UNITED NATIONS

GENERAL ASSEMBLY

Distr.
LIMITED
A/CONF.10/L.26
DRAFT
28 April 1955
ENGLISH ONLY

INTERNATIONAL TECHNICAL CONFERENCE ON THE CONSERVATION OF THE LIVING RESOURCES OF THE SEA

Rome - 18 April 1955

Item 10 of the agenda

INTERNATIONAL TECHNICAL CONFERENCE ON THE CONSERVATION OF THE LIVING RESOURCES OF THE SEA

Types of scientific information required for a fishery conservation programme

The Secretary-General has the honour to communicate the following paper, submitted by Japanese Delegation to the International Technical Conference on the Conservation of the Living Resources of the Sea

PERTINENT FACTS RESPECTING THE LIFE HISTORY, ECOLOGY AND BEHAVIOUR OF THE IMPORTANT SPECIES CONSTITUTING THE FISHERY RESOURCES IN THE SEAS AROUND JAPAN

UN/SEA-249

28 p.

CONTENTS

A. Conservation management units

Population: As the unit of conservation management, Japanese sardines are deemed to be of one population.

Age composition: Percentage of the age composition of catches is shown in Table 1.

B. Magnitute of conservation management units

Geographical range: They are caught in the coastal waters all around Japan.

C. Life history, ecology and behavior of the fish constituting the resource

Age of maturity: Their maturity begins fully one year after birth (body length 12 - 16 cm) and is completed in full 2 years (body length 18 cm).

The sex ratio is almost 1:1. But there are more females than males in older fish.

Spawning: The most important spawning grounds are located around Goto Islands off the north-western coast of Kyushu. There are also other spawning grounds in the Japan Sea south of Noto peninsula and along the Pacific coast south of Boso Peninsula.

The spawning season comes earlier in the south (December) and later in the north (June).

The water temperature for spawning is 13° - 17°C.

In spawning season the fish move deep in the day time, but they come to the surface in the evening twilight.

Spawning takes place from 8 to 10 o'clock in the evening.

Number of eggs spawned: The number of eggs spawned by a 1-age fish (16 cm) is about 20,000, but a big fish (over 20 cm) spawns approximately 100,000 eggs.

Development and growth: Eggs are hatched in about 60 hours (2-3 days). Hatched larvae are 3.2 mm in length. In 3-4 days, they grow 5 mm, and at the time of scale formation, 35 mm; in 3 months after birth, 50-60 mm; at the time of taking adult form, 75mm; in 6-7 months after birth, about 100 mm; in one year, 120-160 mm; in 2-years, around 180 mm; in 3 years, around 200 mm; in 4 years, around 210 mm.

Longevity: Their longevity is considered to be 4 years or there abouts.

Migration: Eggs spawned and larvae hatched in the adjacent waters south of Japan are carried along by the current. When they grow strong enough to swim (5-6 cm) they begin to run up northwards to seek for food till August or September. In autumn and winter they come down southwards. When they grow more than one year, they again go up northwards to seek for food in spring and summer. They then come down south to spawn in autumn and winter.

D. Fishing intensity

Production: The production of Sardine, with a peak of 1,600,000 tons in 1936, gradually declined. But since 1945 it has been showing an increasing trend. As to the reason for such phenomenon, it is said that their spawning grounds, which had once moved to the north thereby reducing the size of the suitable spawning area, have now been extended to the south. and enlarged. (See Table 2).

Effect: The total crude decreasing rate of total production of this group was 60-70%, of which 17% is estimated to be the effect of fishing. (1942).

E. Feeding interrelationship

Food: Larvae and juvenile fish feed on zooplankton. When they grow a little older, they eat phytoplankton in addition to zoo-plankton. Adult fish take chiefly diatom plankton in the waters.

Literature

1. Progress report on Sardine Population Investigation (1949-1951)

   Tokai Regional Fisheries Research Laboratory 1953.

2. Progress report on Sardine Population Investigation (1952)

   Tokai Regional Fisheries Research Laboratory 1954

3. Elements of Fisheries Resources (1949) Aikawa, Hiroaki

4. Concerning Stock of Sardine (1942) Tauchi, Morisaburo

   Japan Fisheries Science Society Bulletin (10) 5

5. Fishing Conditions of Yellowtail around Goto Islands, Nagasaki Prefecture and Ajiro, Izu (1934) Uda and Honda

   Japan Fisheries Science Society Bulletin (2) 5.

Table 1

Age composition of sardine caught in Pacific side in 1953

North eastern coastal waters of Japan

CATCH	A G E				TOTAL
	0	1	2	3	
Metric ton	ton 6,873	ton 3,236	ton 8,396	ton 76	ton 18,547
Ratio	37.1%	17.5%	45.2%	0.2%	100 %

Middle coastal waters of Japan

CATCH	A G E				TOTAL
	0	1	2	3	
Metric ton	ton 755	ton 532	ton 1,155	ton 5	ton 2,447
Ratio	30.9%	21.7%	47.2%	0.2%	100 %

Table 2

Sardine catch by type of fishery in 1953

Type of fishery	Metric ton	Percentage
Surrounding net	417,068 ton	63.19%
Beach seine and boat seine	102,533	15.54
Gill net	61,541	9.32
Set net	38,970	5.91
Lift net	32,441	4.91
Angling and long-line	1,826	0.28
Drag net	45	0.01
Others	5,561	0.84
Total	659,985 ton	100.00%

Clupea pallasi Cuvier et Valenciennes; Herring

A. Conservation management units

Population: Herring are found in all waters around Honshu, Hokkaido and South Sakhlien, but they are handled as one population for the purpose of conservation management. Besides, there are 2 or 3 populations, though small, which come into lakes to spawn.

B. Magnitude of management units

Geographical range: They are caught in the waters around south Sakhalien and Hokkaido, especially in waters north of Shikotan, Hokkaido. But formerly, they were caught in waters north of Yamagata prefecture in the Japan Sea, and in waters north of Miyagi prefecture in the Pacific, and also off the south-eastern part of Korea.

C. Life history, ecology and behaviour

Age of maturity: The mature individuals occupy 10% of 3-age group; 30-60% of 4-age group; and 100% of 5- and older age groups. Their body length in maturity ranges 26-30.5 cm.

Spawning: The spawning season is during March to May; and it is earlier in the south and later in the north. The water temperature for spawning is also higher in the south (5° - 6°C) and lower in the north (3°C).
The fishing grounds are spawning grounds. As the spawning season approaches, Herring gradually come up in the surface layer and move on toward the shore.
In the spawning season they approach the shore in shoal and spawn on sea-weeds and others.

Number of eggs spawned: The number of eggs spawned by a 4-year class fish is around 40,000. However, bigger fish generally spawn more eggs than smaller fish, though they belong to the same year class.

Development: At water temperature of 7.3°-8.4°C, eggs are hatched in 20 - 22 days. In 5 - 7 days after birth, their yolk is consumed and they grow 9 - 10 mm in length. They grow 2.5 cm in one month; 4 cm in 2 months; 7 cm in 3 months; 10 cm in 6 months; 15 cm in full one year; 22 cm in 2 years; 26 cm in 3 years; 29 cm in 4 years; 30.5 cm in 5 years; 32 cm in 6 years; 33 cm in 7 years; 34 cm in 8 years; 34.5 cm in 9 years; 35 cm in 10 years.

Longevity: Their longevity is 8 years -. But there are a few which are though to be 16 years old and thereabout.

Migration: Juvenile fish grow in the Okhotsk Sea. Then they come down south in autumn along the Pacific coast. Next year they run up northwards and enter into the Okhotsk Sea. In autumn, they again migrate south along the Pacific coast (the northern part of Honshu), and then return to the Okhotsk Sea till the following summer. Some of them (3 years old) appear for spawning or a spring Herring near the coast of

Hokkaido and south Sakhalien, but most of them stay in the Okhotsk Sea. After spawning season they migrate to the northern Okhotsk Sea, and then come down south into the Japan Sea in January and February.
During the migration, they are caught either as spring Herring (spawning) or as summer Herring (immature).

Spring Herring (spawning Herring):
3-age and older groups

D. Fishing intensity

Production: About 4,500,000 metric tons of Herring catch in 1933 was the highest record in the past, and about 40,000 tons was the lowest. The recent production ranges from 200,000 - 300,000 tons.

Effect: Herring are caught by set-nets and gill-nets. (See Tables 1 and 2)
The catch of Herring depends upon the number of men engaged in fishing and also upon the various environmental factors. The recent poor catch is considered to be due to the shift of the optional spawning ground in Hokkaido to north.

E. Feeding inter-relationship

Food: They feed chiefly on zooplanktons such as Copepoda and Euphaucia. Most of the stomachs of fish which have come up from both bottom and medium layers are empty. Then they begin to seek for food and eat a great quantity until about 6 days before their spawning. In about 16 days after spawning, they begin to feed again and become thick, being called "fat herring".
Atka mackerel, greenling and starfish prefer to eat eggs of Herring.

Literature

1. Herring Fishing and its Biological Study (1952)
Ishida, Akio
Fisheries Science Library No.4

2. Recent Bad Fishing Conditions of Spawning Herring in Hokkaido (1942)
Tauchi, Morisaburo
Japan Science Society Report (17) 1

Table I

Age Year	3	4	5	12	13	14	15	16 over	Total
1939	42,9%	49.1	3.3						
	43,508 tons	49,809	3,29(						101,312
1940	2.0%	72.4	22.0						
	3,395 tons	116,710	35,51(						161,174
1941	0.9%	10.8	80.4						
	1,552 tons	18,096	135,12(						168,011
1942	16.1%	14.1	10.7						
	27,601 tons	24,329	18,36(						171,405
1943	0.2%	74.1	7.7						
	650 tons	221,778	22,90'						299,253
1944	0.1%	0.6	86.7						
	311 tons	2,081	314,98(						363,345
1945	5.8%	0.3	0.5						
	19,413 tons	505	1,71'						334,950
1946	1.2%	15.2	1.1						
	3,386 tons	40,955	2,88(						269,569
1947	0.6%	2.8	14.3						
	1,219 tons	5,409	28,22'						197,012
1948	0.4%	6.5	8.6						
	711 tons	11,463	15,20(						176,250

Age Year	3	4	5	11	12	13	14	15	16 over	Total
1949	17.9%	7.4	9.[illegible]							
	31,904 tons	13,049	16,4[illegible]							178,056
1950	2.7%	37.1	3.[illegible]9.3		0.9					
	4,310 tons	59,328	5,1[illegible]777		1,465					159,806
1951	10.6%	6.5	31.[illegible]6.9		36.3	1.0				
	17,780 tons	10,928	53,3[illegible]556		60,990	1,748				168,088
1952	0.7%	61.0	3.[illegible]6.6		0.9	18.5	0.3			
	1,835 tons	163,664	8,4[illegible]675		2,403	49,457	840			268,139
1953	1.1%	0.6	80.[illegible]3.9		0.1	0.1	8.5	0.1		
	2,510 tons	1,454	186,7[illegible]945		358	158	19,682	300		232,580
1954	0.9%	1.6	0.[illegible]3.5		3.1	0.8	0.5	17.2	0.	
	1,053 tons	1,826	7[illegible]508		3,443	923	520	19,184	191	111,471

The [illegible]ive age.

The [illegible]ic ton.

Table 2

Type of fishing gear used for herring

Kind	Year 1940	1950
Number of the set-nets	602	1,025
Number of gillnets (converted)	475	917
Total	1,077	1,942

Seriola quinqueradiata Temminck et Schlegel; Yellowtail

A. Conservation management units

Population: Yellowtail are caught in all coastal waters of Japan.

As the unit of conservation management, they are considered to belong to one population.

Age composition: The age composition of fish caught annually in Sagami Bay is as follows:
1-age fish 16%; 2-age fish 21%; 3-age fish 30%; 4-age fish 25% (Aikawa 1949)

B. Magnitute of management unit: The size of a population is estimated to be 129,300,000 fish (Tauchi) or 125,615 - 805,625 tons (Aikawa)

C. Life history, ecology and behavior

Age of maturity: They become mature partly in 2 years after birth and mostly after 3 years.

Spawning : Their spawning grounds are located in coastal waters of the Southern Japan.

Spawning season begins in February in the south and ends in June in the north.

Growth rate: They reach 3 cm in 2 months after birth; 15 cm in 4 months; 20 cm in 6 months; 30 cm. (1 kg) in one year; 40 - 50 cm (3 - 4 kg) in 2 years; 60 - 70 cm (6 - 7 kg) in 3 years; 70 - 80 cm (8 - 9 kg) in 4 years.

Migration: Optimum water temperature is 14° - 17°C.

The speed of their swimming is fast when they seek for food, while it is slow in their spawning time. The highest speed averages 49 sea miles per day, and in ordinary times they swim about 10 sea miles a day.

D. Fishing intensity

Catch: The total catch in 1890 was 15,000 tons. The recent record is approximately 50,000 tons.

They are caught all the year round in South Japan, and in North Japan big fish are caught chiefly in summer.
They are caught by set-nets, trap-pockets, long-lines and pole-and-line fishing.

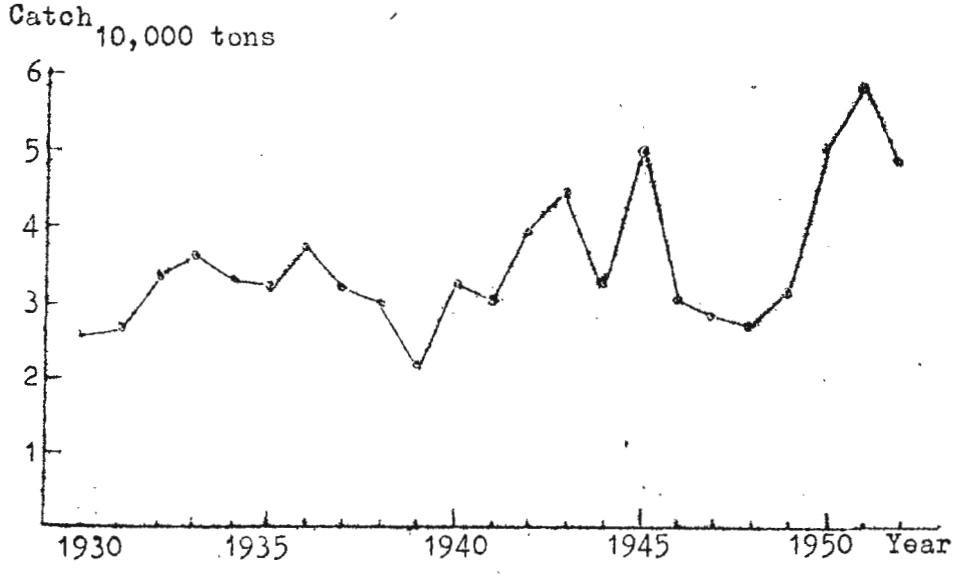
E. Feeding interrelationship

Food: They are animal feeders. The adult feed on anchovy, sardine, horse mackerel and mackerel. The larva and juviniles live under floating-weeds they are often eaten by other fish. On the other hand the adult are eaten by porpoise, pilot whale and dolphin.

Literature

1. Yellowtail and its Fishing (1953) Matsushita Tomonari
Fisheries Science Library No.6

2. Concerning Stock of Yellowtail (1940) Tauchi, Morisaburo
Japan Fisheries Science Society Bulletin (9) 3



Annual catch of yellow tail

Mackerel

Mackerel include the following two species:

Pneumatophorus japanicus Houttuyn

Japanese mackerel

Pneumatophorus tapeinocephalus Bleeker

Japanese spotted mackerel or Southern mackerel

A. Conservation management units

Population: Japanese Mackerel are caught in all coastal waters around Japa, in the Yellow Sea and the East China Sea. Japanese spotted mackerel or Southern mackerel are abundant in waters around southern Japan.

As the unit of conservation management, the two species are treated as one population.

C. Life history, ecology and behavior

Age of maturity: Some of them become mature in 2 years after birth, and the rest after 3 years.

Spawning: Their spawning area includes all coastal waters of Japan.

Their spawning season extends from April to June, and it is earlier in the south, but later in the north.

Spawning water temperature ranges from 13.5° to 21°C, and the optimum water temperature is 18°C.

Number of eggs spawned: The number of intra-overian eggs of a fish is estimated to be 300,000 - 400,000, and they are spawned in 4 or 5 times.

Development: At 20°C, eggs are hatched in around 50 hours. In 6 months or one year they grow t2 - 20 cm in length, and in 2 years, 25 - 30 cm; in 3 years, 30 - 34 cm; and in 4 years, 34 - 38 cm. Most of the commercial fish belong to 2 - 4 age groups, and 5 and 6 age fish are very few.

Migration: Japanese mackerel live in waters of 7° - 23°C and their optimum temperature is 10° - 20°C. Japanese spotted mackerel live in warmer waters of 15° - 28°C, than the other.

Young fish of both species live in warmer waters than the adult.

When the Japanese mackerel leave the southern waters, the spotted mackerels appear here.

Both of these fish migrate in shoal. 0-age class and 1-age groups fish make a separate shoal respectively, while 2-age and older age group live together.

They make specially dense shoals and come up near the the surface in the spawning season.

Japanese mackerel run up northwards during spring and summer, swimming through the surface layer; and late in autumn and early in winter they come down southwards through the bottom layer.

They spend the winter in coastal waters of South Japan.

Most of Japanese spotted mackerel leave the Japanese coastal waters in winter and go down southwards.

D. Fishing intensity

Catch: The production of mackerels in the prewar years exeeeded 100,000 tons and after the war (in 1946) it dropped to 60,000 tons. But with gradual recovery, it amounted to about 230,000 tons in 1953. The percentage of spotted mackerel was below 30% of the total.

Effect: Formerly stick-held dip-nets were used for this fishing. But now fishing motor vessels with improved surrounding nets and with Hanezuri (a type of angling) are being used.

With regard to the fishing effect, there is no fear of overfishing of Japanese mackerel. As to Japanese spotted mackerel, it is believed that more fish can be exploited without harm in the East China Sea and Yellow Sea.

E. Feeding inter-relationship

Food: They feed on pelagic crustaceaus, small squids and small fishes such as Sardine and Sandlaunce.

Literature

Ecology of Mackerel (1953)

Kasahara, Hiroshi and Ito, Hideo

Fisheries Science Library No.7

Annual catch of mackerel

Colobabis saira (Brevoort); Skipper, Pacific Saury or Mackerel Pike

A. Conservation management units

Population: Skipper in Japan are regarded as a single population in the conservation management.

B. Magnitute of population management

Geographical range: In the Pacific they are caught in waters from the Kurile Islands down to the Okinawa Islands (25°N, 136°E).

C. Life history, ecology and behaviour

Age of maturity: They become mature in 3 years after birth and fish of over 27 cm (3 - 4 age groups) can spawn.

Spawning: In the spawning season they approach the coast.

They spawn 700 - 900 eggs per fish at a time, twice or thrice during the season.

Their spawning grounds are located in the waters south of the central Japan. The spawning season covers a long period from November to June of the next year. They spawn in November and again June in the northern part of the spawning ground and once in March in the southern part.

The optimum water temperature for spawning is 15° - 18° C.

Development: At 15° - 16° C, eggs are hatched in 10 hours. Juveniles (7 mm in length) and young fish are carried northwards by sea current as far as northern waters of Japan.

o-age fish in adult are found nearly always in coastal and offshore waters. They gradually move northwards from there.

Migration: During southwards migration of adult fish (25 cm or more) along the Pacific coast, they are crowded densely. In August they occur in the northern waters. They gradually come down southwards and reach the central part of Japan around November. These large shoals are mainly fished commercially.

But in the Japan Sea, migration of adult fish (25 cm or more) is very small in scale. They occur in the southern waters of the Japan Sea in spring, then they migrate northwards and reach the waters off the West coast of Hokkaido in summer.

The optimum temperature is 15° - 24° C. They are typical pelagic species, and rarely descend deep even in the daytime.

Length composition: Before the war there were two modes in the size distribution 25 cm and 29 cm. But after the war these two modes disappeared and there is now a new single mode between 26 - 27 cm, mainly due to the increase in production of the younger groups (25 cm).

D. Fishing intensity

Fishing intensity: Their phototaxis is strong by positive. But in their spawning season their reaction is weakened to some extent.

Before the war, production by drift-net amounted to 10,000 - 20,000 tons, but after the war the use of stick-held-dip-

nets with fish lamps because of the strong phototaxis, has multiplied the production ten times. And it reached 250,000 tons in 1953.
(See Fig. III)

The Amount of catch per boat by drift nets for 1932 averaged 17.5 tons, while that by the newly employed stick-held-dip-nets for 1951 averaged 114.6 tons.

Effect: Despite of the increased exploitation by these dip-nets the present production can be maintained without fear of overfishing.

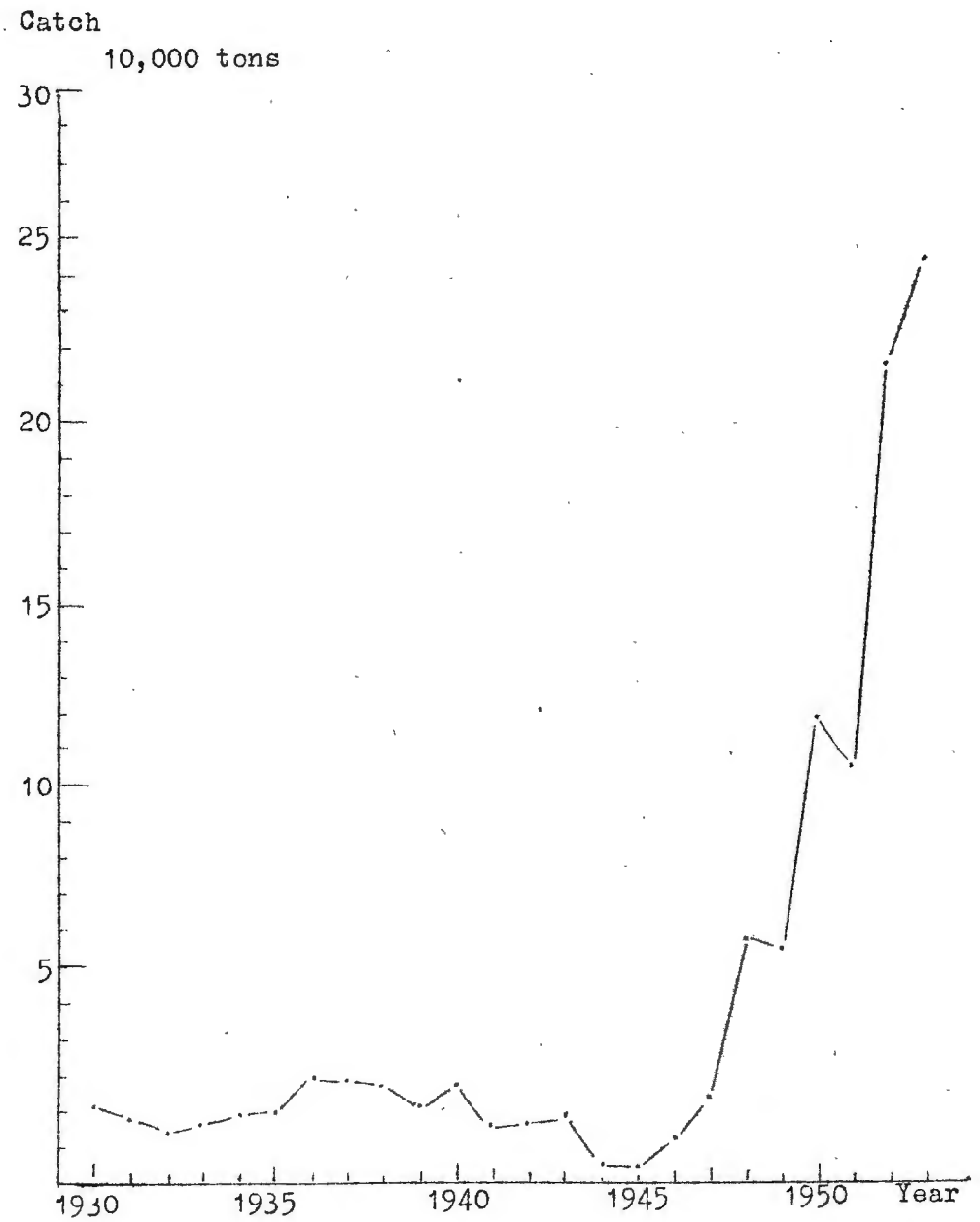
E. Feeding inter-relationship

Food: Adult fish predate crustacea as mainly diatoms.

Literature

Study of skipper (1952) Kasahara, Hiroshi and Otsuru, Norio

Fisheries Science Library No.3



Annual catch of skipper

Tunas in Japanese Waters

Cominant species among Tunas caught in the Japanese waters are the following two species:

(1) Germo germo Lacepede; Albacore

(2) Thunnus orientalis Temminck et schegel; Tuna or Bluefin Tuna.

Although there are some Tunas caught in the Japanese waters, they are small in production.

A. Conservation management units

Population:

Albacore and Bluefin Tuna in the Japanese waters are now considered to be a single population from the point of management unit.

B. Magnitude of management units

Geographical range: (1) Albacore - They are caught in almost all waters between the east coast of Japan and 180°E and also between 40°N, and 25°N.

(2) Tuna (Bluefin)- They are caught in all coastal waters of Japan and in the high sea surrounded by the lines of 150°E and 25°N the coastal line of the Islands of Japan.

C. Life history, ecology and behavior

Fishing season: (1) Albacore - In the waters near the Midway Islands, big Albacore are caught in November to March, and in the Japanese northern waters small Albacore are caught in July and August.

(2) Tuna - Off the Pacific coast of Japan, big Tuna are caught in winter in the waters south of the central part, and in summer in the waters north of the central part.

In the Japan Sea, Tuna of medium size are caught in spring and summer. Small Tuna are caught in all coastal waters all the year round.

Body weight: The body weight of commercial fish is as follows:

Albacore - Small type --- under 10 kg;
Big type ... 10 - 30 kg.

Tuna - Small type --- under 20 kg; medium type ... 20 - 100 kg; Big type ... over 100 kg.

Spawning: The number of intra-ovarian eggs of a fish is exeedingly large: Albacore, 300,000 eggs; Tuna, 1,000,000 eggs.

The spawning ground of Albacore is in the waters off the Midway Islands and that of the Tuna is located in the waters south of the subtropical front.

D. Fishing intensity

Catch:

	Average of 1921-1925	:	1953
Albacore	11,250 tons	:	52,500 tons
Tuna	22,500 tons	:	17,250 tons

Effect: No remarkable increase can be seen in the production of Tuna, but with improved technique and gear of long-line fishing, the catch of Albacore has greatly increased in recent years.

E. Feeding inter-reltationship

Food: Both Albacore and Tuna are animal feeders, eating many species of fish. In the stomachs of the adult, there can be found a considerable number of juveniles and young fish of different species.

Literature

Chart of Annual Fishing Conditions by Tuna Long-line Fishing (1954)

Nankai Regional Fisheries Research Laboratory

39

Bottom Fish exploited in the East China Sea and Yellow Sea

A. Conservation management units

Population: Fishery resources in the East China Sea and Yellow Sea consist of more than 250 economically important bottom fish. But as the unit of management, they are treated as a single unit.

B. Magnitude of management units

Geographical range: Bottom fish as a whole in these waters behave independently from those in adjacent waters, and hardly mix with other fish.

C. Life history, econology and behavior

Most of these species spawn in the coastal waters, and their larvae and juveniles grow there. Adult fish shows feeding migrations toward open sea, each species taking their own routes. Movements of bottom fish as a whole are very complicated, and they are caught all the year round in all fishing grounds.

D. Fishing intensity

Production: The production in 1940 was 200,000 tons, but it dropped to less than 20,000 tons in 1945. The present production has been restored to the level of prewar years.

Catches in 1953 by otter trawlers were 34,189 tons and two boat trawlers were 238,000 tons, totalling 272,000 tons.

The number of licensed boats and the catch per boat for 1953 were as follows:

Licensed boats	Number	Catch by boat
Otter trawlers	58	707.625 kg
Large trawlers	783	543.75 kg

(See Fig. IV and V)

Effect: Most of the fishing boats stay at ports in July and August. The Japanese fishing fleet operating in these waters has reached the level of prewar years, and with improved gear and facilities, the annual average catch per net has dropped from 851 kg in 1947 to 547 kg. However, in view of the increasing trend of the total production, it is thought that there is no fear of over-fishing in this area. But it is considered beneficial for the fishing resources not to increase further the number of boats in this area.

With regard to species of fish constituting the resources, biological investigations are now being carried on by experts.

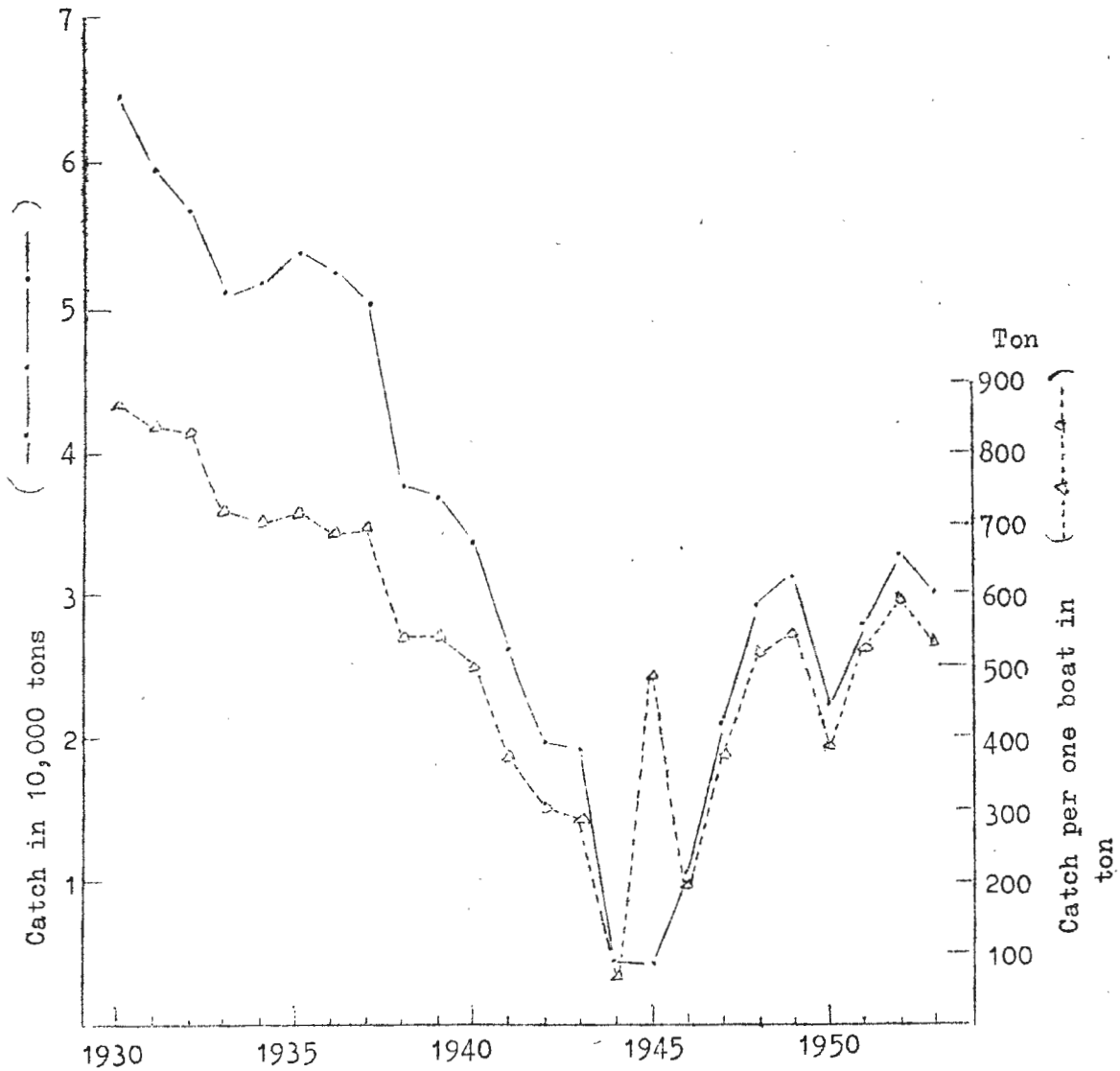
E. Feeding inter-relationship

Food: Most of bottom fish are either necton or benthos feeders and generally eat animal. Larvae and juveniles of any species are preyed on by adult fish of other species. Among the bottom fish, such a great struggle for existence occurs that the populations are strongly interdependent with each other.

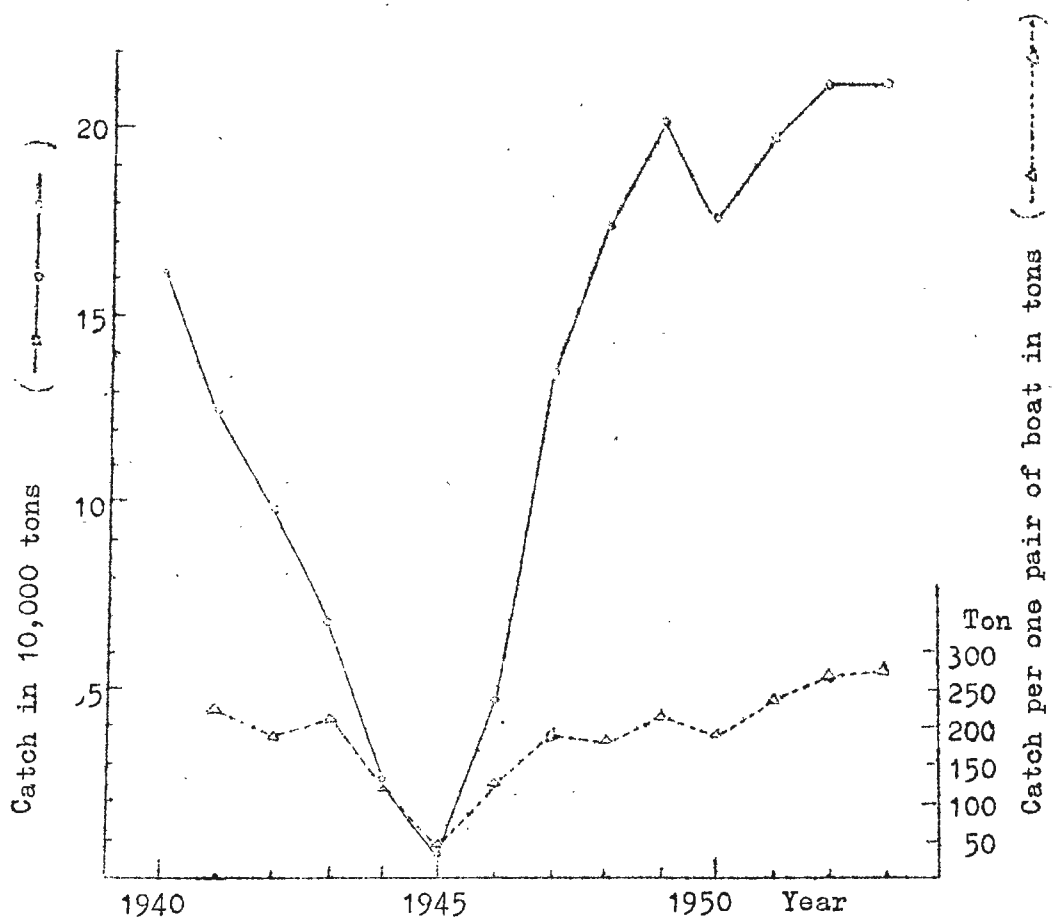
Literature

Study of Bottom Fish Resources in the East China Sea and Yellow Sea (1953)

Seikai Fisheries Research Laboratory



Annual catch of bottom fish in East China Sea and Yellow Sea by otter trawler



Annual catch of bottom fish in East China Sea and Yellow Sea by two boats type

Bottom Fish exploited in Japanese Coastal Waters

A. Conservation management units

There are very many species of fish in the Japanese coastal waters, and dominant species vary according to fishing grounds. But as the unit of management, they are treated as a single population.

B. Magnitude of management units

Geographical range: They are distributed in waters less than 200 meters in depth around Japan. In special regions, however, they may be fished in waters of 500 meters in depth.

C. Life history, ecology and behavior

They come generally near the shore in their spawning season and then leave there after spawning. They are resident inhabitants and show only small migration.

Most of them become mature in one or two years after birth, and spawn in spring or summer, 1 - 3 age fish are the important object of commercial fishery.

D. Fishing intensity

Production: Production for 1944 was 45,000 tons, which is the lowest recorded in twenty years. With a gradual development afterwards, it has now exceeded 500,000 tons. (See Fig. VI)

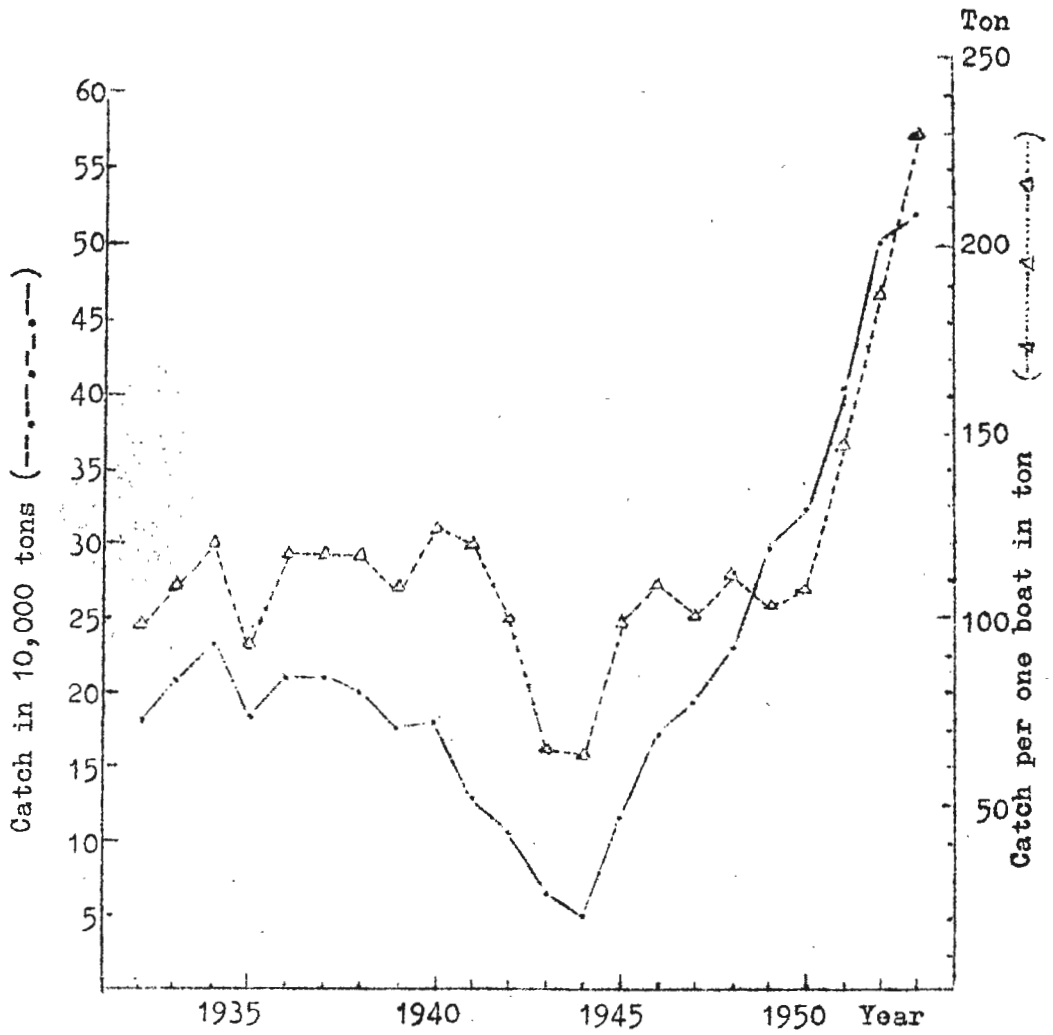
Fishing intensity: After the war, a gradually increasing trend can be seen in the total production and in the catch per boat. But due to conservation measures, the number of registered fishing boats in the Japanese waters, which was at 2,836 in 1951, has been reduced to 1,983 by the end of 1954.

Literature

Statistics on Fisheries Production by Trawlers in the Japanese Waters (1952)

MAF Research Statistics Division

Ommastrephes sloani pacifius Steenstrup; Flying Squid or Sagittated



Annual catch of bottom fish in Japanese waters

Ommastrephes sloani pacifius Steenstrup; Flying Squid or Sagittated calamary

A. Conservation management units

Population: They are caught in all coastal waters of Japan. As the unit of management, however, they are treated as one unit.

B. Magnitude of management units

The unit consists of both summer and winter spawning group. The magnitude of the summer group is only 10 - 20% of the winter groups.

C. Life history, ecology and behaviour

Spawning: The number of males and females in the spawning group is almost equal.

The number of eggs spawned by a fish is around 500,000.

Spawning season: Summer group - during June to August in the south and during July to September in the north. The water temperature is around 23°C.

Winter group - during January to March in the south of the Central Japan and the water temperature is over 10°C. They do not spawn in the north.

The body (mantle) length attains 7 cm in 2 months after birth; 15 cm in 6 months; 19 cm in 7 months; 20 cm in 8 months; 21 cm in 9 months; 22 cm in 10 months; 23 cm in 11 months and 25 cm in 12 months.

They become mature in a year, and die after spawning.

Migration: In the daytime they swim in a layer of about 100 meters deep and come up at night to a surface layer.

During autumn and winter they come southwards from Hokkaido down to Kyushu. In spring they move northwards from the south and reach Hokkaido in summer. Some groups reside anywhere and do not migrate.

It is known that the highest speed of their migration is 10 sea miles a day.

D. Fishing intensity

Production: The productivity of the population has increased in the recent years. Formerly, the average annual catch was 100,000 tons, but it has recently increased to 400,000 - 600,000 tons, which is only 5 - 15% of the total populations. (See Fig. VII)

E. Feeding inter-relationship

Food: They are animal feeders, and live chiefly on Sardine, small mackerel and pelagic crustacesus.

Literature

Research Report on Squid Population (1953)
Hokkaido Regional Fisheries Research Laboratory