EXPLORATORY FISHING ON THE HANCOCK SEAMOUNTS BY THE TOWNSEND CROMWELL, 1976-79

Reginald M. Gooding

Southwest Fisheries Center Honolulu Laboratory, National Marine Fisheries Service, NOAA, P.O. Box 3830, Honolulu, Hawaii 96812

ABSTRACT

Under authority of the U.S. Fishery Conservation and Management Act (FCMA) of 1976, which extended jurisdiction over fishery resources within 200 miles of the nation's coastline, the National Marine Fisheries Service initiated a program to collect catch and effort data and biological information on the pelagic armorhead, Pentaceros richardsoni, and alfonsin, Beryx splendens, at Hancock Seamounts which fall within the Fishery Conservation Zone. Data were collected from three sources--research cruises of the NOAA ship Townsend Cromwell, fishing trips of Japanese commercial vessels carrying U.S. observers, and fishing trips of Japanese commercial vessels fishing in 1969-76 prior to the enactment of the FCMA. The preliminary results of this study showed that 77% of the Cromwell's catch in 1979 consisted of armorheads, that night trawling was significantly more productive than day trawling, and that 95% of the armorhead were the so-called "lean" type. Experimental handline fishing over the seamounts revealed that in addition to armorheads and alfonsins, the Japanese mackerel, Scomber japonicus, also appeared to be in relatively good numbers.

Hancock Seamounts
Pentaceros richardsoni
Beryx splendons
bottom trawling
handline fishing

INTRODUCTION

The central North Pacific seamounts extend to the northwest from the northern end of the Hawaiian ridge towards the Emperor Seamount chain. Southeast Hancock and Northwest Hancock are the most southeasterly of this group (Figure 1), respectively located 300 and 367 km (162 and 198 nmi) to the northwest of Kure.

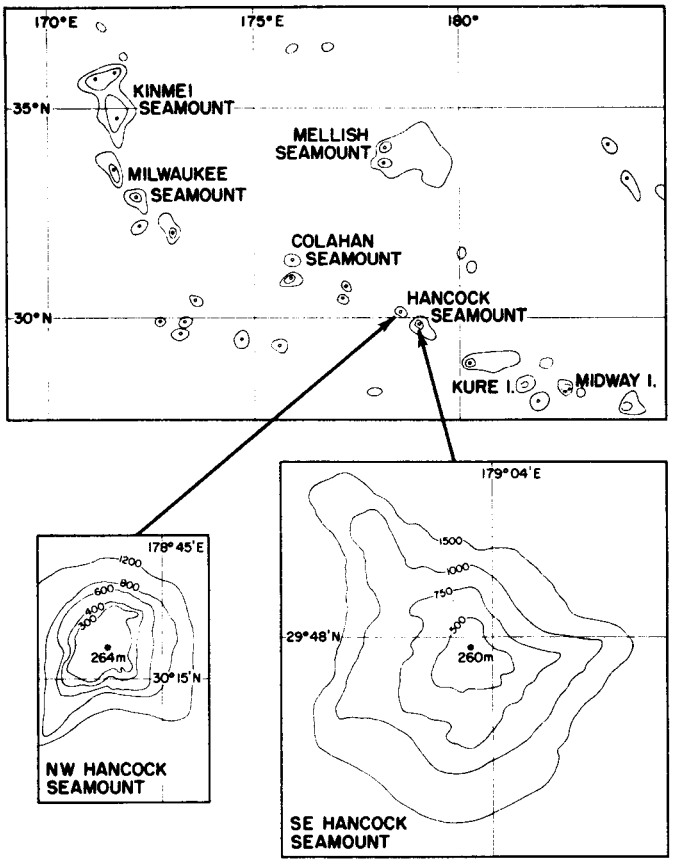

Figure 1. The location of Hancock Seamounts in relation to Midway and Kure and other North Pacific seamounts, and their depth configurations

Until quite recently interest in this group of seamounts, as in others, has primarily been geological, and almost nothing was known about their biological resources. However in 1967 a Russian trawler discovered the occurrence of pelagic armorhead, Pentaceros richardsoni, and alfonsin, Beryx splendens, on the seamounts northwest of the Hawaiian chain (Sakiura, 1972) and a fishery was born. In 1969 Japanese trawlers, which had been diverted from the Bering Sea fishing grounds, joined the Soviets in exploiting the new fishery.

Sakiura (1972) in his translation of a Russian paper, reported that commercial trawlers of the U.S.S.R. harvested approximately 133,400 metric tons (MT) of pelagic armorhead during 1969-70. Except for this remarkably high estimate of early catches on the then virgin grounds, no information on subsequent Soviet fishing is available.

Pelagic armorhead make up approximately 90% of the Japanese trawl catches from the seamounts with alfonsin and rockfish, Sebastes matsubari, constituting most of the remainder of the commercially valuable part of the catch.

In the Japanese bottom longline fishery the prime target species is alfonsin, followed by Sebastes sp. and Epinephelus sp.

For the Japanese, during the early years (1969 to 1971) of the seamount trawl fishery, there was considerable variation in both catch and effort. From 1972 to 1976 the catch of pelagic armorhead stabilized at 20,000 to 30,000 MT/yr. However, as fishing effort increased, catch per unit effort (CPUE) decreased each year, with CPUEs in metric tons per hour of trawling of approximately 60 in 1972, 34 in 1973, 22 in 1974, 14 in 1975, and 10 in 1976 (Sasaki, 1978). These figures include all Japanese commercial trawling in the central North Pacific seamount fishery. Available information indicate that the Hancocks were very productive grounds for pelagic armorhead, with catch rates reaching 83 MT/h in 1972, 40 MT/h in 1973, and 23 MT/h in 1974, 16 MT/h in 1975, and 11 MT/h in 1976 (Japan Marine Fishery Resource Research Center, 1973; Takahashi and Sasaki, 1977).

Since the Japanese bottom longline fishery for alfonsin, which began on the Milwaukee Banks around 1972, is a so-called "open fishery," requiring no permits or licenses in Japan, virtually nothing is known about the activity of the Japanese longline vessels. However, fragmentary reports indicate that the CPUE for longline-caught alfonsin was also declining through 1975 (Suisan Sekai, 1976; Sasaki, 1978).

On March 1, 1977, the United States, under authority of the Fishery Conservation and Management Act (FCMA) of 1976, extended its jurisdiction over fishery resources to all the area within 200 miles of the nation's coastline. The 200-mile Fishery Conservation Zone (FCZ) around the Hawaiian Archipelago included all of Southeast Hancock. The 200-mile line actually crosses Northwest Hancock, but apparently all of the relatively shallow trawlable ground on this seamount also falls within the FCZ.

In January 1977 the National Marine Fisheries Service (NMFS) Southwest Region published an environmental impact statement and Preliminary Fishery Management Plan which in essence limited fishing for pelagic armorheads and alfonsins within the FCZ by foreign vessels to 50 vessel-days per year each of trawling and bottom longlining. The annual quota by foreign vessels of pelagic armorheads and alfonsins was set not to exceed 2,000 MT/yr of either species or of the combined species.

Under the FCMA, Japan and the U.S.S.R. were each allocated 1,000 MT of seamount groundfish for 1977. No Japanese vessels fished on the Hancock Seamounts in 1977. In May 1977 a Soviet trawler, the Ekvator, was apprehended and cited by the U.S. Coast Guard for trawling in the Hancock area contrary to regulations defined in the FCMA. This vessel had taken 22 MT of pelagic armorhead within the FCZ.

In 1978 the Ryuyo Maru No. 2 was the only foreign vessel to fish the Hancock Seamounts. It was chartered by the Japan Marine Fishery Resource Research Center (JAMARC), and was accompanied by a NMFS observer (Kazama, 1978). In 1979 the sole foreign vessel to fish on the Hancocks was the commercial Japanese trawler, Aso Maru, also accompanied by a NMFS observer (Evering, 1979).

No U.S. commercial fishing vessels presently fish or have ever fished on the north central Pacific seamounts.

The National Marine Fisheries Service, Southwest Fisheries Center Honolulu Laboratory, conducted only intermittent resource surveys of the Hancock Seamounts. The data presented in this report are based on five exploratory fishing surveys during Townsend Cromwell cruises 76-06, October 1976; 77-02, May 1977; 78-01, February 1978; 78-03, September 1978; and 79-02, May 1979.

METHODS

Bottom fishing was conducted by stern trawling and hook-and-line fishing.

During the first cruise in 1976 the net used was a high opening Norwegian fish trawl with a 20-m headrope and a 25-m footrope. On the subsequent cruises, a larger "Noreastern" fish trawl with a 27-m headrope and a 32-m footrope was used with a pair of 1.8 x 2.7 steel V-type doors.

On the first two cruises (76-06 and 77-02) only blind tows, without the aid of a net sonde, were conducted. On the last three cruises, a "Noreastern" trawl was used with a Furuno 400 Mark II[1] net recorder (net sonde).

Handline fishing on the seamounts was conducted with 20-hook gear using cut squid as bait. During the first two cruises lines were manually handled. On subsequent cruises hydraulic gurdies were employed.

RESULTS

Trawling

During the five cruises, nine successful trawl tows (net was on the bottom), totaling 137 minutes of fishing time, were made on Northwest Hancock and three successful tows, totaling 77 minutes, were made on Southeast Hancock (Table 1). On cruise 78-01, the net sonde was used for the first time, however, it was malfunctioning and none of the four trawls made on Southeast Hancock were on the bottom, resulting in zero catch. Table 1 lists weight and the total catch of fish species taken in the 12 successful trawls. Table 2 gives pertinent information for each trawl and lists the dominant species taken on each station.

As noted earlier, during the first two cruises trawling was conducted without a net sonde. Although a net sonde was used on cruise 78-03, it was not until the last cruise that the vessel personnel had acquired a reasonable degree of expertise in the use of the equipment. This may be one of the factors responsible for the remarkably larger catches of armorhead on cruise 79-02 compared to earlier cruises. Another is that cruise

[1]Reference to trade names does not imply endorsement by the National Marine Fisheries Service, NOAA.

TABLE 1. FISHES CAUGHT TRAWLING ON HANCOCK SEAMOUNTS BY THE TOWNSEND CROMWELL IN ORDER OF THEIR ABUNDANCE IN THE HAULS BY WEIGHT

Fish	Number	Weight (kg)
Pentaceros richardsoni	2,579	975
Promethichthys prometheus	282	172
Zenopsis nebulosus	188	61
Squalus fernandinus	53	60
Beryx splendens	304	49
Ariomma lurida	134	31
Conger sp.	11	21
Antigonia steindachneri	137	7
Physiculus edelmanni	40	5
Polymixia nobilis	14	4
Emmelichthys sp.	17	2.7
Priacanthus boops	13	2.6
Diaphus trachops	145	2.6
Brotulidae	36	2.5
Polymixia japonica	29	2.4
Mytophum nitidulum	138	1.7
Hyperoglyphe japonica	2	1.3
Isistius brasiliensis	4	1.0
Sternoptychidae	2	<1
Antigonia eos	26	<1
Macrorhamphosus scolopax	8	<1
Chascanopsetta prorigera	3	<1
Parabothus coarctatus	10	<1
Argentia sp.	32	<1
Lophiomus miacanthus	4	<1
Tosanoides filamentosus	1	<1
Bothidae	6	<1
Centroscyllium nigrum	3	<1
Beryx decadactalys	1	<1
Hoplichthys sp.	1	<1
Pseudanthias kelloggi	2	<1
Rhynchocymba nystromi nystromi	4	<1
Astronesthus lucifer	1	<1
Argyropelecus aculeatus	2	<1
Etmopterus villosus	3	<1
Physiculus grinnelli	1	<1
Argyripnus atlanticus	1	<1
Parapercis roseoviridis	2	<1
Peristedion engyceros	1	<1

TABLE 2. DOMINANT SPECIES (BY WEIGHT) TAKEN IN 12 TRAWLS ON THE HANCOCK SEAMOUNTS ON TOWNSEND CROMWELL CRUISES

Dominant Species in Haul (Weight)	No. Fish	Weight (kg)	Area SE - NW Hancock	Date	Local Time	Bottom Depth (fm)	Surface Temp. °C	Bottom Temp. °c	Fishing Time (min)	Cruise No.	Station No.	Total Catch (kg)	Percentage of P. richardsoni in catch
P. richardsoni	34	21.9	SE	10/24/76	2133	145-160	25.2	13.5	19	76-06	49	29.7	74
B. splendens	3	3.6											
M. nitidulum	125	1.6											
P. richardsoni	64	21.0	SE	5/2/77	6835	144-170	21.5	12.6	20	77-02	52	68.0	31
A. lurida	134	30.5											
S. fernandinus	6	5.0											
Z. nebulosa	14	4.0											
Emmelichthys sp.	16	2.7											
Z. nebulosa	11	3.0	NW	9/9/78	1324	155-165	26.6	12.0	10	78-03	31	3.2	0
B. splendens	1	0.1											
A. eos	5	0.1											
P. richardsoni	118	59.5	NW	9/10/78	2150	150-165	26.6	12.0	15	78-03	33	95.0	28
P. prometheus	22	25.1											
Z. nebulosa	61	23.8											
S. fernandinus	4	3.6											
A. eos	37	2.7											
B. splendens	44	2.3											
P. richardsoni	32	71.2	NW	9/10/78	0925	155-165	26.6	12.0	23	78-03	34(1)	18.7	60
Z. nebulosa	24	6.9											
H. japonica	5	0.3											
A. eos	10	0.3											
B. splendens	99	18.1	NW	9/10/78	1115	155-165	26.6	12.0	20	78-03	34(2)	37.2	25
Z. nebulosa	36	9.9											
P. richardsoni	26	9.2											
A. eos	9	0.3											
P. richardsoni	31	10.5	NW	5/4/79	1405	147-149	19.9	15.0	14	79-02	26	14.7	71
Z. nebulosa	7	2.0											
A. steindachneri	17	0.5											
P. richardsoni	10	3.5	NW	5/5/79	1000	144-150	20.9	14.9	17	79-02	31	6.9	51
Z. nebulosa	12	2.8											
A. steindachneri	11	0.3											
P. richardsoni	270	93.6	NW	5/5/79	2116	144	20.4	14.2	14	79-02	33	113.8	82
P. prometheus	28	10.5											
B. splendens	32	4.7											
D. trachops	145	2.6											
P. richardsoni	553	208.0	NW	5/5/79	2320	141	20.5	14.2	13	79-02	34	228.7	91
S. fernandinus	4	8.5											
P. prometheus	15	7.0											
B. splendens	14	1.4											
P. prometheus	225	132.9	NW	5/6/79	0155	144	20.5	14.4	11	79-02	35	165.8	15
P. richardsoni	70	25.1											
B. splendens	50	7.8											
P. richardsoni	1,373	546.0	SE	5/6/79	2100	140	19.9	14.8	38	79-02	37	614.9	89
S. fernandinus	39	43.5											
B. splendens	60	7.4											
Z. nebulosa	31	6.9											

78-03 followed the fishing trip of the Japanese trawler Ryuyo Maru No. 2 at Hancock whereas on cruise 79-02 the Cromwell preceded the Japanese trawler Aso Maru. On cruise 79-02 the mean catch per hour was 642 kg total and 497 kg for armorhead, whereas for the three other cruises combined the mean catch per hour was 108 kg total and 62 kg for armorhead. This heterogeneity in such limited data precludes any extensive analysis. From Table 2 it is clear that, in general, the same species dominated the catches, and that our catch results, in agreement with those of the Japanese and Soviets, indicate that evening and night trawls are far more productive than day trawls. The mean night catch per hour was 680 kg total and 520 kg armorhead compared to mean day catch rates of 86 kg total and 38 kg for armorhead.

For cruise 79-02 the mean length of armorhead was 25.5 cm for both males and females, and 95% of the fish were the so-called "lean" type. This is the same proportion of lean fish reported for the Aso Maru. It is of some interest to note that only on the best hauls, during cruise 79-02 (stations 33, 34, and 37), did the percentage of armorhead in the catch approach that reported for Japanese trawlers (Sasaki, 1978).

Handlining

Table 3 summarizes the handlining conducted on the seamounts. Line hours fished totaled 24 at seven stations on Southeast Hancock and 28 at six stations on Northwest Hancock. Armorhead were most abundant with a mean catch for all fishing stations of 1.7 kg/line-hour. Although alfonsins were taken in small numbers on four stations, the overall mean catch of 0.2 kg/line-hour was very low. The largest catch, 37.4 kg/line-hour of Japanese mackerel, Scomber japonicus, was made on Southeast Hancock, during Townsend Cromwell's first visit to the seamounts.

DISCUSSION AND CONCLUSIONS

The Townsend Cromwell's fishing activity on the Hancock Seamounts has provided much needed experience for NMFS scientific and vessel personnel. However, the data we have collected are certainly insufficient to allow even general speculation on the condition of the armorhead and alfonsin fishery on the Hancock Seamounts.

Subsequent to cessation of intensive foreign commercial fishing on the Hancocks, since the 1976 season, the only other data available on the fishing conditions in the area are from trawling operations of the Ryuro Maru No. 2 in 1978 and the Aso Maru in 1979. The impression of the NMFS observers assigned to those vessels was that the Japanese considered fishing to be poor when compared to the conditions which prevailed during earlier years of the fishery.

Townsend Cromwell cruise 80-02 during April of 1980 will conduct the most intensive survey of the Hancock Seamounts and others in the vicinity of Kure and Midway Islands thus far attempted by NMFS. In addition to bottom fishing with trawl and handlines, we will utilize 100-hook bottom longline gear similar to that used in the Japanese alfonsin fisheries.

A U.S. domestic seamount fishery would seem unlikely in the near future. However, foreign interest in the Hancock Seamount grounds will probably continue.

To develop an acceptable fishery management plan, NMFS will require an adequate data base. Future plans at the Southwest Fisheries Center Honolulu Laboratory call for a comprehensive study of the Hancock Seamounts and other seamounts located within the Hawaiian Island FCZ.

SUMMARY

A study of fishery resources over Hancock Seamounts, which are located within the FCZ of the Hawaiian Archipelago, was initiated in October 1976. Data collected aboard the Townsend Cromwell were in general agreement with Japanese fishing results which indicated that catch rates were significantly higher at night rather than during daytime and that a large proportion of the catch at Hancock Seamounts consisted of pelagic armorhead, Pentaceros richardsoni, most of which were the so-called "lean" type. The balance of the catch consisted of alfonsin, Beryx splendens. Handline fishing also produced relatively good numbers of Japanese mackerel, Scomber japonicus. Future research needs include

TABLE 3. HANDLINE CATCHES ON THE HANCOCK SEAMOUNTS ON TOWNSEND CROMWELL CRUISES

Species	No. Fish	Weight (kg)	Area SE - NW Hancock	Date	Fishing Time (Local)	Cruise No.	Station No.	Catch Per Line-Hour (kg)
Scomber japonicus	28	43.6	SE	10/29/76	1740-1815	76-06	47	37.4
Hyperoglyphe japonica	1	6.4						5.5
Pentaceros richardsoni	2	1.4						1.2
Decapterus russellii	1	1.2						1.0
Squalus fernandinus	1	0.7						0.6
Beryx splendens	1	0.9	SE	10/29/76	1822-1930	76-06	48	1.0
Hyperoglyphe japonica	2	4.2	SE	5/25/77	1815-2145	77-02	50	0.6
Squalus fernandinus	3	3.3						0.5
Pentaceros richardsoni	6	2.9						0.4
Beryx splendens	1	0.8						0.1
Squalus fernandinus	12	14.1	SE	2/10/78	0950-1135	78-01	60	4.0
Scomber japonicus	11	13.6						3.9
Decapterus russellii	4	4.5						1.2
Pentaceros richardsoni	7	3.2						1.0
Squalus fernandinus	4	7.1	SE	2/11/78	0820-0905	78-01	67	4.7
Pentaceros richardsoni	8	2.6						1.7
Decapterus russellii	1	0.9						0.6
Pentaceros richardsoni	60	21.2	SE	2/11/78	1115-1435	78-01	68	3.2
Squalus fernandinus	13	17.4						2.6
Hyperoglyphe japonica	1	2.0						0.1
Scomber japonicus	1	0.5						0.03
Hyperoglyphe japonica	1	2.2	NW	9/7/78	1736-2107	78-03	26	0.3
Beryx splendens	1	0.9						0.15
Pentaceros richardsoni	2	0.7						0.14

TABLE 3. HANDLINE CATCHES ON THE HANCOCK SEAMOUNTS ON TOWNSEND CROMWELL CRUISES (Continued)

Species	No. Fish	Weight (kg)	Area SE - NW Hancock	Date	Fishing Time (Local)	Cruise No.	Station No.	Catch Per Line-Hour (kg)
Pentaceros richardsoni	9	3.8	NW	9/8/78	0900-1133	78-03	28	1.2
Scomber japonicus	1	1.2						0.4
Hyperoglyphe japonica	1	1.2						0.4
Decapterus russellii	1	1.2						0.4
Pseudanthias	1	0.2						0.1
Hyperoglyphe japonica	7	12.4	NW	9/9/78	1746-2011	78-03	32	2.6
Pentaceros richardsoni	5	1.9						0.4
Scomber japonicus	1	1.4						0.3
Squalus fernandinus	1	1.2						0.2
Pentaceros richardsoni	34	13.2	NW	10/2/79	1647-2012	79-02	28	4.7
Beryx splendens	1	0.8						0.3
Pentaceros richardsoni	23	10.0	NW	10/2/79	0519-1842	79-02	30	1.5
Beryx splendens	9	7.8						1.2
Hyperoglyphe japonica	2	3.8						0.6
Pentaceros richardsoni	51	25.37	NW	10/2/79	1818-1957	79-02	32	7.7
Hyperoglyphe japonica	2	3.9						0.6
Pentaceros richardsoni	10	3.8	SE	10/3/79	1910-2005	79-02	36	1.3

monitoring of the stock at Hancock Seamounts and additional surveys of other seamounts in the vicinity of Kure and Midway. Collection of biological and morphometric data will be continued.

REFERENCES

Evering, G.C. 1979. Seamount fishery, foreign vessel observer report, Aso Maru (May 27-July 10, 1979). Southwest Fisheries Center Administrative Report H-79-14, National Marine Fisheries Service, NOAA, Honolulu, Hawaii. 10 pp.

Japan Marine Fishery Resource Research Center (JAMARC). 1973. Surveys of trawling grounds in the north central Pacific Ocean, 1972 season (Showa 47-nendo kaigai torōru shingyojyo kigyōka chōsa hokokusho--Hokubu chūo Taiheiyō kaiiki). Translation of portions of JAMARC Report 7, March 1973, 89 pp. (English translation by T. Otsu, 1977, 27 pp., Translation No. 19; available Southwest Fisheries Center, National Marine Fisheries Service, NOAA, Honolulu, Hawaii).

Kazama, T.K. 1978. Seamount fishery, foreign vessel observer report--Ryuyo Maru No. 2 (April 22-June 3, 1978). Southwest Fisheries Center Administrative Report 15H, National Marine Fisheries Service, NOAA, Honolulu, Hawaii. 10 pp.

Sakiura, H. (translator). 1972. The pelagic armorhead, Pentaceros richardsoni, fishing grounds off the Hawaiian Islands, as viewed by the Soviets (So-Ren kara mita Hawaii oki kusakari tsubodai gyojyo). Suisan Shuho (the Fishing & Food Industry Weekly) 658: 28-31, June 15, 1972. (English translation by T. Otsu, 1977, 7 pp., Translation No. 17; available Southwest Fisheries Center.

Sasaki, T. 1978. The progress and present status of the seamount fishing ground development program. Bulletin of the Japanese Society of Fisheries Oceanography (33):51-53. (English translation by T. Otsu, 1977, 27 pp., Translation No. 19; available Southwest Fisheries Center, National Marine Fisheries Service, NOAA, Honolulu, Hawaii).

Suisan Sekai. 1976. The present status of the alfonsin, Beryx splendens, fishery in the Midway fishing grounds (Midway kai-iki no kin-me sogyo no genkyo). (Excerpt) Suisan Sekai 25(8):28-32. (English translation by T. Otsu, 1977, 5 pp., Translation No. 18; available Southwest Fisheries Center, National Marine Fisheries Service, NOAA Honolulu, Hawaii.)

Takahashi, T., and T. Sasaki. 1977. Trawl fishery in the central North Pacific seamounts (Kita Taiheiyo chubu kaizan ni okeru torōru gyogyō). Hokuyo soko-uo gyogyō--Shiryo (3) [Northern waters groundfish fishery--Data (3)]. Division of Northern Waters Groundfish Resources, Far Seas Fisheries Research Laboratory, 45 pp.. (English translation by T. Otsu, 1977, 49 pp., Translation No. 22; available Southwest Fisheries Center, National Marine Fisheries Service, NOAA, Honolulu, Hawaii.)