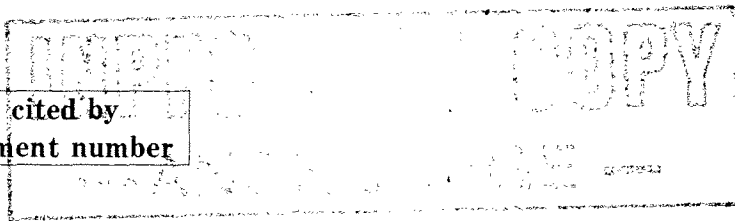


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第35大清丸によるアラスカ湾における
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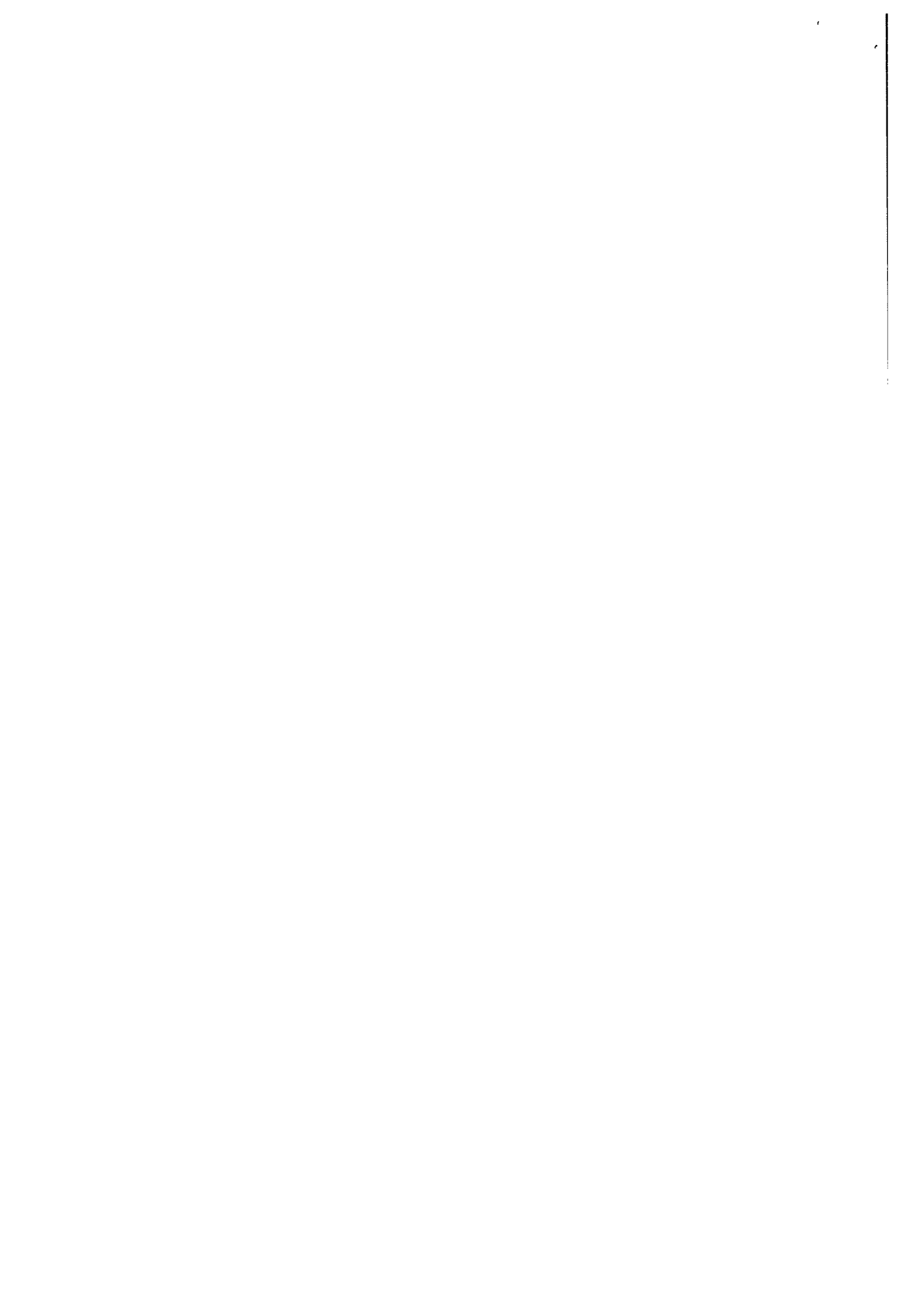
Preliminary report on the Japan-U. S.
cooperative groundfish survey in the
Gulf of Alaska by *Taisei maru* No. 35 in 1987

水戸啓一
Kei-ichi Mito

1987年 9月
September 1987
水産庁
Fisheries Agency of Japan

この文書を引用する場合は下記による：

水戸啓一，1987，第35大清丸によるアラスカ湾における1987年度日米共同底魚資源調査中間報告，14頁，（第34回INPFC定例年次会議提出文書，1987年10月，カナダ，ヴァンクーバー市），水産庁，遠洋水産研究所，日本，〒424清水市折戸5-7-1.



第35 大 清 丸 による アラスカ 湾 にお ける 1987 年 度 日 米 共 同 底 魚 資 源 調 査 中 間 報 告

水 戸 啓 一
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1. は じ め に

アラスカ湾における第2 回目の日本国水産庁遠洋水産研究所と米国商務省海洋漁業局(NMFS) 北西・アラスカ漁業センター(NWAF C) との共同トロール底魚資源調査は、1984 年の第1 回目の後を受けて、1987 年5~9 月の期間に行われた。本調査の目的はアラスカ湾における底魚類の資源量を推定し、重要魚種の資源生物学的特性に関する知見を収集することである。日本からは第35 大 清 丸、米国からはNore-dick と Lets go が参加し、同時に行われていた米ソ共同調査に、ソ連からはBabaevsk が参加した。

本報告は、日本の調査船第35 大 清 丸によって行われた5 月21 日から7 月8 日までの第一次調査の結果を予備的にまとめたものである。

2. 方 法

調査船として北転船第35 大 清 丸を用船した。第35 大 清 丸はスタン・トロール船で、1979 年以降の日米共同底魚資源調査に使用した調査船とほぼ同型である。第35 大 清 丸の要目を表1 に、使用した漁具及び付属漁具を表2 に示した。第35 大 清 丸は、1982 年9 月に建造され以前の調査船に比べ新しく、主機の馬力が大きく、曳網速度も速い。使用した漁具のグランドとしては、海底の荒い場所でも曳網できるように、タイヤグランドを使用した。直径約60 cm のタイヤ149 本を連結し、長さを23 m として、グランドの中央部分に配置した。

第一次調査に参加した調査員は、日本から遠洋水産研究所水戸啓一、東京水産大学篠原宏司、米国からNorthwest and Alaska Fisheries Center のThomas Wilderbuer (5 月15 日から6 月12 日の期間) 及びRonald Payne (6 月13 日から7 月8 日) であった。この他19 名の乗組員が調査員と共に、魚種組成と体長組成の測定、年齢形質の採集等に携わった。

第35 大 清 丸は1987 年5 月15 日(日本時)に八戸港を出港し、5 月21 日(米国時)Fox 諸島沖において調査を開始した。順次西側へ調査を進め、主にShumagin 海区とChirikof 海区を調査し、6 月12 日コディアック港に、燃油の補給と米国調査員の交代のため入港した。6 月13 日コディアック出港後は、Kodiak 海区を調査した。また、7 月1 日~7 日は、第35 大 清 丸、Nore-dick、Lets go 及びBabaevsk の4 調査船の漁獲能力比較試験を行った。そして、7 月8 日セワ

ード港に入港し、第一次調査を終了した。

調査海域は、170°WのFox 諸島海域から144°WのWessel's Reef 海域までで、水深は1,000 mまでである。この海域を水深と地形によって43のStrataに分割し、面積に応じて定点を配置した。そして、日米共同調査に参加した3隻の調査船に定点を割り当てた。第35大清丸の第一次調査において曳網を実施した調査点を図1に示す。229回の曳網を行い、このうち定点調査として成功した曳網は181回、比較試験としての曳網は45回であった。

定点調査においては、まず魚群探知機によって海底地形を調査し、曳網可能な海域を探索する。その海域において30分間の着底曳きを行う。漁獲物を種類別に分けて、重量と個体数を計測する。重要な魚種については100～300個体を無作為抽出して、雄雌に分けて、体長を測定する。さらに、耳石と胃を採取した。また、精密測定用として主要魚種の冷凍標本を採集した。

2～3回の曳網に1回の割合でXBTによる底水温の測定を行った。

音響機器を用いて、曳網中の網口幅の広がり測定を行った。

また、漁獲能力比較試験においては、スケトウダラ、アラスカアブラガレイ、マダラ、ギンダラなどの重要魚種がある程度漁獲できる海域において、3～4隻の調査船が相互間の距離を0.2～0.5海里に保って、10～30分間の平行曳網を行った。そして、漁獲物の魚種組成と体長組成を計測した。

3. 結 果

第一次調査の結果を、INPFC海区别水深帯別に30分曳網当りの魚種別漁獲量としてまとめ、表3に示した。全魚種合計の漁獲量は、Shumagin海区では水深301～700 m帯、Chirikof海区では水深201～500 m帯、Kodiak海区では水深101～200 m帯と301～500 m帯が多かった。また、海区别水深帯別の主要魚種は、Shumagin海区では、水深1～100 m帯でマダラとオヒョウ、101～200 m帯でアラスカアブラガレイ、201～300 m帯でアラスカメヌケとギンダラ、301～500 m帯でムネダラ、ギンダラ及びアラスカキチジ、501～1,000 m帯でムネダラであり、Chirikof海区では、1～100 m帯でキタノメヌケ、101～200 m帯でアラスカアブラガレイ、201～300 m帯でギンダラ、301～500 m帯でヒレグロメヌケとギンダラ、501～1,000 m帯でギンダラとムネダラであった。Kodiak海区では、1～100 m帯でオヒョウとマダラ、101～200 m帯でアラスカアブラガレイとスケトウダラ、201～300 m帯でギンダラ、301～500 m帯でギンダラとヒレグロメヌケ、501～700 m帯でギンダラとムネダラが卓越した。

1984年に行われた第37大吉丸の第一次調査における30分曳網当りの魚種別漁獲量(Wakabayashi 1984)と、今回の結果の比較を表4に示した。全魚種合計の漁獲量は、Shumagin海区では水深201～700 m帯で1984年のほうが多く、Chirikof海区では201～700 m帯で1987年のほうが多く、Kodiak海区では101～200 m帯と301～500 m帯で1987年のほうが多かった。アラスカアブラガレイはShumagin海区で1987年のほうが多く漁獲され、オヒョウは3海区とも1987

年のほうが多く漁獲された。マダラはChirikof 海区で1984年のほうが多く、スケトウダラはShumagin 海区では1984年、Chirikof 海区では1987年のほうが多く漁獲された。ギンダラはShumagin 海区では1984年、Chiriko 海区とKodiak 海区では1987年のほうが多く、アラスカメヌケはShumagin 海区では1984年、Chirikof 海区では1987年のほうが多く漁獲された。アラスカキチジは1984年と1987年の漁獲量には明瞭な差はみられなかった。

オヒョウの30分曳網当りの漁獲尾数の分布を図2に示した。分布量の多い海域はUnalaska島東部とKodiak島の東部である。

オヒョウの海区別水深帯別の体長組成を表5に、また30分曳網当りの体長組成を図3に示した。Shumagin 海区での水深1～100 m帯では、体長46～50 cmにモードがあり、101～200 m帯では56～60 cm、201～300 m帯では71～75 cmと96～100 cmにモードがあった。Chirikof 海区では、水深1～100 m帯で体長41～45 cmと66～70 cm、101～200 m帯で61～65 cm、81～85 cm及び101～105 cm、301～500 m帯で106～110 cmにモードがみられた。Kodiak 海区では1～100 m帯で41～45 cm、101～200 m帯で111～115 cmにモードがみられた。このように水深が深いほどまた東の海区ほど大型個体が多い傾向がみられた。

漁獲能力比較試験の結果として、主要魚種について調査海域(site)別に、15分曳網当りの平均漁獲量と95%信頼限界を表6に示す。各siteの広さは5×5海里以下であり、95%信頼限界の値の平均値に対する比から、site内での各魚種の分布様式を判断できる。この比の小さいウマガレイ、アラスカアブラガレイ、アラスカキチジは一樣な分布をしているものと思われる。逆に比の大きいマダラ、スケトウダラ、ギンダラ、キタノメヌケはある地点に集中した分布をしているものと思われる。site内で一樣に分布する魚種については、各調査船間のその魚種に対する漁獲能力の比は精度の高い値として得られるが、集中的な分布をする魚種については誤差が大きくなる可能性がある。

References cited

Wakabayashi, K. 1984. Preliminary report on the Japan-U.S. cooperative demersal trawl survey in the Gulf of Alaska by Daikichi maru No. 37 in 1984. (Document submitted to the International North Pacific Fisheries Commission) 10 p. Fisheries Agency of Japan, Tokyo, 100 Japan.

Table 1. Specifications of the research vessel Taisei maru No.35 conducting the Japan-U.S. cooperative groundfish survey in the Gulf of Alaska in 1987.

Overall length (m)	49.62
Gross tonnage (ton)	349.70
Shaft horsepower (PS)	3,400
Propeller	Controllable pitched propeller
Type of trawl	Stern trawl
Number of crew	24
Number of scientists	3

Table 2. Specifications of trawl gears used for the 1987 survey.

Head rope length (m)	55.6
Footrope length (m)	65.0
Overall net length (m)	89.84 ^a
Mesh size of codend (mm)	100 ^b
Diameter of bobbins (mm)	530
Diameter of tires (mm)	600
Dandyline length (m)	156 ^c
Size of otterdoor (m x m)	2.55 x 3.85 ^d
Weight of otterdoor in water (kg)	3,200

a including codend (18.24 m in length)

b triple-layered

c otter pendant (14 m) + joining wire (2 m)
+ single dandyline (70 m) + double dandyline (70 m)

d width x height

Table 3 (1). Average catch per unit effort (kg/30 min. trawled) of major species, by INPFC area and depth zone, sampled by Taisel maru No.35 during the Japan-U.S. cooperative groundfish survey in the Gulf of Alaska in May-July of 1987.

INPFC Area	S H U M A G I N					
	Depth zone (m)	1-100	101-200	201-300	301-500	501-700
Number of hauls	18	25	4	3	3	2
Yellowfin sole	0.1	0.0	0.0	0.0	0.0	0.0
Rock sole	110.0	13.7	0.1	0.0	0.0	0.0
Flathead sole	34.1	41.0	0.3	0.0	0.0	0.0
Greenland turbot	0.0	0.4	0.0	1.4	1.7	0.0
Arrowtooth flounder	46.2	621.1	135.9	44.1	4.9	0.0
Pacific halibut	163.0	176.5	141.8	45.4	0.0	27.0
Rex sole	0.8	75.3	62.0	17.7	12.0	0.0
Dover sole	0.0	0.8	1.2	67.4	73.5	5.7
Deepsea sole	0.0	0.0	0.0	0.0	0.0	0.0
Alaska plaice	0.0	0.0	0.0	0.0	0.0	0.0
English sole	0.0	0.0	0.0	0.0	0.0	0.0
Butter sole	0.0	0.0	0.0	0.0	0.0	0.0
Starry flounder	0.0	0.0	0.0	0.0	0.0	0.0
Other flatfishes	0.0	0.0	0.0	0.0	0.0	0.0
Pacific cod	194.3	184.1	34.1	0.0	0.0	0.0
Walleye pollock	71.7	130.5	119.9	0.6	0.0	0.0
Pacific hake	0.0	0.0	0.0	0.0	0.0	0.0
Sablefish	0.0	65.0	200.2	366.9	451.7	78.2
Pacific ocean perch	26.9	189.3	245.5	0.0	0.0	0.0
Northern rockfish	85.3	46.9	2.1	0.0	0.0	0.0
Shortraker rockfish	0.0	0.0	5.3	136.4	6.9	0.0
Rougheye rockfish	0.0	2.9	9.0	94.1	0.0	0.0
Dusky rockfish	19.4	66.3	0.4	0.0	0.0	0.0
Marlequin rockfish	0.0	26.0	0.0	0.0	0.0	0.0
Black rockfish	0.1	0.0	0.0	0.0	0.0	0.0
Redbanded rockfish	0.0	0.1	0.9	0.0	0.0	0.0
Sharpchin rockfish	0.0	0.0	0.0	0.0	0.0	0.0
Tiger rockfish	0.0	0.0	0.0	0.0	0.0	0.0
Yelloweye rockfish	0.0	0.1	0.0	0.0	0.0	0.0
Bocaccio	0.0	0.0	0.0	0.0	0.0	0.0
Other rockfishes	0.0	0.0	0.0	0.0	0.0	0.0
Shortspine thornyhead	0.0	1.9	131.6	361.7	131.1	33.0
Other thornyhead	0.0	0.0	0.0	0.0	0.0	0.0
Eulachon	0.0	0.3	0.0	0.0	0.0	0.0
Atka mackerel	1.6	0.6	0.2	0.0	0.0	0.0
Kelp greenling	0.6	0.0	0.0	0.0	0.0	0.0
Lingcod	0.0	0.0	0.0	0.0	0.0	0.0
Other greenlings	0.0	0.0	0.0	0.0	0.0	0.0
Yellow Irish lord	26.4	6.7	0.8	0.0	0.0	0.0
Bigmouth sculpin	0.8	17.3	19.0	2.5	0.3	0.0
Great sculpin	0.9	0.0	0.0	0.0	0.0	0.0
Mallacocottus zonurus	0.0	0.0	6.5	0.1	0.1	0.0
Other sculpins	0.1	0.1	3.9	0.1	0.0	0.0
Poachers	0.0	0.0	0.0	0.0	0.0	0.0
Giant wrymouth	0.0	0.0	0.0	0.0	0.0	0.0
Eelpouts	0.0	0.0	0.1	0.1	2.0	0.0
Snailfishes	0.0	0.0	0.0	0.5	0.5	0.3
Giant grenadier	0.0	0.0	0.0	875.5	1390.7	1071.4
Coryphaenoides cinereus	0.0	0.0	0.0	22.4	50.8	170.4
Other rattails	0.0	0.0	0.0	0.0	0.0	0.6
Molas	0.0	0.0	0.0	0.0	0.5	0.4
Searcher	0.0	0.0	0.1	0.0	0.0	0.0
Prowfish	1.8	11.8	1.1	0.0	0.0	0.0
Big skate	5.8	6.4	0.0	0.0	0.0	0.0
Longnose skate	0.0	0.7	0.0	0.0	0.0	0.0
Bathyraja aleutica	0.9	0.6	1.0	0.0	0.2	0.0
Other skates	0.3	0.7	0.0	0.0	2.0	0.0
Spiny dogfish	1.9	2.5	0.0	0.0	0.0	0.0
Pacific sleeper shark	0.0	0.0	0.0	0.0	18.3	3.3
Other sharks	0.0	0.0	0.0	0.0	0.0	0.0
Chum salmon	0.0	0.6	0.0	0.0	0.0	0.0
Chinook salmon	0.3	1.7	0.0	0.0	0.0	0.0
Other fishes	0.7	0.0	0.0	0.0	0.0	0.1
Octopus	0.2	1.0	0.0	0.1	0.0	1.3
Red squid	0.0	2.3	76.7	96.4	0.2	0.0
Eight-armed squid	0.0	0.0	0.0	0.0	0.0	0.0
Giant squid	0.0	0.0	0.0	3.5	0.0	0.0
Other squids	0.0	0.0	2.9	0.0	0.0	1.2
Pink shrimp	0.0	0.0	0.0	0.0	0.0	0.0
Sidestripe shrimp	0.0	0.0	0.1	0.0	0.0	0.0
Other shrimps	0.0	0.0	0.0	0.0	0.0	0.0
Tanner crabs	0.0	0.2	0.1	0.2	0.0	0.7
King crabs	0.0	0.0	0.0	0.0	0.0	0.0
Lithodes spp.	0.0	0.0	0.0	0.0	0.0	0.0
Other crabs	0.0	0.0	0.0	0.0	0.0	0.0
Edible whelks	0.0	0.0	0.0	0.0	0.0	0.0
Scallops	0.0	0.0	0.0	0.0	0.0	0.0
Other invertebrate	0.0	0.0	0.0	0.0	0.0	0.0
Total	794.5	1695.7	1202.2	2137.2	2147.6	1393.3
Pacific halibut (Number)	23.2	32.5	16.0	3.7	0.0	2.5

Table 3 (2) (continued)

INPFC Area	C H I R I K O F					
	Depth zone (m)	1-100	101-200	201-300	301-500	501-700
Number of hauls	3	31	1	3	4	4
Yellowfin sole	0.0	0.0	0.0	0.0	0.0	0.0
Rock sole	4.9	3.2	0.0	0.0	0.0	0.0
Flathead sole	1.3	39.8	0.8	0.0	0.0	0.0
Greenland turbot	0.0	0.0	0.0	0.0	1.3	1.1
Arrowtooth flounder	3.8	829.1	475.3	184.1	26.3	0.9
Pacific halibut	28.8	153.4	225.0	330.7	32.3	0.0
Rex sole	0.1	35.3	334.7	22.5	20.6	0.1
Dover sole	0.0	7.2	24.5	36.2	321.4	27.8
Deepsea sole	0.0	0.0	0.0	0.0	0.0	0.0
Alaska plaice	0.0	0.1	0.0	0.0	0.0	0.0
English sole	0.0	0.4	0.0	0.0	0.0	0.0
Butter sole	0.0	0.0	0.0	0.0	0.0	0.0
Starry flounder	0.0	0.0	0.0	0.0	0.0	0.0
Other flatfishes	0.0	0.0	0.0	0.0	0.0	0.0
Pacific cod	0.9	189.1	4.4	0.0	0.0	0.0
Walleye pollock	0.0	20.5	288.6	4.1	0.0	0.0
Pacific hake	0.0	0.0	0.0	0.0	0.0	0.0
Sablefish	0.0	156.1	2945.6	1324.4	1155.2	499.4
Pacific ocean perch	38.3	45.9	829.3	2.7	0.0	0.0
Northern rockfish	124.3	23.3	6.2	0.0	0.0	0.0
Shortraker rockfish	0.0	0.5	0.0	1347.1	10.5	0.0
Rougheye rockfish	0.0	11.3	7.3	190.7	0.3	0.0
Dusky rockfish	7.2	8.5	8.3	0.0	0.0	0.0
Harlequin rockfish	17.6	0.2	0.0	0.0	0.0	0.0
Black rockfish	0.0	0.0	0.0	0.0	0.0	0.0
Redbanded rockfish	0.0	4.1	4.4	0.6	0.0	0.0
Sharpchin rockfish	0.0	0.0	0.0	0.0	0.0	0.0
Tiger rockfish	0.0	0.0	0.0	0.0	0.0	0.0
Yelloweye rockfish	0.0	0.0	0.0	0.0	0.0	0.0
Bocaccio	0.0	0.0	0.0	0.0	0.0	0.0
Other rockfishes	0.0	0.0	0.0	0.0	0.0	0.0
Shortspine thornyhead	0.0	0.4	108.2	413.1	183.4	95.2
Other thornyhead	0.0	0.0	0.0	0.0	0.0	0.0
Eulachon	0.0	2.6	0.0	0.0	0.0	0.0
Atka mackerel	0.3	0.1	0.0	0.0	0.0	0.0
Kelp greenling	0.4	0.0	0.0	0.0	0.0	0.0
Lingcod	0.0	0.0	0.0	0.0	0.0	0.0
Other greenlings	0.0	0.0	0.0	0.0	0.0	0.0
Yellow Irish lord	0.0	0.8	0.0	0.0	0.0	0.0
Bigmouth sculpin	3.4	5.7	17.3	12.8	0.2	0.0
Great sculpin	0.0	0.0	0.0	0.0	0.0	0.0
Mallacocottus zonurus	0.0	0.0	0.4	13.3	0.0	0.0
Other sculpins	0.0	0.1	0.0	0.0	0.0	0.0
Poachers	0.0	0.0	0.0	0.0	0.0	0.0
Giant wrymouth	0.0	1.2	0.0	0.0	0.0	0.0
Eelpouts	0.0	0.0	0.0	0.2	0.1	0.0
Snailfishes	0.0	0.0	0.0	0.0	0.5	0.3
Giant grenadier	0.0	0.0	0.0	1.3	1038.7	498.6
Coryphaenoides cinereus	0.0	0.0	0.0	0.1	27.0	74.3
Other rattails	0.0	0.0	0.0	0.0	0.0	0.3
Molas	0.0	0.0	0.0	0.0	0.1	1.3
Searcher	0.0	0.0	0.0	0.0	0.0	0.0
Prowfish	2.8	2.2	0.0	0.0	0.0	0.0
Big skate	1.8	5.4	0.0	0.0	0.0	0.0
Longnose skate	0.0	0.3	0.0	0.0	0.0	0.0
Bathyraja aleutica	0.0	1.5	0.0	3.9	0.0	0.0
Other skates	0.0	0.2	0.0	0.0	0.7	0.5
Spiny dogfish	0.0	0.3	0.0	0.0	0.0	0.0
Pacific sleeper shark	0.0	0.8	0.0	0.0	11.5	11.3
Other sharks	0.0	0.0	0.0	0.0	0.0	0.0
Chum salmon	0.0	0.2	0.0	0.0	0.0	0.0
Chinook salmon	0.7	1.6	0.0	0.0	0.0	0.0
Other fishes	0.0	0.1	0.0	0.0	0.0	0.2
Octopus	0.0	0.0	0.0	0.0	0.0	0.7
Red squid	0.0	0.2	5.9	10.1	1.2	2.3
Eight-armed squid	0.0	0.0	0.0	0.5	0.0	0.1
Giant squid	0.0	0.0	0.0	12.0	0.8	0.0
Other squids	0.0	0.0	0.0	0.0	0.0	0.0
Pink shrimp	0.0	0.0	0.0	0.0	0.0	0.0
Sidestripe shrimp	0.0	0.1	0.0	0.0	0.0	0.0
Other shrimps	0.0	0.0	0.0	0.0	0.0	0.0
Tanner crabs	0.0	0.2	0.0	1.1	1.2	0.8
King crabs	0.0	0.0	0.0	0.0	0.0	0.0
Lithodes spp.	0.0	0.0	0.0	0.8	0.0	0.0
Other crabs	0.0	0.0	0.0	0.0	0.0	0.0
Edible vheiks	0.0	0.1	0.0	0.1	0.0	0.0
Scallops	0.0	0.0	0.0	0.0	0.0	0.0
Other invertebrate	0.0	0.0	0.0	0.0	0.0	0.0
Total	236.8	1551.9	5286.2	3912.2	2832.9	1214.8
Pacific halibut (Number)	8.0	14.9	15.0	19.3	0.8	0.0

Table 3 (3) (continued)

INPFC Area	K O D I A K				
	Depth zone (M)	1-100	101-200	201-300	301-500
Number of hauls	23	41	6	6	4
Yellowfin sole	0.0	0.0	0.0	0.0	0.0
Rock sole	80.2	13.2	0.0	0.0	0.0
Flathead sole	5.3	101.1	1.8	1.8	0.0
Greenland turbot	0.0	0.0	0.0	0.0	1.0
Arrowtooth flounder	89.6	1285.4	141.9	102.1	15.4
Pacific halibut	366.1	547.7	84.5	61.6	2.3
Rex sole	3.4	76.2	86.3	12.7	2.2
Dover sole	0.3	21.0	147.8	154.0	46.7
Deepsea sole	0.0	0.0	0.0	0.0	0.2
Alaska plaice	0.0	0.0	0.0	0.0	0.0
English sole	0.6	10.0	0.0	0.0	0.0
Butter sole	6.4	1.3	0.1	0.0	0.0
Starry flounder	4.5	0.1	0.0	0.0	0.0
Other flatfishes	0.0	0.0	0.0	0.0	0.0
Pacific cod	331.5	168.6	25.3	4.2	0.0
Valleye pollock	36.0	766.2	39.6	0.5	0.4
Pacific hake	0.0	0.0	0.0	0.1	0.0
Sablefish	3.1	191.0	590.0	1174.2	577.0
Pacific ocean perch	0.1	120.1	43.2	2.9	0.0
Northern rockfish	98.4	92.4	0.5	0.0	0.0
Shortraker rockfish	0.7	0.5	17.5	669.8	7.3
Rougheye rockfish	0.0	11.3	43.5	315.8	0.0
Dusky rockfish	18.5	55.6	1.2	0.0	0.0
Harlequin rockfish	0.5	53.9	0.0	0.0	0.0
Black rockfish	3.2	0.0	0.0	0.0	0.0
Redbanded rockfish	0.0	0.4	0.1	0.7	0.0
Sharpchin rockfish	0.0	0.0	0.0	0.0	0.0
Tiger rockfish	0.0	0.0	0.0	0.0	0.0
Yelloweye rockfish	0.0	0.6	0.0	0.0	0.0
Bocaccio	0.0	0.3	0.0	0.0	0.0
Other rockfishes	0.0	0.1	0.0	0.0	0.0
Shortspine thornyhead	0.0	0.8	101.3	119.0	59.2
Other thornyhead	0.0	0.0	0.0	0.0	0.0
Eulachon	0.0	0.4	0.5	0.0	0.0
Atka mackerel	0.1	0.1	0.0	0.0	0.0
Kelp greenling	0.9	0.1	0.0	0.0	0.0
Lingcod	1.4	0.0	0.0	0.0	0.0
Other greenlings	0.0	0.0	0.0	0.0	0.0
Yellow Irish lord	3.5	8.0	0.0	0.0	0.0
Bigmouth sculpin	0.4	5.0	10.6	15.6	0.0
Great sculpin	2.1	1.2	0.0	0.0	0.0
Mallacottus zonurus	0.0	0.1	0.1	1.0	0.0
Other sculpins	0.1	0.0	0.0	0.0	0.0
Poachers	0.0	0.0	0.0	0.0	0.0
Giant vrymouth	0.0	0.6	0.0	0.0	0.0
Eelpouts	0.0	0.1	0.1	0.0	0.1
Snailfishes	0.0	0.0	6.0	0.0	0.1
Giant grenadier	0.0	0.0	0.0	364.1	492.3
Coryphaenoides cinereus	0.0	0.0	0.0	0.1	24.0
Other rattails	0.0	0.0	0.0	0.0	0.0
Molas	0.0	0.0	0.0	0.0	0.6
Searcher	0.1	0.2	0.0	0.0	0.0
Prowfish	1.6	5.2	0.5	1.5	0.0
Big skate	24.2	5.4	0.0	0.0	0.0
Longnose skate	0.0	0.7	0.4	0.5	0.0
Bathyraja aleutica	0.2	2.4	0.0	4.5	0.0
Other skates	0.1	0.2	0.0	0.0	0.0
Spiny dogfish	0.3	0.4	0.0	0.0	0.0
Pacific sleeper shark	0.0	0.0	5.0	0.0	0.0
Other sharks	0.0	0.0	0.0	0.0	0.0
Chum salmon	2.3	7.8	0.0	0.0	0.0
Chinook salmon	22.1	0.6	0.0	0.0	0.0
Other fishes	0.2	0.0	0.0	0.0	0.0
Octopus	0.0	0.0	0.0	0.1	0.5
Red squid	0.0	0.1	6.7	8.4	1.7
Eight-armed squid	0.0	0.0	0.0	0.0	0.0
Giant squid	0.0	0.0	0.0	0.0	0.0
Other squids	0.0	0.0	0.0	0.2	0.0
Pink shrimp	0.0	0.0	0.0	0.0	0.0
Sidestripe shrimp	0.0	0.0	0.2	0.1	0.0
Other shrimps	0.0	0.0	0.0	0.0	0.0
Tanner crabs	0.0	0.7	0.0	0.0	0.0
King crabs	0.0	0.2	0.0	0.0	0.0
Lithodes spp.	0.0	0.0	0.0	0.0	0.2
Other crabs	0.1	0.0	0.0	0.0	0.0
Edible whelks	0.0	0.0	0.0	0.0	0.1
Scallops	0.0	0.0	0.0	0.0	0.0
Other invertebrate	0.0	0.0	0.0	0.0	0.0
Total	1108.1	3557.8	1354.4	3015.4	1231.1
Pacific halibut (Number)	60.2	32.3	5.8	2.8	0.8

Table 4. Average catch per unit effort (kg/30 min. trawled) of major species. by INPFC area and depth zone. sampled by Japanese trawlers during the 1984 and 1987 Japan-U.S. cooperative groundfish survey in the Gulf of Alaska.

Species	Depth zone(m)	Shumagin		Chirikof		Kodiak	
		1984	1987	1984	1987	1984	1987
Arrowtooth flounder	1 - 100	36.1	46.2	-	3.8	-	89.6
	101 - 200	314.2	621.1	1,090.3	829.1	1,195.1	1,285.4
	201 - 300	153.4	135.9	636.4	475.3	164.4	141.9
	301 - 500	49.3	44.1	136.3	184.1	199.4	102.1
	501 - 700	7.5	4.9	5.4	26.3	15.0	15.4
Pacific halibut	1 - 100	40.8	163.0	-	28.8	-	366.1
	101 - 200	29.0	176.5	144.8	153.4	317.4	547.7
	201 - 300	10.8	141.8	45.1	225.0	110.5	84.5
	301 - 500	3.4	45.4	2.7	330.7	23.8	61.6
Pacific cod	1 - 100	274.0	194.3	-	0.9	-	331.5
	101 - 200	128.9	184.1	921.1	189.1	219.6	168.6
	201 - 300	45.8	34.1	158.9	4.4	65.2	25.3
Walleye pollock	1 - 100	177.2	71.7	-	0.0	-	36.0
	101 - 200	299.8	130.5	0.1	20.5	4.6	766.2
	201 - 300	916.5	119.9	2.2	288.6	468.8	39.6
Sablefish	101 - 200	154.8	65.0	92.8	156.1	536.9	191.0
	201 - 300	395.6	200.2	372.0	2,945.6	354.8	590.0
	301 - 500	678.8	366.9	546.9	1,324.4	101.2	1,174.2
	501 - 700	538.3	451.7	447.2	1,155.2	368.2	577.0
	701 - 1000	78.7	78.2	361.8	499.4	570.7	-
Pacific ocean perch	1 - 100	0.6	26.9	-	38.3	-	0.1
	101 - 200	111.2	189.3	5.4	45.9	44.3	120.1
	201 - 300	2,075.9	245.5	21.8	829.3	95.5	43.2
	301 - 500	12.0	0.0	6.9	2.7	48.8	2.9
Shortspine thornyhead	201 - 300	193.5	131.6	427.5	108.2	120.1	101.3
	301 - 500	182.3	361.7	211.1	413.1	133.0	119.0
	501 - 700	176.5	131.1	110.1	183.4	132.6	59.2
	701 - 1000	126.7	33.0	82.1	95.2	110.1	-
Total	1 - 100	922.7	794.5	-	236.8	-	1,108.1
	101 - 200	1,219.1	1,695.7	2,364.2	1,551.9	2,462.8	3,557.8
	201 - 300	4,008.6	1,202.2	1,891.4	5,286.2	1,563.3	1,354.4
	301 - 500	2,383.3	2,137.2	2,528.5	3,912.2	1,544.0	3,015.4
	501 - 700	2,460.7	2,147.6	1,821.7	2,832.9	1,574.4	1,231.1
	701 - 1000	1,901.7	1,393.3	1,773.4	1,214.8	1,508.6	-

Table 5. Length frequency distributions of Pacific halibut by INPFC area and depth zone, sampled by Taisei maru No.35 during the Japan-U.S. cooperative groundfish survey in the Gulf of Alaska in May-July of 1987.

Area	Shumagin							Chirikof							Kodiak					Grand total			
	Depth zone (m)	1-100	101-200	201-300	301-500	501-700	701-	Total	1-100	101-200	201-300	301-500	501-700	701-	Total	1-100	100-200	201-300	301-500	501-700	Total	Number	%
FL class																							
21- 25 cm	0	2	0	0	0	0	2	0	0	0	0	0	0	0	1	0	0	0	0	0	1	3	0.1
30	5	1	0	0	0	0	6	1	0	0	0	0	0	1	5	0	0	0	0	0	5	12	0.3
35	10	1	0	0	0	0	11	1	2	0	0	0	0	3	33	2	0	0	0	0	35	49	1.1
40	28	1	0	0	0	0	29	2	1	0	0	0	0	3	110	6	1	0	0	0	117	149	3.3
45	49	7	0	1	0	0	57	5	12	0	0	0	0	17	226	18	0	0	0	0	244	318	7.1
50	89	25	3	0	0	0	117	3	15	0	0	0	0	18	181	17	0	0	0	0	198	333	7.4
55	46	69	4	0	0	0	119	0	23	0	0	0	0	23	84	10	0	0	0	0	94	236	5.3
60	25	161	4	0	0	0	190	1	19	0	0	0	0	20	64	11	1	0	1	77	287	6.4	
65	18	140	5	0	0	0	163	2	41	0	1	0	0	44	74	20	3	0	0	97	304	6.8	
70	24	136	6	0	0	0	166	4	33	1	0	0	0	38	78	23	3	1	2	107	311	6.9	
75	15	59	7	0	0	1	82	1	24	0	4	0	0	29	56	38	0	0	0	94	205	4.6	
80	21	44	6	1	0	0	72	0	26	2	1	0	0	29	50	50	1	1	0	102	203	4.5	
85	10	25	4	0	0	0	39	2	44	3	4	0	0	53	58	74	0	0	0	132	224	5.0	
90	10	31	2	1	0	1	45	0	23	0	4	0	0	27	39	83	0	1	0	123	195	4.3	
95	13	22	5	1	0	1	42	1	35	3	4	2	0	45	26	80	4	1	0	111	198	4.4	
100	15	22	8	2	0	1	48	0	33	1	3	0	0	37	27	94	1	0	0	122	207	4.6	
105	7	19	3	1	0	0	30	0	40	1	9	0	0	50	23	96	4	4	0	127	207	4.6	
110	4	14	1	2	0	0	21	0	25	1	11	0	0	37	17	129	2	2	0	150	208	4.6	
115	3	7	1	1	0	0	12	0	20	1	4	0	0	25	18	143	3	2	0	166	203	4.5	
120	9	9	2	1	0	1	22	0	15	1	2	0	0	18	10	141	0	0	0	151	191	4.3	
125	2	1	1	0	0	0	4	0	11	0	4	0	0	15	10	103	2	1	0	116	135	3.0	
130	1	3	1	0	0	0	5	1	4	1	2	0	0	8	6	62	1	0	0	69	82	1.8	
135	6	3	0	0	0	0	9	0	1	0	2	0	0	3	13	28	1	0	0	42	54	1.2	
140	1	1	0	0	0	0	2	0	4	0	0	0	0	4	6	38	0	0	0	44	50	1.1	
145	0	2	0	0	0	0	2	0	2	0	0	0	0	2	6	15	1	0	0	22	26	0.6	
150	1	2	0	0	0	0	3	0	3	0	1	0	0	4	5	16	0	0	0	21	28	0.6	
155	0	0	0	0	0	0	0	0	0	0	1	0	0	1	5	2	0	0	0	7	8	0.2	
160	1	2	0	0	0	0	3	0	1	0	0	0	0	1	6	4	1	0	0	11	15	0.3	
165	1	1	0	0	0	0	2	0	2	0	0	0	0	2	7	3	0	0	0	10	14	0.3	
170	0	0	1	0	0	0	1	0	2	0	0	0	0	2	3	2	0	0	0	5	8	0.2	
175	0	1	0	0	0	0	1	0	1	0	0	0	0	1	3	1	0	0	0	4	6	0.1	
180	1	0	0	0	0	0	1	0	0	0	0	0	0	0	1	0	0	0	0	1	2	0.0	
185	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0	0	0	2	2	0.0	
190	1	0	0	0	0	0	1	0	0	0	0	0	0	0	1	1	0	0	0	2	3	0.1	
195	0	0	0	0	0	0	0	0	0	0	1	1	0	2	1	0	0	0	0	1	3	0.1	
200	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	1	1	0.0	
205	0	1	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0.0	
210	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1	0	2	2	0.0	
215	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	
220	1	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0.0	
Total	417	812	64	11	0	5	1309	24	462	15	58	3	0	562	1254	1313	29	14	3	2613	4484	100.0	

Table 6. Average catch and 95% confidence limit per 15 minutes tow of major species in each trawl comparison site, sampled by Taisei maru No.35, during the Japan-U.S. and the U.S.-U.S.S.R. cooperative groundfish surveys in the Gulf of Alaska in July 1987.

Site Latitude (N)	57-05~ 57-08		56-48~ 56-51		57-17~ 57-21		57-30~ 57-35		57-26~ 57-31	
Longitude (W)	152-40~152-46		152-05~152-03		152-27~152-33		150-14~150-20		150-14~150-20	
Depth (m)	143~152		94~100		84~103		216~290		260~358	
Number of tows	12		9		7		8		7	
Av. catch and 95%CL (Kg)	\bar{x}	95%CL	\bar{x}	95%CL	\bar{x}	95%CL	\bar{x}	95%CL	\bar{x}	95%CL
Yellowfin sole	-	-	-	-	33.9	± 23.6	-	-	-	-
Rock sole	-	-	-	-	52.4	± 30.6	-	-	-	-
Flathead sole	165.4	± 20.0	-	-	404.3	± 114.8	-	-	-	-
Arrowtooth flounder	540.2	± 85.9	168.8	± 72.7	319.2	± 64.7	55.9	± 11.9	25.6	± 11.9
Pacific halibut	-	-	40.3	± 16.3	62.4	± 76.5	56.3	± 15.9	-	-
Rex sole	-	-	-	-	-	-	26.8	± 10.4	28.0	± 9.4
Dover sole	-	-	-	-	-	-	14.1	± 6.8	31.4	± 7.9
Pacific cod	75.1	± 34.8	749.8	± 690.8	55.4	± 28.6	14.0	± 3.6	-	-
Walleye pollock	254.4	± 55.1	-	-	4,161.8	± 2,960.2	74.9	± 53.0	29.3	± 24.3
Sablefish	-	-	-	-	-	-	118.0	± 83.3	343.0	± 183.4
Pacific ocean perch	-	-	-	-	-	-	78.3	± 26.1	35.9	± 21.1
Northern rockfish	-	-	109.3	± 104.2	-	-	-	-	-	-
Shortraker rockfish	-	-	-	-	-	-	-	-	38.2	± 12.1
Rougheye rockfish	-	-	-	-	-	-	-	-	50.2	± 14.8
Shortspine thornyhead	-	-	-	-	-	-	39.3	± 12.4	37.2	± 9.0

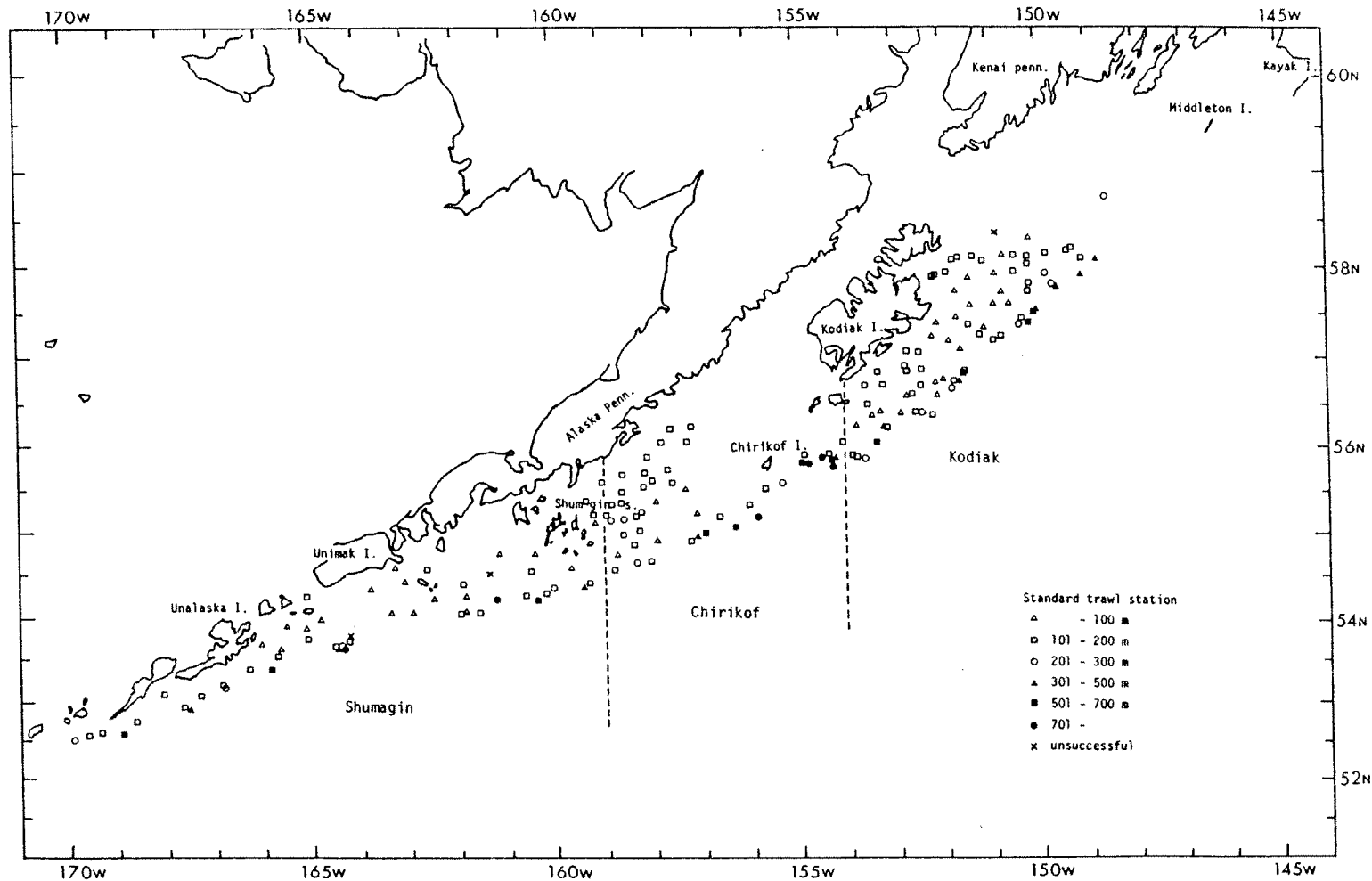


Fig. 1. Location of the sampling stations surveyed by Taisei maru No.35 during the Japan-U.S. cooperative groundfish survey in the Gulf of Alaska in May-July of 1987.

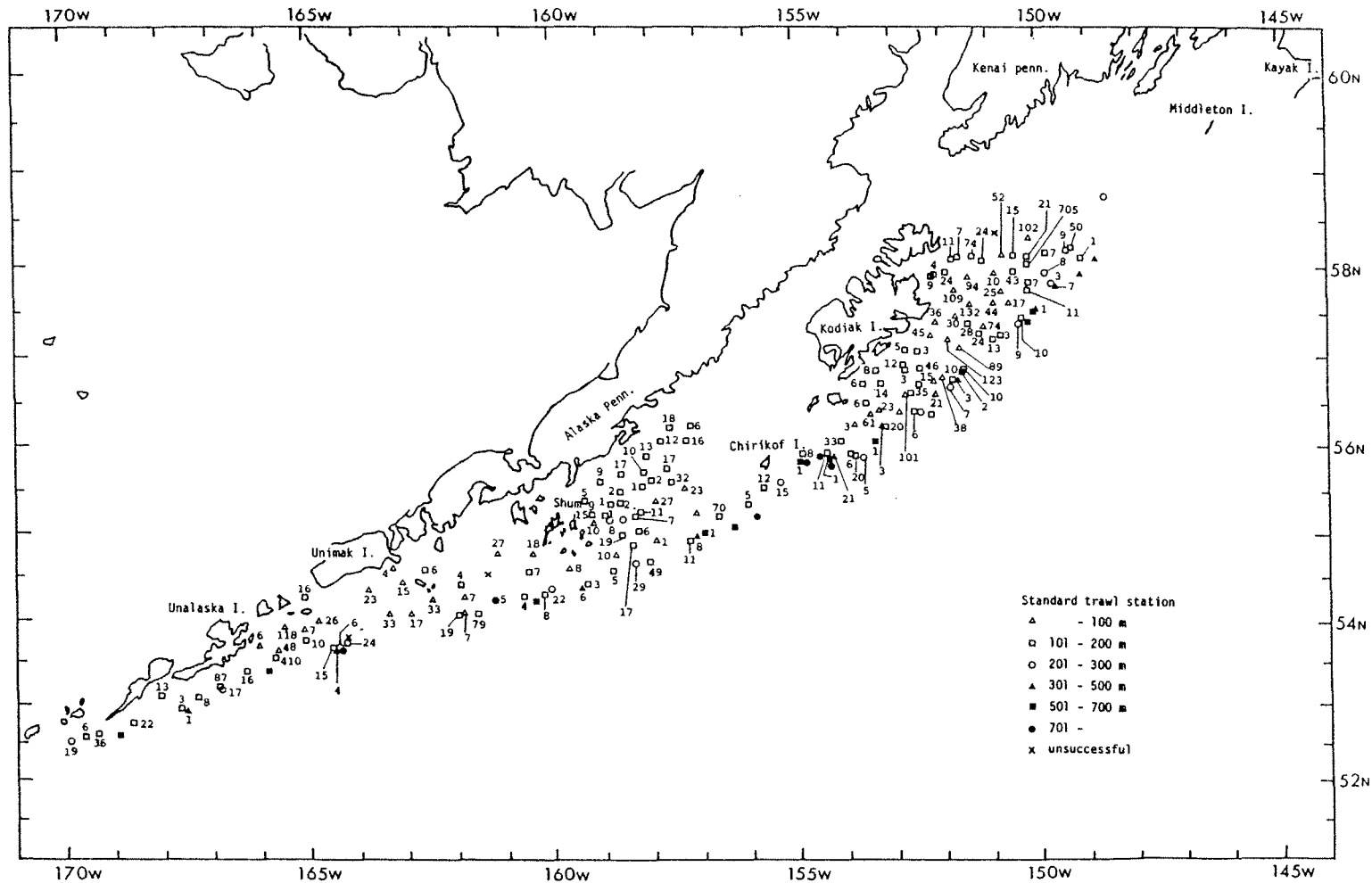


Fig. 2. Numbers of Pacific halibut per 30 minutes tow sampled by Taisei maru No.35 during the Japan-U.S. cooperative groundfish survey in the Gulf of Alaska in May-July of 1987.

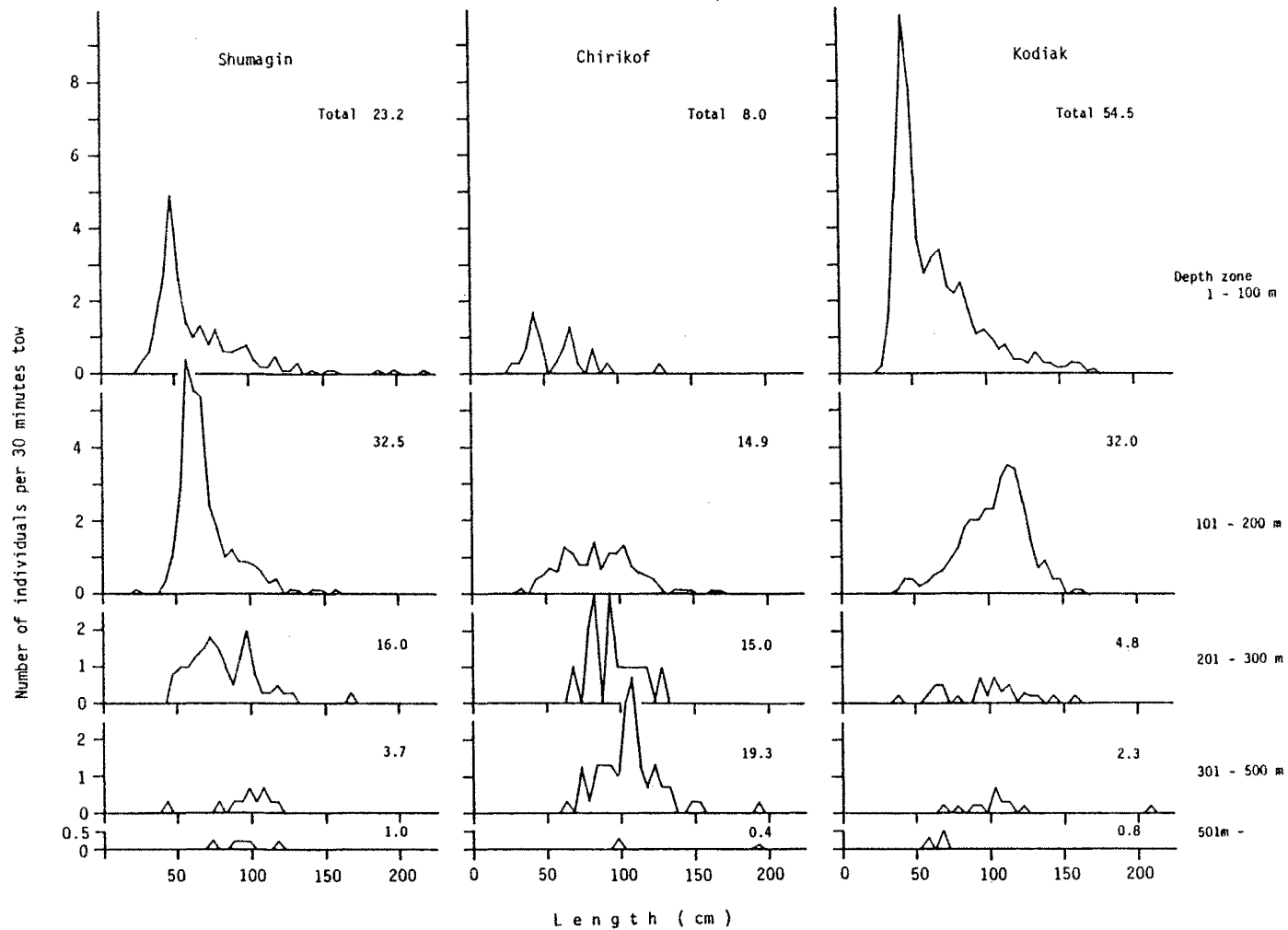


Fig. 3. Length composition of Pacific halibut by area and depth zone, sampled by Taisei maru No.35 during the Japan-U.S. cooperative groundfish survey in the Gulf of Alaska in May-July of 1987.

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TRANSLATION

PRELIMINARY REPORT ON THE JAPAN-U.S. COOPERATIVE
GROUNDFISH SURVEY IN THE GULF OF ALASKA
BY THE TAISEI MARU NO. 35 IN 1987

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As a duplication of the 1984 survey, the second Japan-U.S. cooperative groundfish resources trawl survey by the Far Seas Fisheries Research Laboratory of the Fisheries Agency of Japan and the Northwest and Alaska Fisheries Center (NWAFC) of the National Marine Fisheries Service (NMFS) of the U.S. Department of Commerce was conducted in the Gulf of Alaska from May to September in 1987. Objectives of this survey were to estimate the biomass of groundfish in the Gulf of Alaska and to collect data on biological characteristics of major groundfish resources. The research vessel Taisei maru No. 35 from Japan and the vessels Nore-dick and Lets go from the United States participated. In addition to the Japan-U.S. cooperative survey, a U.S.-U.S.S.R. cooperative survey was also conducted, with the Babaevsk participating from the U.S.S.R.

This report summarizes preliminary results of the first survey conducted by the Taisei maru No. 35 from 1987 May 21 to July 8.

Methods

The Taisei maru No. 35, a landbased dragnet stern trawler, was chartered as a research vessel. This vessel was almost the same type as the research vessels engaged in the previous Japan-U.S. cooperative surveys on groundfish resources in and after 1979. Specifications of the Taisei maru No. 35 are shown in Table 1. Specifications of gear used and auxiliary gear used for the survey are shown in Table 2. The Taisei maru No. 35, built in September, 1982, is, however, rather new compared with the previous research vessels, her main engine horse power is greater and her towing speed is also faster. A "tire-groundline" was used in order to be able to tow over rough sea bottom. One hundred and forty-nine tires, about 60 cm in diameter, were linked together and the linked tires (23 m in length) were arranged at the central part of the groundline.

Research personnel aboard in the first survey were Kei-ichi Mito, Far Seas Fisheries Research Laboratory and Koji Shinohara, Tokyo University of Fisheries, both were from Japan, Thomas Wilderbuer (from May 15 to June 12), and Ronald Payne (from June 13 to July 8) of the U.S., NWAFC. In addition, 19 crew members participated in determining species and size-composition, and collecting age characteristics.

The Taisei maru No. 35 departed from the port of Hachinohe on May 15, 1987 (Japan standard time) and commenced the survey off the Fox Islands on May 21 (U.S. time). The survey activities moved gradually toward the west, were concentrated initially in the Shumagin and Chirikof Areas, and the vessel entered the port of Kodiak for refueling and replacement of the U.S. research representative on June 12. After departing from Kodiak on June 13, the vessel was engaged in surveys in the Kodiak Area. During the period July 1 to 7, comparative fishing efficiency experiments for the Taisei maru No. 35, Nore-dick, Lets go, and Babaevsk were conducted. The Taisei maru No. 35 entered the port of Seward on July 8 on completion of the first survey.

The survey area was from the Fox Islands region at 170°W to Wessel's Reef region at 144°W, and depths surveyed were down to 1,000 m. This area was divided into 43 strata by depth and topography and fixed stations according to size of area. These stations were allocated to the three research vessels participating in the Japan-U.S. cooperative survey. Research stations at which the Taisei maru No. 35 conducted tows in the first survey are shown in Fig. 1. The Taisei maru No. 35 conducted 229 trawling operations of which 181 were successful as station surveys, and 45 were successful as trawling operations in comparative experiments.

In the station surveys, configurations of the sea bottom were first surveyed by the fish finder to search for towable areas. Thirty minute on-bottom tows were conducted in those areas. Catches were sorted by species, and weight and numbers of individuals of each species were recorded. For major species, random samples of 100 to 300 individuals were taken, sorted by sex, and body-lengths measured. In addition, otoliths and stomachs were collected and frozen samples of major species were collected for detailed measurement.

Records of bottom water temperature were collected using XBTs at the rate of one every two or three tows.

Measurements of the width of the trawl opening while trawling were made by acoustic means.

In comparative fishing experiments, in areas where some certain extent of major species such as pollock, arrowtooth flounder, Pacific cod, and sablefish were taken, while three or four research vessels kept at distances of 0.2 to 0.5 miles from one another, they conducted 10 to 30 minute parallel tows. Species and size-composition of the catches taken were recorded.

Results

Results of the first survey are shown in Table 3 as catch by species per 30-minute tow by INPFC area and by depth zone. The total catch of all species was abundant in depths between 301 and 700 m in the Shumagin Area, between 201 and 500 m in the Chirikof Area, between 101 and 200 m and between 301 and 500 m in the Kodiak Area. In the Shumagin Area the dominant species by depth zone were Pacific cod and halibut in depths between 1 and 100 m and arrowtooth flounder in depths between 101 and 200 m, Pacific ocean perch and sablefish in depths between 201 and 300 m, giant grenadier, sablefish and shortspine thornyhead in depths between 301 and 500 m, and giant

grenadier in depths between 501 and 1,000 m. In the Chirikof Area, the dominant species were northern rockfish in depths between 1 and 100 m, arrowtooth flounder in depths between 101 and 200 m, sablefish in depths between 201 and 300 m, shorttraker rockfish and sablefish in depths between 301 and 500 m, and sablefish and giant grenadier in depths between 501 and 1,000 m. In the Kodiak Area, the dominant species were halibut and Pacific cod in depths 1 and 100 m, arrowtooth flounder and pollock in depths 101 and 200 m, sablefish in depths 201 and 300 m, sablefish and shorttraker rockfish in depths 301 and 500 m, and sablefish and giant grenadier in depths 501 and 700 m.

Catches by species per 30-minute tow by the Daikichi maru No. 37 in the first survey conducted in 1984 (Wakabayashi 1984) were compared with the results for 1987 (Table 4). Total catches were higher in depths between 201 and 700 m for the Shumagin Area in 1984 than in 1987. In the Chirikof Area, total catches in depths between 201 and 700 m in 1987 were higher than those in 1984. In the Kodiak Area, total catches in depths between 101 and 200 m, and 301 and 500 m in 1987 were higher than in 1984. Catches of arrowtooth flounder in the Shumagin Area in 1987 were higher than in 1984, and catches of halibut in all three areas in 1987 were higher than those in 1984. Catches of Pacific cod in 1984 were higher than those in 1987, except for the Shumagin Area. Catches of pollock in the Shumagin Area in 1984 were higher than in 1987 and in the Chirikof Area were higher in 1987 than those in 1984. Catches of sablefish in the Shumagin Area in 1984 were higher than those in 1987, and in the Chirikof and Kodiak Areas were higher in 1987 than in 1984. Catches of Pacific ocean perch in the Shumagin in 1984 were higher than in 1987 and in the Chirikof Area were higher in 1987 than in 1984. No distinct differences were observed in catches of shortspine thornyhead between 1984 and 1987.

The numbers of halibut caught per 30-minute tow are shown in Fig. 2. Trawling stations with high density of halibut were concentrated in waters east of Unalaska Island and east of Kodiak Island. The length

composition of halibut by INPFC area and by depth zone, and per 30-minute tow are shown in Table 5 and Fig. 3, respectively. Modes were found at 46 to 50 cm in depths of 1 and 100 m, at 56 to 60 cm in depths 101 and 200 m, at 71 to 75 cm and 96 to 100 cm in depths 201 and 300 m in the Shumagin Area. Modes were observed at 41 to 45 cm and 66 to 70 cm in depths between 1 and 100 m, at 61 to 65 cm, 81 to 85 cm, and 101 to 105 cm in depths between 101 and 200 m, and at 106 to 110 cm in depths between 301 and 500 m in the Chirikof Area. In the Kodiak Area, modes were found at 41 to 45 cm in depths between 1 and 100 m and at 111 to 115 cm in depths between 101 and 200 m. The sizes of halibut in deeper water and eastern areas were greater than in shallower depths and western areas.

The results of the comparative fishing efficiency experiments, the average catch and 95% confidence limits per 15-minute tow of major species are shown in Table 6 by survey site. The extent of each site was 5 x 5 miles or less, and it was possible to determine the distribution pattern of each species within a site based on the ratio of the 95% confidence limit to the average value. It was considered that flathead sole, arrowtooth flounder, and shortspine thornyhead for which this value was small had uniform distributions, and in contrast, that Pacific cod, pollock, sablefish, and northern rockfish for which this value was large had aggregated distributions. Although the ratio of fishing efficiency for species which had uniform distributions within a site was considered to be of relatively high accuracy, it is possible that the error will be larger for species which had aggregated distributions.

REFERENCE, TABLES 1 TO 6, AND FIGS. 1 TO 3
ARE IN ENGLISH IN THE JAPANESE DOCUMENT