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1983年第38大東丸によるアリューシャン
海域における日米共同底魚資源調査
中間報告

Preliminary report on the Japan-U.S. cooperative
groundfish surveys in the Aleutain Region
by Daito maru No. 38 in 1983

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1983年第38大東丸によるアリューシャン海域 における日米共同底魚資源調査中間報告

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1983年の水産庁による北洋底魚生物調査は、北転型スタン・トローラー第38大東丸を用船し、7月から11月にかけて、アリューシャン海域の底魚資源調査を日米共同の形で実施している。本報告では、7、8月に実施された第1次調査の概要を報告する。

調 査 日 程

調査船第38大東丸は1983年7月10日釧路を出港し、7月16日にSouthwest Strataの西側から東へ向って調査を開始した(Fig. 1参照)。Southwest Strata終了後、Northwest Strata東側水域、Northeast Strata西側水域、Southeast Strata、Adak島南側水域、Northeast Strata、Atka島北側水域、Southern Bering Sea海域、Northeast Strata東側水域と調査を進め、8月29日Southeast Strata Amliia島南の水域で第1次調査を終了した。この間123回のひき網を行い、9月4日に釧路に帰港した。

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今回の日米共同底魚資源調査には、アメリカ合衆国から、NOAA Ship Miller Freeman と Chapman の2隻が参加し、それぞれ7月29日～8月15日と、8月22日～29日までの期間、大東丸と共に、同じ海域において同時に調査が実施された。また、釧路出港から帰港までの間、Northwest & Alaska Fisheries Center の Herbert Shippen 氏と Thomas Wilderbuer 氏の2人が調査期間の前半と後半とに分かれて、大東丸に乗船し、共同調査に従事した。さらに、同センターの Charles West 氏が8月10～15日の間、大東丸に乗船し、本調査に使用したトロール網に関して漁具測定を実施した。

調査船及び漁具

本調査に用船した第38大東丸(北海道、稚内船籍)は、総トン数349.23トンの北転型トロール船で、1979年からベーリング・アリューシャン海域で調査船として用船されたものとはほぼ同型の船である。調査船の要目を表1に示した。また本調査に用いたトロール漁具及び付属漁具の仕様を表2に示した。

トロール網の袖網の展開距離を推定するために、トロール・ワープの展開角を、小山(1974)の方法に従って、各ひき網毎に測定した。さらに、ひき網番号82、83、86、89番目の4回のひき網時に、West氏がヘッド・ロープの中央と左右の袖網の先端に漁具測定用機器を取り付け網口の高さと袖網の広がり等の測定を行った。この方法により、5秒毎の網口の高さと、袖網の展開距離に関する情報を入手することができた。

調査の概要

1980年に実施されたアリューシャン海域日米共同底魚資源調査結果に基づき、調査水域が設定された。すなわち、アリューシャン海域(170°E～165°W)を大きく次の6つに分けた; Northwest Strata, Northeast Strata, Southwest Strata, Southeast Strata, Southern Bering Sea 及び Bowers Ridge Strata (Fig. 1)。さらに、それぞれの Strata を経度1度ごとに区切り、1～100 m、101～200 m、201～300 m、301～500 m、501～900 m の5つの水深帯を設定した。各水深帯内のひき網回数は、1980年の調査結果から、スケトウダラ、マダラ、ムネダラ、アラスカメヌケ及びキタノホッケの5種の漁獲重量に応じて設定された。つまり、前回の調査でこれらの魚種の漁獲重量が多かった水深帯では、数回のひき網が計画された。第1次調査中に大東丸により実施された水深帯別の調査点が図1に示されている。

7月16日から8月29日の間に、米国の調査船との会合、調査打ち合わせ、米国調査員の乗下船、燃油の補給等に用いた期間を除く、40日間が調査に費やされ、この間123回のひき網が実施された。この内、119回のひき網に関し、計画された60分ひき網を完了することができた。

共同調査中は、米国の調査船と無線による連絡を保ちながら調査を進行した。原則として、経度1度内の調査点を1隻の調査船がひき網することとし、経度1度を1つおきに調査を実施した。しかし、調

査点が米国水域 3 マイル内に存在する場合には、米国の調査船がこの点を分担し、比較的水深の深い 501 ~ 900 m 層の調査点は時として大東丸によってひき網がなされた。

漁獲物の内、魚類、タコ、イカ類、エビ類及びびカニ類に関しては、魚種別あるいは魚種群別の漁獲重量を測定して漁獲物重量組成を求めた。主要魚種については、各ひき網毎に 100 ~ 200 尾 (スケトウダラについては約 300 尾) を抽出し、雌雄別に体長穿孔カード上で穿孔を行い、5 mm の階級毎の体長組成を求めた。また同時に、年齢査定用形質として耳石 (スケトウダラとマダラでは、鱗も) が採集された。耳石採集対象魚種は、シュムシュガレイ、ウマガレイ、カラスガレイ、アラスカアブラガレイ、ヒレナガナメタ、マダラ、スケトウダラ、ギンダラ、キタノホッケ、アラスカメヌケ、キタノメヌケ、キタオオメヌケ、アラメヌケ、キチジであった。オヒョウに関しては、入網したすべての個体の尾叉長と体重を測定した後、直ちに海中へ投棄した。

調査中に得られた漁獲物重量組成、主要魚種の 5 mm 毎の体長組成等は 1 日の調査終了後、データ・ロガーにインプットされた。

各定点調査で得られた漁獲物重量組成がストラータ及び水深帯別に表 3 に示されている。Northwest Strata、Southeast Strata 及び Southern Bering Sea では、1 ~ 100 m 水深の調査点の多くが米国水域 3 マイル内に存在するために、ひき網を実施することが不可能であった。

アリューシャン海域で実施された 1980 年の調査の中間報告 (山口, 1980) と比較すると、Southwest Strata では、いずれの水深帯においても、全漁獲量の CPU E が、1983 年では 1980 年の 2 ~ 3 倍を記録している。特に、キタノホッケの CPU E 値が 1983 年では著しい増加を示している。Northeast Strata と Southeast Strata では、スケトウダラ及びマダラの CPU E 値が 1980 年より相当増加している。また、両 Strata 共に、キタノホッケの CPU E 値が 1980 年より著しい増加を示している。

オヒョウの定点別、60 分ひき網当りの漁獲尾数を図 2 に、また、体長組成を表 4 と図 3 に示した。オヒョウは、調査水域全体に亘って広く分布していた。体長 90 ~ 110 cm のオヒョウが全尾数の約 30 % を占めた。

トロール漁具の袖網に測定器を取り付けて、4 回の実験が実施された。トロール・ワープ展開角度より推定された袖網の展開距離と実際の測定より得られた値は次の通りである。

方法 \ 網番号	82	83	86	89
実際の測定より	27.5 m	28.8 m	28.6 cm	29.2 m
展開角度より	24.7 m	27.7 m	21.4 m	29.1 m

参 考 文 献

小山武夫：船尾トロールについての実験的考察。東海水研報、77 : 171 ~ 247、1974。

山口関常：1980 年第 62 初枝丸によるアリューシャン海域における底魚資源調査中間報告。

水産庁、20 頁、1980。

PRELIMINARY REPORT ON THE JAPAN-U.S. COOPERATIVE GROUND FISH
SURVEYS IN THE ALEUTIAN REGION BY DAITO MARU NO. 38 IN 1983

Kazuyuki Teshima

The North Pacific groundfish resource assessment surveys by the Fisheries Agency of Japan in 1983 are being conducted under the Japan-US cooperation in the Aleutian Region from July to November with the use of a landbased trawler Daito maru No. 38. This report describes the outline of the first survey conducted in July and August of 1983.

Research Itinerary

Research vessel Daito maru No. 38 left Kushiro on July 10, and started to work eastward from the west side of Southwest Strata on July 16 (Fig. 1). After completing survey operations in the Southwest Strata, Daito maru proceeded into the following areas; the eastern waters of Northwest Strata, the western waters of Northeast Strata, Southeast Strata, the southern waters of the Adak Island, Northeast Strata, the northern waters of the Atka Island, Southern Bering Sea, and the eastern waters of Northeast Strata; The first survey was completed in waters south of the Amlia Island in Southeast Strata on August 29. A total of 123 times of operations were carried out during the first survey period and the vessel returned to Kushiro on September 4.

The present Japan-US cooperative groundfish surveys were joined by the two US, NOAA ships, Miller Freeman and Chapman, and they conducted the surveys together with Daito maru from July 29 and to August 15, and from August 22 to 29. During an entire survey period from the time of departure from Kushiro until return, Mr. Herbert Shippen, and Mr. Thomas Wilderbuer from Northwest and Alaska Fisheries Center, were aboard Daito maru alternately for the first half and the second half of the period to participate in the cooperative survey. Mr. Charles West from NWAFC also stayed aboard Daito maru to measure to horizontal and vertical opening of the trawls used in the surveys from August 10 to 16.

Research Vessel and Gears Used

Daito maru No. 38 (registered in Wakkanai, Hokkaido) used in the surveys is a landbased trawler with the gross tonnage of 349 tons. This vessel is of the almost same in type to those used previously as research vessels in the Bering-Aluetian surveys since 1979. The general arrangement of the vessel is shown in Table 1. The specifications of the trawls and accessory gears used in the surveys are shown in Table 2.

In order to estimate the spread between the both wings of the trawls, the angle of the trawl warp was measured on every tow based on methods by Koyama (1974). In addition, Mr. West attached the trawl mensuration system on the tips of both wings as well as on the center of the head rope to measure both horizontal and vertical openings of the trawls when four operations, the 82, 83, 86 and 89th tows were conducted. With this method information was obtained as to the height and spread of the trawls every five seconds.

Summary of Surveys

Survey areas were designed based on the results obtained through the Japan-US cooperative groundfish surveys conducted in the Aleutian Region

in 1980. To be specific, the Aleutian Region (170°E ~ 165°W) was largely divided into the following six areas; Northwest Strata, Northeast Strata; Southwest Strata, Southeast Strata, Southern Bering Sea, and Bowers Ridge Strata (Fig. 1). Each strata was cut by 1° longitude (sample unit), in which five depth zones of 1 ~ 100 m, 101 ~ 200 m, 201 ~ 300 m, 301 ~ 500 m, and 501 ~ 900 m were allotted. The number of survey stations was allotted based on the combined abundance of the five principal species attained in the 1980 surveys; pollock, Pacific cod, giant grenadier, Pacific ocean perch and Atka mackerel, i.e., several survey stations were scheduled to be conducted in the sample unit where the catch of the five species was greater in the previous surveys. Trawl stations by depth zone carried out by Daito maru during the first survey are shown in Fig. 1.

A net of 40 days were spent for the surveys from July 16 to August 29 excluding time spent for meeting with US research vessels, taking the US scientists on or off Daito maru and for the fuel oil supply. During the first survey a total of 123 times of operations were conducted. The 119 times of tows were made for duration of 60 minutes each as planned.

Daito maru was conducting the survey keeping in contact with the US vessels by radio throughout the survey period. In principle, one vessel was planned to allot one sample unit within 1° longitude. Both Japanese and US vessels were surveying alternate sampling unit. However, in the case when survey stations were found to be situated within the US 3-mile zone, these stations were sampled by the US vessels, and sampling efforts were sometimes paid by Daito maru at stations deeper than 500 m.

Out of the catch, fish, octopus, squids, shrimps, and crabs were measured on the weight by species or species group, and the catch weight composition was obtained. On the major species, 100 ~ 200 pcs (or 300 in case of pollock) were taken from every trawl and the body sizes were recorded on punch cards by sex, and the body size composition with 5 mm-interval was attained. At the same time, otoliths (also scales from both pollock and Pacific cod) were collected as materials for the age determination. The species of which otoliths were collected were rock sole, flathead sole, greenland turbot, arrowtooth flounder, rex sole, Pacific cod, pollock, sablefish, Atka mackerel, Pacific ocean perch, northern rockfish, shorttraker rockfish, rougheyeye rockfish and thornyheads. All halibuts caught were measured on fork length and weight, and immediately released in the sea.

The catch weight composition, and the body length composition of major species with every 5 mm-interval were put into the data logger.

The catch weight composition obtained in each survey station are shown in Table 3 classified by strata and depth zone. Since many of the 1 ~ 100 m depth zones in Northwest Strata, Southeast Strata, and Southern Bering Sea were situated within the US 3-mile zone, operations could not be made in these areas.

As compared with the preliminary report of the 1980 surveys (Yamaguchi, 1980) conducted in the Aleutian Region, the CPUE value in every depth zone of Southwest Strata in 1983 registered two to three times that in 1980. Particularly, the CPUE value of Atka mackerel remarkably increased in 1983. In Northeast Strata and Southeast Strata, the CPUE value of pollock and Pacific cod considerably increased over those in 1980. In both strata, the CPUE of Atka mackerel also registered a remarkable increase over that in 1980.

The number of halibut caught by the 60-minute tow and by station is shown in Fig. 2, and the body size composition is shown in Fig. 3 and 4. Halibuts were distributed widely throughout the surveyed areas. Halibut measuring 90-110 in fork length accounted for about 30 per cent.

Trawls with the mensuration system were experimented four times to measure the spread of the trawls. The spread between the wings of the trawls estimated from the angle of the trawl warp and the values from actual measurement are as follows:

Mode \ Net No.	1982	1983	1986	1989
Actual measurement	27.5 m	28.8 m	28.6 m	29.2 m
Estimation from trawl warp angle	24.7 m	27.7 m	21.4 m	29.1 m

References

- Koyama, Takeo. 1974. Studies on the stern trawler. Bull. Tokai Reg. Fish. Res. Lab., 77: 171-247 (In Japanese).
- Yamaguchi, Hirotune. 1980. Preliminary report on the Japan-US groundfish survey in the Aleutain Region by Hatsuei maru No. 62 in 1980. (Document submitted to the International North Pacific Fisheries Commission) 20 p. Fisheries Agency of Japan, Tokyo 100, Japan.

Table 1. Specifications of the research vessel Daito maru No. 38 conducting the Japan-US cooperative surveys in the Aleutain Region in 1983.

Overall length (m)	51.76
Gross tonnage (ton)	349.23
Horsepower (PS)	2,800
Propeller	Controlable pitch propeller
Trawl winch	17 tons/80 m/min.
Type of trawl	Stern trawler
Number of crew	24
Scientists	3

Table 2. Specifications of the trawl gears used for the 1983 surveys.

Headrope length (m)	46.9
Footrope length (m)	58.0
Overall net length (m)	71.3 ^{a/}
Mesh-size of codend (mm)	100 ^{b/} + 90 ^{c/}
Diameter of bobbins (mm)	530
Handrope length (mm)	92.0 ^{d/}
Size of otterdoor (m)	2.25 x 3.45
Weight of the otterdoor in water (Kg)	2,400

^{a/} Overall net length = net wing to codend (54.3 m) +
codend length (17.0 m)

^{b/} Anterior part of the cod end

^{c/} Posterior part

^{d/} Including the otter pendant length (12 m)

Table 3-1. Standardized catch (kg/60 min. trawled) by species and by depth zone during the Japan-US cooperative surveys in the Aleutain Region, July and August of 1983.

Southwest Strata					
Species	Depth zone (m), (Numer of hauls)				
	001/100(4)	101/200(22)	201/300(11)	301/500(7)	501/900(10)
Rock sole	60.3	17.3	1.7	0.1	-
Flathead sole	7.1	4.1	1.9	0.2	0.5
Greenland turbot	-	0.3	3.7	26.9	17.7
Arrowtooth flounder	9.9	27.2	25.2	28.9	23.1
Halibut	14.0	6.4	4.1	2.3	-
Rex sole	-	4.5	0.1	1.1	1.4
Deepsea sole	-	-	-	-	0.5
Dover sole	-	-	-	-	1.0
Sub-total	(91.3)	(59.8)	(36.7)	(59.5)	(44.2)
Pacific cod	583.6	320.3	45.3	-	-
Pollock	339.0	1,054.4	2,715.6	15.4	1.0
Sub-total	(922.6)	(1,374.7)	(2,760.9)	(15.4)	(1.0)
Sablefish	-	-	-	8.0	58.0
Pacific ocean perch	0.2	916.0	575.7	4.5	-
Northern rockfish	823.7	396.7	24.1	24.2	-
Shortraker rockfish	2.7	0.5	0.8	448.3	27.1
Rougheye rockfish	5.6	109.0	78.9	45.8	2.3
Other rockfishes	0.3	0.8	-	0.2	-
Thornyheads	2.3	0.3	5.3	54.4	111.1
Atka mackerel	1,631.6	2,972.6	216.8	17.0	-
Greenlings	1.4	-	-	-	-
Sculpins	77.2	26.6	23.8	2.7	2.7
Poachers	-	0.0	0.0	-	-
Eelpouts	0.2	-	0.0	-	0.7
Snailfishes	-	-	0.7	0.3	5.8
Rattails	-	-	-	-	1,777.6
Searcher	0.4	1.6	0.2	0.0	-
Prowfish	3.1	33.1	3.5	-	-
Skates	19.2	15.6	15.7	6.2	21.9
Other fishes	-	0.8	0.0	-	5.7
Sub-total	(2,567.9)	(4,473.6)	(945.5)	(611.6)	(2,012.9)
Total of fishes	(3,581.8)	(5,908.1)	(3,743.1)	(686.5)	(2,058.1)
Octopus	0.2	1.6	1.3	0.8	-
Squids	3.6	18.1	625.5	129.1	28.0
Sidestrip shrimp	-	0.0	-	1.1	-
Crabs	2.0	7.0	13.7	4.4	2.1
Others	5.6	0.0	-	-	2.3
Sub-total	(11.4)	(26.7)	(640.5)	(135.4)	(32.4)
Total catch	3,593.2	5,934.8	4,383.6	821.9	2,090.5
Halibut (Number)	2.0	1.6	0.4	0.7	-

Table 3-2. Standardized catch (kg/60 min. trawled)

Northwest strata					
Species	Depth zone (m), (Number of hauls)				
	001/100	101/200(1)	201/300(3)	301/500(1)	501/900(4)
Rock sole		96.8	102.9	-	-
Flathead sole		-	-	-	-
Greenland turbot		-	4.1	167.4	96.3
Arrowtooth flounder		-	186.2	253.8	18.4
Halibut		168.8	69.2	-	-
Rex sole		-	1.4	-	0.7
Deepsea sole		-	-	-	0.3
Dover sole		-	-	-	0.8
Sub-total		(265.6)	(363.8)	(421.2)	(116.5)
Pacific cod		607.6	538.1	-	-
Pollock		2,515.4	2,693.6	-	0.2
Sub-total		(3,123.0)	(3,231.7)	-	(0.2)
Sablefish		-	-	-	19.8
Pacific ocean perch		234.0	1,139.2	-	-
Northern rockfish		23.4	-	-	-
Shortraker rockfish		-	0.3	35.4	14.5
Rougheye rockfish		5.2	105.9	11.4	-
Other rockfish		-	-	-	-
Thornyheads		-	-	7.6	38.3
Atka mackerel		-	-	-	-
Greenlings		-	-	-	-
Sculpins		25.4	30.4	-	0.1
Poachers		-	-	-	-
Eelpouts		-	-	1.7	2.7
Snailfishes		-	-	-	0.7
Rattails		-	-	-	1,493.8
Searcher		-	-	-	-
Prowfish		5.2	8.6	-	-
Skates		-	22.9	41.4	8.9
Sub-total		(293.2)	(1,307.3)	(97.5)	(1,578.8)
Total of fishes		(3,681.8)	(4,902.8)	(518.7)	(1,695.5)
Octopus		-	-	-	-
Squids		-	2.4	64.2	9.2
Sidestrip shrimp		-	-	-	-
Crabs		6.8	19.4	-	3.4
Others		-	-	-	-
Sub-total		(6.8)	(21.8)	(64.2)	(12.6)
Total catch		3,688.6	4,924.6	582.9	1,708.1
Halibut (number)		6.0	4.0	-	-

Table 3-3. Standardized catch (kg/60 min. trawled)

Northeast Strata					
Species	Depth zone (m), (Number of hauls)				
	001/100(1)	101/200(9)	201/300(6)	301/500(5)	501/900(12)
Rock sole	4.7	54.7	39.9	-	-
Flathead sole	-	-	-	3.9	-
Greenland turbot	-	1.4	3.4	350.2	472.3
Arrowtooth flounder	-	27.3	19.6	342.4	62.5
Halibut	156.0	63.1	63.0	17.5	3.0
Rex sole	-	0.1	1.2	2.0	1.7
Deepsea sole	-	-	-	-	0.2
Dover sole	-	-	-	0.7	3.6
Sub-total	(160.7)	(146.6)	(127.1)	(716.7)	(543.3)
Pacific cod	6,679.2	167.0	162.7	16.4	-
Pollock	78.6	4,295.2	832.9	7.1	0.1
Sub-total	(6,757.8)	(4,462.2)	(995.6)	(23.5)	(0.1)
Sablefish	-	136.8	230.9	101.6	625.7
Pacific ocean perch	-	466.3	600.8	141.8	-
Northern rockfish	291.2	162.3	-	-	-
Shortraker rockfish	-	-	-	452.2	20.1
Rougheye rockfish	-	15.1	25.7	251.0	1.8
Other rockfishes	-	1.2	-	-	-
Thornyheads	-	1.2	-	35.7	50.2
Atka mackerel	14,107.0	34.3	45.2	-	-
Greenlings	-	-	-	-	-
Sculpins	9.3	26.7	252.5	25.9	-
Poachers	-	-	-	-	-
Eelpouts	-	-	-	1.6	1.0
Snailfishes	-	0.1	0.0	-	0.1
Rattails	-	-	-	320.2	1,151.2
Searcher	-	0.8	0.1	-	0.0
Prowfish	3.7	19.9	0.6	-	-
Skates	11.5	34.2	25.4	35.1	14.3
Other fishes	-	-	-	-	8.6
Sub-total	(14,422.7)	(898.9)	(1,181.2)	(1,365.1)	(1,873.0)
Total of fishes	(21,341.2)	(5,507.7)	(2,303.9)	(2,105.2)	(2,416.3)
Octopus	-	-	0.5	0.3	-
Squids	-	0.8	3.5	29.8	23.5
Shrimps	-	-	-	-	-
Crabs	-	6.3	19.2	3.6	1.0
Others	-	0.0	-	-	-
Sub-total	-	(7.1)	(23.2)	(33.7)	(24.5)
Total catch	21,341.2	5,514.8	2,327.1	2,138.9	2,440.9
Halibut (Number)	15.0	4.7	3.0	0.6	0.1

Table 3-4. Standardized catch (kg/60 min. trawled)

Species	Depth zone (m), (number of hauls)				
	001/100	101/200 (8)	201/300 (7)	301/500 (2) 501/900 (1)	
Rock sole		55.7	65.2	3.5	-
Flathead sole		-	-	-	-
Greenland turbot		-	-	19.5	2.2
Arrowtooth flounder		88.9	31.9	36.5	44.4
Halibut		64.1	53.1	32.0	65.6
Rex sole		-	0.2	3.0	1.5
Deepsea sole		-	-	-	-
Dover sole		-	-	-	-
Sub-total		(208.7)	(150.4)	(94.5)	(113.7)
Pacific cod		669.6	218.8	17.2	-
Pollock		8,688.4	1,226.2	91.3	-
Sub-total		(9,358.0)	(1,445.0)	(108.5)	-
Sablefish		667.1	48.0	59.8	277.0
Pacific ocean perch		1,502.4	234.9	9.2	-
Northern rockfish		6.8	0.8	-	-
Shortraker rockfish		2.4	39.9	171.4	-
Rougheye rockfish		10.4	95.2	159.0	-
Other rockfish		0.6	0.2	-	-
Thornyheads		-	4.7	31.9	69.6
Atka mackerel		4,167.1	-	-	-
Greenlings		-	-	-	-
Sculpins		60.5	63.4	15.3	-
Poachers		-	0.0	-	-
Eelpouts		-	-	-	-
Snailfishes		-	0.0	-	-
Rattails		-	-	2.7	6.2
Searcher		-	0.1	-	521.6
Prowfish		3.8	1.2	-	-
Skates		11.4	16.4	52.0	14.6
Other fishes		1.6	-	34.5	-
Sub-total		(6,434.1)	(504.8)	(535.8)	(889.0)
Total of fishes		(16,000.8)	(2,100.2)	(738.8)	(1,002.7)
Octopus		0.2	1.3	-	-
Squids		-	0.8	12.6	-
Shrimps		-	-	-	-
Crabs		2.0	4.9	-	-
Sub-total		2.2	(7.0)	(12.6)	(-)
Total catch		16,003.0	2,107.2	751.4	1,002.7
Halibut (Number)		5.3	2.7	0.7	-

Table 3-5. Standardized catch (kg/60 min. trawled)

Species	Depth zone(m), (Number of hauls)			
	001/100	101/200(2)	201/300(3)	301/500(2) 501/900(2)
Rock sole		0.7	2.6	-
Flathead sole		-	0.4	-
Greenland turbot		-	-	165.8
Arrowtooth flounder		32.8	25.3	114.4
Halibut		197.4	41.8	11.5
Rex sole		0.5	0.1	81.1
Deepsea sole		-	-	-
Dover sole		-	-	-
Sub-total		(231.4)	(70.2)	(372.8) (1,070.3)
Pacific cod		804.7	471.9	18.0
Pollock		170.2	1,730.0	58.0
Sub-total		(974.9)	(2,201.9)	(76.0)
Sablefish		-	-	457.8
Pacific ocean perch		1,497.9	2,700.7	80.6
Northern rockfish		505.7	-	-
Shortraker rockfish		-	-	340.6
Rougheye rockfish		2.5	174.3	194.1
Other rockfish		99.7	9.3	-
Thornyheads		-	0.9	62.2
Atka mackerel		-	-	-
Greenlings		-	-	-
Sculpins		72.8	16.5	48.2
Poachers		-	-	-
Eelpouts		-	-	-
Snailfishes		-	-	-
Rattails		-	-	-
Searcher		-	-	-
Prowfish		1.1	10.1	-
Skates		23.6	14.6	14.1
Other fishes		2.3	-	-
Sub-total		(2,205.6)	(2,926.4)	(1,697.6) (329.4)
Total of fishes		(3,411.9)	(5,198.5)	(2,146.4) (1,399.7)
Octopus		-	0.2	-
Squids		-	-	8.3
Shrimps		-	-	-
Crabs		0.3	6.2	3.3
Sub-total		(0.3)	(6.4)	(11.6) (17.3)
Total catch		3,412.2	5,204.9	2,158.0 1,417.0
Halibut(number)		6.0	1.7	1.5

Table 4. Size composition of halibut caught during the Japan-US cooperative surveys in the Aleutain Region, July and August of 1983.

Fork length	Frequency	Fork length	Frequency
31 -35 cm	2	-115 cm	11
-40		-120	5
-45	2	-125	11
-50	10	-130	12
-55	10	-135	6
-60	14	-140	4
-65	11	-145	3
-70	11	-150	2
-75	5	-155	1
-80	13	-160	1
-85	11	-165	
-90	13	-170	
-95	17	-175	1
-100	17	-180	
-105	21	-185	3
-110	13	-230	
		-235	1
<hr/>			
Total:	231		
Average FL:	93.8 cm		
Average weight:	14.2 kg		

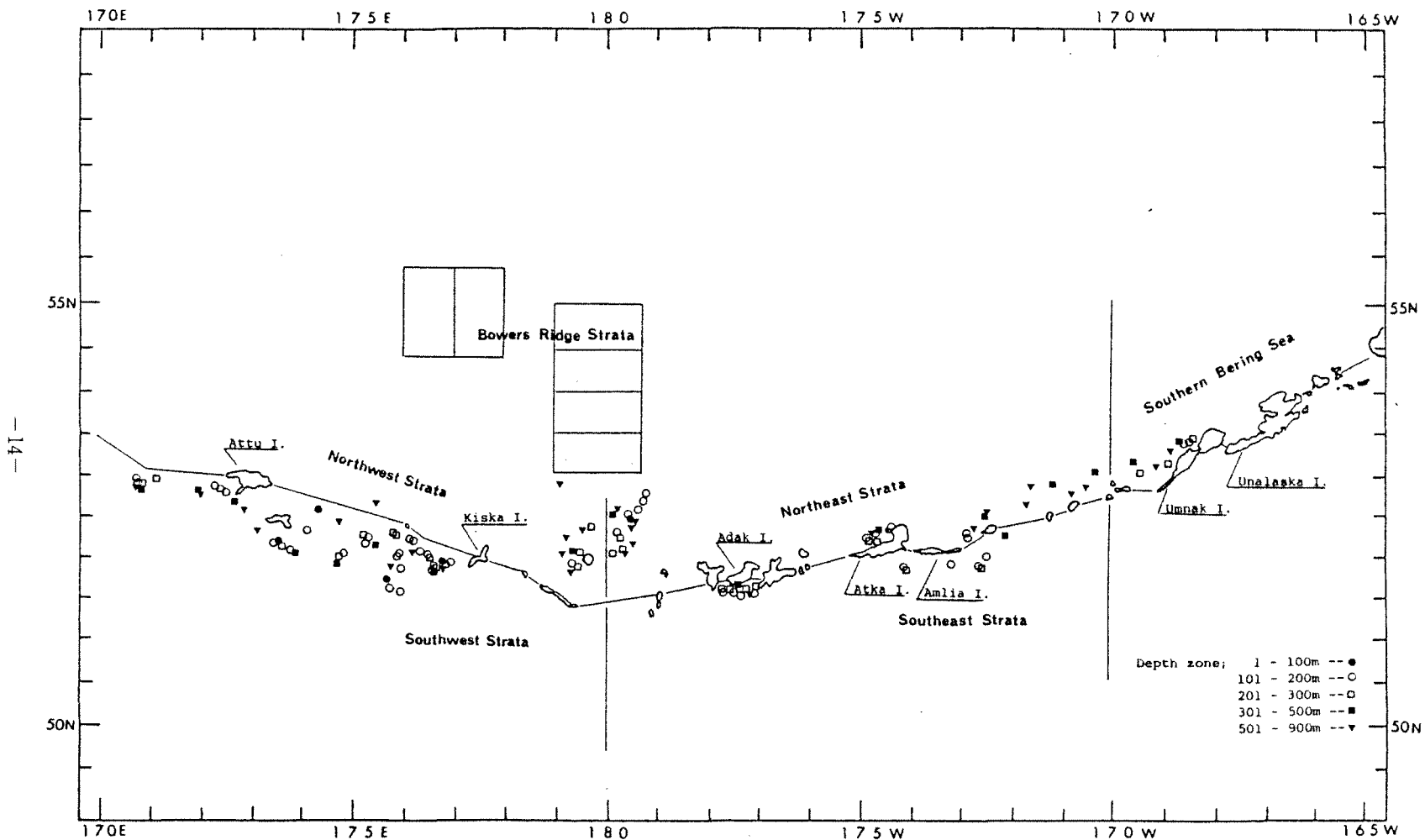


Fig. 1. Stations where trawl operations were conducted by Daito maru No.38 during the Japan-US cooperative surveys on groundfish resources in the Aleutain Region, July and August of 1983.

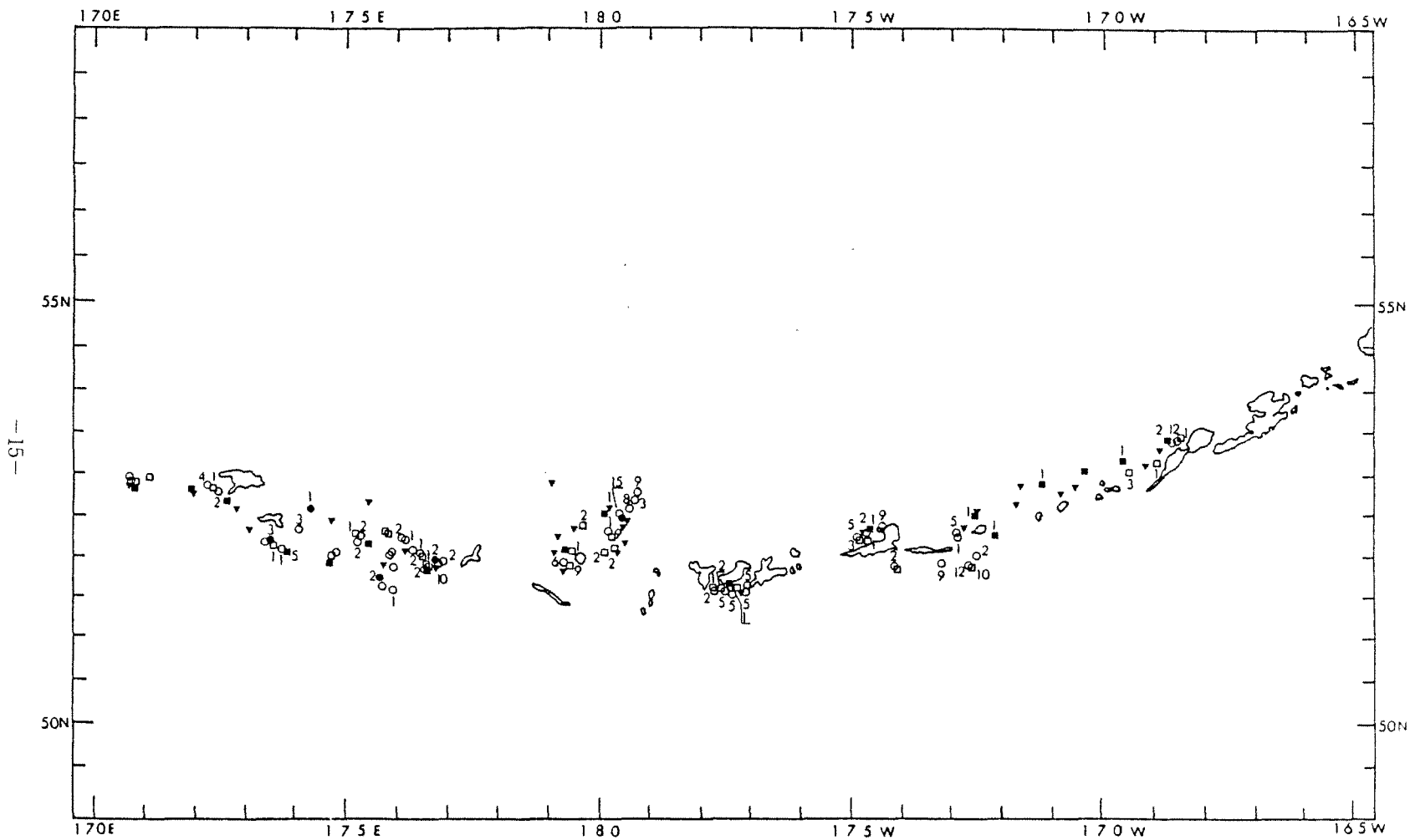


Fig. 2. The number of halibut caught and the stations where halibut were caught during the Japan-US cooperative surveys on groundfish resources in the Aleutian Region, July and August of 1983.

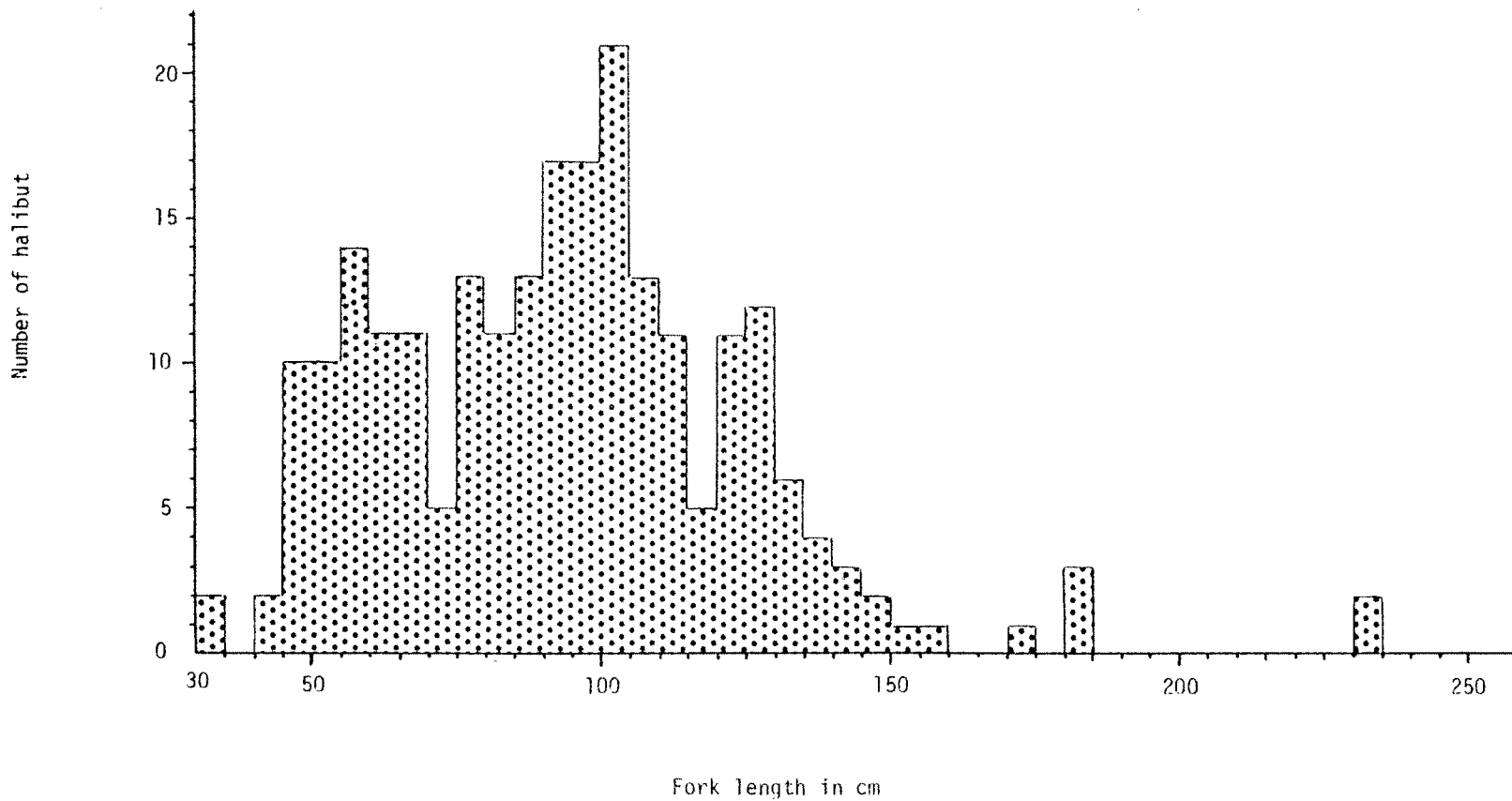


Fig. 3. Size composition of halibut caught during the Japan-US cooperative surveys on groundfish resources in the Aleutain Region, July and August of 1983.