Outline of Flying Squid Investigations Conducted by Scientific Vessels of the Fisheries Agency of Japan in the North Pacific in 1991

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ABSTRACT

In 1991, a total of 5 Japanese research vessels conducted surveys on flying squid resources in the North Pacific ocean. The objectives of these surveys were to collect information on the biomass of flying squid, determine their horizontal and vertical distribution, track by biotelemetry technique the diurnal behaviour of flying squid and sea birds, compare the catch by surface and subsurface driftnets, and to conduct jigging operations using various jigs as well as to collect biological information on other fishes, marine mammals and sea birds caught incidentally by driftnets. Although there was some research that could not fully achieve the initial objectives, because catches of flying squid by both driftnet and squid jigging were unusually poor, new information was collected by tracking flying squid and on sea birds. The subsurface net fishing demonstrated the possibility of reducing the incidental catch of sea birds. In addition, operational troubles such as caused by entanglement when using the subsurface nets were reduced by use of the float-saved type subsurface net.
Introduction

This report is an outline of the flying squid resource investigations conducted by 5 Japanese scientific research vessels in the North Pacific from April to October in 1991. Some surveys are still being conducted, and preliminary data are included in the report. Survey using the Hokko maru was conducted by the Hokkaido National Fisheries Research Institute and surveys by four other vessels were conducted by the National Research Institute of Far Seas Fisheries.

The surveys with drift nets were conducted in July (5 times), August (13 times), and September (8 times as of September 10).

The surveys with jigs were conducted in April (4 times), June (18 times), July (10 times), and August (6 times). The surveys conducted in April and August were hand jigging to obtain flying squid for biotelemetry experiments.

Twelve longline surveys were conducted in July.

1. Outline of flying squid resource investigation

In 1991, five Japanese research vessels were engaged in investigations on flying squid in offshore areas of the North Pacific Ocean. They collected information on the biomass of flying squid, their horizontal and vertical distribution, tracked flying squid and sea birds by biotelemetry and studied their diurnal behaviour. Jigging experiments were conducted using various hooks and tests were made to compare the catch with surface and subsurface nets. In addition biological information on other fishes, marine mammals and sea birds caught incidentally by drift nets was collected (Tables 1 and 2 Figs. 1 to 5).

2. Research conducted and outline of results

The following is the survey procedure and outline of results obtained by vessel. Details of the results are described in other documents.

(1) Hokko maru: Researchers aboard the Hokko maru fished for mature flying squid individuals, tracked mature flying squid individuals by biotelemetry experiment, sampled larval and juvenile squids with three kind of plankton nets, and made oceanographic observation, etc. in the eastern offshore areas of the Ogasawara Islands in April. Tracking of squid was done for three individuals, and the vertical movements at day and night (diurnal movement pattern) were determined (Doc. 3666). Samples taken with the plankton nets are now undergoing analysis.

(2) Wakatori maru: Researchers aboard the Wakatori maru attached conventional single jigs, double jigs with an added hook about 10cm below the single hook, and jumbo jigs to 5 automatic squid jigging machines, and conducted 27 comparisons between catch rate and drop-out rate for each jig.

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One Japanese scientist and one Canadian scientist were on board the Wakatori maru and engaged in the research on monitoring catch of squids, measurements of body length, etc. In addition, at stations, measurements were made of surface water temperature and water temperature and salinity at each layer from the surface to depths of 300m by C.T.D.

As catches of flying squid in the jigging experiments were extremely poor, a complete analysis was not possible, but it was suggested that the ordinary single jig was the most effective for the small-sized flying squid, but it had a tendency to drop-out large-sized squid, and the jumbo jig was the most effective in that respect (Doc. 3663).

(3) Shoyo maru: Researchers aboard the Shoyo maru caught live sea birds (1st cruise) and live flying squid (2nd cruise), attached electro magnetic transmitters and supersonic transmitters to those animals (biotelemetry technique), and tracked their pattern of movement. In addition, when attempts were made to catch live sea birds, 5 fishing experiments with surface driftnets were conducted.

Sea birds selected for research were a short-tailed shearwater, a laysan albatross and a black-footed albatross that were taken by driftnet, hand jigging, and salmon longline. These sea birds were almost motionless on the surface of the sea at night. Submerging behaviour was observed only for the short-tailed shearwater (Doc. No. 3664).

Flying squid for biotelemetry studies were caught by hand jigging and seven were equipped with pingers to monitor their behaviour. The results showed that the main swimming depth at night of flying squid was 40m and shallower, and during the day varied by individual, but was mainly in depths between 100m and 350m, and no common directivity of their horizontal movements was observed (Doc. 3664).

The Japanese scientist aboard conducted the surveys on sea birds and flying squids. Plankton samples were collected with 6 tows of a bongo net at the request of a Canadian scientist. Sightings for marine mammals were conducted by a U.S. scientist. Oceanographic observations in the first cruise included XBT observations at about 60 stations, setting of Algos buoys at three stations, and CTD observations at locations of driftnet and longline operations. In the 2nd cruise, CTD observations were made at hand jigging stations as were observation of water transparency, and these findings are now under analysis.

(4) Kaiun maru: The Kaiun maru conducted 13 comparative fishing experiments using 200 tans each of surface and subsurface driftnets from 42°30' to 44°30'N and from 178°E to 178°W in the North Pacific during the periods between July and August. In addition, ropes with built in floats were used as floatline and upper rope in the subsurface driftnet (40 tan), and improvements in dealing with the subsurface driftnets were attempted by reducing the number of floats (float-saved type subsurface net).
The results showed that while the incidental catch of sea birds was greatly reduced by using subsurface driftnets, CPUE (catch per 1,000 effective tans) of flying squid was about 67% of that of the surface driftnet. Further, although the effectiveness of the subsurface driftnet in avoidance of incidental take of small cetaceans or northern fur seals was not clearly determined, because of little data, it was suggested that there are some possibilities to reduce the incidental take. Entanglement in the subsurface driftnet with lower number of floats was reduced remarkably, compared with the ordinary subsurface driftnet, and handling was easy (Doc. 3665).

One Japanese and one Canadian scientists were on board the Kaiun maru for the surveys, and were engaged in counting the catch by the driftnets, the drop-out from the nets, the biological surveys and the sampling of flying squid or fishes. Measurements of surface water temperature were made at each station as well as measurements by CTD of water temperature and salinity at each depth layer from the surface to 300m.

(5) Kanki maru No. 3: the survey was divided into a first and second cruise. In the first cruise, eleven observations were made on entangled locations of flying squid and animals caught incidentally using the surface driftnets at grid locations between 38° to 46°N and 169° to 178°E of the North Pacific from August to September. One Japanese and one U.S. scientist were on board the Kanki maru No. 3 on the first cruise and were engaged in counting the catch (in numbers) of squids or fishes and the drop-out from the driftnets. They also made measurements of body length and sampled catches. Sightings for marine mammals were also conducted.

The 2nd cruise was in progress as of September 30, and involves counting of catch (in numbers) of flying squid with the automatic squid jigging machine using four types of jigs and recording the number of squid that drop-out from the jigs. The catching and drop-out processes are scheduled to be recorded by television camera. Prior to the jigging experiments, measurements were made of the spectroscopic radiant illumination of the fish lamp. In addition, comparative fishing experiments with a biodegradable driftnet made of bioplastic material and an ordinary driftnet are scheduled. In the first cruise, surface water temperature were recorded, and MBT observations made, and in the second cruise, CTD's were also used.

Pertinent documents submitted to the 38th INPFC Annual Meeting (Research vessels) and Tables 1 and 2 and Figs. 1 to 5 are in English in the Japanese document.