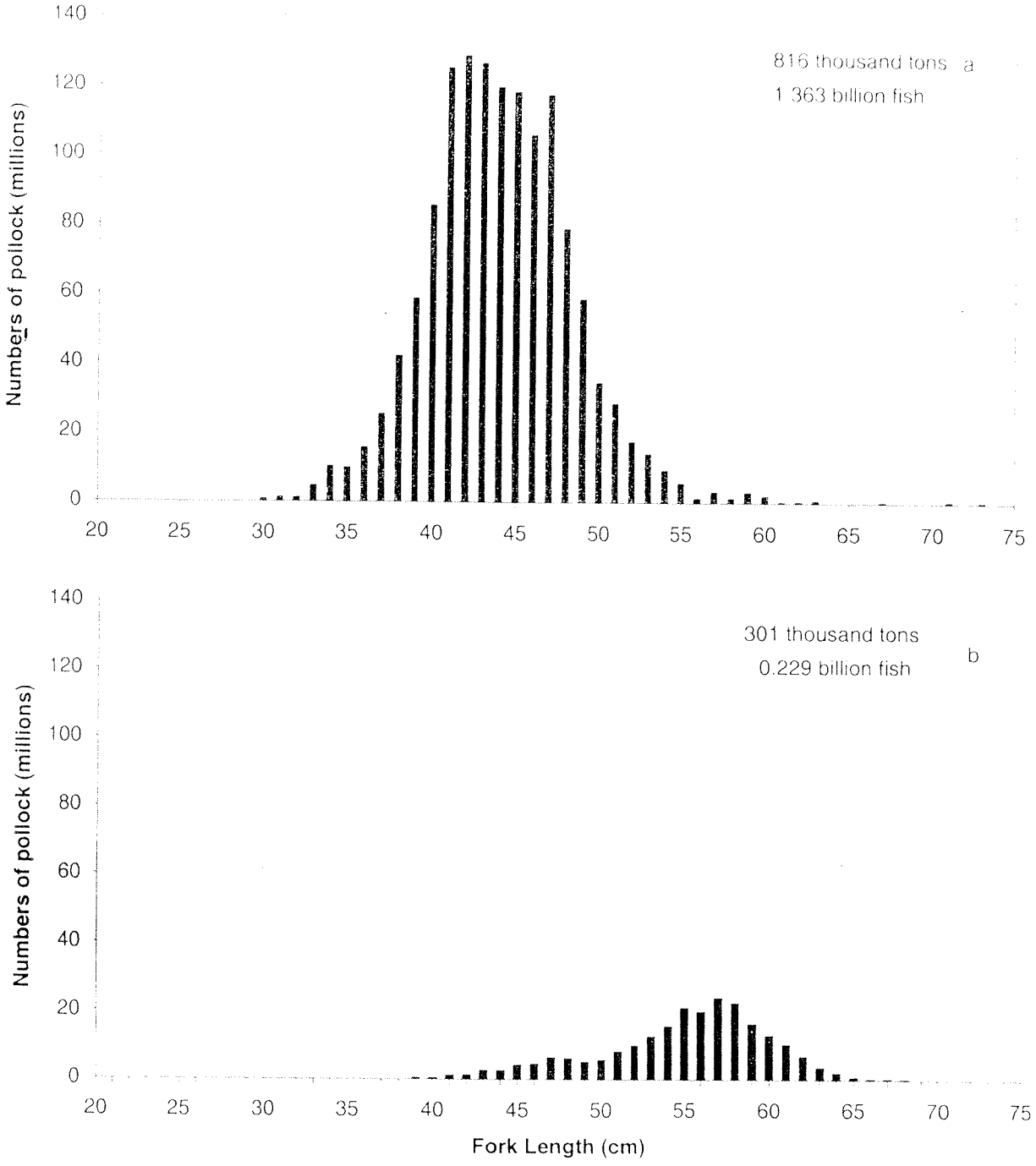


Figure 6. Estimated pollock numbers at length from the winter 2000 echo integration-trawl survey of the southeastern Bering Sea shelf (a) and Bogoslof Island area (b).

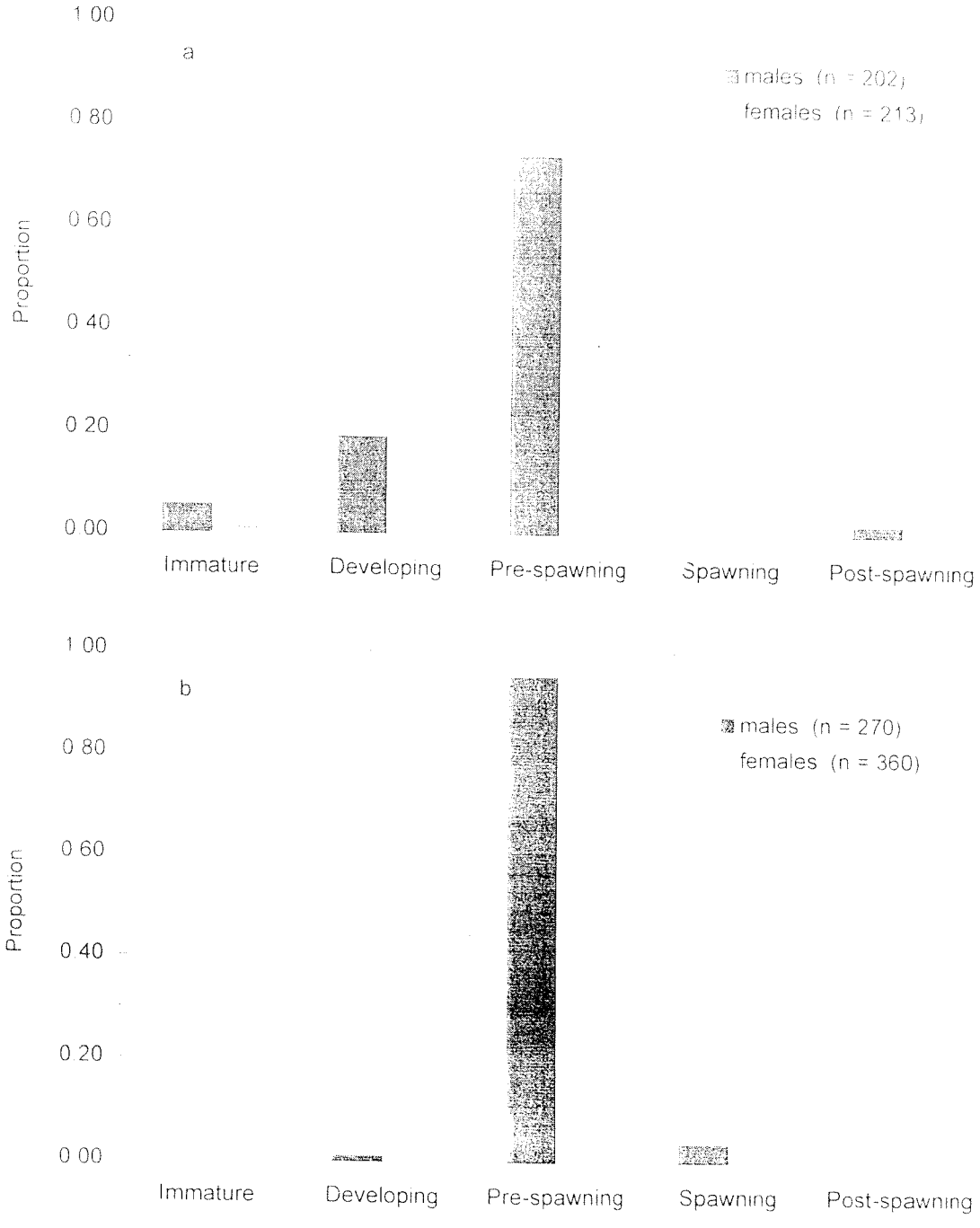


Figure 7. Maturity stages of pollock observed during the winter 2000 echo integration-trawl survey of the southeastern Bering Sea shelf (a) and Bogoslof Island area (b).

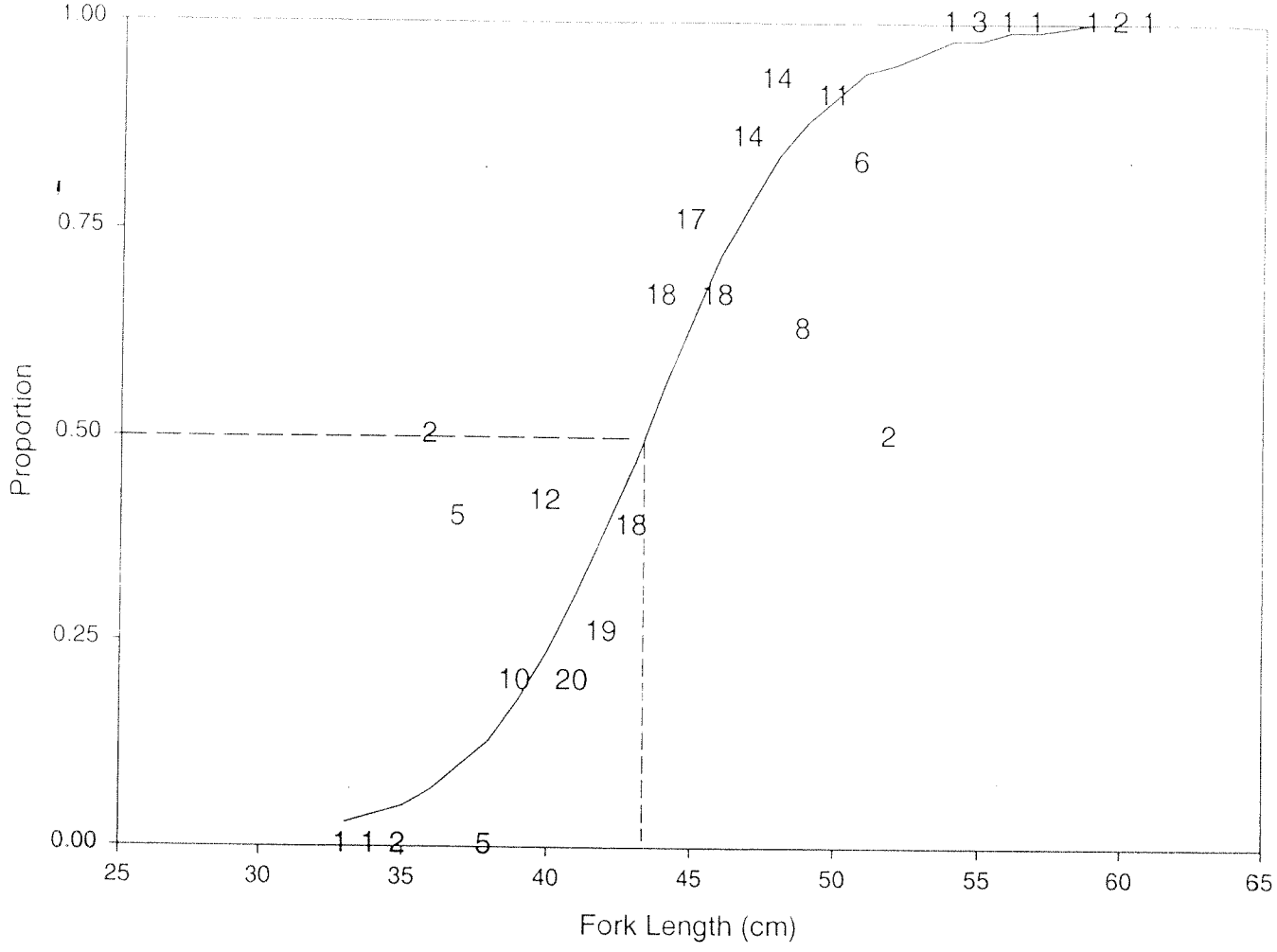


Figure 8. Maturity at length for female pollock from the winter 2000 echo integration-trawl survey of the southeastern Bering Sea shelf. Numbers indicate actual observations. Solid line indicates predicted values. Dashed line indicates length at 50% maturity.

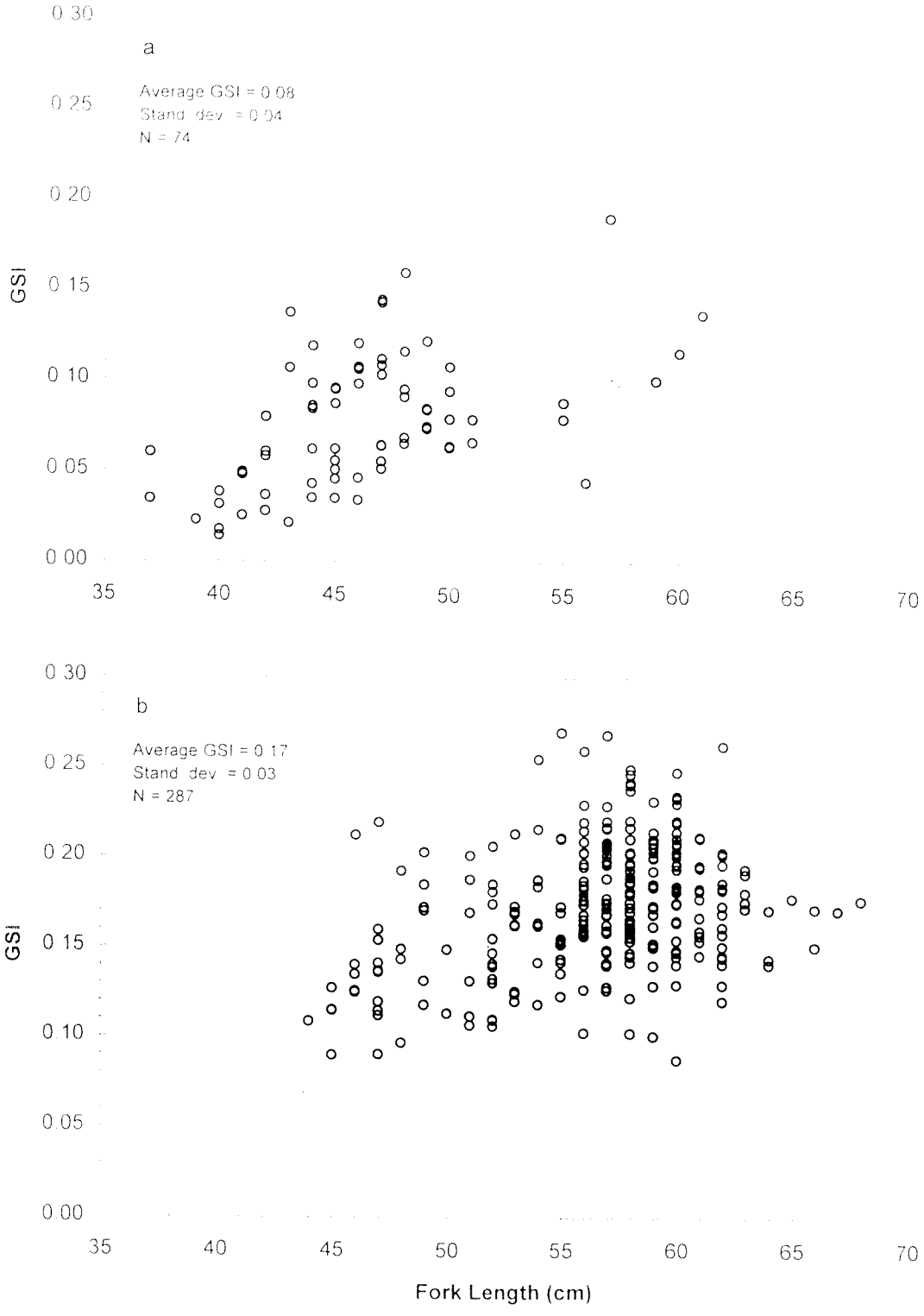


Figure 9. Pollock gonadosomatic indices for mature females as a function of length from the winter 2000 echo integration-trawl survey of the southeastern Bering Sea shelf (a) and Bogoslof Island area (b).

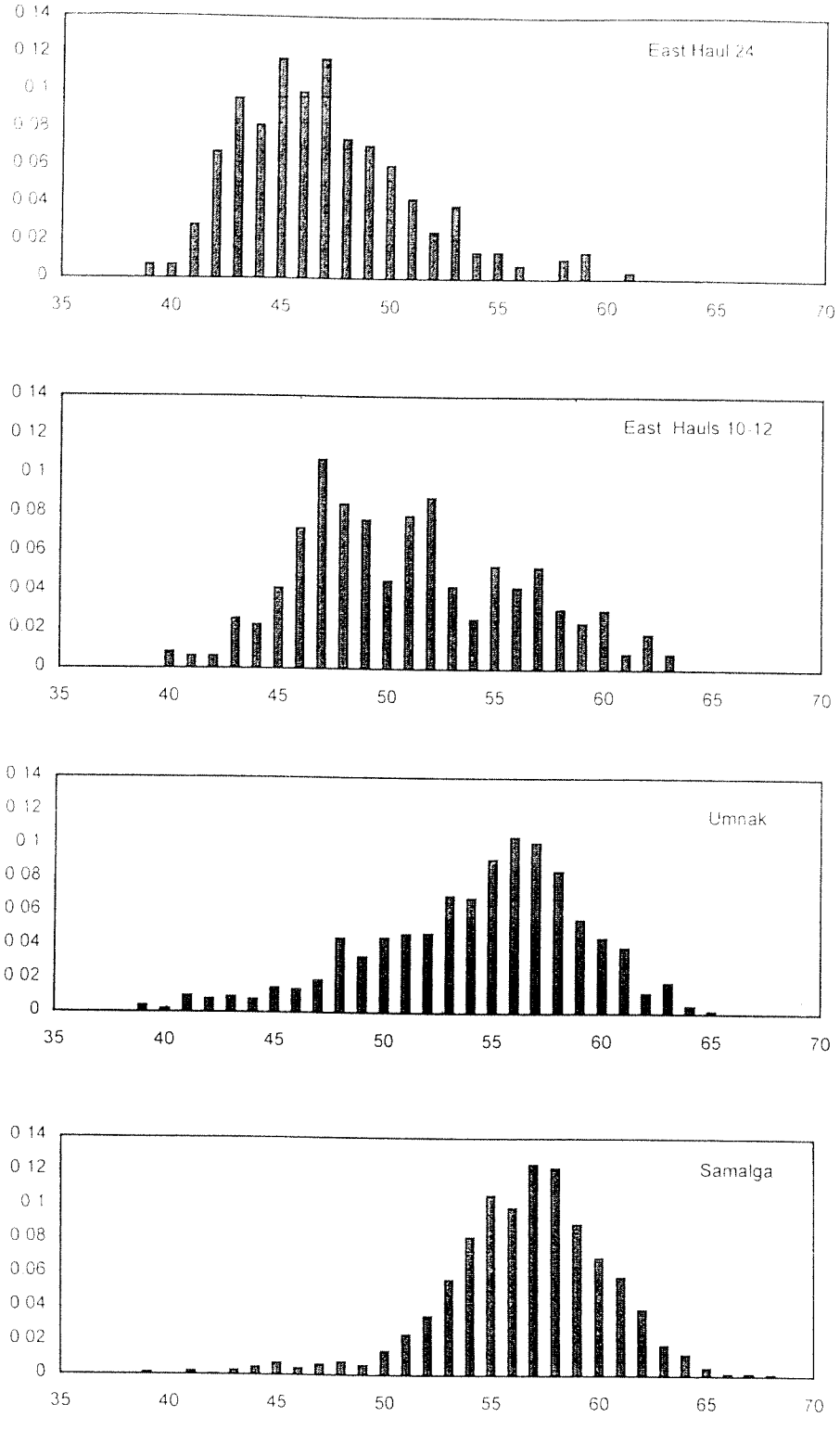


Figure 10. Pollock proportion at length for subregions of the 2000 winter Bogoslof echo integration-trawl survey. Average length increases from east to west (top to bottom panel).

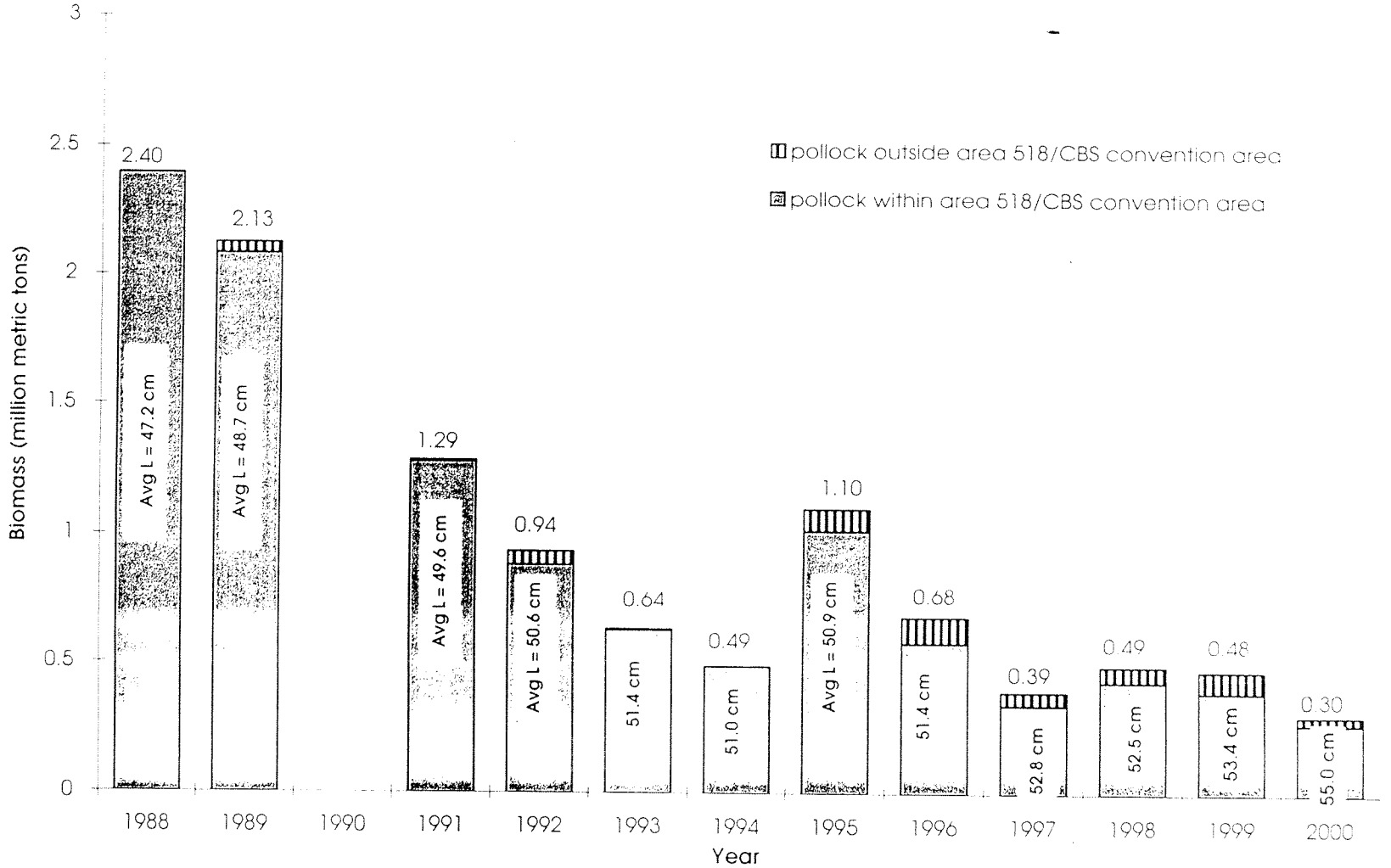


Figure 11. Biomass estimates and average fork lengths obtained during winter echo integration-trawl surveys for spawning walleye pollock near Bogoslof Island, 1988-2000. U.S. surveyed '88-'98, and '00. Japan surveyed in '99. There was no survey in 1990. Total pollock biomass for each survey year is indicated.

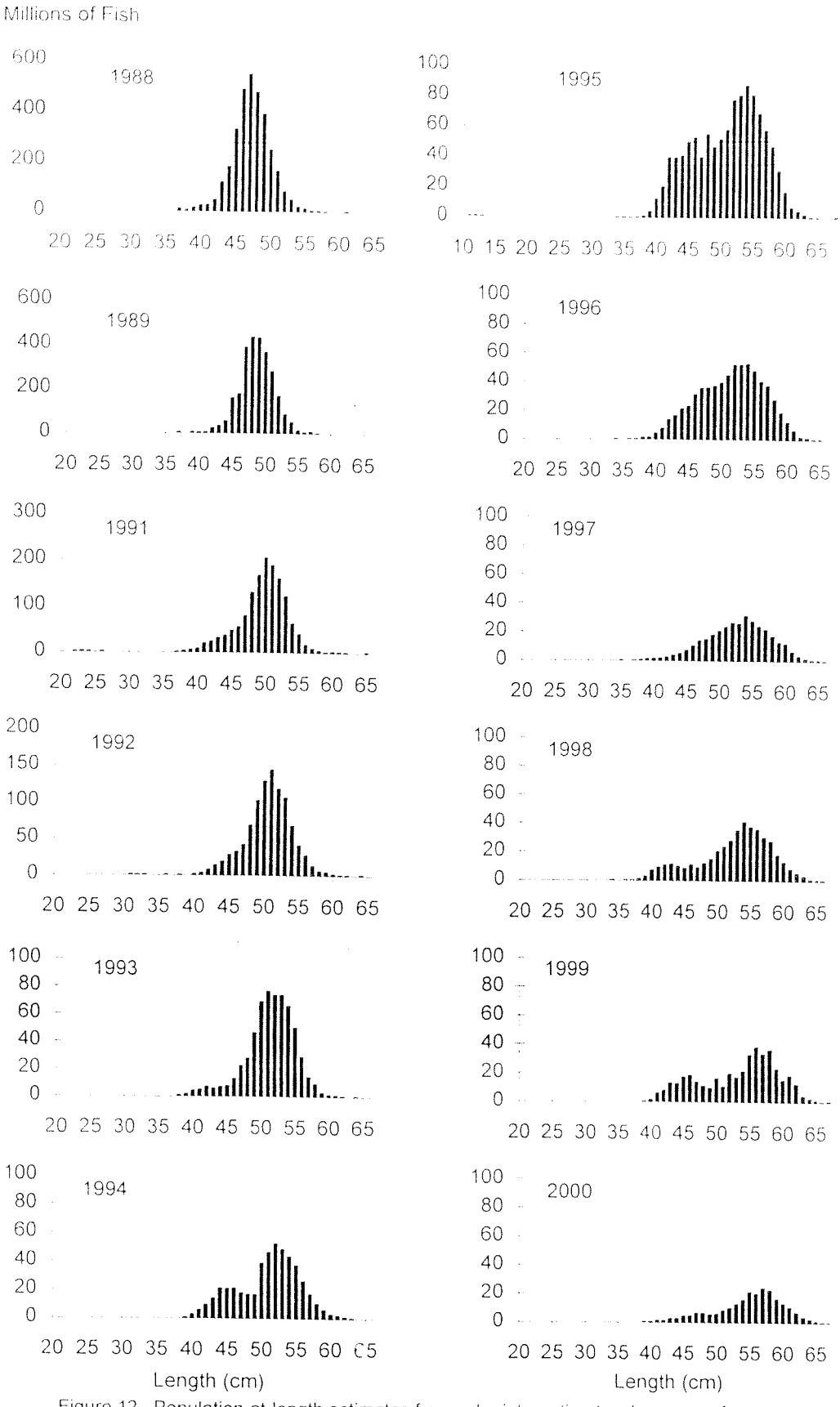


Figure 12. Population-at-length estimates from echo integration-trawl surveys of spawning pollock near Bogoslof Island in winter 1988-2000. US surveyed '88-'98 and 2000; Japan surveyed in 1999. There was no survey in 1990. Note y-axis scales differ.

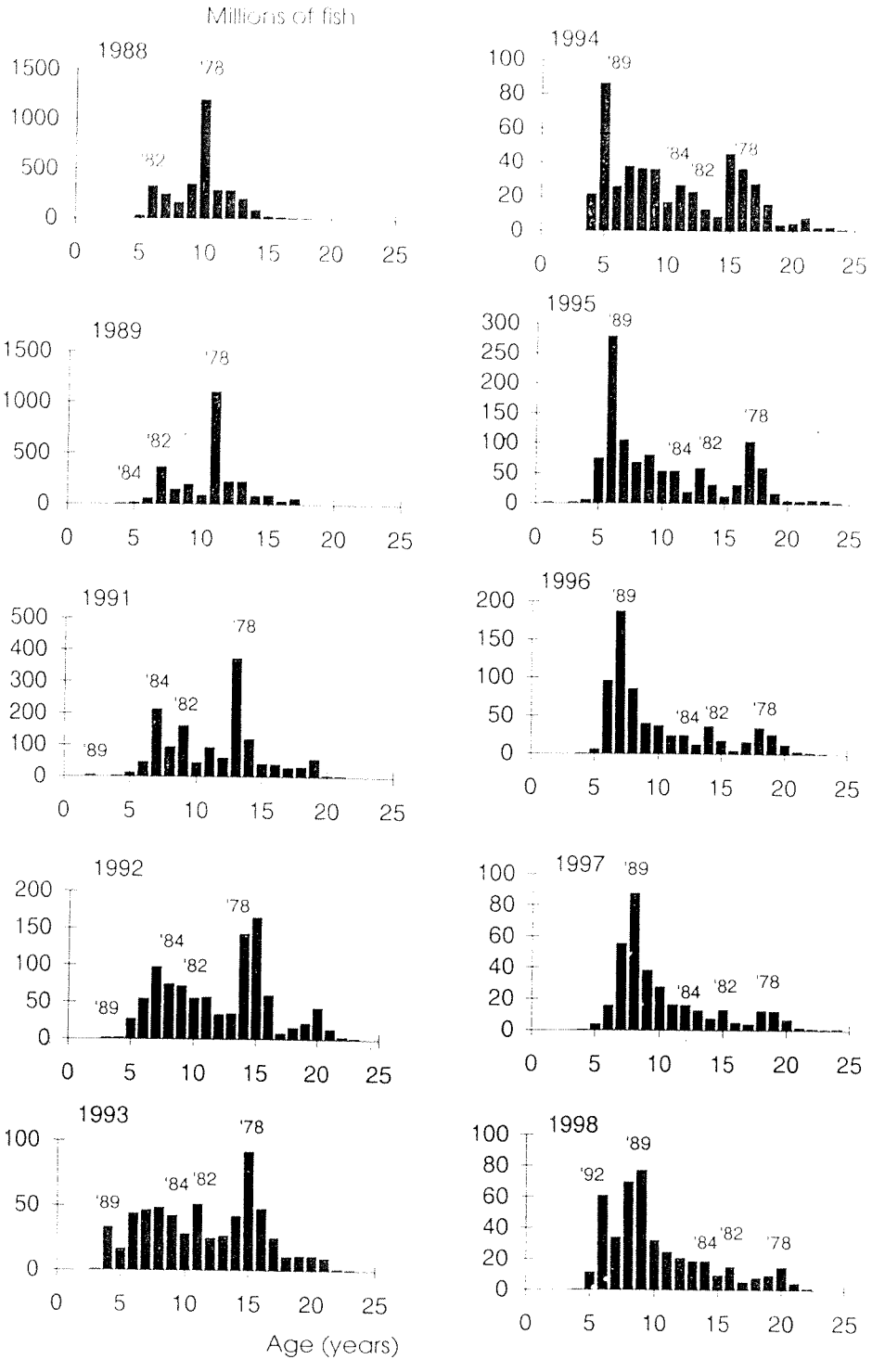


Figure 13. Population-at-age estimates obtained during echo integration-trawl surveys of spawning walleye pollock near Bogoslof Island in winter 1988-99. Major year classes are indicated. US surveyed in 88-98. Japan surveyed in 1999. No survey was conducted in 1990. Ages are not yet available for 2000.