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National Oceanic and Atmospheric Administration
NATIONAL MARINE FISHERIES SERVICE
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SEAMOUNT TRAWL FISHERY
FOREIGN VESSEL OBSERVER REPORT, TAKACHIHO MARU
(MAY 3-17, 1982)

By

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The 1982 foreign trawl fishery for western Pacific seamount groundfish opened May 1, 1982. As in previous years, the trawling office of Nippon Suisan Kaisha, Ltd., in Tobata, Japan, notified the Southwest Fisheries Center Honolulu Laboratory, National Marine Fisheries Service of their proposed schedule for trawling inside the U.S. Fishery Conservation Zone (FCZ) around Hawaii (see Table 1 and Figure 1). The first trawler which operated in Hawaii's FCZ in 1982 was the Takachiho Maru, a 3,600-gross ton independent stern trawler which normally fishes in the Gulf of Alaska, but which had been trawling the Emperor Seamounts, northwest of Midway Islands since February 1982 (see Appendix Table 1). I boarded the Takachiho Maru from a U.S. Navy tug at Midway on May 2 (CUT) and began 14 days of sampling pelagic armorhead and alfonsin at the Hancock Seamounts.

Table 1.--Area of operation.

Emperor Seamounts	Nippon Suisan designation	Position	
		Latitude N	Longitude E
Kinmei	"G" Bank	35°00'	171°45'
Milwaukee group	"F" Banks		
Yuryaku	"FC"	32°40'	172°15'
Kanmu	"FB"	32°15'	172°47'
So. Kanmu	"FA"	32°02'	173°06'
Colahan	"E" Bank	31°00'	175°55'
Unnamed	"D" Bank	30°26'	177°28'
<u>Fishery Conservation Zone</u>			
Northwest Hancock	"C" Bank	30°16'	178°42'
Southeast Hancock	"J" Bank	29°48'	179°04'
Southeast Hancock	"K" Bank	29°40'	179°20'

As in my previous experience aboard a Nippon Suisan trawler (see Southwest Fisheries Center Administrative Report H-81-9, Kitakami Maru), working and living conditions were very comfortable, due in large part to efforts by Mr. M. Toriai of Tobata in planning to meet the unique problems facing a foreign vessel observer. On the Takachiho Maru, Captain Ooshio and Chief Radio Officer Shibuya both spoke English very well, as did Third Officer Iwamoto, who was of great help with my sampling during the fishing period. Weighing baskets of fish was facilitated by the large factory space, and by having a separate set of scales away from the processing area. Also my sampling station was located next to the conveyor that moved the catch to the production line, so I was able to watch for unusual fishes without wading into the catch bins.

Although fishing this spring was somewhat more successful than during the period fished by the Kitakami Maru (August-September 1981), catch rates

were still disappointing in comparison with those of previous years. Nightly catches ranged from 7 to 50 metric tons (mt) of armorhead, averaging 20 mt early in the fishing period and dropping to 10 mt toward the end of the period. A total of 267.5 mt of all species were taken (Table 2) from a season's quota of 1,000 mt for Japan. The Takachiho Maru is of a size class which permits the use of fishmeal and oil extraction equipment, and this facility provides greater efficiency in the utilization of the resource than does the smaller Kitakami Maru which does not have such a capability.

Table 2.--Summary of total catch by species, Takachiho Maru.

<u>Target Species</u>	
Common names	Pelagic armorhead, boarfish
Japanese name	Kusakari tsubodai
Scientific name	<u>Pentaceros richardsoni</u> Smith
Federal Species Code ¹	200
Product	Headed, gutted, and frozen in 21-kg cases. Heads and viscera used for fishmeal and oil
Season's catch FCZ (to date)	243.5 mt
Total frozen product (to date)	143.7 mt = 6,844 cases
Common name	Alfonsin
Japanese name	Kinmedai
Scientific names	<u>Beryx splendens</u> , <u>B. decadactylus</u>
Federal Species Code ¹	201
Product	Dressed and frozen (lg) or whole frozen (sm) in 21-kg cases.
Season's catch FCZ (to date)	13.8 mt
Product (to date)	10.9 mt (round: 139 cases, dressed: 379 cases)

Incidental Species
(Federal Species Code 499)¹

<u>Common name</u>	<u>Scientific name</u>	<u>Product</u>
Mirror dory	<u>Zenopsis nebulosa</u>	Filletted, frozen (large fish only) meal/oil
(none)	<u>Hyperoglyphe japonica</u>	Dressed, frozen
(none)	Emmelichthyidae	Frozen whole
Season's catch FCZ: 10.2 mt (to date)		
Product		
Frozen:	8 mt (round: 337 cases, dressed: 36 cases, fillet: 5 cases)	
Oil:	14.4 mt	
Meal:	17.7 mt (= 590 bags)	

¹Federal Register 43(244):59301, Tuesday, December 19, 1978.

Essentially all fish were caught at night, between 8:00 p.m. and 6:00 a.m. local time, although an occasional trial haul in midday produced a few hundred kilograms. Day watches were usually spent maintaining and repairing equipment and chipping and painting the vessel. The weather at Hancock Seamounts was usually overcast and calm, with occasional sunny, breezy days.

Following a brief description of trawling and factory operations is a discussion of sampling methods and some observations on catch trends for this fishing period. Catches by species and area are tabulated in Table 3, catch per unit effort by species and area in Table 4, and biological sampling data are summarized in Table 5.

Table 3.--Trawl catch by species and area (in metric tons).

Species	Northwest Hancock Seamount		Southeast Hancock Seamount		All FCZ Banks
	"C" Bank	"J" Bank	"K" Bank		
Armorhead	63.8	157.2	22.5		243.5
Alfonsin	3.9	7.4	2.5		13.8
Others	4.1	5.6	0.5		10.2
Total	71.8	170.2	25.5		267.5

Table 4.--Catch per unit effort in kilograms per minute by area and species.

	Northwest Hancock Seamount		Southeast Hancock Seamount		All FCZ Banks
	"C" Bank	"J" Bank	"K" Bank		
Number of hauls	24	45	15		84
Total minutes trawling (includes turns off the seamount)	1,975	3,730	1,650		7,355
Armorhead					
Total catch (kg)	63,770	157,165	22,555		243,490
kg/min	32.3	42.1	13.7		33.1
Alfonsin					
Total catch (kg)	3,883	7,411	2,509		13,803
kg/min	2.0	2.0	1.5		1.9
Other species					
Total catch (kg)	4,147	5,624	436		10,207
kg/min	2.1	1.5	0.3		1.4
All species					
Total catch (kg)	71,800	170,200	25,500		267,500
kg/min	36.4	45.6	15.5		36.4

Table 5.--Summary of biological observations on armorheads and alfonsins.

	Northwest Hancock Seamount	Southeast Hancock Seamount		All FCZ Banks	Range
	"C" Bank	"J" Bank	"K" Bank		
<u>Armorheads--Total number of fish sampled: 1,684</u>					
Average fork length (mm)	305	304	304	304	271-410
Average weight (kg)	0.47	0.46	0.50	0.47	0.24-1.50
Sex ratio (% male:% female)				40:60	
Body type--essentially all lean type fish in FCZ					
<u>Alfonsins--Total number of fish sampled: 391</u>					
Average fork length (mm)	large 308 small 193 } 233	226	264	236	157-530
Average weight (kg)	large 0.70 small 0.27 } 0.50	0.42	0.52	0.48	0.08-2.85
Sex ratio (% male:% female) (large fish only)				75:25	

TRAWLING OPERATION

The gear and techniques used aboard the Takachiho Maru were essentially the same as on all previous seamount trawlers (see Appendix Figure 1). The otter boards are convex rectangular steel, 2.2 x 4.4 m. The footrope length is 60 m; vertical opening while in operation, 7 m, horizontal opening 20 m, with cod end mesh size 90 mm. The main trawl cable is 30-mm steel wire. The cable-out-to-depth (scope) ratio was 2.5. More detailed descriptions of trawling procedures are given in earlier reports.¹

The prospective site of the tow is first surveyed, using two wet paper recorders, a color video display, and side scan sonar. Then the net is deployed on approach to the site, and as many as five passes over the chosen site are made, bringing the doors up to the stern ports for each turn. During the haul a net recorder sends signals showing height of net opening, fish entering the net, as well as water temperature at fishing depth. Then, at a suitable time determined from the electronic displays, the net is retrieved at the end of a pass, and the catch dumped below deck

¹Observer reports on the central Pacific seamount trawl fishery:

Kazama, T. K. 1978. Seamount fishery, foreign vessel observer report, Ryuyo Maru No. 2, (April 22-June 3, 1978). Southwest Fish. Cent. Admin. Rep. 15H, 1978. Southwest Fish. Cent., Natl. Mar. Fish. Serv., NOAA, Honolulu, HI 96812, 6 p.

Evering, G. C., Jr. 1979. Seamount fishery, foreign vessel observer report, Aso Maru (May 27-July 10, 1979). Southwest Fish. Cent. Admin. Rep. H-79-14. Southwest Fish. Cent., Natl. Mar. Fish. Serv., NOAA, Honolulu, HI 96812, 10 p.

Everson, A. R. 1980. Seamount fishery, foreign vessel observer report, Kitakami Maru (August 9-October 4, 1980). Southwest Fish. Cent. Admin. Rep. H-80-15. Southwest Fish. Cent., Natl. Mar. Fish. Serv., NOAA, Honolulu, HI 96812, 13 p.

Everson, A. R. 1980. Seamount fishery, foreign vessel observer report, Aso Maru (September 24-30, 1980). Southwest Fish. Cent. Admin. Rep. H-80-16. Southwest Fish. Cent., Natl. Mar. Fish. Serv., NOAA, Honolulu, HI 96812, 10 p.

Shippen, N. T. 1981. Seamount fishery, foreign vessel observer report, Aso Maru (June 9-19, 1981). Southwest Fish. Cent. Admin. Rep. H-81-4. Southwest Fish. Cent., Natl. Mar. Fish. Serv., NOAA, Honolulu, HI 96812, 6 p.

Barnett, W. B. 1981. Seamount fishery, foreign vessel observer report, Kitakami Maru (August 15-October 1, 1981). Southwest Fish. Cent. Admin. Rep. H-81-9. Southwest Fish. Cent., Natl. Mar. Fish. Serv., NOAA, Honolulu, HI 96812, 12 p.

to the factory. A single site might provide one or more nights of steady fishing, or it might take all night to find any fish. The captain and navigational officers are very skillful in interpreting echo sounder displays and at negotiating the comparatively tiny fishing grounds in this area, even without the use of the loran. (Hancock Seamounts are in the shadow of transmission from the Kure Atoll loran station, so navigation is by Omega and a SATNAV plotter in addition to the bottom profilers.) Hangups were infrequent, but time consuming when they occurred. In one instance the headrope parted and the net recorder and several floats were lost. The recorder was recovered in good shape in a haul made 2 days later in the same area.

FACTORY OPERATION

The factory of the Takachiho Maru is a complex system of conveyors which sends the catch through two heading saws and into a washing vat. From there, more conveyors move the headed fish to sorting and packing tables, and the heads and trash fish into a grinder hopper above the fishmeal plant. The layout of the factory is essentially the same as that of the Aso Maru; its capacity is approximately 2 mt/h. At the packing tables, dressed fish are sorted and packed into 10.5 kg freezer trays by species and size. These trays are conveyed to a glaze sprinkler and placed in the flash freezer for about 5 h, after which the frozen blocks of fish are removed from the trays and wrapped in plastic. Two such blocks make up a 21-kg case of final product (= 23 kg gr. wt.) which is stored in the main fishholds. The fishmeal grinders and dryers produce 30-kg sacks of meal which are sold for agricultural use (animal feed and fertilizer), and the oil is kept in an 80-kl tank. Product recovery ratios from heads and viscera are about 16% for meal and 3-9% for oil, depending on the type of fish. Most of the incidental catch not mentioned in Table 2 was used for fishmeal and oil. A notable exception being the larger sharks and skates which were discarded. A collection of photographs of incidental species to this fishery is maintained at the Honolulu Laboratory, Foreign Vessel Observer Program.

SAMPLING METHODS

Because fishing was conducted only during the night, I was able to sample every significant haul and still get plenty of rest during the day. A rough idea (to within 1 mt) of the catch could be obtained by observing the cod end of the trawl when it was hauled aboard. I made a final estimate of the catch in the factory, based on experience at judging irregular heaps of fish in a bin of known dimensions. This figure was later checked against the figures kept on the vessel's logs.

Basket samples (15-30 kg each) were taken from the three or four largest hauls each night, and length measurements were obtained from conveyor fish for minor hauls. Randomness in sampling was assured by having the baskets filled early or later during processing of a particular haul, alternating with each sample. Each basket was then weighed (ship's platform scale) and sorted by species, and numbers of individuals of each species recorded. Composition of the catch is based upon the weight ratios obtained in this manner.

From the same sample, 30 armorhead were then individually measured, weighed, sexed, and graded as fat or lean body type. The average sizes and weights of fish, and sex ratios were estimated from these measurements and observations. Fork length was determined using a measuring board, and individual weights on hand held 1- or 3-kg scales. No otoliths were taken. Alfonsin were usually not present in any quantity in basket samples, so periodically 30 fish samples were taken from the conveyer for average fish lengths and weights. Large alfonsin were sexed (small fish normally have undeveloped gonads).

Incidental species were photographed, and notes were taken on stomach contents of armorheads and alfonsins and other general observations such as body type trends.

OBSERVATIONS

In general, the fish caught by the Takachiho Maru seemed to be of the same type as those caught by the Kitakami Maru last season, differing mainly in degree of gonad development. At this time of year ovaries are small and pink, the eggs becoming larger and more orange later in the summer. As on the Kitakami Maru, almost all armorhead caught within the FCZ were of the "lean" body type. There seemed to be less variation within this general type among the different seamounts; that is "C," "J," and "K" Banks all had armorhead of very similar size and weight, as opposed to the catch of the Kitakami Maru in which larger fish (and greater quantities) were found at "C" Bank. This year "J" Bank (Southeast Hancock) yielded more armorhead and markedly less alfonsin and other species than did "C" Bank (Northwest Hancock), a reversal of the late 1981 catch. "K" Bank (also on Southeast Hancock Seamount) showed some differences from "J" Bank, but as in previous years, the difficulties encountered in trawling at "K" Bank, because of its small size, precluded expending comparable fishing effort at that location.

Catch per unit of effort (trawling time) was about double that of last August and September; catch rates of "J" Bank were as much as 10 times higher than those obtained on the Kitakami Maru in 1981. As in 1981, catches were spotty and unpredictable. Sometimes a particular haul of several tons of fish was immediately preceded and followed by hauls of near zero catch. By far the most productive hauls were made between 3 and 5 a.m. local time, and catches fell sharply at daybreak. It would be interesting to learn the extent to which catch figures reflect actual amounts of fish present, and what role behavioral responses play in determining the catch of armorhead on a daily basis.

Alfonsin were not abundant, making up only 5% of the total catch inside the FCZ, although they are the object of a nearly single species fishery on seamounts outside the FCZ. All three U.S. banks fished had variable proportions of small and large alfonsins, with the greater volume seeming to comprise a mixture of large and small fish rather than exclusively small fish.

No precious coral was trawled on either of the FCZ seamounts.

ITINERARY
(CUT Dates)

- May 2 - Honolulu (Hickam AFB) - Midway
Midway - Embarked Takachiho Maru
- May 3 - Fishing began inside FCZ
- May 17 - Fishing ceased inside FCZ
- June 1 - Arrived Tobata, Kitakyushu, Japan
- June 8 - Arrived Honolulu.

RECORDS

Scientist's log
Daily trawl haul form
Length/weight/sex log
Species composition from basket samples
Vessel sighting form
Time and attendance form
Radio report file
Photographs

Appendix Table 1.--Vessel and gear specifications and personnel,
Takachiho Maru, 1982.

Vessel

Permit No.	JA-82-0291-A
Length	96 m
Gross tonnage	3,609 mt
Net tonnage	1,968 mt
Width	16 m
Draft	9.8 m
Engine type	6 cylinder diesel
Fuel consumption	12 kl/day fishing, 14 kl/day running
Horsepower	3,900
Hull number	96150
Registration No.	F01-90
Company/owner	Nippon Suisan Kaisha
Vessel type	Independent stern trawler
Year launched	1965
Port of registry	Tokyo, Japan
Home port	Tobata, Kitakyushu, Japan
Radio call sign	JPBU

Gear

Net dimensions	See Appendix Figure 1
Door dimensions	See Appendix Figure 1
Main trawl winch	Electric 395 kW
Total wire on drum	2,000 m
Flash freezer capacity	2,560 trays = 1,280 cases
Processing speed	2 mt/h

Personnel

(53 total ship complement)

Prior experience in
seamount fishery

Captain	Mr. Masamichi Ooshio	1 year
Chief Radio Operator	Mr. Masaru Shibuya	None
Navigation Officers		None
Doctor		None
Engineers		None
Oilers		None
Galley		None
Deck and processing crew		None

NET DIMENSIONS AND CHARACTERISTICS

Type of Vessel Japanese Independent
Stern Trawler

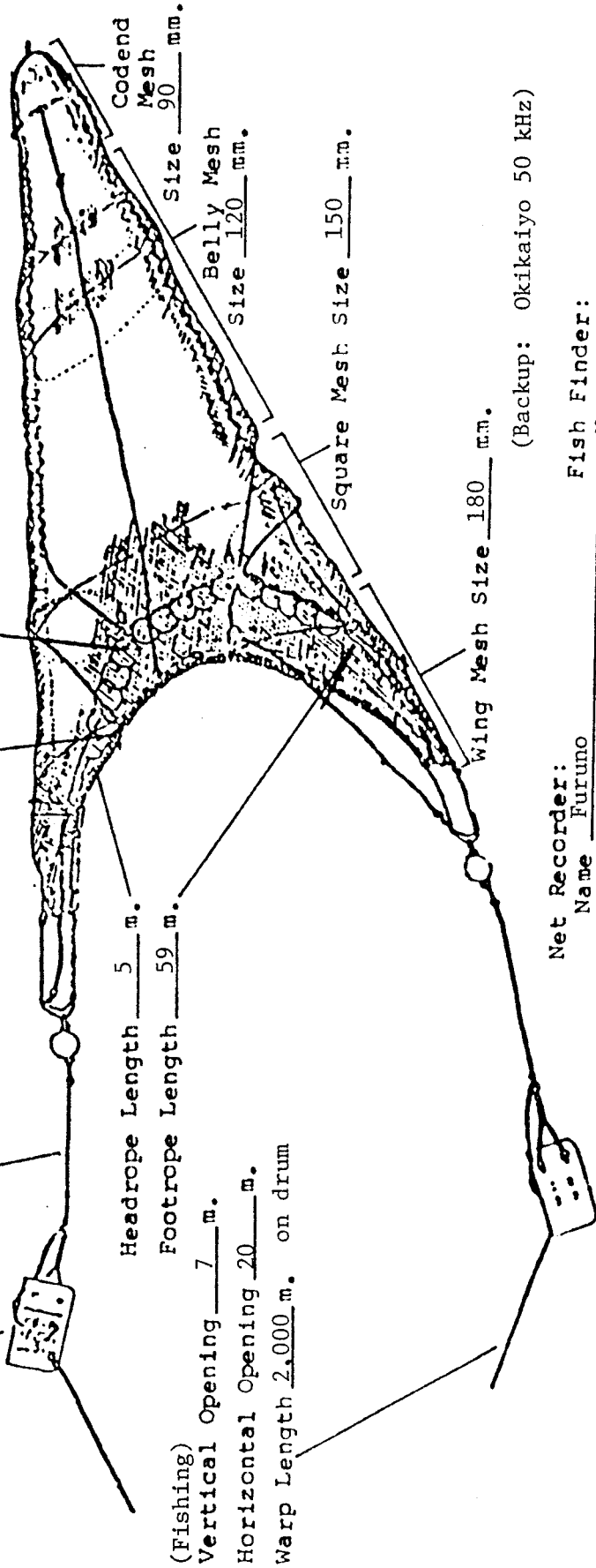
Observation Period May 1-17, 1982

Trawl Doors: Shape rectangular
Type steel-convex
Dimensions 2.2 m. x 4.4 m.
Weight 2,000 kg.

Dandyline Length 100 m.

Floats: Number 50
Size 30 cm diameter
Material plastic
Shape spherical

Bobbins: Number 33
Size 51 or 84 cm diameter
Material steel and rubber
Shape spherical



Headrope Length 5 m.

Footrope Length 59 m.

(Fishing)

Vertical Opening 7 m.

Horizontal Opening 20 m.

Warp Length 2,000 m. on drum

Codend Mesh
Size 90 mm.

Belly Mesh
Size 120 mm.

Square Mesh Size 150 mm.

Wing Mesh Size 180 mm.

(Backup: Okikaiyo 50 kHz)

Net Recorder:
Name Furuno
Model Number 1550327
Frequency 50 kHz

Fish Finder:
Name Kaijo Denki
Model Number 2493 R-17J-5
Frequency 24 kHz
Paper Type - Wet x Dry
Speed of Advance _____

Appendix Figure 1.---Description of trawl gear used on the Takachiho Maru in this fishery.