(Report on results of the N/O Coriolis cruise for the evaluation of pelagic fish resources in Seychelles waters (September-November 1979).).

Marchal,-E.; Varlet,-F.; Stequert,-B.; Conand,-F.

B (Book) 1980. 20 pp

Echo survey were carried out in the Seychelles waters in order to evaluate the pelagic fish resources. The methods and procedures adopted for the survey are described. Results indicated that the Decapterus stocks are abundant. Albacore, Thunnus albacares and bonito, Euthynnus affinis were found to a certain extent throughout the Seychelles plateau, but they appeared more abundant in November than October. Stocks from the area of the Amirantes Islands were the richest in comparison with the rest of the Seychelles archipelago. Oceanographic data for the area surveyed is given in tables.

The feeding of the yellowfin tuna Thunnus albacares- (Bonnaterre) and bigeye tuna Thunnus obesus- (Lowe) in the equatorial zone of the Indian Ocean.

Kornilova,G.N.-(AzCherNIRO,-Kerch'-,-USSR)

J (Journal-Article) Vopr.-Ikhtiol., 1980 20(6), 897-905

Fish was found to account for the highest percent of the total weight of the food consumed by the tunas, with cephalopods and crustaceans consumed to a lesser degree. Different combinations of food organisms with 1 or 2 predominant components were observed in different areas. The food similarity of the 2 species decreased with depth.

Exploratory fishing for baitfish along the Indian Ocean coast.

Pimolchinda,J.; Singhagraiwan,T.-(Address-not-stated)

J (Journal-Article) Thai-Fish.-Gaz., 1980 33(2), 153-165

Exploratory fishing for baitfish species suitable for pole and line tuna fishing was carried out by RV Pramong 3-, along the Indian coast from Phuket to the Malaysian border. The predominant bait species taken by lift net were Stolephorus heterolobus- and silverside Allanetta forskali- which were mainly found at Koh Ka in Phang nga Bay. The availability and abundance of other species has not yet been determined. S. heterolobus- appears to be the more suitable baitfish species for pole and line tuna fishing.

(The isles of the Indian Ocean: Budget and perspectives of fisheries development.).

B (Book) PARIS-FRANCE-DPA 1980. 101 pp

DOSSIERS-D.P.A.-SER.-PRODUITS-PAYS.

The development of marine and continental fisheries of the Indian Ocean Islands is discussed, with respect to increasing the small fisheries production and to the development of the modern commercial fishery. Topics considered include: 1) fishery production (traditional and artisanal); 2) water potentials for prawn, lobsters, crabs and crayfish, demersal fish, pelagic fish (tuna) and molluscs; 3) rearing; and 4) marketing of products.

Tuna Statistics Indo-Pacific and Indian Ocean.

Skillman,-R.A.

B (Book); N (Num 1980. 91 pp

As part of a FAO/UNDP project, a consultant was engaged to assist the governments in the Indian and Pacific ocean area in the preparation for long-term management of tuna and tuna-like species. This report summarizes the progress made by the tuna management specialist on assembling tuna statistics for Indian Ocean and Indo-Pacific fisheries and includes a proposal for a computer and data management means of making these statistics available to the fisheries scientists associated with the IOFC and IPFC.

Feeding of yellowfin tuna, Thunnus albacares , bigeye tuna, Thunnus obesus , in the equatorial zone of the Indian Ocean.

Kornilova,-G.N.

J (Journal-Article) J.-ICHTHYOL. 1980. vol. 20, no. 6, pp. 111-119

A study was made of the feeding of yellowfin tuna, Thunnus albacares , and of bigeye tuna, T. obesus , caught during the summer in the equatorial zone of the Indian Ocean, from areas in which tunas had high indices of fullness. Fish is the greatest percentage by weight in the food of tunas; cephalopods and crustaceans account for smaller percentages. In some parts of the zone there are various combinations of forage organisms with 1-2 dominant organisms in the food of tunas. Competition for the same prey is reduced in the 2 tuna species by feeding at different depths.

A study on the relative growth of yellowfin tuna, Thunnus albacares , and bigeye tuna, Thunnus obesus , taken by Korean tuna longliners in the Indian Ocean.

Lee,-J.U.; Kim,-B.Y.; Yang,-W.S.

J (Journal-Article) BULL.-FISH.-RES.-DEV.-AGENCY,-BUSAN. 1980. no. 23, pp. 187-195

Some biological data such non-meristic characteristics as fish length, head length and body weight for the Indian yellowfin Thunnus albacares) 5,553 specimens and bigeye tuna (T. obesus) 8,917 specimens were collected from Korean tuna longliners operated in the fishing area, N 10 degree similar to S 15 degree in 1978, and the data were used to fit the relative growth's equation and also calculated the correlation coefficient(r). The results obtained are summarized.

Status report: Billfishes in the Indian Ocean.

Yoshida,-H.O.

B (Book) STATUS-REPORTS-ON-WORLD-TUNA-AND-BILLFISH-STOCKS.-PROCEEDINGS-OF-SECOND-TUNA-RESEARCH-WORKSHOP-HELD-AT-SAN-CLEMENTE,-CALIFORNIA-USA,-ON-DECEMBER-15-17,-1980. National-Marine-Fisheries-Serv.,-La-Jolla,-CA-USA.-Southwest-Fish.-Cent 1981. pp. 118-141

NOAA-TECH.-MEMO.

Billfishes are caught primarily as a by-catch on longline gear set to catch tunas in the Indian Ocean. Most of these billfishes appear to be sold in Japan where striped marlin brings the highest price, followed by swordfish, blue marlin, and black marlin. Tentative results from production model analyses indicate that no significant increase in total yield can be expected for blue and black marlin, whereas striped marlin yields could increase with increased effort. Swordfish and sailfish stock do not appear to be adversely affected by current levels of fishing efforts. Additional statistics must be collected from the fleets of participating nations to give a clearer picture of stock status in these waters.

Status report: North Pacific bluefin tuna.

Hanan,-D.A.

B (Book) STATUS-REPORTS-ON-WORLD-TUNA-AND-BILLFISH-STOCKS.-PROCEEDINGS-OF-SECOND-TUNA-RESEARCH-WORKSHOP-HELD-AT-SAN-CLEMENTE,-CALIFORNIA-USA,-ON-DECEMBER-15-17,-1980. National-Marine-Fisheries-Serv.,-La-Jolla,-CA-USA.-Southwest-Fisheries-Cent LA-JOLLA,-CA-USA-NOAA-NMFS 1981. pp. 246-255

NOAA-TECH.-MEMO.

Northern Pacific bluefin tuna are fished by surface gear including purse seine, trolling, bait, gill net, trap, and harpoon in the eastern and western Pacific. Bluefin are also caught by longline in the western Pacific and, to a lesser extent, in the central and eastern Pacific and the east Indian Ocean. The resource appears to be composed of a single stock; the western Pacific catch is composed of juveniles and mature adults while the eastern Pacific stock consists mainly of 1-, 2-, and 3-year old fish. Presence of a second stock off New Zealand is not confirmed by studies.

Mercury in fish of the Republic of Seychelles and hair and blood mercury levels of part of the population exposed to methyl mercury through fish consumption.

Matthews,-A.D.

B (Book) FISH.-BULL.-FISH.-DIV.-SEYCHELLES. 1981. no. 9, 62 pp

A total mercury survey of twelve important fish species has been completed - these are: Yellowfin tuna, Skipjack tuna, Dogtooth tuna, Bonito, Carangue balo, Becune, Sailfish, Kingfish, Bourgeois, Vara Vara, Vielle platte and Job. Methyl mercury contents were also analysed. The results obtained should be consulted whenever export of any of these species is considered since various countries have "Maximum permissable mercury values in fish for human consumption". A small survey of mercury in the hair of fishermen and mothers and their new born babies has also been carried out.

Purse seine trials off Mahe for small pelagic fish 1973.

Ratcliffe,-C.

B (Book) FISH.-BULL.-FISH.-DIV.-SEYCHELLES. 1981. no. 1, 9 pp

The introduction of purse seining for small pelagic fish species in Seychelles' waters in May 1973 by a French tuna clipper and subsequent day and night fishing trials by the Fisheries Division demonstrated the effectiveness of this method. The results of trials, conducted between June and December 1973, are reported here and descriptions are given of the equipment used and the operational techniques employed. The apparent reactions of the three main fish species -- maquereau doux (Rastrelliger kanagurta), maquereau gros yeux or teka (Selar crumenophthalmus) and sardine de france (Sardinella sirm)--caught at night to different intensity attraction lights are also considered.

Longlining in Seychelles exclusive economic zone 1980/1981.

Harris,-A.

B (Book) FISH.-BULL.-FISH.-DIV.-SEYCHELLES. 1981. no. 17, 21 pp

A total of 4,742 tons of tuna and related species were caught by licensed longline vessels in Seychelles Exclusive Economic Zone in a period of 8 months starting in November 1980 and terminating in June 1981. Altogether, a total of 93 licenses were issued for periods of 1 to 4 months representing a licensed tonnage of 82998.75 tons and deriving a revenue of SR4,149,937. The total value of the catch, calculated using prices at the time is estimated at around US $15.7 million. Fishing took place predominantly in the northern and eastern parts of the E.E.Z. with vessels obtaining a season mean catch rate of 1.13 tons per day. Highest monthly mean catch rates were obtained in November and in May whilst December, January, February and June produced the largest monthly catches.

Katsuobushi production in the Seychelles.

Matthews,-A.D.

B (Book) FISH.-BULL.-FISH.-DIV.-SEYCHELLES. 1981. no. 19, 12 pp

Technical help has been offered by the Japanese for the setting up of a Katsuobushi industry in the Seychelles. This industry would create considerable employment in the Seychelles and, because of the high added value, considerable financial benefit would accrue to the Seychelles. Bonito and skipjack are both under-utilized resources in Seychelles waters and could be exploited by either local or foreign boats to supply an indigenous Katsuobushi industry. Initial investment is likely to be in the region of R.2.5 million. This investment would provide for a plant processing 5 tons of raw material per day.

Status report: Tunas in the Indian Ocean.

Riggs,-F.V.

B (Book) STATUS-REPORTS-ON-WORLD-TUNA-AND-BILLFISH-STOCKS.-PROCEEDINGS-OF-SECOND-TUNA-RESEARCH-WORKSHOP-HELD-AT-SAN-CLEMENTE,-CALIFORNIA-USA,-ON-DECEMBER-15-17,-1980. National-Marine-Fisheries-Serv.,-La-Jolla,-CA-USA.-Southwest-Fish.-Cent 1981. pp. 99-117

NOAA-TECH.-MEMO.

The status of stocks of four species of tuna (albacore, bigeye, yellowfin, and skipjack) in the Indian Ocean were analysed. Since 1962 estimated annual catch of albacore in the Indian Ocean has fluctuated widely between 10,000 and 28,000 mt. This stock appears fully harvested and there appears to be no reason for concern over the future of the stock at this time. Estimated annual catch of bigeye tuna reached a high of 48,600 mt in 1978. A production model analysis did not produce a reliable prediction of MSY. The yield curve showed increasing catch with effort and did not reach an asymptote. This stock appears to be only light exploited. Yellowfin tuna are fished by surface and longline gears. Estimated annual catch fluctuated widely from 1952 to 1978 but exhibited a general upward trend. The estimated total catch for 1978 was 62,500 mt. It is unlikely that longline catch could be increased appreciably above the current level. However, it is generally felt that there is a potential for increased landings of yellowfin tuna by surface fisheries. The surface skipjack tuna fishery is relatively undeveloped. Estimated catch for 1978 was 32,600 mt. There have been no quantitative assessments of the Indian Ocean skipjack tuna stock.

Food Habits of Larvae of Tunas and Their Related Species in the Area Northwest of Australia.

Uotani,-I.; Matsuzaki,-K.; Makino,-Y.; Noka,-K.; Inamura,-O.; Horikawa,-M.

J (Journal-Article) BULL.-JAP.-SOC.-SCI.-FISH. 1981. vol. 47, no. 9, pp. 1165-1172

Gut contents of a total of 4159 larvae of albacore, yellowfin tuna, bigeye tuna, southern bluefin tuna, skipjack and frigate tuna collected in the area northwest of Australia from Oct. 1977 to Jan. 1978, and from Dec. 1978 to Mar. 1979, were examined. The results obtained are as follows. Gut contents of tunas and those of skipjack and frigate tuna are noticeably different in the composition of food elements: Four species of tunas feed generally on the Copepoda and other zooplanktons in nearly equal numbers or slightly more Copepoda, whereas skipjack and frigate tuna Appendicularia and Evadne . The food composition between the above two groups of larvae could be attributable to the difference in their feeding habit on prey organisms, not to the plankton composition in their habitats. Individual gut contents of four species of tunas are mainly small ones of 0.21-0.80 mm body length.

Experimental Tuna Rafts Feature in Record Catches.

J (Journal-Article) FINS. 1981. vol. 14, no. 3, pp. 3-6

This article briefly describes successful efforts, off the southern coast of Western Australia, to increase tuna catches by using tuna aggregating rafts. The design of the rafts is illustrated and their positions off the coast are given.

Genetic Diversity of Skipjack Tuna in the Atlantic, Indian and Pacific Oceans.

Fujino,-K.; Sasaki,-K.; Okumura,-S.

J (Journal-Article) BULL.-JAP.-SOC.-SCI.-FISH. 1981. vol. 47, no. 2, pp. 215-222

Comparison of genetic data of serum esterase and transferrin systems of the skipjack tuna, collected from the Atlantic, Indian, and Pacific Oceans, together with the results reported earlier, disclosed that fish from the Indian Ocean are distinguishable from those collected both in the Atlantic Ocean and the western Pacific Ocean and suggested that the skipjack tuna, now inhabiting in the worlds major oceans, first appeared in the Indian Ocean and then some of the members of the population emigrated to the other oceans, resulting in genetic diversification into the geographical populations, called the Atlantic Subpopulation, Indian Subpopulation, Western Pacific Subpopulation, and Central-eastern Pacific Subpopulation(s), after reproductive isolation. Regarding the east-west difference of genetic compositions within the Pacific Ocean, analyses of our data from than > 24,000 fish indicated the "step structure" with a gap between 160 degree E and 175 degree E more distinctly in the southern hemisphere. Apparent differences in allele frequencies of genetic systems, found recently in 6-phosphogluconate dehydrogenase and phosphoglucose isomerase, between the waters of Japan and Papua New Guinea suggested the necessity of further accumulation of the data before any conclusive statement on population structure in the regions.

Dispersal of Tropical Marine Fauna to the Great Australian Bight by the Leeuwin Current.

Maxwell,-J.H.; Cresswell,-G.R.

J (Journal-Article) AUST.-J.-MAR.-FRESHWAT.-RES. 1981. vol. 32, no. 4, pp. 493-500

A tropical element in the demersal and pelagic fauna of the Great Australian Bight has been observed. The fauna includes benthic invertebrates, such as the basket star, Euryale aspera , and the holothurians Pentacta anceps and Pentacta quadrangularis , and tropical pelagic tuna, such as the oriental bonito, Sarda orientalis . It is suggested that the Leeuwin Current, which flows southward to Cape Leeuwin and then eastward, is responsible for the existence of tropical fauna in the Bight. The low salinity waters of the Leeuwin Current were observed for the first time to round Cape Leeuwin.

(Gear Research Trials for the Longline Fishery).

Dahm,-E.

J (Journal-Article) INF.-FISCHWIRTSCH. 1981. vol. 28, no. 4, pp. 142-149

Trials were carried out by 2 German cutters for the Seychelles tuna long line fishery to ascertain optimum catch success. Each boat had 12 lines and fished for either bonito (Euthynnus affinis) or yellowfin (Thunnus albacares). Bonito were caught mainly by those lines close to the boat and yellowfin by those furthest away. Steel lines are thought more durable than rope. Initial trials suggest that white bait may not be as successful as previously thought.

(Experimental Fishery at the Seychelles With Two German Trawlers.).

Steinberg,-R.

J (Journal-Article) INF.-FISCHWIRTSCH. 1981. vol. 28, no. 3, pp. 11-113

Fishery investigations and stock assessment were carried out with two German charter-trawlers at the Seychelles. Different catching methods were tested, first of all in view of tuna populations. The following catching methods (trolled pole- and line-gear and a 30 km longline) were tested. With the trolled gear first yellowfin tuna (Thunnus albacares) and bonitos (Euthynnus affinis) were caught.

Marine casualties: Southeast Atlantic and Southwest Indian Ocean 1965 -- 1981.

J (Journal-Article) S.-AFR.-SHIPP.-NEWS-FISH.-IND.-REV. 1981. vol. 36, no. 12, pp. 17-50

The 491 Marine casualties listed and plotted on the accompanying chart are the major incidents in Southern African waters since 1965. Of the total, 359 were merchant ships, 80 South African fishing craft and 52 were foreign fishing boats, mostly Far Eastern tuna catchers. Of the 359 merchant ships listed, 83 sank or grounded, 109 had power failures of either main or auxiliary engines which immobilised the ship, the hulls or gear of 76 were damaged, 61 suffered fires or explosions and 30 were involved in collisions. Of the total, 171 were cargo ships, 128 were tankers, 36 were bulk carriers and 24 were tugs, supply craft and other vessels. Analysis by flag shows the native land of registration. Liberia had the highest number of ships registered with 62.

Some Oceanographic Measurements in the Great Australian Bight.

Provis,-D.G.; Lennon,-G.W.

B (Book); K (Conf FIFTH-AUSTRALIAN-CONFERENCE-ON-COASTAL-AND-OCEAN-ENGINEERING-1981:-OFFSHORE-STRUCTURES.-ABSTRACTS-IN-DEPTH. National-Committee-on-Coastal-and-Ocean-Engineering-Australia 1981. pp. 119-120

The Great Australian Bight is a large area the oceanography of which is virtually unknown. The historical information available for this region is made up almost entirely of C.S.I.R.O. cruise data, consisting of water temperature and salinity at specific depths. Most of these data were collected in the summer months in the tuna fishing grounds south and west of Port Lincoln. This study is the first exercise to yield continuous time series of data from moored instruments Records of the currents, water temperature, salinity and sea level have been obtained from instruments moored on the continental shelf and near the shelf edge.

Fishing efficiency of deep longline for bigeye tuna in the Atlantic as inferred from the operations in the Pacific and Indian oceans.

Suzuki,-Z.; Kume,-S.

J (Journal-Article); COLLECT.-VOL.-SCI.-PAP.-ICCAT-RECL.-DOC.-SCI.-CICTA-COLECC.-DOC.-CIENT.-CICAA. 1982. vol. 17, no. 2, pp. 471-486

Through deep longline operations deployed by Japanese boats, starting from 1975 in the western equatorial Pacific, a working hypothesis on vertical distribution of bigeye tuna (Thunnus obesus) has become proven: habitat of bigeye tuna is highly associated with thermocline in the tropical areas. In addition, results of several epxerimental research cruises support these conclusions. In the Atlantic, use of the deep longline is still limited. On the basis of pertinent information obtained in the Pacific and Indian Oceans, where the deep longlining is now widely applied, an inference was made speculating possible development of the deep longline method and its expected outcome in the Atlantic.

Spanish pole and line tuna venture in Seychelles.

Nageon-de-Lestang,-J.

J (Journal-Article) SWIO-FISH.-BULL.-BULL.-PECHES-OISO. 1982. no. 1, 3 pp

As a result of an agreement between the Seychelles and Spanish governments, 2 Spanish pole and line vessels west to the Seychelles for a 9-month prospection campaign to assess the tuna resources in the Seychelles EEZ, and also to demonstrate the potential of the pole and line fishing technique. A total of 610 tons of tuna were landed, i.e., Thunnus albacares and Katsuwonus pelamis . The problem of using live bait is considered briefly.

Report of the SWIOP Workshop on Monitoring, Control and Surveillance, Mahe, Seychelles (20-25 September 1982).

B (Book); K (Conf VICTORIA-SEYCHELLES-SWIOP 1982. 18 pp

Major objectives of the Workshop were to satisfy domestic consumption, create employment and derive revenue from licensing or joint ventures in the southwest Indian Ocean region. Tuna fisheries, fish aggregating devices, access to tuna resources, EEZ legislation, licensing practices and regional coordination are examined and control surveillance considered with respect to the Seychelles experience.

The purse seine fishery of Mangalore (Karnataka).

Dhulkhead,-M.H.; Muthiah,-C.; Rao,-G.S.; Radhakrishnan,-N.S.

J (Journal-Article) MAR.-FISH.-INF.-SERV.-TECH.-EXT.-SER. 1982. no. 37, pp. 1-7

An appraisal of the purse seine fishery at Mangalore is made based on fish landing data for 1979-81. Fishing operations and the various fishery resources (oil sardine, mackerel, catfishes, anchovies, tuna, carangids, silver bellies, other clupeoids, prawns and pomfrets) are discussed together with the economics and crew earnings.

Age and growth of the bigeyed tuna, Thunnus obesus (Scombridae) in the Indian Ocean.

Tankevich,-P.B.

J (Journal-Article) J.-ICHTHYOL. 1982. vol. 22, no. 4, pp. 26-31

Features of age and growth of bigeyed tuna, T. obesus , was determined from 3 regions of the Indian Ocean. Length-weight relationships and correlation between body length and vertebral radius were determined. Bertalanffy's equations were used to describe length and weight increase. The growth of females and males is essentially similar to the 3rd - 4th year and subsequently females grow more slowly until sexual maturity is reached.

Some considerations on the vertical distribution particularly of the striped marlin in the Indian Ocean and on the fishing characteristics of the tuna longline gear.

Hanamoto,-E.; Shibata,-T.; Okui,-H.

J (Journal-Article) BULL.-KANAGAWA-PREFECT.-FISH.-EXP.-STN. 1982. no. 4, pp. 17-21

The training ship Tosakaien Maru (467 gross tons) fished a series of 35 tuna longline stations in the Indian Ocean in waters south of Sri Lanka in September-October 1981. Data were collected on the catches of tunas, billfishes, and sharks on the various hooks of the gear and the data were analyzed to study the vertical distribution of the various species. The highest proportion of striped marlin (Tetrapterus audax) catches (46.2%) were made on the shallowest hooks, Nos. 1 and 7, and averaged 23.1 percent on the two hooks. The catches of bigeye tuna were greatest on the deepest hook. The results for the yellowfin tuna were intermediate between the striped marlin and the bigeye tuna. The striped marlin were caught in largest proportion at the calculated depth of approximately equals 100 meters. Nearly half (47.6%) of the striped marlin were landed alive.

(The O.R.S.T.O.M. and the development of the surface tuna fishery in the western Tropical Indian Ocean.).

Marsac,-F.; Stequert,-B.

J (Journal-Article) PECHE-MARIT. 1982. vol. 61, no. 1257, pp. 689-694

Actual fishing experiments are conducted in the area of the Seychelles. They are aimed at the development of the tuna fishery in the economical zone and in the adjacent waters. Three principal actions are developed: a programme of aerial infrared radiometry; a prospect of the western Tropical Indian Ocean by an oceanic purse-seiner; and a program of estimating the resources of living bait in the area of the Seychelles.

Summary of project activities (GCP/RAS/089/NOR) "Establishment of a biological data collection system for tuna and related species in Mindanao (Philippines) and eastern Indonesia area.

B (Book); K (Conf REPORT-OF-THE-CONSULTATION-MEETING-OF-THE-JOINT-INDONESIAN-PHILIPPINE-TUNA-WORKING-GROUP,-MANILA,-PHILIPPINES,-21-23-OCTOBER-1981. FAO-UNDP-South-China-Sea-Fish.-Dev.-Coord.-Programme,-Manila-Philippines 1982. pp. 39-53

The project started operations in November 1979 with the purpose of establishinng an operational infrastructure for tuna sampling in Mindanao and East Indonesia and obtaining biological data on species composition, length/weight, maturity and seasonality of tunas and related species in landings. Project activities and results are outlined. Some general recommendations are made regarding future development of the project: 1) sampling in Indonesia should be expanded to include the Indian Ocean areas, and to include species, abundance and seasonality of baitfish and also small pelagics; 2) sampling in the Philippines should be expanded to include localities in the Sulu Sea and Navotas.

Resources of tunas and related species and their fisheries in the Indian Ocean.

Silas,-E.G.; Pillai,-P.P.

B (Book); Z (Biblio CMFRI-BULL. COCHIN-INDIA-CMFRI 1982. no. 32, 174 pp

This publication presents detailed information about Indian Ocean tunas and tuna-like fish, their ecology and fisheries including present levels of exploitation.

Growth and age of the bigeye tuna Thunnus obesus (Lowe) (Scombridae) in the Indian Ocean.

Tankevich,-P.B.

J (Journal-Article) VOPR.-IKHTIOL. 1982. vol. 22, no. 4, pp. 562-567

The highest increments of 59 cm are observed in T. obesus in the first year of life. In subsequent years the growth slows down and the annual increment in the 5th-6th year is 14.1-15.5 cm. The linear and weight growth is the same in males and females until they reach the age of 3-4 years when the growth rate in females slows down. The fish from the northeastern Indian Ocean are characterized by a higher growth rate as compared to those from the southeastern and southwestern areas. In long-line catches the bigeye tuna is represented by 42 to 200 cm long fish, weighing 1.3 to 124 kg and aged 1 to 8 years.

Improving the acceptability of canned mackerel tuna (Euthynnus affinis).

Balachandran,-K.K.; Vijayan,-P.K.; Joseph,-J.

J (Journal-Article) FISH.-TECHNOL.-SOC.-TECHNOL.,-COCHIN. 1982. vol. 19, no. 1, pp. 59-60

Methods for improving the colour and flavour of canned mackerel tuna, Euthynnus affinis, and modifications in the canning process are reported.

Planning the fisheries development in Zanzibar. Tanzania. Project findings and recommendations.

B (Book) ROME-ITALY-FAO 1982. 33 pp

The main aims of the project were to help the government to obtain the highest possible marine fisheries production commensurate with the maintenance of resource abundance and also to increase income and employment for the large part of the Zanzibar population dependent on artisanal fisheries. The main species involved in the fisheries are tuna, Sardinella and Indian mackerel (Rastrelliger kanagurta). The conclusions and recommendations of the project are reported.

Distribution of tuna larvae between Madagascar and the Equator, Indian Ocean.

Conand,-F.; Richards,-W.J.

J (Journal-Article) BIOL.-OCEANOGR. 1982. vol. 1, no. 4, pp. 321-336

A total of 433 plankton tows, made in the Indian Ocean between the equator and Madagascar, were examined for the presence of scombrid larvae. In order of abundance, those found were: Katsuwonus pelamis (73%), Thunnus albacares (15%), Auxis sp. (7%), Euthynnus affinis (2%), Acanthocybium solandri (0.6%), Thunnus obesus (0.3%), and Thunnus alalunga (0.3%). The distribution and abundance of larvae were examined in terms of temperature and salinity data collected concurrently. Ranges of both parameters were well within normal limits of larval occurrence. Larvae of K. pelamis and T. albacares were most abundant during the summer season. K. pelamis were scarce at temperatures lower than 24 degree C, but salinity conditions showed no effect. For T. albacares temperatures below 27 degree C correlated with low abundance, and high temperatures and salinities correlated with high abundance.

ORSTOM in Seychelles.

Marsac,-F.; Stequert,-B.

J (Journal-Article) SWIO-FISH.-BULL.-BULL.-PECHES-OISO. 1982. no. 1, 5 pp

At the present time, research in progress at the Seychelles section of ORSTOM is directed towards development of surface tuna fisheries in the EEZ and adjacent waters, concerning: 1) an aerial infrared radiometry programme to localize areas of high probability of fish; 2) a fish aggregating device programme and test fishing of the West Indian Ocean to estimate feasibility of a commercial fishery; and 3) a livebait resource survey around the principal islands of the Seychelles plateau.

State of the fisheries of Western Australia, 1980.

J (Journal-Article) FINS. 1982. vol. 15, no. 1, pp. 8-11

Production figures for the years 1978/1979 and 1979/1980 for Western Australia are given. Details of the state of the following individual fisheries are also included: rock lobsters (Panulirus); salmon (Salmonidae); prawns (Penaeidae); Shark Bay scale fishery; Cockburn Sound; Estuarine fisheries and Tuna (Scombridae).

Preliminary cruise report Dr. Fridtjof Nansen . Survey of the abundance and distribution of the fish resources off Kenya.

B (Book); N (Num BERGEN-NORWAY-INST.-MAR.-RES. 1982. 16 pp

In December 1980 a combined acoustic and trawl survey was carried out with the vessel in a joint programme with Kenyan authorities, FAO (Rome), and NORAD. The present report is a preliminary cruise report of survey in 1982 in the period 12-24 August. The main objectives were: acoustic survey of the small pelagic fish resources off Kenya, and of the demersal fish resources in the 20-200 m bottom zone with intensive trawl sampling; trawl survey of the demersal fish resources in the 200-500 m bottom zone; charting of the main hydrological regime off Kenya; and acoustic survey of the mesopelagic resources off 500 m bottom depth and offshore surveillance of schooling tuna.

Maldives. Utilization of anchored surface floating rafts. A report prepared for the projects TCP/MDV/001 and TCP/MDV/0105.

Peters,-C.

R (Report) 1982. 28 pp

The project was divided into 2 phases; the first included the design, construction and use of 6 fish aggregation devices and the second required the evaluation of their fish aggregation abilities, technical performance and economic feasibility for use in the tuna fisheries of the Maldives. The results and recommendations of the project are included in the report.

(Evolution of tuna catches by the Asiatic longliners in the French "Exclusive Economic Zone" in the southwest part of the Indian Ocean from 1969 to 1979.).

Kopp,-J.

J (Journal-Article) SCI.-PECHE. 1982. no. 321, pp. 13-25

This paper constitutes an introduction to a detailed study, the purpose of which is to demonstrate the importance of tuna fishing in the French "exclusive economic zone" in the Indian Ocean. Overfishing and biological characteristics of the catch are discussed.

(Tuna fishing with pole and line.).

Fischer,-W.

J (Journal-Article) INF.-FISCHWIRTSCH. 1982. vol. 29, no. 2, pp. 83-86

Within the scope of an agreement concluded between the Federal Republic of Germany and the Republic of the Seychelles, a fisheries project in the area of the Seychelles with two chartered German cutters was carried out. The Institute for Fishing Technology attended to the performance of this project. Some vessels used for tuna fishing with pole and line, catch of living bait, detection and catch of tuna and processing of the catch are described.

The status of tuna fishery in Agatti Island in Lakshadweep.

Varghese,-G.; Shanmugham,-P.

J (Journal-Article) J.-MAR.-BIOL.-ASSOC.-INDIA. 1983. vol. 25, no. 1-2, pp. 190-201

Lakshadweep is the only place in India where an organised tuna fishery exists. Skipjack tuna (Katsuwonus pelamis) forms the major fishery resource of the waters surrounding these islands. The annual production of 4000 tonnes of tuna from Lakshadweep makes up approximately equals 20% of the total tuna landings in India. Pole-and-line is the principal gear employed in fishing. The crafts used are 7.62-meters-long mechanised boats. Out of the 4 pole-and-line tuna fishing centers in Lakshadweep, approximately equals 46% of the total tuna caught is from Agatti Island. Different aspects governing this fishery in Agatti Island are discussed. The seasonal abundance, catch per unit effort, species composition, gonad condition and feeding habits are presented.

Tuna fisheries of the Indian Ocean and development prospects in the Indian EEZ.

Dwivedi,-S.N.; Devaraj,-M.

B (Book); K (Conf TUNA-UPDATE-83,-14-15-APRIL-1983,-BOMBAY.-PROCEEDINGS. Trivedi,-K.K.-ed. Association-of-Indian-Fishery-Industries,-New-Delhi-India 1983. pp. 6-12

The status of tuna stocks and development of the tuna fisheries in the Indian Ocean and Indian EEZ are discussed. Problems relating to management of the fisheries are also considered. (Publ. in coop. with: Ministry of Agriculture, New Delhi (India); Marine Products Export Development Auth., Cochin (India))

Recent results of tuna lining in the Indian seas.

Swaminath,-M.; Nair,-M.K.R.

J (Journal-Article) J.-MAR.-BIOL.-ASSOC.-INDIA. 1983. vol. 25, no. 1-2, pp. 113-117

This paper reviews the development and growth of tuna longlining in India from early 1960s, the assistance received from FAO through the Japanese expert, and the training provided by CIFNET to the personnel required for larger and sophisticated fishing vessels for oceanic fishing. The recent trend of tuna and related fishery in the high seas is discussed.

(Experimental seining survey on the tuna purse seiner Yves de Kerguelen in the west of the tropical Indian Ocean.).

Marsac,-F.; Piton,-B.; Potier,-M.; Stequert,-B.

B (Book) RAPP.-SCI.-MISSION-ORSTOM-SEYCHELLES. VICTORIA-MAHE-SEYCHELLES-ORSTOM 1983. no. 3, 112 pp

After a brief description of the purse seiner Yves de Kerguelen and the work conducted on board, the authors present the general meteorological and oceanographic conditions in the prospected area. The survey being splitted in space and time stratas, the study of several hydrological factors in differents areas over 2 different periods allowed the oceanographic context during the course of the survey to be more accurate. Once the zones of abundance has been indicated and presented, tentative correlation between the presence of tuna to several environmental factors are suggested.

(The live bait in the Seychelles Islands: A synthesis.).

Marsac,-F.; Poupon,-J.C.; Potier,-M.; Stequert,-B.

B (Book) RAPP.-SCI.-MISSION-ORSTOM-SEYCHELLES. VICTORIA-MAHE-SEYCHELLES-ORSTOM 1983. no. 1, 68 pp

The principal baitfishes of the continental shelf of the Seychelles are reviewed; their biology, reproduction and growth are considered. The survival of baitfishes may be determinant for their choice. The construction of large cages intended for keeping baitfishes alive, and anchored in different beaches of the principal island, is suggested. However, the fishing stock around the Seychelles is of minor importance, and could not support the fishing effort of more than five well-equipped boats.

(Aerial radiometry and tuna resources in Seychelles Islands.).

Marsac,-F.

B (Book) RAPP.-SCI.-MISSION-ORSTOM-SEYCHELLES. VICTORIA-MAHE-SEYCHELLES-ORSTOM 1983. no. 2, 104 pp

In november 1981, a reserach program for evaluation of tuna resources using aerial surveys and infra-red radiometry began in the Seychelles Islands. The 250 flight hours had been carried out during 2 distinct climatic periods: The north-west monsoon (November to March) and the decreasing south-east monsoon (October). During the hot season, the sea surface temperature fluctuated from 27 degree to 31 degree C, without any sharp and lasting gradients: a significant surface tunas abundance had been observed in the range 29-30 degree C. The use of a sampling analysis method allowed the assessment of an average tuna catchable potential in the sampled areas. The dominating productivity of the part of equatorial counter-current, East of Seychelles Islands, and the one of the divergence zone, of minor importance, at the North boundary of the South equatorial current could be outlined. In october, the tunas were concentrated on the Mahe bank and at its limits.

Muscle color deterioration in iced and frozen stored bonito, yellowfin and skipjack tuna caught in Seychelles waters.

Matthews,-A.D.

J (Journal-Article) J.-FOOD-TECHNOL. 1983. vol. 18, no. 3, pp. 387-392

The color deterioration of muscle in iced and frozen stored bonito, yellowfin and skipjack tuna caught in Seychelles waters has been determined. Storage life on ice before noticeable browning occurred was 12-14 days for yellowfin tuna and 7 days for bonito and skipjack tuna. At cold storage temperatures above -30 degree C color deterioration was very rapid. A new procedure has been devised for preparing the water extract necessary for the analysis of the ratio of met- to oxy- and deoxyhaemoglobin.

Consideration on developing India's tuna fisheries.

Hooker,-P.J.

B (Book); K (Conf TUNA-UPDATE-83,-14-15-APRIL-1983,-BOMBAY.-PROCEEDINGS. Trivedi,-K.K.-ed. Association-of-Indian-Fishery-Industries,-New-Delhi-India 1983. pp. 25-45

Based on the data available, India very likely has adequate tuna resources available, especially on the West coast, to develop a tuna fishery on the offshore resources for the international market. Tuna resources for developing the fishery for coastal tunas apparently exist although the problems of development are likely more complex than for the offshore fishery and are not necessarily resource-based. Data currently available on resource availability and areas for potentially successful development could be supplemented by actual fishing data obtained as the development process is implemented. Perhaps as important as knowledge about the resource base is the need to identify the development objectives as clearly as possible beyond this step the course of development will be set by considering the constraints of fleet utilization, costs of infrastructure development, marketing arrangements and methods chosen for obtaining capital, skills and technology. (Publ. in coop. with: Ministry of Agriculture, New Delhi (India); Marine Products Export Development Auth., Cochin (India))

Development of tuna fisheries - is resource availability the constraint?.

Silas,-E.G.

B (Book); K (Conf TUNA-UPDATE-83,-14-15-APRIL-1983,-BOMBAY.-PROCEEDINGS. Trivedi,-K.K.-ed. Association-of-Indian-Fishery-Industries,-New-Delhi-India 1983. pp. 14-23

A review is presented on tuna resource availability. Data regarding potential exploitable yield, commercial production and estimated maximum sustainable yield are included. Options for the development of tuna fisheries in the Indian Ocean are discussed. (Publ. in coop. with: Ministry of Agriculture, New Delhi (India); Marine Products Export Development Auth., Cochin (India))

Tuna resources and the productivity of fishing grounds.

Ueyanagi,-S.; Honma,-M.

J (Journal-Article); BULL.-JAP.-SOC.-FISH.-OCEANOGR.-SUISAN-KAIYO-KENKYUKAIHO. 1983. no. 42, pp. 33-36

Productivity in terms of catch/effort relationship for areas of the tuna longline fisheries was studied. Data from the "Annual report of effort and catch statistics by area on Japanese tuna longline fisheries" from 1952 to 1979 were computer-processed to find the relationship between fishing effort and catch and the sustainable catch curves were estimated for each of the major fishing grounds including the western, central, and eastern tropical Pacific Ocean and the south-western Indian Ocean. The present levels of fishing effort were estimated to be at or near the levels of the maximum sustainable yields (MSY) for all these areas. The curves obtained indicated that a reduction in effort from the present levels would result in an improved productivity in terms of CPUE, that is, a 20-30% reduction in effort would increase CPUE by 1.2-1.3 times, with only a slight decrease in total catch.

Fisheries in the southwest Indian Ocean.

Ardill,-J.D.

J (Journal-Article) AMBIO. 1983. vol. 12, no. 6, pp. 341-344

Marine fishery resources of the Southwest Indian Ocean are generally limited by low primary productivity and narrow coastal shelf areas. Traditional fisheries account for 90% of landings but suffer from lack of fishing gear and distribution channels. Industrial fisheries for crustaceans and for tuna are largely controlled from foreign countries and are overcapitalized. Marine environments are little spoiled except in densely populated areas and near rivers carrying pollutants and sediments.

Reconsideration of single cohort analysis.

Wang,-C.-H.

J (Journal-Article) ACTA-OCEANOGR.-TAIWAN. 1983. no. 14, pp. 146-156

In fishery biology, if the fishing mortality rate of the oldest age of the year class for which a reliable catch composition in age is available, the SCA-method (Single Cohort Analysis or Single Virtual Population Analysis) is always used to estimate the population size and the fishing mortality rate by age. Age composition data of Indian Ocean yellowfin tuna (Thunnus albacares) from 1952 to 1977 are used as an example to show that the relative recruitment are varied from small to large with the assumed values of the fishing mortality rate of age four, F sub(4), increasing gradually from 0.2 to 1.6. If F sub(4) values are multiplied by the relative effective fishing efforts, the annual variation of the relative recruitment depends on the given F sub(4) values: it shows a smooth decay curve for lower levels, and fluctuates greatly for higher levels of F sub(4).

French tuna purse seining in the South West Indian Ocean.

J (Journal-Article) SWIO-FISH.-BULL.-BULL.-PECHES-OISO. 1983. no. 4, pp. 4-6

A brief account of the performance of four tuna purse seiners based in the Seychelles and fishing in the southwest Indian Ocean is presented. For the 1982-83 season a total of 7649 t of tuna were caught (70% skipjack, 30% yellowfin) in 553 days of actual fishing. Over 80% of the fish were caught around drifting objects. The main fishing grounds were located between 58 degree E and 66 degree E and 3 degree S and 6 degree S.

Management of the southern bluefin tuna fishery.

J (Journal-Article) FINS. 1983. vol. 16, no. 2, pp. 7-9

Some of the major elements significant in the formulation of a tuna (Thunnus thynnus), management program in Western Australia are outlined under the following headings: 1) State authorizations, 2) state of the tuna stocks; 3) size of fish to be caught; 4) a quota system; 5) purse seiners; 6) log books; and 7) offshore constitutional settlement.

Tumour-like growths from southern Australian marine fish.

Lester,-R.J.G.; Kelly,-W.R.

J (Journal-Article) TASM.-FISH.-RES. 1983. no. 25, pp. 27-32

Three neoplasms and one growth of uncertain status from Australian marine fish are described. Osteomas were found on the pterygiophores of six Caranx georgianus and on the haemal spines of three. Two lipomas were identified, one from the body cavity of Aldrichetta forsteri , and one from the musculature of Thunnus maccoyii . A mass on the caudal peduncle of Bigener brownii was believed to be the result of chronic inflammation rather than the development of neoplastic tissue.

(Development of marine fisheries. Madagascar. Conclusions and recommendations of the project.).

B (Book) ROME-ITALY-FAO-UNDP 1983. 60 pp

The major objectives of the project were to develop the marine fisheries of Madagascar-both artisanal and industrial, increasing the exploitation of the marine resources and improving the nutritional status of the fishing population and further developing the exportation of fishery products. Results and recommendations of the project regarding the artisanal and industrial (shrimp, tuna and small pelagic species) fisheries are included.

Somalia. Prospecting surveys and demonstration fishing. A report prepared for the Fisheries Development and Training Project (Phase 2).

Kerr,-J.K.

R (Report) ROME-ITALY-FAO 1983. 13 pp

The main purpose of the project is to increase fish production, expand domestic and export markets and bring into effective operation fisheries development in Somalia. The results of Barrier corral trap trials, artisanal shrimp fishing trials, and tuna driftnet trials are presented. Recommendations are given regarding the gear and boats used in the trials.

(On mercury and selenium in tuna fish tissues 8. The levels of mercury and selenium in albacore from the Indian Ocean.).

Kai,-N.; Ueda,-T.; Takeda,-M.; Kataoka,-A.

J (Journal-Article) J.-SHIMONOSEKI-UNIV.-FISH.-SUISAN-DAIGAKKO-KENKYU-HOKOKU. 1983. vol. 31, no. 3, pp. 69-73

The levels of mercury and selenium in the ordinary muscles and the kidneys of 14 specimens of albacore, Thunnus alalunga , from the Indian Ocean are presented. The correlations between the levels of methyl mercury (MeHg) and total mercury (T-Hg) were significant in both tissues. The ratio of MeHg and T-Hg, i.e., MeHg/T-Hg, was about 0.90 in ordinary muscle and only about 0.20 in kidney. T-Hg and MeHg in ordinary muscle also correlated significantly with T-Hg and MeHg in kidney, respectively. As the result, the first-order regression coefficient in case of T-Hg was about 2 and that in case of MeHg was about 1/2. On the other hand, the inverse correlations between T-Hg and the molar ratio of selenium level (Se) and T-Hg i.e., Se/Hg, were observed in both tissues. In ordinary muscle, the value of Se/Hg tended near 1 with the increase in T-Hg, but the tendency was not observed in kidney.

A study on the population analysis of yellowfin tuna, Thunnus albacares , Bonnaterre and bigeye tuna, Thunnus obesus , Lowe, exploited by longline fishery for 1971-1979.

Lee,-J.U.; Yang,-W.S.

J (Journal-Article); BULL.-FISH.-RES.-DEV.-AGENCY,-BUSAN. 1983. no. 31, pp. 21-32

Some population analyses on yellowfin (T. albacares) and bigeye tuna (T. obesus) based on the data from Korean, Japanese and Taiwanese tuna longline fisheries in the Indian Ocean during the 1971-1979 periods were carried out to support the information available for rational utilization of these resources and for fishery management. The most abundant fishing ground of yellowfin was an area between the north of Malagasy and the east coast of Africa, and that of bigeye was an area from the equator to 10 degree N in the western Indian Ocean. In the area index (5 degree X5 degree) by country, Japan showed the highest index with the decreasing trend year by year and Taiwan kept a constant level showing the reciprocal tendency by year. On the contrary Korea's value indicated the increase trend at the lowest level among them CPUE data revealed Korea had high value levels compared to the values of Japan and Taiwan having showed almostly constant trends. Density index of yellowfin by latitude in the Indian Ocean appeared to be abundant in the areas between the equator and 10 degree S, bigeye in the areas from 10 degree N to 10 degree S all together with three countries.

(Results of the tuna research program carried out by Spanish bait tuna vessels in Seychelles waters (July 1981 - March 1982).).

Cort,-J.L.

B (Book) INF.-TEC.-INST.-ESP.-OCEANOGR. 1983. no. 4, 60 pp

The results of the Spanish research tuna program carried out by two bait boat tuna vessels in Seychelles waters, showed that there is a large resource of yellowfish (Thunnus albacares) and skipjack (Katsuwonus pelamis) in area. Though these resources are available throughout the year, the yield is highest in autumn. Very large tuna schools are concentrated on the edge of the Mahe platform and the banks of Seychelles waters (Fortuna, Lady Denison, St. Francois, Le Constant). Size of yellowfin caught ranged between 3 and 30 kg, and skipjack size varied from 2.5 to 4.5 kg. Studies showed that yellowfin schools are generally composed of groups of the same age. The mean growth of the one-year class is 3.7 cm and studies of the cross-section of dorsal fin rays showed many rings that were not related to the age of the fish.

Tuna fisheries in the South West Indian Ocean.

Ardill,-J.D.

B (Book); K (Conf THE-PROCEEDINGS-OF-THE-NORAD-TANZANIA-SEMINAR-TO-REVIEW-THE-MARINE-FISH-STOCKS-AND-FISHERIES-IN-TANZANIA,-MBEGANI,-TANZANIA,-6-8-MARCH-1984. Iversen,-S.A.;Myklevoll,-S.-eds. Tanzania-Fisheries-Research-Inst.,-Dar-es-Salaam-Tanzania 1984. pp. 97-119

An account is given of tuna species and their distribution in the southwest Indian Ocean in relation to geographic and oceanographic conditions. Traditional and artisanal fisheries, industrial fisheries, and fish aggregating devices are described. The state of expansion of stocks and prospects for future expansion are considered. Publ. in coop. with: Norwegian Agency for Int. Development, Oslo (Norway); Institute of Marine Research, Bergen (Norway).

Fishery resources in the North Arabian Sea and adjacent waters.

Venema,-S.C.

B (Book); K (Conf MARINE-SCIENCE-OF-THE-NORTH-WEST-INDIAN-OCEAN-AND-ADJACENT-WATERS. Angel,-M.V.-ed. 1984. vol. 31, no. 6-8A pp. 1001-1018

DEEP-SEA-RES. vol. 31, no. 6-8A

The Arabian Sea has drawn the attention of oceanographers and marine biologists because of its unique oceanographic penomena. The reported upwellings and related high primary production off southwest Arabia, Somalia, and the Malabar coast of India, have led to high expectation in terms of harvestable fish resources. Many surveys on the fishery resources have been carried out in the region. The estimates of standing biomass, and the potential yields derived therefrom, obtained from these surveys and other assessments, are compared with actual landings, to assess sustainable levels of exploitation and possible development. The relationship between climatic variability in oceanographic phenomena, and fluctuations in abundance of living resources, eg. tuna, is considered. This review includes the Arabian Sea from the Maldives to Somalia, the gulfs between Iran and the Arabian peninsula, the Gulf of Aden, and, to a limited extent, the Red Sea. The fish resources are discussed by major surveys or areas, while tunas, crustaceans and cephalopods are dealt with separately.

Program, abstracts and summary report.

B (Book); K (Conf MAPUTO-MOZAMBIQUE-INST.-INVEST.-PESQUEIRA 1984. vp

Distribution of tunas and other large pelagic fishes in relation to oceanological conditions in the Pacific and Indian oceans.

Osipov,-V.G.

B (Book) CONDITIONS-OF-FORMATION-OF-COMMERCIAL-FISH-CONCENTRATIONS.. USLOVIYA-OBRAZOVANIYA-PROMYSLOVYKH-SKOPLENIJ-RYB.- 1984. pp. 126-140

SB.-NAUCH.-TR.-VNIRO.

Water structure, biomass of food organisms, distribution of water temperature and salinity, and oxygen content were found to influence horizontal and vertical distribution and behaviour of 5 tuna species, swordfish and blue shark in the open areas of the Pacific and Indian Oceans.

Tuna fisheries in the Southwest Indian Ocean.

Ardill,-J.D.

B (Book) VICTORIA-SEYCHELLES-SWIOP 1984. 22 pp

Following an account of tuna species common in the Southwest Indian Ocean and their distribution with respect to geographic and oceanographic conditions, the different tuna fishing activities conducted in the area are described. An examination is made of the current state of exploitation of the stocks, indicating also prospects for expansion of the industry.

Tuna fisheries in the South West Indian Ocean.

Ardill,-J.D.

B (Book) SWIOP-DOC.-DOC.-OISO. Victoria-Seychelles-FAO-UNDP 1984. 22 pp

Tuna species and their distribution in the southwest Indian Ocean are examined with respect to geographic and oceanographic conditions, and their fisheries discussed, both artisanal and industrial. The state of exploitation of the stocks is examined and prospects for expansion considered.

(Results of the prospecting research on the surface resources of tuna led since 1971 in the Western Indian Ocean.).

Marsac,-F.; Stequert,-B.

J (Journal-Article); PECHE-MARIT. 1984. vol. 63, no. 1271, pp. 83-94

Since 1971, experimental fisheries which have for an aim the exploitation of surface tuna were effected in the Indian Ocean in three geographical areas: North-West of Madagascar and Comoro Islands, eastern coast of Africa and Seychelles Islands. Data on the distribution of catches by species and on the catch yield of yellowfin tuna and skipjack are given.

Indian Ocean Fishery Commission (IOFC). Report of the third session of the Committee for the Development and Management of Fisheries in the Southwest Indian Ocean, Mombasa, Kenya, 14-16 November 1984.

B (Book); K (Conf FAO-FISH.-REP. ROME-ITALY-FAO 1984. no. 320, 36 pp

The final formal report of the third session of the Indian Ocean Fishery Commission (IOFC), Committee for the Development and Management of Fisheries in the Southwest Indian Ocean, held in Mombasa, Kenya, from 14 to 16 November 1984 is presented. Major topics were the state of fisheries resources in the region, problems and opportunities for fisheries management and development, fish processing and improving quality control, data collection, licensing and control of foreign fishing, international cooperation in tuna fisheries, Indo-Pacific Tuna Development and Management Programme, UNDP/FAO Regional Fisheries Development and Management Project for the Southwest Indian Ocean and follow-up actions to the FAO World Conference on Fisheries Management and Development. The main recommendations of the session are listed.

Compositions of usable and trash fish in tuna long-line fishing.

Yamasaki,-S.; Orihara,-T.

J (Journal-Article); MINI-REV.-DATA-FILE-FISH.-RES.-FISH.-RES.-LAB.,-KAGOSHIMA-UNIV. 1984. vol. 3, pp. 103-110

Composition of trash and useable fish in tuna long-line fishing and relations between hook ratio and some environmental factors such as PO sub(4)-P, DO content, pH, salinity and water temperature, in fishing grounds, were studied. The survey was conducted in the Indian Ocean. Number and body weight of all fishes obtained were measured. Thirteen hundred and sixty fishes were caught, with a total weight of 17.3 ton. The total hook ratio was 9.0%, which included 7.0% trash fish and 2.0% useable fish. Trash fish accounted for 77.4% of the total number, and 48.7% of the total weight. Positive relationships were observed between hook ratio and PO sub(4)-P and DO content.

(The Reunion Island: A base for the purse-seiners in the Indian Ocean. June 1984: 1000 t Transhipped in a first test.).

Gall,-J.Y.-Le

J (Journal-Article) PECHE-MARIT. 1984. vol. 63, no. 1277, pp. 439-443

In this paper the importance of the Reunion Island in the tuna fishery in the Indian Ocean is illustrated. Since 1970, the purse seiners have docked at this island to make repairs and to lay in food supplies for themselves. The Reunion Island is also a base for the transhipping of the caught tunas and is used by the French fishing vessels and also by several purse seiners of Ivory Coast, Spain, URSS and Mauritius.

Review of tuna fishery in Sri Lanka.

Joseph,-L.

B (Book); N (Num COLOMBO-SRI-LANKA-FAO-UNDP 1984. 29 pp

Four species of tunas dominate the tuna fisheries in Sri Lanka. The relative importance of the four main gears in the fishery has changed as a result of development activities such as mechanisation and introduction of synthetic nets. The present production of 30,000 to 35,000 metric tons per annum constitutes 15 to 20% of all fish landed in the country.

Tuna fisheries in the South West Indian Ocean.

Ardrill,-J.D.

B (Book); K (Conf THE-PROCEEDINGS-OF-THE-NORAD-KENYA-SEMINAR-TO-REVIEW-THE-MARINE-FISH-STOCKS-AND-FISHERIES-IN-KENYA,-MOMBASA,-KENYA,-13-15-MAR-1984. Iversen,-S.A.;Myklevoll,-S.-eds. Kenya-Marine-and-Fisheries-Research-Inst.,-Mombasa-Kenya 1984. pp. 83-105

Following a brief account of tuna species and their distribution in relation to geographical and oceanographical conditions, tuna fisheries in the South West Indian Ocean are described, considering also the state of exploitation of the stocks and prospects for expansion. (Published in cooperation with: The Norwegian Agency for Int. Development, Oslo, Norway, and the Institute of Marine Reserach, Bergen, Norway.)

Major findings from the Indo-Pacific historical tuna fisheries data summary.

Sakurai,-T.

B (Book); N (Num COLOMBO-SRI-LANKA-IPTP 1984. 15 pp

An account is given as to the importance of tuna in the Indopacific region and the development of the tuna fishery. Catch data are presented for the following areas: western Indian Ocean, eastern Indian Ocean, northwest Pacific Ocean, western central Pacific Ocean and southwest Pacific Ocean.

Australian southern bluefin tuna industry.

J (Journal-Article) Q.-REV.-RURAL-ECON. 1984. vol. 6, no. 2, pp. 185-190

An account is given of the situation and outlook for the Australian southern bluefin tuna industry. The biology, economics and exploitation are discussed, considering also consequences of a stock collapse and management options.

(The authorization and control of foreign fishing in Madagascar waters. A report prepared for the Government of the Democratic Republic of Madagascar by the United Nations Food and Agriculture Organization.).

Derham,-P.J.; Christy,-L.C.

R (Report) Rome-Italy-FAO 1984. 11 pp

By request of the Government of Madagascar the FAO studied the situation of control and authorization of foreign fishing and offered recommendations. The two possibilities open to foreign fishing are the shrimp resources off the northwest coast and the tuna resources in deep water. Since the coast of physical surveillance and enforcement would be higher than the income by fees a set of alternatives for controlling the foreign fishery are presented. The alternatives include: 1) license foreign vessels under bilateral agreements emphasizing flag-state responsibility; 2) co-operate with other states in the region to exchange information and harmonize conditions of foreign fishing; 3) utilize physical surveillance as a spot check only to the extent that self-reporting and indirect means of verifying compliance are believed to be incomplete or unreliable. Each alternative is discussed in detail in the report.

The 1982 assessment of the southern bluefin tuna (Thunnus maccoyii) population and the determination of catch levels which stabilize the parental biomass.

Hampton,-J.; Majkowski,-J.; Murphy,-G.I.

B (Book) REP.-CSIRO-MAR.-LAB. 1984. no. 165, 29 pp

The southern bluefin tuna (Thunnus maccoyii) population is assessed using cohort analysis. Four combinations of natural mortality and terminal fishing mortality parameters are used to see if their selection affects the assessment. Although the four cohort analyses provide quantiatively different results, the overall conclusions, which confirm the previously recognized critical state of the population, are not affected by the choice of these parameters. Recruitment for the period 1950-1976 was stable, but parental biomass underwent a significant decline (40%) from 1967 to 1975, then remained approximately constant until 1980. The 1980 parental biomass level is estimated to be 21-30% of the virgin parental biomass.

Tuna live-baitfish investigations at Vizhinjam.

Luther,-G.; Gopakumar,-G.; Mohan,-M.

B (Book); K (Conf PROCEEDINGS-OF-THE-SYMPOSIUM-ON-COASTAL-AQUACULTURE-HELD-AT-COCHIN-FROM-JANUARY-12-TO-18,-1980.-PART-3:-FINFISH-CULTURE. Marine-Biological-Assoc.-of-India,-Cochin-India 1985. no. 6 pp. 861-875

SYMP.-SER.-MAR.-BIOL.-ASSOC.-INDIA. no. 6

Rearing of some species of Stolephorus and a few other small sized fish was done within the breakwater area at Vizhinjam, southwest coast of India using "Well-type" cages made of nylon netting. Transportation of fish from fishing site to the rearing cages ranged between 10 min. and 1 hr. Mortality of Stolephorus buccaneeri during transportation and during the first two days after stocking put together ranged from 10-20%. Transporting about 100 fish of about 75 mm length in cans of 50 l. capacity and continuous addition of fresh sea water during transportation reduced mortality. S. devisi also survived for about two months. In S. bataviensis and S. indicus , however, initial mortality was very high and the fish hardly l ved for more than a few hours after stocking. The periods for which other fish were reared in the cages were: Ambassis gymnocephalus for 9 mo.; Pranesus duodecimalis 5 mo.; Sardinella gibbosa 2 mo. and S. longiceps for 4 mo. Some problems associated with rearing of live baitfish in cages are identified and solutions for some of them outlined.

Spawning biology of the skipjack, Katsuwonus pelamis (Linnaeus) from Minicoy waters.

Mohan,-M.; Kunhikoya,-K.K.

B (Book); N (Num TUNA-FISHERIES-OF-THE-EXCLUSIVE-ECONOMIC-ZONE-OF-INDIA:-BIOLOGY-AND-STOCK-ASSESSMENT. Silas,-E.G.-ed. Central-Marine-Fisheries-Research-Inst.,-Cochin-India 1985. no. 36 pp. 149-154

CMFRI-BULL. no. 36

A study was made on the spawning of skipjack (Katsuwonus pelamis) in Minicoy waters, with particular reference to reproduction. Maturity, sex ratio, spawning season and frequency of fecundity are discussed.

Biology of the bait fishes Spratelloides delicatulus (Bennet) and S. japonicus (Houttuyn) from Minicoy waters.

Mohan,-M.; Kunhikoya,-K.K.

B (Book); N (Num TUNA-FISHERIES-OF-THE-EXCLUSIVE-ECONOMIC-ZONE-OF-INDIA:-BIOLOGY-AND-STOCK-ASSESSMENT. Silas,-E.G.-ed. Central-Marine-Fisheries-Research-Inst.,-Cochin-India 1985. no. 36 pp. 155-164

CMFRI-BULL. no. 36

Details are given of the distribution and abundance, length frequency distribution, age and growth, maturity, spawning, sex ratio, fecundity, feeding and behaviour of 2 species of bait fish from Minicoy: Spratelloides delicatulus and S. japonicus .

Observation on the tuna shoals associated with flotsam in the offshore waters of Minicoy Island during 1982-83 season.

Mohan,-M.

B (Book) TUNA-FISHERIES-OF-THE-EXCLUSIVE-ECONOMIC-ZONE-OF-INDIA:-BIOLOGY-AND-STOCK-ASSESSMENT. Silas,-E.G.-ed. Central-Marine-Fisheries-Research-Inst.,-Cochin-India 1985. no. 36 pp. 188-192

CMFRI-BULL. no. 36

Preliminary information is presented on the catch patterns, ecology and behaviour of tuna species associated with floating objects in Minicoy waters during the 1982/83 fishing season. Several hypotheses regarding the association of fish to the floating objects are examined.

Observations on the fishery and certain aspects of the biology of yellowfin tuna, Thunnus albacares (Bonnaterre) taken by longline gear in the EEZ of India.

Silas,-E.G.; Pillai,-P.P.; Jayaprakash,-A.A.; Pillai,-M.A.

B (Book); N (Num TUNA-FISHERIES-OF-THE-EXCLUSIVE-ECONOMIC-ZONE-OF-INDIA:-BIOLOGY-AND-STOCK-ASSESSMENT. Silas,-E.G.-ed. Central-Marine-Fisheries-Research-Inst.,-Cochin-India 1985. no. 36 pp. 176-183

CMFRI-BULL. no. 36

An account is given of the yellowfin (Thunnus albacares) tuna longline fishery of the oceanic waters of India. Data regarding the morphometry, length composition and food of the yellowfin are included.

Age and growth of Katsuwonus pelamis (Linnaeus) and Thunnus albacares (Bonnaterre) from Minicoy waters.

Mohan,-M.; Kunhikoya,-K.K.

B (Book) TUNA-FISHERIES-OF-THE-EXCLUSIVE-ECONOMIC-ZONE-OF-INDIA:-BIOLOGY-AND-STOCK-ASSESSMENT. Silas,-E.G.-ed. Central-Marine-Fisheries-Research-Inst.,-Cochin-India 1985. no. 36 pp. 143-148

CMFRI-BULL. no. 36

An examination is made of studies conducted on the age and growth of skipjack (Katsuwonus pelamis) and yellowfin (Tunnus albacares) tuna from Minicoy waters. Length frequency distribution, age and growth, and von Bertalanffy's growth equation are examined.

Observations on tuna fishery at Ratnagiri-Malwan area, north-west coast of India.

Silas,-E.G.; Pillai,-P.P.; Siraimeetan,-P.

B (Book) TUNA-FISHERIES-OF-THE-EXCLUSIVE-ECONOMIC-ZONE-OF-INDIA:-BIOLOGY-AND-STOCK-ASSESSMENT. Silas,-E.G.-ed. Central-Marine-Fisheries-Research-Inst.,-Cochin-India 1985. no. 36 pp. 184-187

CMFRI-BULL. no. 36

An account is given of a survey conducted on the tuna fisheries off the coast of Maharashtra, India. Some biological data of the main species landed (Thunnus tonggol and Euthynnus affinis) are included.

Comparative efficiency of live-baits for skipjack tuna Katsuwonus pelamis fishery at Minicoy.

Mohan,-M.; Kunhikoya,-K.K.

J (Journal-Article) J.-MAR.-BIOL.-ASSOC.-INDIA. 1985. vol. 27, no. 1-2, pp. 21-28

Skipjack tuna (Katsuwonus pelamis) are caught commercially at Minicoy, India, by pole and line fishing using live bait fish. The relationship between live bait fish catches and the skipjack tuna fishery during the 1981-82 season is described from Indian waters for the first time. An attempt is made to compare the relative effectiveness of the different species of the bait fish. The factors which may affect the effectiveness of different live baits and the tuna fishery at Minicoy are discussed.

Indian tuna fishery development -- perspectives and a management plan.

Silas,-E.G.; Pillai,-P.P.

B (Book) TUNA-FISHERIES-OF-THE-EXCLUSIVE-ECONOMIC-ZONE-OF-INDIA:-BIOLOGY-AND-STOCK-ASSESSMENT. Silas,-E.G.-ed. Central-Marine-Fisheries-Research-Inst.,-Cochin-Inida 1985. no. 36 pp. 193-208

CMFRI-BULL. no. 36

An examination is made of tuna production trends and development programmes in India regarding longlining and purse seining and infrastructure priorities.

Exploratory fishing by oceanic drift gillnetting and purse seining in the Lakshadweep.

Silas,-E.G.; Pillai,-P.P.

B (Book); N (Num TUNA-FISHERIES-OF-THE-EXCLUSIVE-ECONOMIC-ZONE-OF-INDIA:-BIOLOGY-AND-STOCK-ASSESSMENT. Silas,-E.G.-ed. Central-Marine-Fisheries-Research-Inst.,-Cochin-India 1985. no. 36 pp. 165-175

CMFRI-BULL. no. 36

Findings are presented of exploratory drift gillnetting and purse seining conducted in the Lakshadweep Sea. Number of tuna specimens, size range, percentage composition, average weight and length frequencies are examined briefly.

Length-weight relationship of skipjack, Katsuwonus pelamis (Linnaeus) and yellowfin tuna Thunnus albacares (Bonnaterre) from Minicoy waters.

Mohan,-M.; Kunhikoya,-K.K.

B (Book); N (Num TUNA-FISHERIES-OF-THE-EXCLUSIVE-ECONOMIC-ZONE-OF-INDIA:-BIOLOGY-AND-STOCK-ASSESSMENT. Silas,-E.G.-ed. Central-Marine-Fisheries-Research-Inst.,-Cochin-India 1985. no. 36 pp. 138-142

CMFRI-BULL. no. 36

Details are given of the length-weight relationship of skipjack (Katsuwonus pelamis) and yellowfin (Thunnus albacares) tunas in Minicoy waters.

Fishery and bionomics of tunas at Minicoy Island.

Mohan,-M.; Livingston,-P.; Kunhikoya,-K.K.

B (Book); N (Num TUNA-FISHERIES-OF-THE-EXCLUSIVE-ECONOMIC-ZONE-OF-INDIA:-BIOLOGY-AND-STOCK-ASSESSMENT. Silas,-E.G.-ed. Central-Marine-Fisheries-Research-Inst.,-Cochin-India 1985. no. 36 pp. 122-137

CMFRI-BULL. no. 36

Data regarding the tuna fishery at Minicoy Island are presented, considering fishing area, crafts, pole-and-line, bait collection, scouting, drumming, fishing operations, troll line, effort, catch, CPUE, species composition and size distribution.

Fishery and bionomics of tunas at Calicut.

Balan,-V.; Yohannan,-T.M.

B (Book); N (Num TUNA-FISHERIES-OF-THE-EXCLUSIVE-ECONOMIC-ZONE-OF-INDIA:-BIOLOGY-AND-STOCK-ASSESSMENT. Silas,-E.G.-ed. Central-Marine-Fisheries-Research-Inst.,-Cochin-India 1985. no. 36 pp. 115-121

CMFRI-BULL. no. 36

Data regarding the tuna fishery at Calicut, India, are presented, considering effort, catch, CPUE, species composition, length frequency distribution and length-weight relationship.

On the occurrence, size distribution, morphometry and feeding habits of the juveniles of Euthynnus affinis (Cantor), Auxis thazard (Lacepede), and Sarda orientalis (Temminck and Schlegel), along the Tuticorin coast, Gulf of Mannar.

Saraimeetan,-P.

B (Book); N (Num TUNA-FISHERIES-OF-THE-EXCLUSIVE-ECONOMIC-ZONE-OF-INDIA:-BIOLOGY-AND-STOCK-ASSESSMENT. Silas,-E.G.-ed. Central-Marine-Fisheries-Research-Inst.,-Cochin-India 1985. no. 36 pp. 104-114

CMFRI-BULL. no. 36

The results are presented of studies on the fishery and bionomics of juvenile tuna species (Euthynnus affinis, Auxis thazard and Sarda orientalis at Tuticorin, India. Size distribution, length-weight relationship and meristic counts are examined.

Review of fisheries in Oman (KISR 1863).

Al-Harrasy,-A.S.A.

B (Book); K (Conf FINAL-REPORT.-THE-PROCEEDINGS-OF-THE-1984-SHRIMP-AND-FIN-FISHERIES-MANAGEMENT-WORKSHOP. Mathews,-C.P.-ed. Kuwait-Inst.-for-Scientific-Research,-Safat-Kuwait 1985. pp. 125-128

A brief examination is made of the Oman fisheries, which is mainly artisanal, describing the various sectors: tuna, demersal, cuttlefish and squid, lobster and abalone.

Maturation and spawning of Euthynnus affinis, Auxis thazard and Auxis rochei in the Mangalore inshore area during 1979-82.

Muthiah,-C.

B (Book); N (Num TUNA-FISHERIES-OF-THE-EXCLUSIVE-ECONOMIC-ZONE-OF-INDIA:-BIOLOGY-AND-STOCK-ASSESSMENT. Silas,-E.G.-ed. Central-Marine-Fisheries-Research-Inst.,-Cochin-India 1985. no. 36 pp. 71-85

CMFRI-BULL. no. 36

The findings are presented of investigations on the maturation and spawning of Euthynnus affinis, Auxis thazard and A. rochei along the Mangalore coast of India. Fecundity, spawning season, spawning periodicity, relative condition and sex ratio are examined.

Fishery and bionomics of tunas at Mangalore.

Muthiah,-C.

B (Book); N (Num TUNA-FISHERIES-OF-THE-EXCLUSIVE-ECONOMIC-ZONE-OF-INDIA:-BIOLOGY-AND-STOCK-ASSESSMENT. Silas,-E.G.-ed. Central-Marine-Fisheries-Research-Inst.,-Cochin-India 1985. no. 36 pp. 51-70

CMFRI-BULL. no. 36

Data regarding the tuna fishery at Mangalore, India are presented, considering fishing area, craft, gear, effort, catch, CPUE, species composition, size composition and length-weight relationship.

Fishery and bionomics of tunas at Vizhinjam.

Pillai,-P.P.; Sarma,-P.S.S.

B (Book); N (Num TUNA-FISHERIES-OF-THE-EXCLUSIVE-ECONOMIC-ZONE-OF-INDIA:-BIOLOGY-AND-STOCK-ASSESSMENT. Silas,-E.G.-ed. Central-Marine-Fisheries-Research-Inst.,-Cochin-India 1985. no. 36 pp. 44-50

CMFRI-BULL. no. 36

Data regarding the tuna fishery off Vizhinjam, India, are presented, considering the following: fishing area, craft, gear, effort, catch, CPUE, species composition, size composition, and length-weight relationship.

Fishery and bionomics of tunas at Cochin.

Silas,-E.G.; Pillai,-P.P.; Jayaprakash,-A.A.; Pillai,-M.A.

B (Book); N (Num TUNA-FISHERIES-OF-THE-EXCLUSIVE-ECONOMIC-ZONE-OF-INDIA:-BIOLOGY-AND-STOCK-ASSESSMENT. Silas,-E.G.-ed. Central-Marine-Fisheries-Research-Inst.,-Cochin-India 1985. no. 36 pp. 28-43

CMFRI-BULL. no. 36

Data regarding the tuna fisheries off Cochin, India are presented, considering fishing area, craft, gear, effort, catch, CPUE, catch composition, size distribution and length-weight relationship.

Population dynamics of tunas: Stock assessment.

Silas,-E.G.; Pillai,-P.P.; Srinath,-M.; Jayaprakash,-A.A.; Muthiah,-C.; Balan,-V.; Yohannan,-T.M.; Siraimeetan,-P.; et-al.

B (Book); N (Num TUNA-FISHERIES-OF-THE-EXCLUSIVE-ECONOMIC-ZONE-OF-INDIA:-BIOLOGY-AND-STOCK-ASSESSMENT. Silas,-E.G.-ed. Central-Marine-Fisheries-Research-Inst.,-Cochin-India 1985. no. 36 pp. 20-27

CMFRI-BULL. no. 36

An analysis is made of Indian tuna stocks using length composition data and describing the formulae used.

A critique on national tuna fishery.

Silas,-E.G.; Pillai,-P.P.

B (Book); N (Num TUNA-FISHERIES-OF-THE-EXCLUSIVE-ECONOMIC-ZONE-OF-INDIA:-BIOLOGY-AND-STOCK-ASSESSMENT. Silas,-E.G.-ed. Central-Marine-Fisheries-Research-Inst.,-Cochin-India 1985. no. 36 pp. 8-19

CMFRI-BULL. no. 36

Of the common tuna and billfish represented in the Indian tuna fishery, the skipjack constitutes > 76% of the catch in the Lakshadweep Islands and Euthynnus affinis 65% along the mainland. The fishery is described in detail, detailing fishing craft and gear, production statistics, seasonal pattern, purse seining and longlining.

Methodology and brief review of the oceanological features of the Indian waters.

Silas,-E.G.; Pillai,-P.P.

B (Book); O (Revi TUNA-FISHERIES-OF-THE-EXCLUSIVE-ECONOMIC-ZONE-OF-INDIA:-BIOLOGY-AND-STOCK-ASSESSMENT. Silas,-E.G.-ed. Central-Marine-Fisheries-Research-Inst.,-Cochin-India 1985. no. 36 pp. 6-7

CMFRI-BULL. no. 36

An outline is given of the data collection system for tuna fishery statistics at various centres in India, followed by a brief review of the oceanological features of the Indian Coast.

Tuna fisheries of the EEZ of India -- an introductory statement.

Silas,-E.G.

B (Book) TUNA-FISHERIES-OF-THE-EXCLUSIVE-ECONOMIC-ZONE-OF-INDIA:-BIOLOGY-AND-STOCK-ASSESSMENT. Silas,-E.G.-ed. Central-Marine-Fisheries-Research-Inst.,-Cochin-India 1985. no. 36 pp. 1-5

CMFRI-BULL. no. 36

The tuna fisheries of India are still predominantly an artisanal activity, with marginal inputs from the commercial sector. Following an account of the current situation of the industry, new areas for research and development are detailed.

(Korean longliners fleet activities in the Seychelles Exclusive Economic Zone.).

Potier,-M.; Hallier,-J.P.; Nageon-de-Lestang,-J.

B (Book) RAPP.-SCI.-ANTENNE-ORSTOM-SEYCHELLES. SEYCHELLES-ANTENNE-ORSTOM 1985. no. 6, 33 pp

From 1979 Korean longliners fishing in the Seychelles Economic Zone have had to obtain fishing licences. Licences are granted on a monthly basis and the vessels are required to complete catch and effort forms. From analysis of such forms, total catch, fishing effort, catch per unit effort (C.P.U.E.) as well as location of fishing grounds were determined. In 1982 longliners operated all year round and the average monthly effort was 1,500,000 hooks but with a well marked seasonal variation. Thus 65% of the total fishing effort were exerted in the months of October to December comprising 70% of the total catch. The total catch for that year was 9,600 tonnes, of which 54% (5.200 t) were yellowfin and 34% bigeye. Between them these species made up nearly 90% of the total catch.

Fishery and bionomics of tunas at Tuticorin.

Siraimeetan,-P.

B (Book); N (Num TUNA-FISHERIES-OF-THE-EXCLUSIVE-ECONOMIC-ZONE-OF-INDIA:-BIOLOGY-AND-STOCK-ASSESSMENT. Silas,-E.G.-ed. Central-Marine-Fisheries-Research-Inst.,-Cochin-India 1985. no. 36 pp. 86-103

CMFRI-BULL. no. 36

Data regarding the tuna fishery at Tuticorin, India are presented, considering fishing area, craft, gear, effort, catch, CPUE, species composition, length-weight relationship, sex ratio and size distribution.

Fisheries institutions in Mauritius.

Christy,-L.; Greboval,-D.

B (Book) VICTORIA-SEYCHELLES-SWIOP 1985. 31 pp

An examination is made of the fishery industry of Mauritius and possible institutional structures for its management. The oceanic tuna fishery, the banks fishery and advanced artisanal fishery are discussed. Needs and opportunities for government intervention in Mauritian fisheries are indicated and a draft bill included for a fisheries development authority act.

Indian Ocean Fishery Commission (IOFC). Report of the Workshop on Tuna Fisheries Management and Development in the Southwest Indian Ocean, Mombasa, Kenya, 12-13 November 1984.

B (Book); K (Conf FAO-FISH.-REP.-FAO,-RAPP.-PECHES. ROME-ITALY-FAO 1985. no. 324, 32 pp

The report of the IOFC Workshop on Tuna Fisheries Management and Development in the Southwest Indian Ocean, held in Mombasa, Kenya, from 12 to 13 November 1984, is presented. Major topics were data collection requirements and data base, recent developments in tuna fisheries, future research and arrangements for collaboration and future of tuna fishing in the Southwest Indian Ocean. The main recommendations of the meeting are given.

Brief descriptions on fishery, data compilation and trends of catch and effort for Japanese longline fishery in the Indian Ocean.

Suzuki,-Z.

B (Book); K (Conf REPORT-ON-THE-PREPARATORY-EXPERT-MEETING-ON-TUNA-LONGLINE-DATA-FOR-STOCK-ASSESSMENT-IN-THE-INDIAN-OCEAN,-PUSAN,-REPUBLIC-OF-KOREA,-8-12,-APRIL-1985. FAO-UNDP-Indo-Pacific-Tuna-Dev.-and-Manage.-Program.,-Colombo-Sri-Lanka COLOMBO-SRI-LANKA-IPTP 1985. pp. 13-21

Following a brief historical review of the Japanese longline tuna fishery in the Indian Ocean, data collection and compilation (concerning catch and effort statistics and size data) is discussed and trend of catch, effective effort and CPUE for the major species considered.

Report on the Preparatory Expert Meeting on Tuna Longline Data for Stock Assessment in the Indian Ocean, Pusan, Republic of Korea, 8-12, April 1985.

B (Book); K (Conf COLOMBO-SRI-LANKA-IPTP 1985. 25 pp

An account is given for the meeting, including discussions on the national report of the tuna fishery in the Indian Ocean, the recent development of purse seine fishery in the western Indian Ocean, and review of the Indian tuna stock assessment.

(Aspects of the tuna fishery evolution in the world (1946-1984).).

Fonteneau,-A.

J (Journal-Article) PECHE-MARIT. 1985. vol. 64, no. 1283, pp. 90-94

The present study combines information gathered from data given by administrative structures I.A.T.T.C. (Interamerican Tropical Tuna Commision), I.O.F.C. (Indian Ocean Fishery Commision) and I.C.C.A.T. (International Commision for the Conservation of Atlantic Tuna), in order to give a summarized evaluation of the present tendencies of tuna fisheries in the world.

The tuna fishery in the EEZ of India, Maldives and Sri Lanka. Appendix 1.

Sivasubramaniam,-K.

B (Book); N (Num TUNA-FISHERY-IN-THE-EEZS-OF-INDIA,-MALDIVES-AND-SRI-LANKA. FAO-UNDP-Proj.-for-Mar.-Fish.-Resour.-Manage.,-Colombo-Sri-Lanka COLOMBO-SRI-LANKA-FAO-UNDP 1985. pp. 19-47

The tuna fishery in the EEZs of the Maldives, Sri Lanka and India is described, considering the yellowfin and skipjack tunas in particular. Details are given regarding the fishing methods and crafts, species composition and distribution, catch, effort and catch rates, seasonal variations, various population parameters and potential yield.

Tuna fishery in the EEZs of India, Maldives and Sri Lanka.

B (Book) COLOMBO-SRI-LANKA-FAO-UNDP 1985. 91 pp

This paper attempts to summarize the present knowledge of those tuna resources in the EEZs of India, Maldives and Sri Lanka that are likely to be shared stocks. It contains a summary report, a survey of tuna fishery in the three EEZs and country reports from Maldives and Sri Lanka.

Driftnet fishery for tuna in the western coastal waters of Sri Lanka.

Joseph,-L.; Amarasiri,-C.; Maldeniya,-R.

B (Book); N (Num FAO-UNDP-Proj.-for-Mar.-Fish.-Resour.-Manage.-Bay-Bengal,-ColomboSri-Lanka COLOMBO-SRI-LANKA-FAO-UNDP 1985. pp. 72-88

A study was undertaken of the drift net fishery for tuna off the west coast of Sri Lanka. Analyses were made of the performance of the 3.5 G.T. class of vessels during the monsoon periods of 1982 and 1983. Following description of the study area and sampling strategy, details are given regarding fishing effort and catch per unit effort, species composition in driftnet fishery and length distribution.

Tunas in the Maldives.

B (Book); N (Num FAO-UNDP-Proj.-for-Mar.-Fish.-Resour.-Manage.,-Colombo-Sri-Lanka COLOMBO-SRI-LANKA-FAO-UNDP 1985. pp. 48-71

The tuna fishery of the Maldives is discussed in detail, considering the biological aspects of the stock exploited and management aspects of the resources. Details are given regarding the fishing methods and crafts, species composition and distribution, catch, effort and catch rates, length-weight relationships and other biological parameters.

Indian Ocean Fishery Commission (IOFC). Report of the third session of the Committee for the Development of fisheries in the Southwest Indian Ocean, Mombasa, Kenya, 14-16 November 1984.

B (Book); K (Conf FAO,-RAPP.-PECHES. ROME-ITALY-FAO 1985. no. 320, 35 pp

The final formal report of the third session of the Indian Ocean Fishery Commission (IOFC), Committee for the Development and Management of Fisheries in the Southwest Indian Ocean, held in Mombasa, Kenya, from 14 to 16 November 1984 is presented. Major topics were the state of fisheries resources in the region, problems and opportunities for fisheries management and development, fish processing and improving quality control, data collection, licensing and control of foreign fishing, international cooperation in tune fisheries, Indo-Pacific Tuna Development and Management Programme, UNDP/FAO Regional Fisheries Development and Management Project for the Southwest Indian Ocean and follow-up actions up to FAO World Conference on Fisheries Management and Development. The main recommendations of the session are listed.

A contribution to the fauna of Didymozoidae from the West Indian Ocean.

Nikolaeva,-V.M.; Dubina,-V.R.

J (Journal-Article) EHKOL.-MORYA. 1985. no. 20, pp. 13-26

Data are presented on 16 trematode species of the family Didymozoidae, 5 of which appeared to be new to science. The new species are described and figured. 7 commercially valuable fishes such as tuna (4 species), blue marlin, sailfish and wahoo were recognized as hosts. The species composition of didymozoids with the subfamily Didymozoinae predominating was found to be close in 4 tuna species. Didymozoid fauna was different in tunas and sailfish and similar in blue marlin and sailfish.

Indian ocean tuna fisheries data summary.

B (Book); N (Num IPTP-DATA-SUMM. COLOMBO-SRI-LANKA-IPTP 1985. no. 3, 62 pp

Data are presented for the tuna fisheries in the Indian Ocean as follows: catch statistics (by ocean and species, by country, by country and gear, and national statistics) and fishing craft statistics (by country).

Report of the Eight Session of the Indian Ocean Fishery Commission, Bangkok, 2-6 July 1985.

B (Book); K (Conf FAO-FISH.-REP.-FAO-RAPP.-PECHES. 1985. no. 341, 24 pp

This document is the final report of the Eighth Session of the Indian Ocean Fishery Commission (IOFC), which was held in Bangkok, Thailand, from 2 to 6 July 1985. Major topics discussed were: the state of marine fisheries, regional collaboration in fisheries research in support of management, fish utilization and marketing, international cooperation in management and development of tuna fisheries, follow-up to the FAO World Conference on Fisheries Management and Development, a review of the activities of the subsidiary bodies of the Commission, and proposed amendments to the IOFC statutes. (FAO FIP/R341 (Fr); ISBN 92-5-102305-0 (En): ISBN 92-5-202305-4 (Fr)).

Oceanographic observations and eastern Indian Ocean, 1983-1984.

B (Book); N (Num DATA-OCEANOGR.-OBS.-EXPLOR.-FISH.-SHIMONOSEKI-UNIV.-FISH. 1985. no. 12, 28 pp

The report presents a summary of work undertaken during 2 exploratory fishing cruises in the Indian Ocean in November 1983 and November-December 1984. The results of ordinary oceanographic observations, summary of tuna longline fishing, biometrical data of tunas caught and samples with NORPAC net for plankton and 2m diameter net for fish larvae are tabulated.

Problems of tuna stock assessment in the Maldives.

Anderson,-C.; Hafiz,-A.

J (Journal-Article) BAY-OF-BENGAL-NEWS. 1985. no. 20, pp. 12-13

Investigations conducted assessing the stocks of skipjack and yellowfin tunas in the Maldives are discussed with respect to problems encountered in using the maximum sustainable yield approach, and length-frequency analysis.

(Environmental conditions and tuna fishing in the western Indian Ocean (1983-1984).).

Marsac,-F.; Hallier,-J.P.

B (Book) RAPP.-SCI.-ANTENE-ORSTOM-SEYCHELLES. VICTORIA-MAHE-SEYCHELLES-ANTENCE-ORSTOM 1985. no. 5, 98 pp

A detailed analysis on hydro-climatic conditions (winds, currents, sea surface temperature, vertical thermal structure precedes the fishing results obtained by the French and Ivory Purse Seiners in the Western Indian Ocean from November 1983 to December 1984. On average, fishing results were good in term of total catch and in relation with the species caught. Total catch reached 81 336 tonnes (72,554 tonnes in 1,984) including 52.4% yellowfin and 39% skipjack. The authors tentatively give a preliminary analysis of the relationship between tuna catches and environment. Length frequency data for the two major species skipjack (Katsuwonus pelamis) and yellowfin (Thunnus albacares) are briefly introduced.

Report on the Expert Consultation on the Stock Assessment of Tunas in the Indian Ocean. Colombo, Sri Lanka, 28 November - 2 December 1985.

B (Book); K (Conf COLOMBO-SRI-LANKA-IPTP 1985. 78 pp

The report of the meeting is presented. Major topics were the review of the status of the stocks of bigeye (Thunnus obesus), albacore (Thunnus alalunga) and southern bluefin (Thunnus maccoyii).

Tuna resource management.

Anderson,-C.

J (Journal-Article) RASAIN. 1985. no. 5, pp. 136-141

A brief account is given of the tuna fishery of the Maldives and the management of the industry. Due to the migratory nature of tuna species, an effective tuna management scheme would have to be international in scope, covering the entire Indian Ocean area; the experience of small island nations in the South Pacific region is considered briefly.

(Evolution and strategy of French tropical tuna fisheries.).

Fournet,-P.

J (Journal-Article) PECHE-MARIT. 1985. vol. 64, no. 1293, pp. 805-812

This paper deals with the evolution of the French tuna fisheries in Tropical Atlantic (Senegal, Ivory Coast), in Seychelles and in Mauritius. The catches are Thunnus albacore, Thunnus obesus and Euthynnus pelamis . The french fishing vessels come from Concarneau, Tregunc, Trevignon (Brittany) and a table strikes the balance of the French tuna boats in 1985.

Tuna fisheries of the Exclusive Economic Zone of India: Biology and stock assessment.

Silas,-E.G.-(ed.)

B (Book); Z (Biblio CMFRI-BULL. COCHIN-INDIA-CMFRI 1985. no. 36, 216 pp

Abstracts of the 21 papers included in the report are cited individually in this issue of ASFA.

An analysis of length frequency data of skipjack tuna (Katsuwonus pelamis) from the gillnet fishery using ELEFAN programs.

Amarasiri,-C.; Joseph,-L.

J (Journal-Article); J.-NATL.-AQUAT.-RESOUR.-AGENCY-SRI-LANKA. 1985. vol. 32, no. 1-2, pp. 57-65

ELEFAN computer programs were used to analyse the length frequency distribution of skipjack tuna (Katsuwonus pelamis) from the gillnet fishery in Sri Lanka. Values of 0.62 and 85 cm. obtained for K and L sub(infinity) are well within the values obtained for skipjack tuna elsewhere, but higher than those reported earlier for Sri Lanka. The high exploitation rate (0.68) obtained for skipjack tuna indicate limited opportunities of expansion of the fishery in the presently exploited range.

A research fishery with trolling lines in the waters of the Seychelles.

Loewenberg,-U.; Kuenzel,-T.; Weber,-W.

J (Journal-Article) Z.-ANGEW.-ICHTHYOL.-J.-APPL.-ICHTHYOL. 1985. vol. 1, no. 4, pp. 145-156

Large pelagic fish species, especially juvenile tuna, occur seasonally on the plateaus. For the most important species (Thunnus albacares, Euthynnus affinis , and Katsuwonus pelamis) the best season seems to be between Oct and May. The catches are closely correlated to the water temperature. There are catch fluctuations in the course of the day. The best hours are between 9-10 and 16-18 o'clock. The trollable stocks of pelagic fish species at the plateaus and banks are estimated to about 2500 t, about 2200 t of which are large scombrid fish.

(The contribution of COFREPECHE to the development of fisheries.).

Toussaint,-R.

J (Journal-Article) PECHE-MARIT. 1985. vol. 64, no. 1290, pp. 569-571

This paper presents the activities of COFREPECHE (French consortium for the development of fisheries) concerning developing countries, fishery societies and French professionals. After the recent participation of the French Institute of Research for the Exploitation of the Sea (IFREMER), COFREPECHE approaches new developing themes, particularly in the field of the technology and of the fishery research.

Study of sashimi tuna potential in W.A.

Robins,-J.P.

J (Journal-Article); FINS. 1985. vol. 18, no. 5, pp. 6-19

The potential of sashimi in Western Australia is discussed in detail considering the following aspects: body condition; market; Japanese longline catch rates; and longline fishing strategy options.

Observations on certain environmental parameters in relation to surface tuna fishery at Minicoy Island, Lakshadweep.

Mathew,-C.V.; Gopakumar,-G.

J (Journal-Article) J.-MAR.-BIOL.-ASSOC.-INDIA. 1986. vol. 28, no. 1-2, pp. 163-168

Environmental parameters such as surface temperature, salinity, dissolved oxygen, zooplankton biomass and availability of forage fishes were studied in relation to the surface tuna fishery at Minicoy Island. A surface temperature range of 28 degree to 30 degree C and salinity of approximately equals 34 ppt were found to be optimum for tuna schools. Dissolved oxygen was not found to act as a limiting factor. Zooplankton biomass was found to influence the tuna catch indirectly through the abundance of forage fishes.

A commentary on the deepsea fishery in Taiwan.

Hsiung,-Kai-Ti

J (Journal-Article) MINI-REV.-DATA-FILE-FISH.-RES.-LAB.-KAGOSHIMA-UNIV. 1986. vol. 4, pp. 39-48

Activities of the deepsea fishery of Taiwan have expanded to the South Pacific, Indian Ocean, and Atlantic Ocean. There are more than 500 fishery companies with about 600 deepsea fishing boats in Taiwan, about 90% of which are based at Kaoshiung in south Taiwan. The deepsea fishery in Taiwan has developed over the last twenty years. Tonnages of fishing boats increased by 3.8 times within 10 years. About 60% of Taiwan's deepsea fishing fleets have been engaged in tuna longline fishing with 90% of the catch exported to the U.S.

Oceanic tuna a feasible fishery in Indian EEZ.

Swaminath,-M.; Nair,-M.K.R.; Pravin,-P.

B (Book); N (Num CIFNET-BULL. COCHIN-INDIA-CIFNET 1986. no. 3, 96 pp

Exploitation of the tuna resources in Indian waters is discussed in detail, examining the following: world tuna fisheries; problems in the way of tuna fisheries development in India; results of training; results of synoptic survey of tuna resources in the EEZ; intensive tuna drive and feasibility studies; and tuna products and markets. Recommendations are included for consideration as guidelines for development of a commercial oceanic tuna fishery.

Indian Ocean tuna fisheries data summary for 1984.

B (Book); N (Num IPTP-DATA-SUMM. COLOMBO-SRI-LANKA-IPTP 1986. no. 5, 67 pp

Tables are presented for the tuna fisheries of the Indian Ocean for 1984, regarding catch statistics and fishing craft statistics.

Fishery resources and policies in the Maldives: Trends and issues for an island developing country.

Sathiendrakumar,-R.; Tisdell,-C.

J (Journal-Article) MAR.-POLICY. 1986. vol. 10, no. 4, pp. 279-293

This article outlines the importance of fishery resources to the Republic of the Maldives and identifies three basic types of fish resources available to the Republic, namely those in coral reef habitats, surface-swimming tuna and deep-swimming tuna which are found beyond the reef area. Reef fisheries may be overexploited by trolling boats but the number of these boats is still increasing. Pole-and-line boats are used to harvest surface-swimming tuna. The pole-and-line fleet is being rapidly mechanized and consequences of this are noted. Deep-swimming tuna stocks are not harvested by the Maldivians nor is the harvesting of these licensed to foreigners in the exclusive economic zone of the Maldives.

The tuna longline fishing grounds in Indonesian waters and the possibility of its industrial development.

Suhendrata,-T.; Bahar,-S.

J (Journal-Article); JURNAL-PENELITIAN-PERIKANAN-LAUT-J.-MAR.-FISH.-RES. 1986. no. 37, pp. 79-93

This study is based on data of the Japanese longline fisheries fishing in the Indonesian waters from 1967 to 1981 and fisheries industry of State Enterprises "Perikanan Samodra Besar" from 1974 to 1984. Catches were dominated by yellowfin tuna (Thunnus albacares), bigeye tuna (T. obesus), albacore (T. alalunga) and several species of billfishes. The hook rate indicates that the most important fishing grounds for yellowfin tuna are Sulawesi Sea, the north of Halmahera to Irian Jaya in the Pacific Ocean, the southwestern part of Sumatera, southern part of Bali and Nusa Tenggara in the Indian Ocean and Banda Sea. For bigeye tuna they were commonly caught in the south western part of Sumatera, southern par of Java, Bali and Nusa Tenggara of Indian Ocean and the Banda Sea. Yellowfin and bigeye tuna catches indicate seasonal variation and five-year-cycle seems to be prominent.

A preliminary account of the gillnet fishery off Veraval during 1979-82.

Kasim,-H.M.; Khan,-M.Z.

J (Journal-Article) INDIAN-J.-FISH. 1986. vol. 33, no. 2, pp. 155-162

In spite of an increase in the fishing effort, the total catch was almost same. The important components of the fishery were elasmobranchs (26% in the total catch), clupeids (25.8%), pomfrets (11.1%), Chirocentrus spp. (8.8%), seer fish (7.6%), catfish (5.6%), tuna (3.2%), ribbonfish (3%) and carangids (%). However, increasing trend was observed in the abundance of Hilsa toli, Parastromateus niger, Chirocentrus dorab, Scomberomorus guttatus and carangids. Generally, the fishery was good in the beginning and at the end of every fishing season, i.e., September-October and May-June, respectively.

[The development of the tuna fisheries of the Indian Ocean in relation to the resources]

Michaud,-P.; Hallier,-J.-P.

B (Book); K (Conf Tech.-Rep.-Seychelles-Fish.-Auth. 1986 21 pp

Since 1983, the tuna purse seine fishery has increased rapidly in the Indian Ocean. This fishery, being mostly based in Seychelles, represents an excellent opportunity to this country. However, it is essential that a good management strategy be adopted in order to ensure the rational exploitation of the resources. Since this fishery is in its early stage of development, it is not yet possible to obtain an accurate assessment of the stocks based on usual stock assessment methods. Nevertheless, from existing knowledge on the Indian and Atlantic oceans, a preliminary analysis of the resources is attempted. Of the 2 stocks studied, the skipjack (Katsuwonus pelamis), known as an opportunist species, can support a higher exploitation rate than the yellowfin (Thunnus albacares). It would seem that catches of Indian Ocean yellowfin can be increased, but in view of the lack of knowledge, it would be more reasonable to maintain the actual level of effort in the purse seine fishery. (DBO).

Occurrence of Caligus coryphaenae on Thunnus thynnus by Hogans (1985): Corrections (Copepoda, Caligidae).

Collette,-B.B.; Cressey,-R.F.

J (Journal-Article) CRUSTACEANA. 1986. vol. 51, no. 2, p. 220

The recent report by Hogans (1985) of Caligus coryphaenae Steenstrup & Luetken, 1861, from bluefin tuna, Thunnus thynnus (L., 1758), from Prince Edward Island is marred by an error of omission and an error of interpretation. Hogans apparently referred only to the host-parasite list in Cressey et al. (1983) and did not examine Cressey & Cressey (1980) which was cited as the source of the complete host-parasite data. Hogans cites a report of C. coryphaenae "from the red tuna (Thunnus thynnus L., 1758) captured in the Red Sea by Tiews (1957)". Thunnus thynnus does not occur in the Red Sea. Tiews referred to the "Roten Thun (Thunnus thynnus) in der Nordsee" - North Sea, not Red Sea.

The western Indian Ocean tuna fishery from 1980 to 1985. A summary of data collected by coastal states.

Lawson,-T.A.; Lablache,-G.; Simeos,-F.; Ali,-A.F.

B (Book); N (Num TECH.-REP.-SEYCHELLES-FISH.-AUTH. VICTORIA-SEYCHELLES-SFA 1986. no. 001, 30 pp

Longliner and purse-seiner catch/effort statistics for tuna fisheries in the western Indian Ocean collected by Mozambique, Seychelles and Somalia are summarized. Although the data are not considered sufficient to indicate trends for the western Indian Ocean as a whole, an examination of data from the Seychelles EEZ shows that catch rates for yellowfin tuna declined consistently from 1982 to 1985, to about half their former levels. (FAO/Indo Pacific Tuna Development and Management Programme, Colombo, Sri Lanka.)

(Prospecting of tuna fisheries effected by the Japanese in the Indian Ocean.).

Stequert,-B.

J (Journal-Article) PECHE-MARIT. 1986. vol. 65, no. 1302, pp. 646-651

Since 1970, the tropical zone, as potential zone for seine fishery, is explored by the Japan Fisheries Agency, then by the JAMARC (Japan Marine Fisheries Resource Centre). After intensive research effected by one then by several purse seiners in the Pacific, the JAMARC has oriented, since some years, its explorations to the Indian Ocean, where annual exploratory fishery operations are performed since 1979. If the first explorations in 1973 and 1979 have concerned the eastern part of this ocean, the seiner Nippon-Maru explores since 1983 the zone situated between the Chagos Archipielago and the Seychelles.

Preliminary observations on tuna resources of the Arabian Sea with particular reference to distribution pattern of yellow fin tuna, Thunnus albacares (Bonnaterre).

Sulochanan,-P.; John,-M.E.; Nair,-K.N.V.

J (Journal-Article) BULL.-FISH.-SURV.-INDIA. 1986. no. 14, pp. 21-33

The tuna resources off southwest coast of India and adjacent oceanic waters with particular reference to the distribution and relative abundance of yellow-fin tuna are described based on exploratory surveys carried out by Fishery Survey of India during October 1983 to December 1985. The catch index for all tuna together and separately for yellow-fin tuna was 1.54% and 1.43% respectively. The remarkably high hooking rate recently recorded in respect of yellow-fin tuna when compared to old rates indicate positive indication for tuna exploitation from Indian waters.

(Statistical control of tuna fisheries in the EEZ of Mozambique.).

Simoes,-F.

B (Book) BOL.-DIVULG.-INST.-INVEST.-PESQ.-MAPUTO. 1986. no. 12, 21 pp

A description is given of the organization and operation of statistical data collection for the scientific and rational management of tuna exploitation in the EEZ of Mozambique.

(Experimental fishing of tuna fish with long-line in the EEZ of Mozambique.).

Simoes,-F.

B (Book) BOL.-DIVULG.-INST.-INVEST.-PESQ.-MAPUTO. 1986. no. 13, 14 pp

Results of the analysis of statistical data gathered aboard 2 crafts licensed for experimental commercial tuna fishing with long-line in the EEZ of Mozambique are presented.

Effect of tagging on the condition of southern bluefin tuna, Thunnus maccoyii (Castlenau).

Hampton,-J.

J (Journal-Article) AUST.-J.-MAR.-FRESHWAT.-RES. 1986. vol. 37, no. 6, pp. 699-705

The results of an experiment designed to assess the effects of tagging on the condition of the southern bluefin tuna, T. maccoyii , are presented. From January to March 1983, 4590 fish were tagged off Esperance, Western Australia. The tagged tuna had significantly lower relative condition factors than the untagged tuna. This effect was greatest in those at liberty 5-20 days. It was also more pronounced in tagged tuna less than 60 cm fork length. A size-related difference in activity level during capture and tagging was suggested as a possible explanation. A change in the behaviour of the tuna immediately after tagging causing them to be less susceptible to the commercial fishery was evidenced by a relatively low number of recaptures during the first 5 days after tagging.

(Surface fishing for tropical tunas in the Indian Ocean.).

Stequert,-B.; Marsac,-F.

B (Book); N (Num FAO-DOC.-TECH.-PECHES. 1986. no. 282, 213 pp

A summary is given of current knowledge regarding the biology of the principal species of tunas in the Indian Ocean, their marine environment and environmental effects on their production. The major artisanal fisheries are described by country and an examination made of the seine and cane fishing sectors.

Biology of the bluepuller, Chromis caeruleus (Cuvier), from Minicoy Atoll.

Mohan,-M.; Pillai,-C.S.G.; Kunhikoya,-K.K.

J (Journal-Article) INDIAN-J.-FISH. 1986. vol. 33, no. 4, pp. 457-470

Chromis caeruleus , a resident reef fish on live ramose corals forming a dominant component in lagoons through-out Lakshadweep, is an important livebait for tuna. The species is diurnal in habit and is an active zooplankton feeder. Analysis of the gut contents reveals little selectivity in feeding. The length-weight relationship, food and feeding, reproduction and growth parameters are discussed.

(Mozambique. Program of experimental fishing for tuna with fishing rod and live bait. A report prepared for the Research and Development of Inland Fisheries Project.).

Rato,-J.D.L.M.

R (Report); N (Nu 1986. 205 pp

An account is given of activities undertaken during the project, which was concerned with the development of tuna fisheries using rod and live bait, in Mozambique. Major tuna species present in the area are described, and fishing gear and methods used outlined, detailing also catch composition and live bait utilized.

Explosive development in the Seychelles' fishing industry.

Hempel,-E.

J (Journal-Article) INFOFISH-MARK.-DIG. 1986. no. 2, pp. 16-18

Development of the Seychelles tuna fishery industry is described, detailing the fishing grounds, operation costs, licensing agreements and markets.

Report on the Expert Consultation on the Stock Assessment of Tunas in the Indian Ocean, Colombo, Sri Lanka, 4-8 December 1986.

B (Book); K (Conf COLOMBO-SRI-LANKA-IPTP 1986. 87 pp

The report describes status of the stocks of the various tuna species in the Indian Ocean: bigeye, albacore, southern bluefin, yellowfin, skipjack, small tunas, seerfishes and billfishes. Interactions between the fisheries are examined and proposals for a tuna tagging project considered. Progress made in the collection of statistics is also discussed.

Republic of Maldives. Tuna catch and effort data 1970-1983.

Anderson,-C.

B (Book); N (Num COLOMBO-SRI-LANKA-IPTP 1986. 59 pp

Estimates are presented of tuna catch and fishing effort by the Maldivian masdhoni and vadhu dhoni fleets for the years 1970-83, The data are given with respect to method of capture, by species and by atoll. In addition, summaries of tuna catches from previous years 1959-61 and 1966-69 and reef fish catches are also presented.

Fisheries development in Lakshadweep.

J (Journal-Article) FISH.-CHIMES. 1986. vol. 6, no. 3, pp. 70-73, 75+

An account is given of the different types of fishing nets in use in Lakshadweep and tuna fishing operations.

(Analysis of the state of Atlantic yellowfin tuna stock, 30 September 1985.).

Diouf,-T.

J (Journal-Article); COLLECT.-VOL.-SCI.-PAP.-ICCAT-RECL.-DOC.-SCI.-CICTA-COLECC.-DOC.-CIENT.-CICAA. 1986. vol. 25, pp. 77-80

This paper analyzes the status of the stock of yellowfin tuna (Thunnus albacares) in the East Atlantic Ocean after the departure of most of the purse seiners to the Indian Ocean. The production model used is applied to recent ICCAT catch data and to corrected CPUE. The present fishing effort seems to be slightly lower than the optimum fishing effort corresponding to MSY. It is thus necessary to control this fishing effort level within a program on yellowfin tuna for the regeneration of the East Atlantic stock.

Indian Ocean Fishery Commission. Report of the Eighth Session of the Committee for the Management of Indian Ocean Tuna, Colombo, Sri Lanka, 3-5 December 1985.

B (Book); K (Conf FAO-FISH.-REP.-FAO,-RAPP.-PECHES. ROME-ITALY-FAO 1986. no. 351, 24 pp

This document is the final report of the Eighth Session of the Committee for the Management of Indian Ocean Tuna of the Indian Ocean Fishery commission, which was held in Colombo, Sri Lanka, from 3 to 5 December 1985. Major topics discussed were: current trends in tuna fisheries in the Indian Ocean, status of the resources, prospects of the exploitation of tuna resources, interaction between fisheries, statistics and data, management measures, future research requirements and future activities of the Indo-Pacific Tuna Development and Management Programme. The main decisions and recommendations are listed.

Towards an appropriate effort-based fishery model for the tuna fishery of Maldives

Kumar,-R.S.; Tisdell,-C.A.

J (Journal-Article) INDIAN-J.-FISH. 1987 vol. 34, no. 4, pp. 433-454

The paper considers the applicability of the Schaefer model and the Fox model to the tuna fishing industry of the Maldives. Examination of Maldivian catch and effort data throws doubt upon the applicability of these models to this fishing industry, which depends on a highly migratory species. An alternative production-type model based on a population threshold assumption is suggested and found to be much more consistent with Maldivian effort and catch data. Such a model may also have application to some other fisheries based on migratory species. (DBO)

Troll and purse seine fisheries in the west and northern Sumatra.

Merta,-G.S.

B (Book); K (Conf COLLECTIVE-VOLUME-OF-WORKING-DOCUMENTS-PRESENTED-AT-THE-EXPERT-CONSULTATION-ON-STOCK-ASSESSMENT-OF-TUNAS-IN-THE-INDIAN-OCEAN-HELD-IN-COLOMBO,-SRI-LANKA,-4-8-DECEMBER-1986. FAO-UNDP-Indo-Pacific-Tuna-Dev.-and-Manage.-Programme,-Colombo-Sri-Lanka 1987. pp. 249-261

Details are given of the tuna fisheries in the western and northern Sumatra waters, considering the troll and purse seine sectors. Species composition, production trends, and research activities are examined.

A review of national tuna fishery -- India.

James,-P.S.B.R.; Pillai,-P.P.

B (Book); K (Conf COLLECTIVE-VOLUME-OF-WORKING-DOCUMENTS-PRESENTED-AT-THE-EXPERT-CONSULTATION-ON-STOCK-ASSESSMENT-OF-TUNAS-IN-THE-INDIAN-OCEAN-HELD-IN-COLOMBO,-SRI-LANKA,-4-8-DECEMBER-1986. FAO-UNDP-Indo-Pacific-Tuna-Dev.-and-Manage.-Programme,-Colombo-Sri-Lanka 1987. pp. 342-352

Tuna fishery in India is still predominantly an artisanal activity. In the recent past, effort in the exploratory surveys as well as utilisation of the resources from the Exclusive Economic Zone of India (EEZ) and contiguous high seas were intensified. In the present communication the recent trend in national tuna fishery in India is presented and some salient points which call for immediate attention for the development of tuna fishery indicated.

Indian Ocean Fishery Commission, Committee for the Management of Indian Ocean Tuna. Report of the Government Consultation on Long-Term Institutional Arrangements for the Management of Indian Ocean Tuna, Rome, 15 and 21 May 1987.

B (Book); K (Conf FAO-FISH.-CIRC. ROME-ITALY-FAO 1987. no. 809, 9 pp

At its Ninth Session (Colombo, Sri Lanka, 9-12 December 1986) the IOFC Committee for the Management of Indian Ocean Tuna set up a small ad hoc group of nations made up of France, Japan, Seychelles, Sri Lanka and Thailand to review in detail the options available for the Long-Term Institutional Arrangements for the Management of Tuna in the Indian Ocean. This circular is the report of the Government Consultation which was held in Rome on 15 and 21 May 1987 pursuant to the Recommendation of the Committee.

Tuna resources in the Thai waters, Andaman Sea.

Boonragsa,-V.

B (Book); K (Conf COLLECTIVE-VOLUME-OF-WORKING-DOCUMENTS-PRESENTED-AT-THE-EXPERT-CONSULTATION-ON-STOCK-ASSESSMENT-OF-TUNAS-IN-THE-INDIAN-OCEAN-HELD-IN-COLOMBO,-SRI-LANKA,-4-8-DECEMBER-1986. FAO-UNDP-Indo-Pacific-Tuna-Dev.-and-Manage.-Programme,-Colombo-Sri-Lanka 1987. pp. 267-280

An examination is made of the tuna resources in the Thai waters of the Andaman Sea and the fishery industry. Fishing gear, species composition, catch rate, seasonality, fishing grounds, size composition, spawning season and grounds, growth parameters and status of stocks are examined.

Final report of the Working Group on the Tunas in the EEZs of Maldives and Sri Lanka.

B (Book); K (Conf COLLECTIVE-VOLUME-OF-WORKING-DOCUMENTS-PRESENTED-AT-THE-EXPERT-CONSULTATION-ON-STOCK-ASSESSMENT-OF-TUNAS-IN-THE-INDIAN-OCEAN-HELD-IN-COLOMBO,-SRI-LANKA,-4-8-DECEMBER-1986. 1987. pp. 281-293

Findings are presented of the Working Group on tunas in the EEZs of the Maldives, and Sri Lanka, describing the general trends of the fisheries. Catch rates, seasonality, pole-and-line effort, size composition and various population parameters are described. A brief account is made of the present status of the tuna resources.

Some observations on the tuna fisheries in the Indian Ocean, particularly in the Central Equatorial Sub-region.

Sivasubramaniam,-K.

B (Book); K (Conf COLLECTIVE-VOLUME-OF-WORKING-DOCUMENTS-PRESENTED-AT-THE-EXPERT-CONSULTATION-ON-STOCK-ASSESSMENT-OF-TUNAS-IN-THE-INDIAN-OCEAN-HELD-IN-COLOMBO,-SRI-LANKA,-4-8-DECEMBER-1986. FAO-UNDP-Indo-Pacific-Tuna-Dev.-and-Manage.-Programme,-Colombo-Sri-Lanka 1987. pp. 294-298

Surface and sub-surface fisheries for tuna in the Indian Ocean are described, examining production trends for yellowfin (Thunnus albacares), bigeye (T. obesus), longtail (T. tonggol) and skipjack (Euthynnus pelamis) tunas. Development of the fisheries and their management are discussed.

Bait-fish and tuna catches at Minicoy Island (Lakshadweep) in relation to lunar cycle during 1983-84 season

Mohan,-M.; Kunhikoya,-K.K.

J (Journal-Article) INDIAN-J.-FISH. 1987 vol. 34, no. 3, pp. 355-358

The catches of bait-fish and tuna in relation to moon phases during 1983-84 pole-and-line tuna-fishing season is discussed. Bait-fish and tuna catches for the season as a whole were relatively high during new-moon phase and low during the last quarter of the moon. Tuna catches per kg of bait fish were high during the last quarter of moon and low during newmoon phase. Efforts in both bait fishing and tuna fishing and catches-per-unit-of-effort of bait fishes and tuna were highest during newmoon phase, then decreased gradually and was lowest in the last quarters. (DBO)

The status of tuna fisheries in the Indonesian part of the Indian Ocean.

Gafa,-B.

B (Book); K (Conf COLLECTIVE-VOLUME-OF-WORKING-DOCUMENTS-PRESENTED-AT-THE-EXPERT-CONSULTATION-ON-STOCK-ASSESSMENT-OF-TUNAS-IN-THE-INDIAN-OCEAN-HELD-IN-COLOMBO,-SRI-LANKA,-4-8-DECEMBER-1986. FAO-UNDP-Indo-Pacific-Tuna-Dev.-and-Manage.-Programme,-Colombo-Sri-Lanka 1987. pp. 310-322

Various gears are used in Indonesian waters to exploit the tuna resources such as purse seines, gill nets, troll line, hand line, longline and seine. Details are given of catch rates and production trends of the various sectors.

(Tuna fishery around anchored floating objects in the Indian Ocean.).

Marsac,-F.; Stequert,-B.

J (Journal-Article) PECHE-MARIT. 1987. vol. 66, no. 1311, pp. 439-446

Fishermen have verified for a long while the concentration of pelagic fish with floating objects. This behavior permitted the development of a specific fishery using drifting and anchored objects. The drifting objects are natural like bamboos, wood planks, boxes, gratings or artificial like rafts constituted by four or six barrels supporting a metallic armature. The second type of floating objects is built by the fishermen. They are the DFC (dispositives for fish concentration) or "payaos" anchored on coastal or oceanic floors. The authors give the principal hypothesis explaining the concentration of pelagic fishes around the floating objects and present the different experiments of a Tuna fishery around DFC in the Indian Ocean, during the six last years.

The western Indian Ocean tuna fishery from 1980 to 1985: A summary of data collected by coastal states.

Lawson,-T.A.; Lablache,-G.; Simoes,-F.; Ali,-F.A.

J (Journal-Article) REV.-INVEST.-PESQ.-MAPUTO. 1987. no. 16, pp. 41-80

Purse seiners have fished for tuna in the Western Indian Ocean since 1979, when the Mauritian vessel Lady Sushil began operations, but it was not until 1983 that catches by purse seiners became significant. In that year, the number of vessels rose from five to fourteen, landing about 20,000 tonnes of skipjack (Katsuwonus pelamis) and yellowfin (Thunnus albacares). At the end of the following year, 1984, there were 49 vessels, mostly of French and Spanish registration, which together landed 100,000 tonnes. Thus in the space of two years, the purse seine fishery in the Western Indian Ocean grew to be of major importance.

Effect of reduced salinity on the initial mortality of sprat, Spratelloides delicatulus (Bennett), in captivity

Gopakumar,-G.; Mathew,-C.V.

J (Journal-Article) INDIAN-J.-FISH. 1987 vol. 34, no. 3, pp. 337-339

The effect of exposure to different concentrations of sea water on the initial mortality of Spratelloides delicatulus, the common tuna-live-bait fish of Lakshadweep was experimented. The shock mortality of the fish due to stress of capture was found to be greatly reduced by introducing them at once in 50% sea water. However, the aggregate mortality from the time of capture to the end of the second day was least among the fish exposed to 75% sea water, being about three-fourth of the mortality in 100% sea water. (DBO)

The tuna fisheries of the Republic of Maldives.

Anderson,-R.C.; Hafiz,-A.

B (Book); K (Conf COLLECTIVE-VOLUME-OF-WORKING-DOCUMENTS-PRESENTED-AT-THE-EXPERT-CONSULTATION-ON-STOCK-ASSESSMENT-OF-TUNAS-IN-THE-INDIAN-OCEAN-HELD-IN-COLOMBO,-SRI-LANKA,-4-8-DECEMBER-1986. FAO-UNDP-Indo-Pacific-Tuna-Dev.-and-Manage.-Programme,-Colombo-Sri-Lanka 1987. pp. 323-336

Details are given of data presented at the 1985 consultation regarding the stock assessment of tuna in the Indian Ocean, together with updated information including 1985 catch figures and length frequency data for 1985-86 for the Maldives fisheries for skipjack (Euthynnus pelamis), yellowfin (Thynnus albacares), frigate (Auxis thazard), little (E. alletteratus) and dogtooth (Gymnosarda nuda) tunas.

Current research on tunas in India.

James,-P.S.B.R.; Jayaprakash,-A.A.

B (Book); K (Conf COLLECTIVE-VOLUME-OF-WORKING-DOCUMENTS-PRESENTED-AT-THE-EXPERT-CONSULTATION-ON-STOCK-ASSESSMENT-OF-TUNAS-IN-THE-INDIAN-OCEAN-HELD-IN-COLOMBO,-SRI-LANKA,-4-8-DECEMBER-1986. FAO-UNDP-Indo-Pacific-Tuna-Dev.-and-Manage.-Programme,-Colombo-Sri-Lanka 1987. pp. 337-341

With the declaration of EEZ India today portends with considerable scope for the development of capture fisheries, especially the oceanic fishes like the tunas and bill fishes. The CMFR Institute has 12 research centres and 28 field stations all along the coast line and provides historical data on the variety-wise and species-wise catch of tunas and other resources collected through a well planned multistage stratified random sampling technique. The Institute is currently engaged in two projects on tunas. The first project on the resources of tunas and bill fishes, where the studies are carried out at 8 centres on the mainland and at 2 centres in the Lakshadweep. The second project is on the resource and biological studies of tuna live-baits in the Lakshadweep carried out from the Minicoy island. The Institute operates seven 13.3 m vessels and two larger vessels to carry out research investigations in the EEZ of the country.

Developing an oceanic tuna fishery in Indian EEZ.

Swaminath,-M.; Nair,-M.K.R.; Parvin,-P.

B (Book); K (Conf PROCEEDINGS-OF-INTERNATIONAL-SEMINAR-ON-TRAINING-AND-EDUCATION-FOR-MARINE-FISHERIES-MANAGEMENT-AND-DEVELOPMENT,-28,-29-AND-30-JANUARY-1986,-COCHIN,-INDIA. Swaminath,-M.;George,-K.C.;Bhande,-V.N.;Kurup,-B.M.-eds. Central-Inst.-of-Fisheries-Nautical-and-Engineering-Training,-Cochin-India 1987. pp. 77-80

The results of tuna longlining training activities conducted in the Indian EEZ are summarized. The following aspects were examined in particular: 1) proper and effective use of navigational aids; 2) meteorological and oceanographic observations to locate tuna grounds; 3) proper rigging and maintenance of gear; and 4) post-harvest operations of fish handling on board. Findings indicate good prospects for the commercial exploitation of oceanic tuna in the area.

Tuna fisheries -- an update for Sri Lanka.

Joseph,-L.; Moyiadeen,-N.M.

B (Book); K (Conf COLLECTIVE-VOLUME-OF-WORKING-DOCUMENTS-PRESENTED-AT-THE-EXPERT-CONSULTATION-ON-STOCK-ASSESSMENT-OF-TUNAS-IN-THE-INDIAN-OCEAN-HELD-IN-COLOMBO,-SRI-LANKA,-4-8-DECEMBER-1986. FAO-UNDP-Indo-Pacific-Tuna-Dev.-and-Manage.-Programme,-Colombo-Sri-Lanka 1987. pp. 299-309

Recent trends in the tuna fisheries of Sri Lanka are examined for the period 1979-85. Catch and effort data and production trends are discussed for the various fishing craft and gear.

Tuna catches by masdhonis in the first years of mechanization.

Anderson,-C.

J (Journal-Article) RASAIN. 1987. no. 7, pp. 162-167

Details are given of authorized estimates of tuna catch and effort by masdhonis in the Maldives during the period 1975-78, considering in particular the impact of mechanization.

(Contribution to the study of fish aggregating devices from of Polynesian experience.).

Depoutot,-C.

B (Book) NOTES-DOC.-OCEANOGR.-CENT.-TAHITI-ORSTOM. PAPEETE-TAHITI-ORSTOM 1987. no. 33, 159 pp

Anchored fish aggregating devices (FADs) for the catch of high sea pelagic fish have been used ever since 1981. The programme's main purpose is to bring help to artisanal tuna, Katsuwonus pelamis and Thunnus albacares , fishery. The study of the action of FAD is conducted through three ways: 1) by comparing results of tuna fishing on and out of FAD; 2) by studying the induced concentration by the FAD by means of acoustical survey techniques; 3) by studying the fish behaviour through sonic tracking. The proportions of small and big fish in FAD catches are higher than out of FAD ones, however, small fish are not so numerous as under flotsam and big fish are fewer than when there are surface prey fish. The abundance of skipjacks during FAD fishing depends on that of the neighbouring ares, which is not true for yellowfins. The observations of the individual behaviours of a skipjack and a yellowfin confirm the daily variations of the depth of swimming. It is not the case for horizontal moves.

Age and growth rate determination of southern bluefin tuna, Thunnus maccoyii , using otolith banding.

Thorogood,-J.

J (Journal-Article) J.-FISH-BIOL. 1987. vol. 30, no. 1, pp. 7-14

Otoliths of southern bluefin, Thunnus maccoyii , of between 42 cm and 167 cm F.L., taken from waters off New South Wales, South Australia, and Western Australia were prepared to reveal annual banding. Methods of preparation and examination are detailed. Otolith growth was demonstrated to be directly proportional to fish growth over the size range studied. Sampling over 13 months provided validation of the annual nature of bands for fish in their 3rd, 4th and 5th year of growth. Band formation of fish in their 2nd, 6th, 7th, 8th and 9th years of growth also appeared to be annular, though samples were available from an insufficient number of months for confident validation. Von Bertalanffy growth parameters derived from determined age-at-length are L sub(x), 261 multiplied by 3 cm; K, 0 multiplied by 108, t sub(o), -0 multiplied by 157.

On a visit to some islands in Lakshadweep.

J (Journal-Article) CMFRI-NEWSL. 1987. no. 35, pp. 2-3, 7

Details are given of observations made during a visit to the Lakshadweep Islands, regarding the pole-and-line fishery for skipjack tuna, live-bait collection, coral reef ecosystems and associated fauna and flora and other ancillary marine fisheries resources.

Seychelles tuna bulletin. Fourth quarter 1986.

B (Book); N (Num SEYCHELLES-TUNA-BULL. VICTORIA-SEYCHELLES-SFA 1987. 15 pp

The number of purse seiners active in the Western Indian Ocean during the fourth quarter of 1986 remained at 33 vessels. Preliminary catch rates for 1986 is estimated at 15.8 MT/day compared to 12.8 MT/day for 1984 and 1985. In the first half of 1986, the seasonal variation in the distribution of fishing effort and in the species composition of the catch differed from previous years. This year (1986) during January and February, the proportion of yellowfin in the catch was high, but fell sharply from April to June as vessels moved to the area south of the EEZ and to the north of the Mozambique Channel. In July, as vessels moved to the North east of the EEZ, catch rates improved with an increase in the proportion of yellowfin. The total catch by purse seiners in 1986 now stands at 135,550 tonnes. The total catch for 1986 is expected to be at least 140,000 tonnes.

Small-scale pole and line tuna fishery in Lakshadweep -- present trend, constraints and strategies for future developments.

James,-P.S.B.R.; Gopakumar,-G.; Pillai,-P.P.

J (Journal-Article) MAR.-FISH.-INF.-SERV.-TECH.-EXT.-SER. 1987. no. 77, pp. 1-10

The small-scale pole and line fishery is the mainstay of the tuna fishery of the Lakshadweep Islands. An account is given of present trends in the fishery, examining constraints and prospects for further development. Strategies appropriate to local conditions to aid policy planners involved in the development of tuna fisheries in Lakshadweep are included.

Impressions of a recent visit to Lakshadweep from the fisheries and marine biological perspectives.

James,-P.S.B.R.; Pillai,-P.P.; Jayaprakash,-A.A.

J (Journal-Article) MAR.-FISH.-INF.-SERV.-TECH.-EXT.-SER. 1987. no. 72, pp. 1-11

Observations made during a study of the pole and line fishery for skipjack, live bait fish, coral reef ecosystem and the associated flora and fauna and other resources of Lakshadweep during the period 20-28 February 1987 are presented. Scope for development of the tourism industry in the islands is examined and the need for preservation of the islands' resources discussed.

The status of exploratory fishing by oceanic purse seine in the Andaman Sea.

Poreeyanond,-D.

B (Book); K (Conf REPORT-OF-THE-2nd-MEETING-OF-TUNA-RESEARCH-GROUPS-IN-THE-SOUTHEAST-ASIAN-REGION,-MANILA,-PHILIPPINES,-AUGUST-25-28,-1987. FAO-UNDP-Indo-Pacific-Tuna-Dev.-Manage.-Programme,-Colombo-Sri-Lanka 1987. pp. 76-80

A brief account is given of exploratory purse seining tuna fishing operations conducted in the Andaman Sea. The catch was composed mainly of Katsuwonus pelamis and Thunnus albacares .

The blue (tuna) revolution.

Saleem,-B.I.

J (Journal-Article) RASAIN. 1987. no. 7, pp. 180-190

Details are given of progress made since 1970 in the tuna fishery industry in the Maldives. Developments such as the mechanization of fishing boats and the exportation of canned and frozen fish products are discussed.

Final report of the Working Group on the Tunas in the Andaman Sea Area.

B (Book); K (Conf COLLECTIVE-VOLUME-OF-WORKING-DOCUMENTS-PRESENTED-AT-THE-EXPERT-CONSULTATION-ON-STOCK-ASSESSMENT-OF-TUNAS-IN-THE-INDIAN-OCEAN-HELD-IN-COLOMBO,-SRI-LANKA,-4-8-DECEMBER-1986. 1987. pp. 239-248

The report describes the results and findings of the Working Group on Tunas in the Andaman Sea. Data regarding species composition, catch rates, production trends, seasonality, size composition, general distribution, growth parameters, maturity and spawning, seasonal movements are discussed. Maximum sustainable yield and exploitation rate, longline catch trends in adjacent areas and shared stocks are also considered.

Competition between tuna fisheries - critical review based on Atlantic examples.

Fonteneau,-A.

B (Book); K (Conf COLLECTIVE-VOLUME-OF-WORKING-DOCUMENTS-PRESENTED-AT-THE-EXPERT-CONSULTATION-ON-STOCK-ASSESSMENT-OF-TUNAS-IN-THE-INDIAN-OCEAN-HELD-IN-COLOMBO,-SRI-LANKA,-4-8-DECEMBER-1986. FAO-UNDP-Indo-Pacific-Tuna-Dev.-and-Manage.-Programme,-Colombo-Sri-Lanka COLOMBO-SRI-LANKA-FAO-UNDP 1987. pp. 195-213

This paper describes the competition observed in the Atlantic Ocean between tuna fisheries. Several types of competition are distinguished. It is first shown that for tropical tunas, there is not presently a relationship between adult fisheries and juvenile fisheries. This is probably because despite the high level of fishing effort, a recruitment overfishing has never been observed in the Atlantic, probably because of the high fecundity and wide spawning areas of these species. The competition between small tuna fisheries and large tuna fisheries are also analyzed for yellowfin (Thunnus albacares) and bigeye (Thunnus obesus). For both species this competition is estimated to be relatively minor at the ocean level, despite the important catches of juveniles. The competition between gears catching large tunas, such as longline and purse seine, is analyzed. The particularities of the vertical stock structure are hypothesized for both species from the catches and cpue by gear. As a consequence of this vertical stock structure, the purse seine is the gear which can take full profit of the yellowfin biomass, and longline the only gear capable to exploit intensively the deep bigeye stock. A more general discussion concerning the short term interactions between fisheries operating in different areas are presented.

Interactions among the Australian southern bluefin tuna fisheries: A preliminary analysis based on a tag release-recapture experiment.

Hearn,-W.S.; Majkowski,-J.

B (Book); K (Conf COLLECTIVE-VOLUME-OF-WORKING-DOCUMENTS-PRESENTED-AT-THE-EXPERT-CONSULTATION-ON-STOCK-ASSESSMENT-OF-TUNAS-IN-THE-INDIAN-OCEAN-HELD-IN-COLOMBO,-SRI-LANKA,-4-8-DECEMBER-1986. FAO-UNDP-Indo-Pacific-Tuna-Dev.-and-Manage.-Programme,-Colombo-Sri-Lanka 1987. pp. 214-225

An analysis is made of tagging data obtained in 1983 and 1984 regarding the southern bluefin tuna (Thunnus maccoyii) in Australian waters. Catch trends and management implications are considered.

Fish aggregating devices (FADs). The Mauritian experience.

Roullot,-J.; Venkatasami,-A.

B (Book); K (Conf COLLECTIVE-VOLUME-OF-WORKING-DOCUMENTS-PRESENTED-AT-THE-EXPERT-CONSULTATION-ON-STOCK-ASSESSMENT-OF-TUNAS-IN-THE-INDIAN-OCEAN-HELD-IN-COLOMBO,-SRI-LANKA,-4-8-DECEMBER-1986. FAO-UNDP-Indo-Pacific-Tuna-Dev.-and-Manage.-Programme,-Colombo-Sri-Lanka 1987. pp. 226-238

An examination is made of findings of a pilot study in Mauritania regarding the use of fishery aggregating devices as a means of controlling the fish catches.

Tuna fishery in the west coast of Peninsular Malaysia.

Yasin,-A.H.

B (Book); K (Conf COLLECTIVE-VOLUME-OF-WORKING-DOCUMENTS-PRESENTED-AT-THE-EXPERT-CONSULTATION-ON-STOCK-ASSESSMENT-OF-TUNAS-IN-THE-INDIAN-OCEAN-HELD-IN-COLOMBO,-SRI-LANKA,-4-8-DECEMBER-1986. FAO-UNDP-Indo-Pacific-Tuna-Dev.-and-Manage.-Programme,-Colombo-Sri-Lanka 1987. pp. 262-266

An account is given of the tuna fishery off the west coast of Malaysia which involves 3 major species: Thunnus tonggol, Euthynnus affinis , and Auxis thazard . Fishing grounds are detailed, catch and landing data provided and a stock assessment made.

Management of potential fishery resources.

Chidambaram,-K.

B (Book); K (Conf SEMINAR-ON-POTENTIAL-MARINE-FISHERY-RESOURCES. Rajagopalan,-M.S.-comp. Central-Marine-Fisheries-Research-Inst.,-Cochin-India 1987. no. 30 pp. 109-125

CMFRI-SPEC.-PUBL. no. 30

The marine fishery resources of India consist mainly of pelagic demersal, midwater, crustaceans, molluscs and seaweeds. Development of these sectors is discussed briefly, considering traditional and mechanized fishing operations. The development of deep-sea fisheries and tuna fisheries is examined, considering also national policy and fishery organization.

Stock assessment of tunas in the seas around India.

James,-P.S.B.R.; Srinath,-M.; Jayaprakash,-A.A.

B (Book); K (Conf COLLECTIVE-VOLUME-OF-WORKING-DOCUMENTS-PRESENTED-AT-THE-EXPERT-CONSULTATION-ON-STOCK-ASSESSMENT-OF-TUNAS-IN-THE-INDIAN-OCEAN-HELD-IN-COLOMBO,-SRI-LANKA,-4-8-DECEMBER-1986. FAO-UNDP-Indo-Pacific-Tuna-Dev.-and-Manage.-Programme,-Colombo-Sri-Lanka 1987. pp. 353-366

Data collected on catch, effort, size ranges and other biological information during the period 1982-83 to 1985-86 on the commercially important species of tunas at five centres along the Indian coast and the Lakshadweep Islands have been analysed. The effect of fishing on the stocks of Euthynnus affinis, Auxis thazard and Katsuwonus pelamis along with the estimates of standing and average annual stocks are highlighted. It was found that in the case of E. affinis , except at Mangalore and Vizhinjam, at all the other centres, namely, Calicut, Cochin and Tuticorin there is likely to be increase in yield with increase in fishing effort. In the case of A. thazard it was found there may not be significant increase in yield at Cochin with increase in effort. However, at Tuticorin, increased effort may result in higher yields of A. thazard . At Minicoy, there is scope for getting increased catches of K. pelamis with increase in effort.

Seychelles Tuna Bulletin, third quarter 1987.

B (Book); N (Num SEYCHELLES-TUNA-BULL. VICTORIA-SEYCHELLES-SFA 1987. 15 pp

Statistics are presented regarding the tuna catches of purse seiners and longliners fishing in the west Indian Ocean for the Period June-September 1987.

Effects of tropical tuna fisheries on non-target species.

Sakagawa,-G.T.

B (Book); K (Conf COLLECTIVE-VOLUME-OF-WORKING-DOCUMENTS-PRESENTED-AT-THE-EXPERT-CONSULTATION-ON-STOCK-ASSESSMENT-OF-TUNAS-IN-THE-INDIAN-OCEAN-HELD-IN-COLOMBO,-SRI-LANKA,-4-8-DECEMBER-1986. FAO-UNDP-Indo-Pacific-Tuna-Dev.-and-Manage.-Programme,-Colombo-Sri-Lanka 1987. pp. 179-194

Two examples are described, whereby non-target species are affected by the activities of tropical tuna fisheries: blue marlin (Makaira nigricans) and baitfish. Principal effects of the fisheries on the non-target stocks are reviewed.

Tuna sampling in Malaysia and Thailand.

Forster,-R.

R (Report) 1987. 21 pp

Details are given of sampling programs conducted in Thailand and Malaysia investigating the tuna and tuna-like species in the Gulf of Thailand and the Andaman Sea, in particular the species and size compositions of the catches.

Estimation of overall effective fishing intensity and stock assessment of Indian Ocean albacore (Thunnus alalunga), 1963-1984.

Hung,-F.-T.; Wang,-C.-H.; Liu,-H.-C.

B (Book); K (Conf COLLECTIVE-VOLUME-OF-WORKING-DOCUMENTS-PRESENTED-AT-THE-EXPERT-CONSULTATION-ON-STOCK-ASSESSMENT-OF-TUNAS-IN-THE-INDIAN-OCEAN-HELD-IN-COLOMBO,-SRI-LANKA,-4-8-DECEMBER-1986. FAO-UNDP-Indo-Pacific-Tuna-Dev.-Manage.-Programme,-Colombo-Sri-Lanka 1987. pp. 88-89

This paper is a study of stock assessment of Indian Ocean albacore (Thunnus alalunga) based on the catch statistics data of tuna longline fishery. Taiwanese and Japanese fishing effort data are analyzed by Honma's method. Generalized production model is used to evaluate the status of the Indian albacore stock for the years 1963 through 1984. Fishing efforts of deep longliners are corrected by an conversion factor R = 0.3876. After standardization of fishing effort, the effective fishing intensities are estimated by Honma's method. Index of effectiveness of Japanese longline fishery is far lower than of Taiwanese longline fishery. This may be due to the difference of target species of Taiwanese and Japanese tuna longline fisheries. Albacore is widely distributed in the area between the latitudes 10 degree S and 40 degree S in Indian Ocean. The major catch from Apr. to Sep. is the immature fish, and shifts to the mature and spawning fish from Oct. to Mar. Exploitation of Indian Ocean albacore appears to exceed the optimum level.

Southern bluefin tuna stock assessment 1986.

Hampton,-J.; Majkowski,-J.

B (Book); K (Conf COLLECTIVE-VOLUME-OF-WORKING-DOCUMENTS-PRESENTED-AT-THE-EXPERT-CONSULTATION-ON-STOCK-ASSESSMENT-OF-TUNAS-IN-THE-INDIAN-OCEAN-HELD-IN-COLOMBO,-SRI-LANKA,-4-8-DECEMBER-1986. FAO-UNDP-Indo-Pacific-Tuna-Dev.-and-Manage.-Programme,-Colombo-Sri-Lanka 1987. pp. 100-105

An examination is made of developments in the Australian tuna fisheries. Parental biomass and recruitment data indicate that a reduction should be made in southern bluefin tuna (Thunnus maccoyii) catches to enable recovery of stocks.

Small-scale tuna fisheries in the Indian Ocean.

Yesaki,-M.

B (Book); K (Conf COLLECTIVE-VOLUME-OF-WORKING-DOCUMENTS-PRESENTED-AT-THE-EXPERT-CONSULTATION-ON-STOCK-ASSESSMENT-OF-TUNAS-IN-THE-INDIAN-OCEAN-HELD-IN-COLOMBO,-SRI-LANKA,-4-8-DECEMBER-1986. FAO-UNDP-Indo-Pacific-Tuna-Dev.-and-Manage.-Programme,-Colombo-Sri-Lanka 1987. pp. 106-112

A summary is made of small-scale fisheries tuna landings in the Indian Ocean by country and by species, giving particular emphasis on little tuna (Euthynnus affinis). Distribution of fishing craft by gear type and relative efficiency of fishing gears are also discussed.

Fishery and age growth of kawakawa (E. affinis) and frigate tuna (A. thazard).

Joseph,-L.; Maldeniya,-R.; Knapp,-M.-van-der

B (Book); K (Conf COLLECTIVE-VOLUME-OF-WORKING-DOCUMENTS-PRESENTED-AT-THE-EXPERT-CONSULTATION-ON-STOCK-ASSESSMENT-OF-TUNAS-IN-THE-INDIAN-OCEAN-HELD-IN-COLOMBO,-SRI-LANKA,-4-8-DECEMBER-1986. FAO-UNDP-Indo-Pacific-Tuna-Dev.-and-Manage.-Programme,-Colombo-Sri-Lanka 1987. pp. 113-123

Details are given of the eastern little tuna (Euthynnus affinis) and frigate tuna (Auxis thazard fisheries of the southern and western coastal waters of Sri Lanka examining also some population biology aspects of species. Catch and CPUE, production and age and growth results are discussed.

A preliminary report on the biology and fishery of Scomberomorus lineolatus in the Zanzibar Channel.

Chisara,-P.K.

B (Book); K (Conf COLLECTIVE-VOLUME-OF-WORKING-DOCUMENTS-PRESENTED-AT-THE-EXPERT-CONSULTATION-ON-STOCK-ASSESSMENT-OF-TUNAS-IN-THE-INDIAN-OCEAN-HELD-IN-COLOMBO,-SRI-LANKA,-4-8-DECEMBER-1986. FAO-UNDP-Indo-Pacific-Tuna-Dev.-and-Manage.-Programme,-Colombo-Sri-Lanka 1987. pp. 124-134

In order to investigate some biological and fishery aspects of Scomberomorus lineolatus in the Zanzibar Channel, data was collected at Kunduchi fish landing station from Mar. To Aug. 1986. Information investigated included catch, effort and catch per unit of gill net fishery operating in the Zanzibar Channel. Also sex ratio age structure were among the parameters investigated. Both catch and catch per unit effort were highest in Apr. and were calculated to be 3199 kg, and 21.8 kg./boat/day respectively. The lowest catch of 852.6kg. Occurred in Aug. The sex ratio was 1:1. Sardines were exclusively the chief source of food for S. lineolatus . The paper discusses the values of the above parameters as estimated from this study and finally compares them with those obtained from the same region and on more or less similar species.

A method to assess the set time of the purse seiners in the Indian Ocean.

Marsac,-F.

B (Book); K (Conf COLLECTIVE-VOLUME-OF-WORKING-DOCUMENTS-PRESENTED-AT-THE-EXPERT-CONSULTATION-ON-STOCK-ASSESSMENT-OF-TUNAS-IN-THE-INDIAN-OCEAN-HELD-IN-COLOMBO,-SRI-LANKA,-4-8-DECEMBER-1986. FAO-UNDP-INDO-PACIFIC-TUNA-DEV.-AND-MANAGE.-PROGRAMME,-COLOMBO-SRI-LANKA 1987. pp. 155-161

The set times relevant to 3 types of tuna purse seine gears used by tuna boats in the Indian Ocean are analysed and their respective efficiencies are compared. The data were collected on board French and Ivorian (FI) seiners by technical officers. Since data from the Spanish vessels which deal with a specific equipment are not available, the results reported by a French seiner using this kind of equipment were considered in order to assess its efficiency. The relationship between the set time and the catch is a linear model, whatever the purse seine gear may be. They confirm that 1) less time is required for setting with the equipment used by Spanish vessels and the French vessel considered; 2) that the recently introduced equipment, with opening ring nets, among the FI fleet, provides a greater efficiency when compared with the previous one fitted with closed ring nets. When catch for several sets are grouped together, a model is presented, which gives an estimation of the total set time. The purpose of these calculations is to provide a better estimation of the purse seiner fishing effort.

A preliminary report on billfish landings on west and south coasts of Sri Lanka.

Joseph,-L.; Amarasiri,-C.

B (Book); K (Conf COLLECTIVE-VOLUME-OF-WORKING-DOCUMENTS-PRESENTED-AT-THE-EXPERT-CONSULTATION-ON-STOCK-ASSESSMENT-OF-TUNAS-IN-THE-INDIAN-OCEAN-HELD-IN-COLOMBO,-SRI-LANKA,-4-8-DECEMBER-1986. FAO-UNDP-Indo-Pacific-Tuna-Dev.-and-Manage.-Programme,-Colombo-Sri-Lanka 1987. pp. 135-144

An analysis is made of the catches of billfish made in the multi-species multigear fisheries conducted in Sri Lanka coastal waters. Fishing gear, effort, CPUE, catch and species composition and total catch estimates are discussed.

Small tuna in the west coast of Thailand.

Boonragsa,-V.; Bhatia,-U.

B (Book); K (Conf COLLECTIVE-VOLUME-OF-WORKING-DOCUMENTS-PRESENTED-AT-THE-EXPERT-CONSULTATION-ON-STOCK-ASSESSMENT-OF-TUNAS-IN-THE-INDIAN-OCEAN-HELD-IN-COLOMBO,-SRI-LANKA,-4-8-DECEMBER-1986. FAO-UNDP-Indo-Pacific-Tuna-Dev.-and-Manage.-Programme,-Colombo-Sri-Lanka 1987. pp. 145-154

An account is given of development of the small tuna fisheries off the west coast of Thailand.

Stock assessment of Indian Ocean albacore by production model analysis, 1952-1984.

Shiohama,-T.

B (Book); K (Conf COLLECTIVE-VOLUME-OF-WORKING-DOCUMENTS-PRESENTED-AT-THE-EXPERT-CONSULTATION-ON-STOCK-ASSESSMENT-OF-TUNAS-IN-THE-INDIAN-OCEAN-HELD-IN-COLOMBO,-SRI-LANKA,-4-8-DECEMBER-1986. FAO-UNDP-Indo-Pacific-Tuna-Dev.-and-Manage.-Programme,-Colombo-Sri-Lanka 1987. pp. 84-87

Catch and effective effort data on Indian albacore (Thunnus alalunga) are examined using a production model analysis.

Manual for collecting statistics and sampling on tuna and tuna-like species in the Indian Ocean and Southeast Asian region.

Sakurai,-T.; Miyake,-M.

B (Book); Q (Traini COLOMBO-SRI-LANKA-IPTP 1987. 157 pp

The manual presents information under the following chapter headings: Annual nominal catch data; Fishing craft statistics; Catch and effort data by small time-area strata; Biological sampling and size compositions of catch; Multi-purpose sampling for small-scale fisheries; Instructions for filling IPTP reporting forms; Species identification; List of standard and common names of tunas and tuna-like species; and Recovering tagged fish.

Tuna fisheries of the Indian Ocean: Recent trends and prospects.

Marcille,-J.M.

B (Book); K (Conf PROCEEDINGS-OF-THE-INFOFISH-TUNA-TRADE-CONFERENCE,-BANGKOK,-THAILAND,-25-27-FEBRUARY-1986. INFOFISH,-Kuala-Lumpur-Malaysia 1987. pp. 38-59

The status of the different stocks of major tunas in the Indian Ocean are reviewed and current catch trends examined. Prospects for future exploitation of the tuna resources are outlined, considering the following: 1) seasonality of the fishery; 2) new fishing grounds; 3) ability of the stocks to support increased effort; 4) interaction between fisheries; and 5) effect of catch rates in the other oceans.

Tuna sampling programme conducted by IPTP in Sri Lanka.

Forster,-R.

R (Report) 1987. 11 pp

Details are given of the sampling strategy adopted by the Indo-Pacific Tuna Development and Management Programme in Sri Lanka. Sampling frequency, daily landings, catch and effort, size composition and sampling forms are described. Data processing is also outlined and a summary made of data collected.

Indian Ocean tuna fisheries data summary for 1985.

B (Book); N (Num IPTP-DATA-SUMM. COLOMBO-SRI-LANKA-IPTP 1987. no. 7, 79 pp

Catch statistics and fishing craft statistics are presented for the Indian Ocean tuna fisheries in 1985. The former are presented by species, country and by gear. Details are given of the number of fisheries crafts in the national fleets in order to give information on the economic and technical developments of the fisheries.

Seychelles tuna bulletin, fourth quarter 1987.

B (Book); N (Num SEYCHELLES-TUNA-BULL. VICTORIA-SEYCHELLES-SFA 1987. 16 pp

Catch statistics are presented of the purse seiners and longliners fishing for tuna in the western Indian Ocean during the fourth quarter of 1987.

Report of the Sixth Session of the Committee for the Development and Management of the Fishery Resources of the Gulfs. Rome, 13-17 October 1986.

B (Book); K (Conf FAO-FISH.-REP.-FAO,-RAPP.-PECHES. ROME-ITALY-FAO 1987. no. 372, 70 pp

The Sixth Session of the Indian Ocean Fishery Commission's Committee for the Development and Management of the Fishery held at FAO Headquarters, Rome, from 13 to 17 October 1986. The major topics considered were: the status of the shrimp and fish resources of the Gulfs; current trends in tuna fisheries in the Arabian Sea and the Gulfs area; the centralization and standardization of fishery data collection and analysis systems; economic and social considerations in shrimp fishery management; the status of fisheries development planning in the Gulfs, and a project proposal for technical assistance in fishery resources management and small-scale fisheries development.

Fishing efficiency of Korean deep longline gear and vertical distribution of tunas in the Indian Ocean.

Gong,-Y.; Lee,-J.U.; Kim,-Y.S.

B (Book); K (Conf COLLECTIVE-VOLUME-OF-WORKING-DOCUMENTS-PRESENTED-AT-THE-EXPERT-CONSULTATION-ON-STOCK-ASSESSMENT-OF-TUNAS-IN-THE-INDIAN-OCEAN-HELD-IN-COLOMBO,-SRI-LANKA,-4-8-DECEMBER-1986. FAO-UNDP-Indo-Pacific-Tuna-Dev.-and-Manage.-Programme,-Colombo-Sri-Lanka 1987. pp. 367-372

The fishing efficiency of the regular and the deep longline and the vertical distribution of tunas by species and size group were examined based on the data from Korean tuna longline fishery in the Indian Ocean from 1973 to 1985. The deep longline gear was more efficient on bigeye tuna (Thunnus obesus) than the regular gear in the western Indian Ocean. The yellowfin (Thunnus albacares) and billfishes (Istiophoridae) are distributed at the shallow layer and bigeye at the deeper layer. The size composition of yellowfin and bigeye tunas with depth indicated that the larger the size of the fishes the deeper the swimming depth.

Interim report on 1986 tuna catch statistics in the Indian Ocean and Southeast Asian regions.

R (Report); N (Nu COLOMBO-SRI-LANKA-IPTP 1987. 63 pp

Preliminary tuna catch statistics are presented from the Indian Ocean and Southeast Asian region for 1986. The data are given according the species, country and gear.

Tuna tagging from a purse seiner.

Shah,-N.J.

J (Journal-Article) SWIO-FISH.-BULL.-BULL.-PECHES-OISO. 1987. no. 22, pp. (17-19)

Some preliminary tagging results presented from a purse seine investigating the Seychelles tuna fishing grounds. The tagging method used is described: dart tags of yellow PVC tubing with bonding nylon single barbed heads were used.

Report on the research mission "Indothon" from Djibouti to Seychelles, 3 to 19 October 1987.

Lablache-Carrara,-G.; Shah,-N.J.

J (Journal-Article) SWIO-FISH.-BULL.-BULL.-PECHES-OISO. 1987. no. 22, pp. (10-16)

Details are given of findings of a research cruise undertaken to investigate the oceanography of the waters off Somalia in relation to the tuna fisheries in the area.

Seychelles tuna bulletin. First quarter 1987.

B (Book); N (Num SEYCHELLES-TUNA-BULL. VICTORIA-SEYCHELLES-SFA 1987. 16 pp

Catch statistics are presented of the purse seiner and longliner tuna fisheries in the Western Indian Ocean for the first quarter of 1987.

Australian southern bluefin tuna fishery.

Franklin,-P.

B (Book); K (Conf INDO-PACIFIC-FISHERY-COMMISSION-IPFC.-PAPERS-PRESENTED-AT-THE-SYMPOSIUM-ON-THE-EXPLOITATION-AND-MANAGEMENT-OF-MARINE-FISHERY-RESOURCES-IN-SOUTHEAST-ASIA.-DARWIN,-AUSTRALIA,-16-19-FEBRUARY-1987. FAO-Reg.-Off.-for-Asia-and-the-Pacific,-Bangkok-Thailand 1987. no. 10 pp. 412-426

RAPA-REP. no. 10

As a consequence of the severe depletion of the Southern Bluefin Tuna (SBT) breeding stock Australia took the unprecedented step of introducing a system of individual transferable catch quotas (ITQ's) for one of its major commercial fisheries. This paper describes the biological situation which led to such a decision and why ITQ's were selected as the primary management tool. Also discussed are the processes which were undertaken to arrive at such a decision and what action has been taken to ensure Australian management efforts were not dissipated by the actions of other fleets active in the fishery for this highly migratory species. The introduction of the management program and the associated reduction in overall catch limits has resulted in an unprecedented and rapid rationalisation of the Australian SBT industry. The nature and extent of this process is also discussed.

Taiwanese tuna fishery and research in the Indian Ocean, 1985-86.

Liu,-H.-C.

B (Book); K (Conf COLLECTIVE-VOLUME-OF-WORKING-DOCUMENTS-PRESENTED-AT-THE-EXPERT-CONSULTATION-ON-STOCK-ASSESSMENT-OF-TUNAS-IN-THE-INDIAN-OCEAN-HELD-IN-COLOMBO,-SRI-LANKA,-4-8-DECEMBER-1986. FAO-UNDP-Indo-Pacific-Tuna-Dev.-and-Manage.-Programme,-Colombo-Sri-Lanka 1987. pp. 373-374

A brief account is given of the Taiwanese tuna fishery in the Indian Ocean for the period 1985-86. Two major gears are used: longlines and gill netters. Catch statistics and research activities are examined briefly.

(Aerial radiometry and tuna fisheries prospection at ORSTOM: Methodology, budget and prospective.).

Marsac,-F.; Petit,-M.; Stretta,-J.M.

B (Book); Z (Biblio INIT.-DOC.-TECH.-INST.-FR.-RECH.-SCI.-DEV.-COOP. PARIS-FRANCE-ORSTOM 1987. no. 68, 33 pp

This book is a synthesis about aerial radiometry and tuna fisheries at ORSTOM in Atlantic, Pacific and Indian Ocean. Historic and bibliographic information and description of equipment are given.

Indian Ocean Fishery Commission. Report of the Ninth Session of the Committee for the Management of Indian Ocean Tuna, Colombo, Sri Lanka, 9-12 December 1986.

B (Book); K (Conf FAO-FISH.-REP.-FAO,-RAPP.-PECHES. ROME-ITALY-FAO 1987. no. 382, 94 pp

This document is the final report of the Ninth Session of the Committee for the Management of Indian Ocean Tuna of the Indian Ocean Fishery Commission, which was held in Colombo, Sri Lanka, from 9 to 12 December 1986. Major topics discussed were: 1) trends in the world tuna fishery and markets; 2) status of resources in the Indian Ocean; 3) activities of the Indo-Pacific Tuna Development and Management Programme (IPTP) and future action; 4) management measures; and 5) options for development of tuna fisheries in coastal States.

(Development of the tuna fishery in the Indian Ocean with respect to the resources.).

Michaud,-P.; Hallier,-J.-P.

B (Book); K (Conf COLLECTIVE-VOLUME-OF-WORKING-DOCUMENTS-PRESENTED-AT-THE-EXPERT-CONSULTATION-ON-STOCK-ASSESSMENT-OF-TUNAS-IN-THE-INDIAN-OCEAN-HELD-IN-COLOMBO,-SRI-LANKA,-4-8-DECEMBER-1986. FAO-UNDP-Indo-Pacific-Tuna-Dev.-and-Manage.-Programme,-Colombo-SriLanka 1987. pp. 162-172

Since 1983, tuna purse seine fishery has increased rapidly in the Indian Ocean. This fishery, being mostly based in Seychelles, represents an excellent opportunity to this country. However, it is essential that a good management strategy be adopted in order to ensure the rational exploitation of the resources. Since this fishery is in its early stage of development, it is not yet possible to obtain an accurate assessment of the stocks based on usual stock assessment methods. Nevertheless, from existing knowledge on the Indian and Atlantic oceans, a preliminary analysis of the resources is attempted. Of the two stocks studied, the skipjack (Katsuwonus pelamis), known as an opportunist species, can support a higher exploitation rate than the yellowfin (Thunnus albacares). It would seem that catches of Indian Ocean yellowfin can be increased, but in view of the lack of knowledge, it would be more reasonable to maintain the actual level of effort in the purse seine fishery.

Tuna in the Andaman Sea.

B (Book); K (Conf COLOMBO-SRI-LANKA-FAO-UNDP 1987. 67 pp

This report summarizes knowledge on tuna resources in the Andaman Sea area. It is based on cooperative investigations by Thailand and Indonesia, and on decisions and discussions at two meetings of a working group, under the auspices of the Bay of Bengal Programme (BOBP). The meetings were held in Colombo, Sri Lanka (Oct 1985) and Phuket, Thailand (Aug 1986). Immediate objectives were to improve the practice of fishery resources assessment among member countries (Bangladesh, Sri Lanka, Maldives Thailand, Malaysia, Indonesia) and to stimulate and assist joint management activities between countries sharing fish stocks.

Overall fishing intensity of longline fishery on albacore in the Indian Ocean, 1952-1984.

Shiohama,-T.

B (Book); K (Conf COLLECTIVE-VOLUME-OF-WORKING-DOCUMENTS-PRESENTED-AT-THE-EXPERT-CONSULTATION-ON-STOCK-ASSESSMENT-OF-TUNAS-IN-THE-INDIAN-OCEAN-HELD-IN-COLOMBO,-SRI-LANKA,-4-8-DECEMBER-1986. FAO-UNDP-Indo-Pacific-Tuna-Dev.-and-Manage.-Programme,-Colombo-Sri-Lanka 1987. pp. 73-83

An examination is made of catch and effort statistics of Japanese and Taiwanese longline fisheries for albacore (Thunnus alalunga) for the period 1952-84. Effective effort and CPUE were estimated from the data.

Collective volume of working documents presented at the Expert Consultation on Stock Assessment of Tunas in the Indian Ocean held in Colombo, Sri Lanka, 4-8 December 1986.

B (Book); K (Conf COLOMBO-SRI-LANKA-FAO-UNDP 1987. 374 pp

Abstracts of the 37 working documents presented at the consultation are cited individually in this issue of ASFA.

Skipjack tuna (K. pelamis) -- aspects on the biology and fishery from the western and southern coastal waters of Sri Lanka.

Amarasiri,-C.; Joseph,-L.

B (Book); K (Conf COLLECTIVE-VOLUME-OF-WORKING-DOCUMENTS-PRESENTED-AT-THE-EXPERT-CONSULTATION-ON-STOCK-ASSESSMENT-OF-TUNAS-IN-THE-INDIAN-OCEAN-HELD-IN-COLOMBO,-SRI-LANKA,-4-8-DECEMBER-1986. FAO-UNDP-Indo-Pacific-Tuna-Dev.-and-Manage.-Programme,-Colobo-Sri-Lanka COLOMBO-SRI-LANKA-FAO-UNDP 1987. pp. 1-10

An examination was made of the seasonal and spatial distribution of the skipjack tuna (Katsuwonus pelamis) in western and southern waters of Sri Lanka. Observations regarding population biology and reproduction were also made. The results are discussed under the following headings: fishing gear and effort, catch and CPUE, age and growth, size composition, maturity and spawning.

Skipjack fishery in the Maldives.

Hafiz,-A.

B (Book); K (Conf COLLECTIVE-VOLUME-OF-WORKING-DOCUMENTS-PRESENTED-AT-THE-EXPERT-CONSULTATION-ON-STOCK-ASSESSMENT-OF-TUNAS-IN-THE-INDIAN-OCEAN-HELD-IN-COLOMBO,-SRI-LANKA,-4-8-DECEMBER-1986. FAO-UNDP-Indo-Pacific-Tuna-Dev.-and-Manage.-Programme,-Colombo-Sri-Lanka 1987. pp. 11-22

Details are given of the Maldive Island tuna fisheries, whose catch is composed of skipjack, (Katsuwonus pelamis), yellowfin (Thunnus albacares), frigate (Auxis thazard) and eastern little tuna (Euthynnus diffinis). Production trends, catch rates, length frequency distribution, parasites, reproduction and gonad indices are examined for the skipjack. The importance of proper management measures to stop overexploitation of the tuna stocks is stressed.

On the distribution and biology of yellowfin tuna (T. albacares) from the western and southern coastal waters of Sri Lanka.

Maldeniya,-R.; Joseph,-L.

B (Book); K (Conf COLLECTIVE-VOLUME-OF-WORKING-DOCUMENTS-PRESENTED-AT-THE-EXPERT-CONSULTATION-ON-STOCK-ASSESSMENT-OF-TUNAS-IN-THE-INDIAN-OCEAN-HELD-IN-COLOMBO,-SRI-LANKA,-4-8-DECEMBER-1986. FAO-UNDP-Indo-Pacific-Tuna-Dev.-and-Manage.-Programme,-Colombo-Sri-Lanka 1987. pp. 23-32

The distribution and biology of the yellowfin tuna (Thunnus albacares) in the western and southern coastal waters of Sri Lanka are discussed, examining also the reproductive biology of the species. The results are considered under the following headings: catch, effort and CPUE, age and growth, recruitment and migration, maturity and spawning.

Seychelles tuna bulletin, second quarter 1987.

B (Book); N (Num SEYCHELLES-TUNA-BULL. VICTORIA-SEYCHELLES-SFA 1987. 15 pp

The number of purse seiners active in the Western Indian Ocean during the second quarter of 1987 decreased from 33 vessels during the previous quarter to a minimum of 29 in May, increasing to 30 in Jun. Good catch rates were obtained during this quarter averaging 16MT/day; the highest catch rate ever recorded during this period for this fishery. The proportion of skipjack in the catch increased in April as vessels moved south to Mozambique Channel. An increase in the catch rate of yellowfin also occurred. The cumulative catch by purse seiners in the Western Indian Ocean for the first half of 1987 was estimated at 42,980 tonnes. A new fishing Agreement was signed in June with a Soviet fishing company that will take effect on the 1st of September 1987. The agreement grants fishing rights to a maximum of 4 purse seiners and 2 longliners to fish for tuna in Seychelles waters. In return Seychelles will benefit from a substantial percentage of the fish caught in its waters.

Fishery interaction: How do we define it and how do we measure it?.

Kleiber,-P.

B (Book); K (Conf COLLECTIVE-VOLUME-OF-WORKING-DOCUMENTS-PRESENTED-AT-THE-EXPERT-CONSULTATION-ON-STOCK-ASSESSMENT-OF-TUNAS-IN-THE-INDIAN-OCEAN-HELD-IN-COLOMBO,-SRI-LANKA,-4-8-DECEMBER-1986. FAO-UNDP-Indo-Pacific-Tuna-Dev.-and-Manage.-Programme,-Colombo-Sri-Lanka 1987. pp. 173-178

Factors to be taken into account in defining fishery interaction and in designing a programme to address it are examined. Applications to assessment of interaction among tuna fisheries in the Indian Ocean are discussed.

Inference of impact of purse seine fishery on longline fishery for yellowfin tuna in the Indian Ocean.

Suzuki,-Z.

B (Book); K (Conf COLLECTIVE-VOLUME-OF-WORKING-DOCUMENTS-PRESENTED-AT-THE-EXPERT-CONSULTATION-ON-STOCK-ASSESSMENT-OF-TUNAS-IN-THE-INDIAN-OCEAN-HELD-IN-COLOMBO,-SRI-LANKA,-4-8-DECEMBER-1986. FAO-UNDP-Indo-Pacific-Tuna-Dev.-and-Manage.-Programme,-Colombo-Sri-Lanka 1987. pp. 33-39

An examination was made of the interaction between the purse seine and longline fisheries for yellowfin tuna (Thunnus albacares) in the Indian Ocean. Yield-per-recruit analyses indicate that the total catches of yellowfin will increase by development of the purse seine fisheries with reduction of the longline catch.

Trend of Japanese longline CPUE for yellowfin and bigeye tunas.

Koido,-T.; Miyabe,-N.

B (Book); K (Conf COLLECTIVE-VOLUME-OF-WORKING-DOCUMENTS-PRESENTED-AT-THE-EXPERT-CONSULTATION-ON-STOCK-ASSESSMENT-OF-TUNAS-IN-THE-INDIAN-OCEAN-HELD-IN-COLOMBO,-SRI-LANKA,-4-8-DECEMBER-1986. FAO-UNDP-Indo-Pacific-Tuna-Dev.-and-Manage.-Programme,-Colombo-Sri-Lanka 1987. pp. 40-43

CPUE data are presented for the Japanese longline fisheries for yellowfin (Thunnus albacares) and bigeye tunas (T. obesus) in the Indian Ocean and an analysis made of the trends.

Development of a multi-cohort analysis method and its application to the Indian Ocean yellowfin tuna.

Wang,-C.-H.; Tanaka,-S.

B (Book); K (Conf COLLECTIVE-VOLUME-OF-WORKING-DOCUMENTS-PRESENTED-AT-THE-EXPERT-CONSULTATION-ON-STOCK-ASSESSMENT-OF-TUNAS-IN-THE-INDIAN-OCEAN-HELD-IN-COLOMBO,-SRI-LANKA,-4-8-DECEMBER-1986. FAO-UNDP-Indo-Pacific-Tuna-Dev.-and-Manage.-Programme,-Colombo-Sri-Lanka 1987. pp. 44-57

Details are given of the methodology involved in converting length composition data into catch-at-age data. The data thus obtained were then used to estimate recruitment and fishing mortality by a multi-cohort analysis for the Japanese yellowfin tuna (Thunnus albacares) fishery in the Indian Ocean.

Preliminary yield per recruit analysis of the Indian Ocean yellowfin.

Marsac,-F.; Hallier,-J.-P.

B (Book); K (Conf COLLECTIVE-VOLUME-OF-WORKING-DOCUMENTS-PRESENTED-AT-THE-EXPERT-CONSULTATION-ON-STOCK-ASSESSMENT-OF-TUNAS-IN-THE-INDIAN-OCEAN-HELD-IN-COLOMBO,-SRI-LANKA,-4-8-DECEMBER-1986. FAO-UNDP-Indo-Pacific-Tuna-Dev.-and-Manage.-Programme,-Colombo-Sri-Lanka 1987. pp. 58-72

This document presents estimates of age specific F by gear on the yellowfin (Thunnus albacares) and bigeye (T. obesus) tuna fisheries of the Indian Ocean and tries to simulate the theoretical interactions in terms of yield per recruit between surface and longline gears fishing on yellowfin stock. By using Asian longline data (Japan, Korea, Taiwan), artisanal fishery data (Maldives, Sri Lanka) and purse seine data (France, Spain, Ivory Coast), cohort analysis yield per recruit analysis according to the RICKER multigear model are performed. Artisanal fisheries as they are catching mainly small fish, induce very unfavorable values of yellowfin yield per recruit. On the other hand, purse seining, a less selective method, can enlarge the yield per recruit by increasing the fishing mortality on a wide range of fish lengths. Interactions between yellowfin fisheries tend to prove, for a high recruitment level, that increasing purse seine catches would generate a moderate negative effect on the longline catches and no effect on the artisanal catches. For bigeye, very little change in its yield per recruit was noted when purse seining is introduced. It would seem that an increase of the longline fishing effort would generate a larger bigeye production, if the catchability coefficient remains constant.

On the distribution and biology of yellowfin tuna (T. albacares) from the western and southern coastal waters of Sri Lanka.

Maldeniya,-R.; Joseph,-L.

B (Book); K (Conf STUDIES-OF-THE-TUNA-RESOURCE-IN-THE-EEZs-OF-SRI-LANKA-AND-MALDIVES. 1988. pp. 108-122

The findings are presented of a study of the distribution and biology of yellowfin tuna (Thunnus albacares) in the western and southern coastal waters of Sri Lanka. Catch, effort, CPUE, age and growth, recruitment and migration, maturity and spawning are discussed.

Studies of the tuna resource in the EEZs of Sri Lanka and Maldives.

B (Book); K (Conf COLOMBO-SRI-LANKA-BAY-OF-BENGAL-PROJECT-UNDP-FAO 1988. 144 pp

The report updates knowledge on the tuna resources in the EEZs of the Maldives and Sri Lanka. Abstracts of the 8 papers presented are cited individually.

Modified water spray chumming system for pole and line fishing of tuna.

Namboodiri,-K.S.

J (Journal-Article) FISH.-TECHNOL.-SOC.-FISH.-TECHNOL.,-COCHIN. 1988. vol. 25, no. 1, pp. 69-71

A water spray chumming system consisting of a 65 x 50 mm centrifugal pump driven by the propulsion engine through a PTO clutch and "V" pulley power transmission system has been developed for the pole and line fishing of tuna. Water is sprayed through pipe loop system fitted on the edge of the fishing platform of the boat through small holes. The distance of the spray length can be adjusted by controlling the flow of the pump discharge water through a wheel valve.

Tuna fisheries -- an update for Sri Lanka.

Joseph,-L.; Moyiadeen,-N.M.

B (Book); K (Conf STUDIES-OF-THE-TUNA-RESOURCE-IN-THE-EEZs-OF-SRI-LANKA-AND-MALDIVES. 1988. pp. 79-93

An examination is made of recent trends in the tuna fisheries of Sri Lanka covering the period 1979-85. Fishing craft and gear used are described and the production of skipjack (Euthynnus pelamis), yellowfin (Thunnus albacares) and small tunas are discussed.

Fishery of kawakawa and frigate tuna, their age and growth.

Joseph,-L.; Maldeniya,-R.; Knaap,-M.-Van-der

B (Book); K (Conf STUDIES-OF-THE-TUNA-RESOURCE-IN-THE-EEZs-OF-SRI-LANKA-AND-MALDIVES. 1988. pp. 123-140

An account is given of the fishery for kawakawa (Euthynnus affinis) and Auxis species in the western and southern coastal waters of Sri Lanka. Catch and CPUE, production, age and growth are discussed for kawakawa and A. thazard in particular.

Some observations on the tuna fisheries in the Indian Ocean, particularly in the central equatorial sub-region.

Sivasubramaniam,-K.

B (Book); K (Conf STUDIES-OF-THE-TUNA-RESOURCE-IN-THE-EEZs-OF-SRI-LANKA-AND-MALDIVES. 1988. pp. 22-29

An account is given of the tuna fisheries of the Indian Ocean, detailing the species involved and catch rates. Development trends and management of the tuna resources of the Indian Ocean are discussed.

Skipjack fishery in the Maldives.

Hafiz,-A.

B (Book); K (Conf STUDIES-OF-THE-TUNA-RESOURCE-IN-THE-EEZs-OF-SRI-LANKA-AND-MALDIVES. 1988. pp. 30-46

General production trends of the skipjack (Katsuwonus pelamis) fishery of the Maldives are examined, considering catch rates and length frequency distributions. Biological data such as sex ratio, gonad maturity and gonad indices are also included.

Oceanographic observations and exploratory fishings in the East China Sea, the eastern Indian Ocean, and the Central Pacific Ocean.

B (Book); N (Num DATA-OCEANOGR.-OBS.-EXPLOR.-FISH.-SHIMONOSEKI-UNIV.-FISH. 1988. no. 14, 70 pp

Oceanographic observations made during fishery surveys conducted in the East China Sea, Indian Ocean and Central Pacific Ocean during 1986 and 1987 are presented. Exploratory tuna longline activities were also conducted.

Development of a multi-cohort analysis method and its application to the Indian Ocean yellowfin tuna length composition.

Wang,-Chien-Hsiung; Tanaka,-S.

J (Journal-Article) BULL.-FAR-SEAS-FISH.-RES.-LAB.-ENYOSUIKENPO. 1988. no. 25, pp. 1-72

A new multi-cohort model with the use of fishing effort as a tuning factor was developed and applied to yellowfin tuna (Thunnus albacares) data of the Japanese longline fishery in the Indian Ocean from 1952 to 1980. The length compositions were converted to age compositions by means of normal curve fitting. The result of analysis showed a decrease of recruitment and population size. However, it should be noted that catches by the surface fisheries were neglected in these calculations.

Skipjack tuna (K. pelamis)--aspects of the biology and fishery from the western and southern coastal waters of Sri Lanka.

Amarasiri,-C.; Joseph,-L.

B (Book); K (Conf STUDIES-OF-THE-TUNA-RESOURCE-IN-THE-EEZs-OF-SRI-LANKA-AND-MALDIVES. 1988. pp. 94-107

The seasonal and spatial distributions of skipjack tuna (Katsuwonus pelamis) in the western and eastern coastal waters of Sri Lanka are examined, considering also population biological parameters including age and growth, size composition, maturity and spawning.

The fisheries of Seychelles.

Lestang,-J.N.-de

B (Book) INDIAN-OCEAN-ISLANDS-DEVELOPMENT. Appleyard,-R.T.;Ghosh,-R.N.-eds. CANBERRA-AUSTRALIA AUSTRALIAN-NATL.-UNIV. 1988. no. 1 pp. 172-185

INDIAN-OCEAN-POLICY-PAP. no. 1

A brief description of the fisheries sector is presented with reference to the artisanal fishery (demersal) and the industrial fishery (tuna). In the short term emphasis will be placed on developing shore-based tuna-related industries that obtain raw material from licensed foreign vessels.

Recruitment and migratory behaviour of yellowfin tuna (Thunnus albacares) from the western and southern coasts of Sri Lanka.

Maldeniya,-R.; Joseph,-L.

B (Book) COLOMBO-SRI-LANKA-IPTP 1988. 16 pp

Yellowfin tuna (Thunnus albacares) made up 23-28% of the tuna catches in the local tuna fisheries in recent years, with an annual production of 6000 to 9000 mt. Bulk of this production came from the gillnet fishery, conducted year round with the level of effort varying seasonally. This paper analysis the catch per unit effort (CPUE) and length data obtained from the gillnet fishery during a four year period (July 1982 to June 1986) to determine the recruitment and migratory behaviour of the species along the western and southern coastal waters of Sri Lanka.

Status and programmes of marine fisheries development and management in Lakshadweep.

Varghese,-G.

J (Journal-Article); CMFRI-SPEC.-PUBL. 1988. no. 40, pp. 84-85

Tuna and tuna-like fishes of Indian seas, hold great promise for development of fishing industry in India. The percentage composition of total tunas in the all-India marine fish production ranged from 0.3% in 1970 to 1.36% in 1984-86. Lakshadweep have the distinction of being the only region in India where an organized tuna fishery has been established in the small-scale mechanised sector. Lakshadweep waters are potentially rich for tuna and shark. The principal gear employed is pole and line. Troll lines and hand lines form subsidiary gears.

Pole and line fishing gear-making industry of Lakshadweep.

Livingston,-P.

J (Journal-Article); CMFRI-SPEC.-PUBL. 1988. no. 40, p. 70

An account is given of the indigenous industry that makes the skipjack tuna pole and line (live bait) gear in Lakshadweep Islands. General aspects of this cottage industry such as the ownership, working place, tools, funds, labour, wages, materials and their procurement, economics and organisation are dealt with Various aspects of hand forging of hooks at Minicoy are described. Also aspects such as seasoning, selection and sizing of poles, selection of hooks, sizing of the line and assembling and testing the gear are dealt with.

Strategies for tuna fisheries development and management in the Indian Exclusive Economic Zone.

James,-P.S.B.R.; Pillai,-P.P.

J (Journal-Article); CMFRI-SPEC.-PUBL. 1988. no. 40, p. 95

A retrospect of national tuna fishery in India is presented, and strategies and perspectives for the development and management of tuna fisheries, chiefly through augmentation and melioration in the (1) traditional small-scale sector; (2) medium commercial fishery sector; and, (3) large-scale commercial fishery sector are presented with substantiating data and information. The prime need of tapping the skipjack tuna resource from the oceanic sector of the EEZ of India and strategies involved in the augmentation of skipjack production by planned development of the small scale fishery sector around the oceanic islands are discussed. The prospects of acquisition and utilisation of the vessel capacity, equipments and expertise of the develop nations in the operational sector of large scale commercial tuna fishery for yellowfin and bigeye from the EEZ, and other policy options for tuna fishery development in the oceanic waters are reviewed.

Management and conservation of marine fishery resources of Andaman and Nicobar Islands.

Dorairaj,-K.; Soundararajan,-R.

J (Journal-Article); CMFRI-SPEC.-PUBL. 1988. no. 40, pp. 96-97

The Andaman and Nicobar Islands offer vast potential fish resources. The remoteness of these islands, lack of adequate information on the areas of abundance of the important fish resources and inadequate infrastructure facilities have posed composite problems in management of the fishery resource exploitation with the result that many important resources like tunas and tuna like fishes, the fishery potential of which is estimated to be around 1,000,000 tonnes, have been hitherto unexploited. The need to study and monitor the important pelagic and demersal resources, establishment of Fisheries Development Corporation for these Islands and improving the various infrastructure facilities like suitable large vessels, modern gears, fish processing and marketing facilities are discussed.

Yellowfin tuna in the Maldives.

Anderson,-R.C.

B (Book); K (Conf STUDIES-OF-THE-TUNA-RESOURCE-IN-THE-EEZs-OF-SRI-LANKA-AND-MALDIVES. 1988. pp. 47-67

A summary is given of biological knowledge regarding yellowfin tuna (Thunnus albacares) caught in the Maldives. Catch rates, catch/effort, maximum sustainable yields are presented. Length-weight relationships, length frequency distributions, reproduction, growth and migration of the species are also discussed.

Mechanization of the skipjack tuna pole and line (live bait) fishery in Lakshadweep.

Livingston,-P.

J (Journal-Article); CMFRI-SPEC.-PUBL. 1988. no. 40, pp. 68-69

A comprehensive account is given of the early developments and progress achieved in the field of mechanization of the skipjack tuna (Katsuwonus pelamis) pole and line (live bait) fishery of Lakshadweep, with special reference to the extension of this unique fishing technique from Minicoy to other Islands since 1958. Based on this study, several of the immediate and future needs in mechanization of the Lakshadweep skipjack tuna pole and line (live bait) fishery are pointed out, so as to enable tuna fisheries developments in sophisticated lines in Lakshadweep, taking useful lessons from the Japanese and Californian fisheries.

Pole and line tuna fishing techniques -- a comparative study with special reference to Lakshadweep fisheries.

Livingston,-P.

J (Journal-Article); CMFRI-SPEC.-PUBL. 1988. no. 40, pp. 69-70

The present paper gives a scientific exposition of certain hitherto little known aspects of the skipjack (Katsuwonus pelamis) tuna pole and line (TPL) fishing technique of Lakshadweep. Four varieties of this gear are described, giving a detailed description of the typical gear. A comparison of this fishing technique with the skipjack TPL of Japan, highseas yellowfin TPL of California and yellowfin TPL of polynesia is made based on literature. The problems of tuna not biting the hook or chum on certain occasions and of the breaking of poles in the Lakshadweep TPL technique are discussed and remedies suggested. The need for introducing the team-gear, the use of baithook, lure-hook and striker, and for improving the mode of angling, chumming and water splashing by adopting technological advancements from the other TPL techniques under comparison are given for increasing the production of tuna Lakshadweep.

Schooling behaviour of tunas in Lakshadweep waters.

Livingston,-P.

J (Journal-Article); CMFRI-SPEC.-PUBL. 1988. no. 40, pp. 31-32

The present paper describes 9 kinds of schooling patterns of the skipjack tuna (Katsuwonus pelamis) and the yellowfin tuna (Thunnus albacares) in the pole and line (live bait) fishing grounds, as identified locally by fisherme of Lakshadweep, particularly Minicoy. These are described here as schooling patterns I to IX after giving their local names and some clue to their identification from boats. The surface or subsurface nature of occurrence of the school, its leaping, feeding and swimming activity, biting habit, biting habit, vulnerability to the gear, size of the school, approximate size and species composition of the school, and the association of the school with water discolouration, floatsam, seabirds, predators, etc are described. The paper also describes four different approaches of the boat to the different kinds of tuna schools.

Detection of tuna schools from observations on sea birds in the skipjack pole-and-line fishing of Lakshadweep.

Livingston,-P.

J (Journal-Article); CMFRI-SPEC.-PUBL. 1988. no. 40, pp. 30-31

The paper deals with the usefulness of sea birds in detecting tuna schools in the pole and line (live bait) fishing technique of Lakshadweep with special reference to Minicoy. Brief notes on the ecology, habitat and distribution of four common species of sea birds, viz., Anous stolidens, Sterna anathaetus, S. bengalensis and S. hirundo , are given together with a list of birds recorded from the different Islands in Lakshadweep. A positive co-relation between the number of sea birds observed and the number of tuna caught on the same day by the observational boat could be established for the fair tuna season, November 1980 to May 1981, at Minicoy. Two peaks, November and April, could be observed in the number of birds, coinciding with peaks in tuna catch Standardised Effort. The various causes for the association of tuna and the birds are brought to light.

Prospects for increasing cephalopod production of India.

Alagarswami,-K.; Meiyappan,-M.M.

J (Journal-Article); CMFRI-SPEC.-PUBL. 1988. no. 40, pp. 21-22

From the order of a 1000 tonnes in 1973, the cephalopod production has risen to the order of 30,000 tonnes in 1985. With aimed fishing, it is certainly possible to increase production of squids and cuttlefishes from the presently exploited zone. Under the aegis of the Marine Products Export Development Authority, certain actions have been initiated in this direction in the recent past at experimental fishing level. Squid and cuttlefish resources in the neritic waters appear to be substantial. Octopus production reported from Lakshadweep is very nominal, being about 14 tonnes/annum. Scope, if any, for improving this production and exploring new grounds needs detailed investigation. From the oceanic waters of EEZ and beyond, the prospects are for the oceanic squids, considered next only to the tuna resources in importance.

Status of tuna fishery in India.

James,-P.S.B.R.; Jayaprakash,-A.A.

B (Book); K (Conf COLLECTIVE-VOLUME-OF-WORKING-DOCUMENTS.-VOL.-3.-PRESENTED-AT-THE-EXPERT-CONSULTATION-ON-STOCK-ASSESSMENT-OF-TUNAS-IN-THE-INDIAN-OCEAN,-HELD-IN-MAURITIUS,-22-27-JUNE-1988. FAO-UNDP-Indo-Pacific-Tuna-Dev.-and-Manage.-Programme,-Colombo-Sri-Lanka 1988. pp. 278-291

Following a brief account of the craft and gear involved in the tuna fisheries of India, and examination is made of production trends, considering seasonal distribution patterns of CPUE and species composition. Purse seining and longlining surveys are outlined and data regarding stock assessment discussed.

Tuna resources off the east coast of India as revealed by charter operations.

John,-M.E.; Patil,-S.M.; Somvanshi,-V.S.

J (Journal-Article) BULL.-FISH.-SURV.-INDIA. 1988. no. 17, pp. 22-48

The results of about a dozen chartered vessels engaged in tuna fishing off the east coast of India during 1985-88 are presented. The general picture that emerges from the study indicates a viable longline fishery during December to April on the east coast of India.

Tuna resources off the south-west coast of India as surveyed during 1986-87.

Sivaprakasam,-T.E.; Sudarsan,-D.

J (Journal-Article) BULL.-FISH.-SURV.-INDIA. 1988. no. 17, pp. 1-21

During 1986-87 Fishery Survey of India conducted extensive survey for tuna resources off south-west coast of India. This confirms that the high concentration of tunas are likely to last for several years until there is considerable fishing pressure on these stocks. The tunas are available throughout the year with high concentration for at least 9 months from 12 degree N to 15 degree N.

An appraisal of marine fishery resources of the Indian Exclusive Economic Zone.

Sudarsan,-D.; Sivaprakasam,-T.E.; Somvanshi,-V.S.; Joh,-M.E.; Nair,-K.N.V.; Joseph,-A.

J (Journal-Article) BULL.-FISH.-SURV.-INDIA. 1988. no. 18, pp. 1-85

The present study is based on the exploratory survey data collected by Fishery Survey of India vessels and attempts to assess the quantum of resources from the presently unexploited grounds outside 50 m depth upto 300 m in the case of demersal fisheries within EEZ of India. The current yield of fishery resources of the sea around India is about 1.8 million tonnes against wide ranging estimates of a potential of 2.3-8.5 million tonnes, which offers great scope to increases the marine fish production. The report also describes infrastructure facilities required to exploit these resources.

Tuna fishery of the Calicut area during the seasons from 1981 to '88

Yohanna,-T.M.; Balasubramanian,-K.K.

J (Journal-Article) INDIAN-J.-FISH. 1988 vol. 35, no. 4, pp. 304-308

Since 1982-'83 tuna catches are on the increase at Calicut, Kerala, India. Effort has increased since 1984-'85 due to modernisation of craft, and simultaneously CPUE also showed increase, indicating scope for further development of the fishery. Situation in July, 1987 perhaps indicates the abundance of tunas in the area during monsoon period.

Size group of skipjack and yellowfin tuna from exploratory fishing survey in the Andaman Sea 1988.

Dhammasak-Poreeyanond

B (Book); K (Conf COLLECTIVE-VOLUME-OF-WORKING-DOCUMENTS.-VOL.-3.-PRESENTED-AT-THE-EXPERT-CONSULTATION-ON-STOCK-ASSESSMENT-OF-TUNAS-IN-THE-INDIAN-OCEAN,-HELD-IN-MAURITIUS,-22-27-JUNE-1988. FAO-UNDP-Indo-Pacific-Tuna-Dev.-and-Manage.-Programme,-Colombo-Sri-Lanka 1988. pp. 13-17

A summary is presented of the findings of a purse seine survey conducted in 1988 concerning the tuna fishery in the Andaman Sea. Catches were mainly composed of Thunnus albacares and Katsuwonus pelamis); data are given regarding total weight of catch, individual sizes and length frequencies. Applications of the information obtained in rational exploitation of the tuna resources in the Indian Ocean are considered briefly.

A study of licensing arrangements for foreign fishing boats in the EEZ of Sri Lanka and an analysis of their catch data.

Atapattu,-A.R.

B (Book); K (Conf COLLECTIVE-VOLUME-OF-WORKING-DOCUMENTS.-VOL.-3.-PRESENTED-AT-THE-EXPERT-CONSULTATION-ON-STOCK-ASSESSMENT-OF-TUNAS-IN-THE-INDIAN-OCEAN,-HELD-IN-MAURITIUS,-22-27-JUNE-1988. FAO-UNDP-Indo-Pacific-Tuna-Dev.-and-Manage.-Programme,-Colombo-Sri-Lanka 1988. pp. 304-308

A discussion is presented on the government policy in Sri Lanka to exploit deep-sea resources through foreign collaboration with participation of the local private sector. Salient features of the Foreign Fishing Act 1979 are discussed. Tuna catch statistics are given for the 13 applicant countries and fishing areas covered are indicated.

The status of tuna fisheries in Sri Lanka.

Dayaratne,-P.; Maldeniya,-R.

B (Book); K (Conf COLLECTIVE-VOLUME-OF-WORKING-DOCUMENTS.-VOL.-3.-PRESENTED-AT-THE-EXPERT-CONSULTATION-ON-STOCK-ASSESSMENT-OF-TUNAS-IN-THE-INDIAN-OCEAN,-HELD-IN-MAURITIUS,-22-27-JUNE-1988. FAO-UNDP-Indo-Pacific-Tuna-Dev.-and-Manage.-Programme,-Colombo-Sri-Lanka 1988. pp. 292-303

An examination is made of available information regarding the tuna fisheries of Sri Lanka. Fishing craft and gear, catch rates, production and development trends are discussed.

Observations on skipjack (Katsuwonus pelamis) and yellowfin tuna (Thunnus albacares) in the Andaman Sea of Thailand.

Weera-Pokapunt; Pattira-Sawasdiworn

B (Book); K (Conf REPORT-OF-THE-2nd-SOUTHEAST-ASIAN-TUNA-CONFERENCE-AND-3rd-MEETING-OF-TUNA-RESEARCH-GROUPS-IN-THE-SOUTHEAST-ASIAN-REGION,-KUALA-TERENGGANU,-MALAYSIA,-22-25-AUGUST,-1988. FAO-UNDP-Indo-Pacific-Tuna-Dev.-and-Manage.-Programme,-Colombo-Sri-Lanka 1988. pp. 211-220

A total of 1,860 samples of skipjack (Katsuwonus pelamis) and 2,060 samples of yellowfin tuna (Thunnus albacares) were sampling from 25 operations of tuna purse seining in the Andaman Sea of Thailand, by R/V Chulabhorn , during February to May, 1988. Measurement of fork length, body weight and sex were recorded for determine the size distribution, length-weight relationship and sex ratio. The mean length at maturity of skipjack was observed to be 348 mm. for male and 346 mm. for female, while yellowfin tuna was observed to be 417 mm. for male and 429 mm. for female. Sex ratio of skipjack for immature group to male and female are 1.8:1.4:1 and of yellowfin tuna are 11.6:1.6:1.

Small craft Thunnus albacares fishery in the Zanzibar Channel.

Chisara,-P.K.

B (Book); K (Conf COLLECTIVE-VOLUME-OF-WORKING-DOCUMENTS.-VOL.-3.-PRESENTED-AT-THE-EXPERT-CONSULTATION-ON-STOCK-ASSESSMENT-OF-TUNAS-IN-THE-INDIAN-OCEAN,-HELD-IN-MAURITIUS,-22-27-JUNE-1988. FAO-UNDP-Indo-Pacific-Tuna-Dev.-and-Manage.-Programme,-Colombo-Sri-Lanka 1988. pp. 269-277

In order to investigate the small craft Thunnus albacares fishery in the Zanzibar Channel, data were collected from September to December, 1986. Information investigated included catch/effort and species composition of both gill net and trolling line fisheries operating in the Zanzibar Channel. Average catches per day for a trolling line fishery for September and October were 169.73 kg. and 188.6 kg. respectively. Average catches per day for a gill net fishery for October and November were estimated to 645.75 kg. and 319.43 respectively. There are 2 peak seasons in the yellowfin tuna fishery appearing during the NE monsoon (April/May) and in the end of SE monsoon (October/November).

Review of tunas fishing in the Indian Ocean and the main results of Soviet investigations of tunas.

Demidov,-V.F.; Romanov,-E.V.

B (Book); K (Conf COLLECTIVE-VOLUME-OF-WORKING-DOCUMENTS.-VOL.-3.-PRESENTED-AT-THE-EXPERT-CONSULTATION-ON-STOCK-ASSESSMENT-OF-TUNAS-IN-THE-INDIAN-OCEAN,-HELD-IN-MAURITIUS,-22-27-JUNE-1988. FAO-UNDP-Indo-Pacific-Tuna-Dev.-and-Manage.-Programme,-Colombo-Sri-Lanka 1988. pp. 349-355

An account is given of the tuna fisheries in the Indian Ocean describing development of the longline fishery during the period 1952-83 and production trends. Investigations conducted by the USSR in the area are outlined, giving also a summary of major results obtained.

Tuna catch and its distribution along the Iranian coast.

Nikouyan,-A.

B (Book); K (Conf COLLECTIVE-VOLUME-OF-WORKING-DOCUMENTS.-VOL.-3.-PRESENTED-AT-THE-EXPERT-CONSULTATION-ON-STOCK-ASSESSMENT-OF-TUNAS-IN-THE-INDIAN-OCEAN,-HELD-IN-MAURITIUS,-22-27-JUNE-1988. FAO-UNDP-Indo-Pacific-Tuna-Dev.-and-Manage.-Programme,-Colombo-Sri-Lanka 1988. pp. 265-268

The species that mainly contribute to the tuna fisheries of Iran are longtail (Thunnus tonggol), kawakawa (Euthynnus affinis), seerfish (Scomberomorus) and billfish. Details are given of catch distributions, fishing seasons, fishing methods and size distribution.

Current knowledge of the distribution, behaviour and abundance of tunas with suggestions for the development of tuna fishery in the Indian EEZ.

James,-P.S.B.R.; Jayaprakash,-A.A.

B (Book); K (Conf THE-FIRST-INDIAN-FISHERIES-FORUM,-PROCEEDINGS.-DECEMBER-4-8,-1987,-MANGALORE,-KARNATAKA. Joseph,-M.M.-ed. 1988. pp. 211-219

The paper outlines the status of the tuna fishery in the Indian EEZ and the annual and seasonal fluctuations in the catches in the maritime states. A brief account of the catch, effort, CPUE, species and size composition and distribution pattern of tunas caught by multiple gears at selected centres like Mangalore, Calicut, Cochin Vizhinjam, Tuticorin and Minicoy along with some aspects of behaviour of tunas is given. The results of the recent tuna long line fishery operations by vessels of Fishery Survey of India (FSI) and Central Institute of Fisheries Nautical and Engineering Training (CIFNET) are discussed. The available information on environmental features of the tuna fishing grounds is reviewed to highlight the gaps in knowledge. The effect of fishing on the stocks of Euthynnus affinis, Auxis thazard and Katsuwonus pelamis is examined along with the estimates of standing and average annual stocks. Suggestions for the development of tuna fishing in the Indian EEZ are indicated.

Indian Ocean Fishery Commission. Report of the Tenth Session of the Committee for the Management of Indian Ocean Tuna, Moka, Mauritius, 28 June-1 July 1988.

B (Book); K (Conf FAO-FISH.-REP.-FAO-RAPP.-PECHES. ROME-ITALY~-FAO 1988. no. 404, 57 pp

This document is the final report of the Tenth Session of the Committee for the Management of Indian Ocean Tuna of the Indian Ocean Fishery Commission, which was held in Moka, Mauritius, from 28 June to 1 July 1988. Major topics discussed were: action on major recommendations and decisions of the Ninth Session; status of resources in the Indian Ocean; FAO's technical assistance in tuna development in the Indian Ocean region; and long-term institutional arrangements for the management of Indian Ocean Tuna. The summary for the main decisions and recommendations are listed in Appendix F.

Asia and the Pacific region: Bangladesh, India, Indonesia, Malaysia, Maldives, Sri Lanka, Thailand. Project findings and recommendations.

B (Book) ROME-ITALY-FAO-UNDP 1988. 28 pp

Details are given of project activities regarding the marine fishery resources in the Southeast Asia region and assessment and management practices. The following specific resources were investigated in particular: 1) tuna resources in the EEZs of the Maldives and Sri Lanka; 2) hilsa resources in the Upper Bay of Bengal; 3) scad and chub mackerel resources of the Malacca Straits; and 4) tuna resources in the Andaman Sea. Project recommendations regarding the following are included: 1) training courses; 2) retention of trained staff; 3) fisheries resources; 4) research stations; 5) computerization of data processing and stock assessment; 6) fisheries legislation; 7) fishery surveys; and 8) fishing and marketing trials.

(Purse seine fishery in the Indian Ocean: Its implantations, local impact and scientific follow-up.).

Hallier,-J.P.

J (Journal-Article) PECHE-MARIT. 1988. vol. 67, no. 1325, pp. 740-746

The redeployment of a French, Spanish and Ivory fishing fleet in the Eastern Atlantic and Western Indian Ocean in 1983-84 appears like a success owing to important tuna resources of this area and to efforts of all concerned. The Seychelles have found in this resource a means to bolster an economy too dependent on the tourist industry. From 1984 to 1987, the purse seiners have captured 540,000 tons of tunas. Two species (Yellowfin Tuna, Thunnus albacares , and Skipjack, Katsuwonus pelamis) represent 95% of the catches. The adaptation of crews to the particular conditions of the area permits yields during the whole year. This fishery has profited by scientific follow-up.

The levels of mercury and selenium in blood of tunas.

Kai,-N.; Ueda,-T.; Takeda,-Y.; Kataoka,-A.

J (Journal-Article) NIPPON-SUISAN-GAKKAISHI-BULL.-JAP.-SOC.-SCI.-FISH. 1988. vol. 54, no. 11, pp. 1981-1985

The levels of mercury and selenium in thirty blood specimens of two species of tunas, i.e., eighteen individuals of yellowfin Thunnus albacares and twelve individuals of big-eye Thunnus obesus , are presented. Fish were captured off the Sumatra coast in the east Indian Ocean. Mercury level and the ratio of methyl mercury content (MeHg) to total mercury content (T-Hg) in the blood were lowest in yellowfin and highest in big-eye, respectively, as compared with those in other tissues and organs previously reported. Both the mercury contents (T-Hg and MeHg) in big-eye were extremely high compared with those in yellowfin, and those contents in both species did not tend to increase with the growth of the fish. Selenium content (Se) in the blood was highest in all tissues and organs, and there was no significant difference in the high selenium levels between both species.

On the newly designed net for hauling up tuna.

Higashikawa,-S.; Hidaka,-M.; Uchiyama,-M.; Arima,-S.; Shimada,-K.; Sekioka,-M.

J (Journal-Article) MEM.-FAC.-FISH.-KAGOSHIMA-UNIV.-KAGOSHIMADAI-SUISANGAKUBU-KIYO. 1988. vol. 37, pp. 121-125

The authors invented a tuna-hauling net which was trially manufactured and used in the Indian Ocean by the training ship Kagoshima-Maru (1293 tons) operating tuna long line. The conclusions reached from the trial are as follows: (1) compared with conventional hooks, the net reduces the chance of missing catches almost completely, and tunas caught by the net are free from all damage; (2) the head-cover protects the head of tuna from the net. In addition, it has an effect of preventing the tuna from getting away, as it shields the eyes of the fish; and (3) the fishing gear (net) is easy to handle and reduces the skills required as well as danger. It is particularly well suited for use at night.

Seychelles tuna bulletin, fourth quarter 1988.

B (Book); N (Num SEYCHELLES-TUNA-BULL. VICTORIA-SEYCHELLES-SFA 1988. 16 pp

Selected trace metal concentrations in different tissues of fish from coastal waters of Pakistan (Arabian Sea).

Jaffar,-M.; Ashraf,-M.

J (Journal-Article) INDIAN-J.-MAR.-SCI. 1988. vol. 17, no. 3, pp. 231-234

Ni, Cu, Mn, Hg, Fe, Cr, Cd, Zn, Pb and As in the edible muscle, kidney and liver of twelve species of fish from the coastal waters of Pakistan (Arabian Sea) were analyzed by atomic absorption spectrometry. The levels of these metals were minimum in muscle, while in liver and kidney they were higher. Ni, Cr, Cd, Pb and As accumulated more in liver than in kidney. Silver pomfret (Pampus argenteus) and black pomfret (Formio niger) contained trace metal levels in the order kidney > liver > muscle. The study revealed that the trace metal levels in pomfrets (Pampus argenteus and Formio niger), longtail tuna (Thunnus tonggol) and Indian oilsardine (Sardinella longiceps) were higher as compared with other fish.

Report of the Expert Consultation on the Stock Assessment of Tunas in the Indian Ocean, Mauritius, 22-27 June 1988.

B (Book); K (Conf COLOMBO-SRI-LANKA-IPTP 1988. 87 pp

An account is given of the consultation describing the various topics examined, which include: Review of national fisheries and research programmes; Review of status of stocks; Interaction between fisheries including tuna fisheries interaction programmes; progress made in the collection of statistics; Review of key research areas; and Follow-up to the Expert Consultation.

(Analysis of data collected on board purse seiners based in the Seychelles (1986-1987).).

Karpinski,-B.

B (Book); N (Num TECH.-REP.-SEYCHELLES-FISH.-AUTH. VICTORIA-SEYCHELLES-SFA 1988. no. 007, 52 pp

The report presents data obtained on board tuna purse seiners operating in Seychelles waters during the period July 1985-December 1987. Information was obtained regarding the biology of the tuna species involved, fishing techniques, stock abundance and fishing effort.

Seychelles tuna bulletin, third quarter 1988.

B (Book); N (Num SEYCHELLES-TUNA-BULL. 1988. 16 pp

Catch statistics are presented for the purse seiners and longliners fishing for tuna in the Western Indian Ocean during the period July-September 1987.

Is tuna fishing a paying proposition?.

Gokhale,-S.V.

J (Journal-Article) SEAFOOD-EXPORT-J. 1988. vol. 20, no. 7, pp. 7-18

An examination is made of the economic viability of tuna fishing in the Indian EEZ, with respect to the findings of a survey conducted by the Fishery Survey of India and the Central Institute of Fisheries Nautical and Engineering Training. Factors affecting the economics of fishing are considered to be: 1) the distance of the fishing ground from the base of the vessel; 2) the rate of capture; and 3) the species composition of the catch.

Contents of selected macronutrients in various marine fish from the Arabian Sea.

Jaffar,-M.; Ashraf,-M.

J (Journal-Article) PAK.-J.-SCI.-IND.-RES. 1988. vol. 31, no. 1, pp. 23-25

Twelve marine fish species from the Arabian Sea were selected for the estimation of calcium, sodium, potassium and magnesium by atomic absorption technique. The fish included in the study were: salmon (salmon sole), tuna (Thunnus thynnus), pomfret silver (Pampus argenteus), pomfret black (P. formioniger), longtail tuna (Thunnus tonggol), Indian oil-sardine (Sardinella longiceps), toli shad (Tenualosa toli), giant catfish (Arius thala), talang queenfish (Scomberoides commersonianus), threadfin bream (Nemipterus japonicus), silver grunt (Pomadasys argyreus) and goldlined sea bream (Rhabdosargus sarba). The macronutrient estimation was performed in the edible muscle of these species to check their nutritional quality on the basis of recommended dietary allowances laid down internationally. On the whole, almost all the fish species were found to be potential sources of the macronutrients.

A summary of information on the fisheries for billfishes, seerfishes and tunas other than skipjack and yellowfin, in the Maldives.

Anderson,-R.C.; Hafiz,-A.

B (Book); K (Conf STUDIES-OF-THE-TUNA-RESOURCE-IN-THE-EEZs-OF-SRI-LANKA-AND-MALDIVES. 1988. pp. 68-78

Data are presented regarding the frigate tuna (Auxis thazard), little tuna (Euthynnus alletteratus), bullet tuna (Auxis rochei), dogtooth tuna (Gymnosarda unicolor), bigeye tuna (Thunnus obesus), albacore (Thunnus alalunga), longtail tuna (Thunnus tonggol), seerfish (Scomberomorus commersoni) and billfish (Istiophoridae) in the Maldives. Production trends and catch rates are also discussed.

On the unusual landings of tunas (Pisces: Scombridae) along Parangipettai, southeast coast of India.

Sivakumaran,-K.P.; Ramaiyan,-V.

J (Journal-Article) J.-MAR.-BIOL.-ASSOC.-INDIA. 1988. vol. 30, no. 1-2, p. 230

An unusual heavy landing of juveniles of frigate mackerel Auxis thazard and little tuna Euthynnus affinis during October 1987 at Parangipettai landing centre India, is reported.

Some observations on the tuna fishery of Pakistan.

Imad,-A.

B (Book); K (Conf REPORT-OF-WORKSHOP-ON-SMALL-TUNA,-SEERFISH-AND-BILLFISH-IN-THE-INDIAN-OCEAN,-COLOMBO,-SRI-LANKA,-DECEMBER,-9-11,-1987. FAO-UNDP-Indo-Pacific-Tuna-Dev.-Manage.-Programme,-Colombo-Sri-Lanka 1988. pp. 17-23

The tuna, Thunnus , fisheries in Pakistan is predominantly artisanal; fishing vessels and gear used are described. Tuna catches vary with the season: Sep Apr show a peak landing season. Statistics regarding landings, species compositions and length frequencies of the individual tuna species are included.

The progress made in the collection of tuna statistics and research highlight on tuna in Indonesia.

Naamin,-N.; Gafa,-B.

B (Book); K (Conf COLLECTIVE-VOLUME-OF-WORKING-DOCUMENTS.-VOL.-3.-PRESENTED-AT-THE-EXPERT-CONSULTATION-ON-STOCK-ASSESSMENT-OF-TUNAS-IN-THE-INDIAN-OCEAN,-HELD-IN-MAURITIUS,-22-27-JUNE-1988. FAO-UNDP-Indo-Pacific-Tuna-Dev.-and-Manage.-Programme,-Colombo-Sri-Lanka 1988. pp. 390-404

Research and sampling activities conducted in Indonesian waters regarding the tuna fishery resources are summarized. The collection of statistical data and information through sampling activities is outlined. Research activities covered the following aspects: bait fish; morphometrics; reproduction; population study; and, behavior. The need for the improvement of national fishery statistics, especially for tuna, is discussed.

Tuna sampling programme conducted by IPTP in Sri Lanka.

Forster,-R.

B (Book); K (Conf REPORT-OF-WORKSHOP-ON-SMALL-TUNA,-SEERFISH-AND-BILLFISH-IN-THE-INDIAN-OCEAN,-COLOMBO,-SRI-LANKA,-DECEMBER,-9-11,-1987. FAO-UNDP-Indo-Pacific-Tuna-Dev.-Manage.-Programme,-Colombo-Sri-Lanka 1988. pp. 94-101

Details are given of the methods of IPTP sampling operations in Sri Lanka. Sampling frequency, daily landings, catch and effort, size composition are described. Data processing and set-up of the forms collecting the data are also outlined.

Description and identification of longtail tuna larvae, Thunnus tonggol (Bleeker) in the Gulf of Thailand.

Chayakul,-R.; Chamchang,-C.

B (Book); K (Conf REPORT-OF-WORKSHOP-ON-SMALL-TUNA,-SEERFISH-AND-BILLFISH-IN-THE-INDIAN-OCEAN,-COLOMBO,-SRI-LANKA,-DECEMBER,-9-11,-1987. FAO-UNDP-Indo-Pacific-Tuna-Dev.-Manage.-programme,-Colombo-Sri-Lanka 1988. pp. 71-79

Larvae of Thunnus tonggol were obtained from the plankton sample collected in the Gulf of Thailand. A total of 28 postlarval specimens were identified as T. tonggol based on the meristic (morphological) characters, and the arrangement of pigments on the body and the locality of the sampling area. The pigmentation and growth stage development in postlarvae are described in detail.

A simple method of determining exploitation levels of neritic tuna stocks.

Yesaki,-M.

B (Book); K (Conf REPORT-OF-WORKSHOP-ON-SMALL-TUNA,-SEERFISH-AND-BILLFISH-IN-THE-INDIAN-OCEAN,-COLOMBO,-SRI-LANKA,-DECEMBER,-9-11,-1987. FAO-UNDP-Indo-Pacific-Tuna-Dev.-Manage.-Programme,-Colombo-Sri-Lanka 1988. pp. 69-70

Details are given of a density method for the assessment of non-target species stocks, considering 3 stocks of neritic tunas, Thunnus , in the Indo-Pacific: the kawakawa Euthynnus affinis stocks of the Philippines and Sri Lanka, and the longtail Thunnus tonggol /kawakawa stocks in the Gulf of Thailand.

Current production and potential yields of small tunas in the Indo-Pacific region.

Yesaki,-M.

B (Book); K (Conf REPORT-OF-WORKSHOP-ON-SMALL-TUNA,-SEERFISH-AND-BILLFISH-IN-THE-INDIAN-OCEAN,-COLOMBO,-SRI-LANKA,-DECEMBER,-9-11,-1987. FAO-UNDP-Indo-Pacific-Tuna-Dev.-Manage.-Programme,-Colombo-Sri-Lanka 1988. pp. 52-61

An examination is made of the current productions of small tunas, Thunnus , by countries of the Indo-Pacific region, in order to delineate areas of highest potential for increasing production. Yield per unit area estimates for countries with high landings of neritic tunas are compared; lower and upper limits of carrying capacity were used to estimate potential yields of neritic tunas in the region.

Stock assessment of Indian Ocean albacore, 1988.

Shiohama,-T.

B (Book); K (Conf COLLECTIVE-VOLUME-OF-WORKING-DOCUMENTS.-VOL.-3.-PRESENTED-AT-THE-EXPERT-CONSULTATION-ON-STOCK-ASSESSMENT-OF-TUNAS-IN-THE-INDIAN-OCEAN,-HELD-IN-MAURITIUS,-22-27-JUNE-1988. FAO-UNDP-Indo-Pacific-Tuna-Dev.-and-Manage.-Programme,-Colombo-Sri-Lanka 1988. pp. 94-98

An examination is made of catch, fishing effort and CPUE data for albacore (Thunnus alalunga) in the Indian Ocean for the period 1952-86. The production model was used to assess the stock status of the species. CPUE data indicate the population size of adult fish to stable in recent years.

Small tuna fishing gears in the Indo-Pacific region.

Yesaki,-M.

B (Book); K (Conf REPORT-OF-WORKSHOP-ON-SMALL-TUNA,-SEERFISH-AND-BILLFISH-IN-THE-INDIAN-OCEAN,-COLOMBO,-SRI-LANKA,-DECEMBER,-9-11,-1987. FAO-UNDP-Indo-Pacific-Tuna-Dev.-Manage.-programme,-Colombo-Sri-Lanka 1988. pp. 89-93

An assessment is made of the relative importance of various fishing gears for small tunas in the Indo-Pacific region, describing the general characteristics of the major fishing gears used in the various countries of the region. Recommendations for future trials in areas of suspected unexploited small tuna resources are included.

Present status of the fishery for small tuna species, billfish and seerfish in Sri Lanka.

Maldeniya,-R.; Moiyadeen,-N.M.; Amarasiri,-C.

B (Book); K (Conf REPORT-OF-WORKSHOP-ON-SMALL-TUNA,-SEERFISH-AND-BILLFISH-IN-THE-INDIAN-OCEAN,-COLOMBO,-SRI-LANKA,-DECEMBER,-9-11,-1987. FAO-UNDP-Indo-Pacific-Tuna-Dev.-Manage.-Programme,-Colombo-Sri-Lanka 1988. pp. 24-37

A review is made of the small tuna species, billfish and seerfish, Scombridae and Istiophoridae, resources of Sri Lanka. Methods of exploitation, production, seasons and biology of the species involved are described.

Preliminary studies of Scomberomorus commerson and Thunnus tonggol in Omani waters.

Dudley,-R.G.; Aghanashinikar,-A.P.

B (Book); K (Conf REPORT-OF-WORKSHOP-ON-SMALL-TUNA,-SEERFISH-AND-BILLFISH-IN-THE-INDIAN-OCEAN,-COLOMBO,-SRI-LANKA,-DECEMBER,-9-11,-1987. FAO-UNDP-Indo-Pacific-Tuna-Dev.-Manage.-Programme,-Colombo-Sri-Lanka 1988. pp. 62-68

Monthly length frequency data and examination of otoliths of Scomberomorus commerson and Thunnus tonggol provided information about the size composition and growth of these species in Omani waters. S. commerson first enters the catch at 48 cm, probably at an age of one year. At two years they average 84 cm. Otoliths of S. commerson show marks which may be useful in determining age. Preliminary yield per recruit analysis indicates that S. commerson are being caught at sub-optimum size. T. tonggol first enter the fishery at 30 cm in October, but typical catches consist of fish between 50 and 80 cm. Length frequency analysis of T. tonggol from commercial catches is of less value than that for S. commerson . Otoliths of L. tonggol show potential for analysis using daily growth rings.

The data compilation system for catch statistics of Taiwanese distant water tuna fisheries in Indian Ocean.

Yeh,-Shean-Ya; Liu,-Hsi-Chiang

B (Book); K (Conf COLLECTIVE-VOLUME-OF-WORKING-DOCUMENTS.-VOL.-3.-PRESENTED-AT-THE-EXPERT-CONSULTATION-ON-STOCK-ASSESSMENT-OF-TUNAS-IN-THE-INDIAN-OCEAN,-HELD-IN-MAURITIUS,-22-27-JUNE-1988. FAO-UNDP-Indo-Pacific-Tuna-Dev.-and-Manage.-Programme,-Colombo-Sri-Lanka 1988. pp. 415-418

The Tuna Resources Research Center (TRRC) at Institute of Oceanography, National Taiwan University was established in 1970 for the compilation of catch statistics of Indian tunas. Log books have been collected since 1967 for Taiwanese longliners and started 1986 for the gillnetters in Indian Ocean. Every captain is requested to turn in their log book after each fishing trip. Recovered log books are carefully checked before making a data entry. Catch and effort information are compiled by month, by vessel, by fishing block, and by species. The radio daily reports are also processed in order for estimating recoverage of the log. A report on "Annual Catch Statistics of Taiwanese Tuna Longline Fishery" is published each year.

Tuna and seerfish fisheries in the United Arab Emirates.

B (Book); K (Conf REPORT-OF-WORKSHOP-ON-SMALL-TUNA,-SEERFISH-AND-BILLFISH-IN-THE-INDIAN-OCEAN,-COLOMBO,-SRI-LANKA,-DECEMBER,-9-11,-1987. FAO-UNDP-Indo-Pacific-Tuna-Dev.-Manage.-Programme,-Colombo-Sri-Lanka 1988. pp. 13-16

A brief account is given of the traditional tuna and seerfish, Scombridae, fishery operations conducted in the United Arab Emirates. The most important fishing gear is the gillnet. Statistics regarding the number of vessels and landings of scombroids at Khorfakkan are included.

Status report of Oman.

Al-Barwani,-R.

B (Book); K (Conf REPORT-OF-WORKSHOP-ON-SMALL-TUNA,-SEERFISH-AND-BILLFISH-IN-THE-INDIAN-OCEAN,-COLOMBO,-SRI-LANKA,-DECEMBER,-9-11,-1987. FAO-UNDP-Indo-Pacific-Tuna-Dev.-Manage.-Programme,-Colombo-Sri-Lanka 1988. pp. 11-12

Landing statistics were given for the artisanal fisheries for kingfish (Scombesomorus commersoni ,) and tunas Thunnus , of Oman for the period 1985-86. Fishing gear used include drift gillnets, troll lines and handlines.

Age and growth rates of yellow-fin tuna Thunnus albacares (Bonnaterre, 1788) (Pisces, Scombridae) in the north-western part of the Indian Ocean, determined by counting the rings of vertebrae.

Romanov,-E.V.; Korotkova,-L.P.

B (Book); K (Conf COLLECTIVE-VOLUME-OF-WORKING-DOCUMENTS.-VOL.-3.-PRESENTED-AT-THE-EXPERT-CONSULTATION-ON-STOCK-ASSESSMENT-OF-TUNAS-IN-THE-INDIAN-OCEAN,-HELD-IN-MAURITIUS,-22-27-JUNE-1988. FAO-UNDP-Indo-Pacific-Tuna-Dev.-and-Manage.-Programme,-Colombo-Sri-Lanka 1988. pp. 68-73

The findings are presented of a study conducted on yellowfin tuna (Thunnus albacares) from the Northwest Indian Ocean, investigating diurnal increments on otoliths. Fork-length and weight were determined; growth rates and age determination calculation are shown.

Japanese systems for collecting and processing tuna catch and fishing effort of longline fishery.

Yonemori,-T.

B (Book); K (Conf COLLECTIVE-VOLUME-OF-WORKING-DOCUMENTS.-VOL.-3.-PRESENTED-AT-THE-EXPERT-CONSULTATION-ON-STOCK-ASSESSMENT-OF-TUNAS-IN-THE-INDIAN-OCEAN,-HELD-IN-MAURITIUS,-22-27-JUNE-1988. FAO-UNDP-Indo-Pacific-Tuna-Dev.-and-Manage.-Programme,-Colombo-Sri-Lanka 1988. pp. 412-414

An examination is made of Japanese tuna longline fishery data collection and processing systems. Catch reports, which include data regarding fishing date, noon position, effort, and number of species caught, and the processing of the data are discussed briefly for the distant water tuna longline and offshore sectors.

Purse seine tuna fishing and environmental conditions in the Somali Basin (0 degree -12 degree N, 43 degree E-60 degree E) at the cessation of the southwest monsoon.

Marsac,-F.

B (Book); K (Conf COLLECTIVE-VOLUME-OF-WORKING-DOCUMENTS.-VOL.-3.-PRESENTED-AT-THE-EXPERT-CONSULTATION-ON-STOCK-ASSESSMENT-OF-TUNAS-IN-THE-INDIAN-OCEAN,-HELD-IN-MAURITIUS,-22-27-JUNE-1988. FAO-UNDP-Indo-Pacific-Tuna-Dev.-and-Manage.-Programme,-Colombo-Sri-Lanka 1988. pp. 154-163

An analysis is made of the fishing success recorded by purse seiners during the cessation of the southwest monsoon in the Somali Basin, according to wind and temperature patterns observed in the fishery. Catch rates are examined with respect to surface and subsurface conditions. The positive effect of unstable environmental conditions on tuna concentrations is highlighted. Applications of such findings to the delimitation of potential fishing grounds are considered.

Study of interaction between longline and purse seine fisheries on yellowfin tuna, Thunnus albacares (Bonnaterre).

Susuki,-Z.

B (Book); K (Conf COLLECTIVE-VOLUME-OF-WORKING-DOCUMENTS.-VOL.-3.-PRESENTED-AT-THE-EXPERT-CONSULTATION-ON-STOCK-ASSESSMENT-OF-TUNAS-IN-THE-INDIAN-OCEAN,-HELD-IN-MAURITIUS,-22-27-JUNE-1988. FAO-UNDP-Indo-Pacific-Tuna-Dev.-and-Manage.-Programme,-Colombo-Sri-Lanka 1988. pp. 171-207

Interaction between longline and purse serine fisheries on yellowfin tuna (Thunnus albacares) remains ambiguous despite high requirement on its information for fishery management of this commercially important species. The present study analyzed the interaction between the 2 fisheries on 3 stocks of yellowfin tuna in the eastern Pacific, western Pacific and eastern Atlantic Ocean up to 1983 since the commencement of the fisheries. Detailed comparison was made for each stock in regard with the 2 fisheries on fishing grounds, fishing seasons, size and maturity of fish in the catch as well of fishing effort, catch and CPUE. The present study covers roles of environmental factors affecting the success of the 2 fisheries, and possible effect of El Nino events on recruitment of yellowfin tuna through analysis of the longline data.

Fishery situation report for small tunas: Australia.

Lyle,-J.M.

B (Book); K (Conf REPORT-OF-WORKSHOP-ON-SMALL-TUNA,-SEERFISH-AND-BILLFISH-IN-THE-INDIAN-OCEAN,-COLOMBO,-SRI-LANKA,-DECEMBER,-9-11,-1987. FAO-UNDP-Indo-Pacific-Tuna-Dev.-Manage.-Programme,-Colombo-Sri-Lanka 1988. pp. 46-50

An account is given of the Australian small tuna, Thunnus , fisheries and the Taiwanese gillnet fishery operating in the Australian Fishing Zone.

Seychelles tuna bulletin. First quarter 1988.

B (Book); N (Num SEYCHELLES-TUNA-BULL. VICTORIA-SEYCHELLES-SFA 1988. 15 pp

JAMARC's activities on tagging of tunas in Indian Ocean.

Takahashi,-M.; Urakawa,-T.; Kasahara,-F.; Kanda,-A.

B (Book); K (Conf COLLECTIVE-VOLUME-OF-WORKING-DOCUMENTS.-VOL.-3.-PRESENTED-AT-THE-EXPERT-CONSULTATION-ON-STOCK-ASSESSMENT-OF-TUNAS-IN-THE-INDIAN-OCEAN,-HELD-IN-MAURITIUS,-22-27-JUNE-1988. FAO-UNDP-Indo-Pacific-Tuna-Dev.-and-Manage.-Programme,-Colombo-Sri-Lanka 1988. pp. 208-223

A description is given of tagging activities conducted by the Japanese Marine Fishery Resources Research Centre in the Indian Ocean, presenting detailed records of tag release and capture for the period 1981-88.

Squids eaten by lancetfish and tunas in the tropical Indo-Pacific oceans.

Okutani,-T.; Tsukada,-S.

J (Journal-Article) J.-TOKYO-UNIV.-FISH.-TOKYO-SUISANDAI-KEMPO. 1988. vol. 75, no. 1, pp. 1-44

Some 428 squid specimens removed from 172 samples of lancetfish and tuna stomachs were identified into 27 "species" of 10 families. The result represents micronektonic squid fauna in the Tropical Indian Ocean and Southwest, Central and Southeast Pacific regions. Morphological observation measurements and taxonomical notes on each species are given. A few new distributional records were found from the materials studied.

Tuna association: A research programme.

Hallier,-J.P.

B (Book); K (Conf COLLECTIVE-VOLUME-OF-WORKING-DOCUMENTS.-VOL.-3.-PRESENTED-AT-THE-EXPERT-CONSULTATION-ON-STOCK-ASSESSMENT-OF-TUNAS-IN-THE-INDIAN-OCEAN,-HELD-IN-MAURITIUS,-22-27-JUNE-1988. FAO-UNDP-Indo-Pacific-Tuna-Dev.-and-Manage.-Programme,-Colombo-Sri-Lanka 1988. pp. 345-348

Details are given of a tuna resource management program implemented in the Seychelles, covering the following: 1) collection of tuna statistics; 2) tuna biology; 3) tagging; 4) oceanographic and biological environment.

Seychelles Research Observer Program.

Lablache,-G.; Karpinski,-B.

B (Book); K (Conf COLLECTIVE-VOLUME-OF-WORKING-DOCUMENTS.-VOL.-3.-PRESENTED-AT-THE-EXPERT-CONSULTATION-ON-STOCK-ASSESSMENT-OF-TUNAS-IN-THE-INDIAN-OCEAN,-HELD-IN-MAURITIUS,-22-27-JUNE-1988. FAO-UNDP-Indo-Pacific-Tuna-Dev.-and-Manage.-Programme,-Colombo-Sri-Lanka 1988. pp. 146-153

An account is given of a research observer program initiated in November 1985 by the Seychelles Fishing Authority in order to supplement available biological knowledge regarding the purse seine tuna fisheries in the area. Vessel activity, searching and school sightings, fishing operations and by catch are described.

Collective volume of working documents. Vol. 3. Presented at the Expert Consultation on Stock Assessment of Tunas in the Indian Ocean, held in Mauritius, 22-27 June 1988.

B (Book); K (Conf COLOMBO-SRI-LANKA-IPTP 1988. 418 pp

Abstracts of the relevant papers presented at the Consultation are cited individually.

Summary of papers presented at workshop on small tuna, seerfish and billfish in the Indian Ocean.

B (Book); K (Conf COLLECTIVE-VOLUME-OF-WORKING-DOCUMENTS.-VOL.-3.-PRESENTED-AT-THE-EXPERT-CONSULTATION-ON-STOCK-ASSESSMENT-OF-TUNAS-IN-THE-INDIAN-OCEAN,-HELD-IN-MAURITIUS,-22-27-JUNE-1988. FAO-UNDP-Indo-Pacific-Tuna-Dev.-and-Manage.-Programe,-Colombo-Sri-Lanka 1988. pp. 125-127

A summary is given of the papers presented at the workshop, which include status reports from Australia, Maldives, Oman, United Arab Emirates, Pakistan and Sri Lanka, and also 10 research papers on the small tuna, seerfish and billfish in the Indian Ocean.

Distribution of longtail tuna (Thunnus tonggol , Bleeker), kawa kawa (Euthynnus affinis , Cantor) and frigate tuna (Auxis thazard , Lacepede) in the western coast of the Gulf of Thailand.

Chamchang,-C.; Chayakul,-R.

B (Book); K (Conf REPORT-OF-WORKSHOP-ON-SMALL-TUNA,-SEERFISH-AND-BILLFISH-IN-THE-INDIAN-OCEAN,-COLOMBO,-SRI-LANKA,-DECEMBER,-9-11,-1987. FAO-UNDP-Indo-Pacific-Tuna-Dev.-Manage.-Programme,-Colombo-Sri-Lanka 1988. pp. 80-88

The paper presents the abundance and distribution of the three species of tuna larvae namely longtail tuna, Thunnus tonggol , kawa kawa, Euthynnus affinis and frigate tuna, Auxis thazard in the western Gulf of Thailand collected monthly for a 6-mo period between Jan and Jun 1987. A total of 68.06 tuna larvae per 1,000 m super(3) of strained water were collected. Tuna larvae were found most abundantly in Jun when longtail tuna was dominant.

BOBP beachcraft at Puri -- where do the catches go?.

J (Journal-Article) BAY-OF-BENGAL-NEWS. 1988. no. 30, pp. 14-20

Findings from a study of fish marketing at Puri are discussed, with particular emphasis given to the marketing of BOBP beachcraft catches. Major species landed were seerfish, bekti, pomfret, shark, catfish and tuna. Purchase of fish, distribution of fish outside Orissa, markets for the fish and transport of the Puri fish are described.

Small craft tuna fishing trials in southern Tanzania.

Scullion,-J.

B (Book); K (Conf COLLECTIVE-VOLUME-OF-WORKING-DOCUMENTS.-VOL.-3.-PRESENTED-AT-THE-EXPERT-CONSULTATION-ON-STOCK-ASSESSMENT-OF-TUNAS-IN-THE-INDIAN-OCEAN,-HELD-IN-MAURITIUS,-22-27-JUNE-1988. FAO-UNDP-Indo-Pacific-Tuna-Dev.-and-Manage.-Programme,-Colombo-Sri-Lanka 1988. pp. 140-145

Details are given of trials conducted to identify underutilized marine fish stocks in southern Tanzania and to develop methods for their exploitation by artisanal fishermen. Findings regarding tuna and small pelagics suitable as live bait for pole-and-line tuna fishing are discussed. Most abundant baitfish species were Sardinella, Herklotsichthys, Stolephorus and Hypoaltherina ; although they are limited, they are believed capable of supporting a modest artisanal pole-and-line tuna fishery.

Seychelles tuna bulletin. Second quarter 1988.

B (Book); N (Num SEYCHELLES-TUNA-BULL. VICTORIA-SEYCHELLES-SFA 1988. 16 pp

Catch statistics are presented for the purse seiners and longliners fishing for tuna in the western Indian Ocean during the period January 1987-June 1988.

A preliminary analysis of the billfish landings observed on the west coast of Sri Lanka.

Forster,-R.

B (Book); K (Conf REPORT-OF-WORKSHOP-ON-SMALL-TUNA,-SEERFISH-AND-BILLFISH-IN-THE-INDIAN-OCEAN,-COLOMBO,-SRI-LANKA,-DECEMBER,-9-11,-1987. FAO-UNDP-Indo-Pacific-Tuna-Dev.-Manage.-Programme,-Colombo-Sri-Lanka 1988. pp. 102-115

Results obtained during sampling programmes conducted in Sri Lanka regarding billfish, Istiophoridae, landings are examined. Fishing gear and effort, catch/effort statistics and size composition are discussed.

Stock structure of blue marlin, Makaira nigricans , populations.

Sakagawa,-G.T.

B (Book); K (Conf REPORT-OF-WORKSHOP-ON-SMALL-TUNA,-SEERFISH-AND-BILLFISH-IN-THE-INDIAN-OCEAN,-COLOMBO,-SRI-LANKA,-DECEMBER,-9-11,-1987. FAO-UNDP-Indo-Pacific-Tuna-Dev.-Manage.-Programme,-Colombo-Sri-Lanka 1988. pp. 116-121

A review is made of data available on blue marlin, Makaira nigricans , catch rates, larval occurrence and tag recoveries with the aim of examining the consistency of stock structure models. Limitations of the models currently used and the need for more complete data are discussed.

Tuna and tuna-like fishes in Bangladesh.

Rashid,-M.H.

B (Book); K (Conf REPORT-OF-WORKSHOP-ON-SMALL-TUNA,-SEERFISH-AND-BILLFISH-IN-THE-INDIAN-OCEAN,-COLOMBO,-SRI-LANKA,-DECEMBER,-9-11,-1987. FAO-UNDP-Indo-Pacific-Tuna-Dev.-Manage.-Programme,-Colombo-Sri-Lanka 1988. pp. 122-123

The EEZ of Bangladesh extends 380 km towards the sea covering an area of 69,000 km super(2) covering mostly the neritic zone and little of the oceanic province. There is continuous discharge of fresh water by the rivers and riverlets. In spite of the large extent of estuarine waters, a few varieties of tuna and tuna-like fishes, which are generally oceanic are available as evident from past survey results and recent commercial landings by drift gillnets and hook and lines. This creates a scope for further investigation for determining commercial viability for a pelagic fishery in the offshore region.

Skipjack tuna fishery of Lakshadweep.

James,-P.S.B.R.; Pillai,-P.P.

B (Book); K (Conf COLLECTIVE-VOLUME-OF-WORKING-DOCUMENTS.-VOL.-3.-PRESENTED-AT-THE-EXPERT-CONSULTATION-ON-STOCK-ASSESSMENT-OF-TUNAS-IN-THE-INDIAN-OCEAN,-HELD-IN-MAURITIUS,-22-27-JUNE-1988. FAO-UNDP-Indo-Pacific-Tuna-Dev.-and-Manage.-Programme,-Colombo-Sri-Lanka 1988. pp. 1-12

Details are given of the skipjack tuna (Katsuwonus pelamis) fishery at Minicoy Island, including the findings and observations made regarding biological and population parameters and stock estimates. Length-weight relationship, sex ratio, spawning, growth and mortality data are included.

SCRS report -- southern bluefin tuna.

B (Book); K (Conf COLLECTIVE-VOLUME-OF-WORKING-DOCUMENTS.-VOL.-3.-PRESENTED-AT-THE-EXPERT-CONSULTATION-ON-STOCK-ASSESSMENT-OF-TUNAS-IN-THE-INDIAN-OCEAN,-HELD-IN-MAURITIUS,-22-27-JUNE-1988. FAO-UNDP-Indo-Pacific-Tuna-Dev.-and-Manage.-Programme,-Colombo-Sri-Lanka 1988. p. 124

Following a brief account of the southern bluefin tuna (Thunnus maccoyii) fisheries, and examination is made of the status of the stocks. Management regulations by Australia and Japan are also considered.

Small tunas, seerfishes and billfishes in the Maldives.

Anderson,-R.C.

B (Book); K (Conf REPORT-OF-WORKSHOP-ON-SMALL-TUNA,-SEERFISH-AND-BILLFISH-IN-THE-INDIAN-OCEAN,-COLOMBO,-SRI-LANKA,-DECEMBER,-9-11,-1987. FAO-UNDP-Indo-Pacific-Tuna-Dev.-Manage.-Programme,-Colombo-Sri-Lanka 1988. pp. 38-45

Catch statistics are presented for the Maldive tuna fisheries, Scombridae and Istiophoridae, considering the following species individually: frigate tuna Auxis thazard , bullet tuna Auxis rochei , little tuna Euthynnus alletteratus , dogtooth tuna Gymnosarda unicolor , longtail tuna Thunnus tonggol , seerfish Scomberomorus and billfish Istiophoridae.

Main results of realization of the Soviet program of tuna tagging in the Atlantic Ocean.

Ovchinnikov,-V.V.; Gaikov,-V.Z.; Fedoseev,-Yu.P.; Shcheglov,-V.G.

B (Book); K (Conf COLLECTIVE-VOLUME-OF-WORKING-DOCUMENTS.-VOL.-3.-PRESENTED-AT-THE-EXPERT-CONSULTATION-ON-STOCK-ASSESSMENT-OF-TUNAS-IN-THE-INDIAN-OCEAN,-HELD-IN-MAURITIUS,-22-27-JUNE-1988. FAO-UNDP-Indo-Pacific-Tuna-Dev.-and-Manage.-Programme,-Colombo-Sri-Lanka 1988. pp. 224-226

Details are given of the results of a tagging program using yellow and red spaghetti-type tags conducted in Angola water regarding the skipjack resources. Tagging/recovery data indicate the skipjack migration route to lie from the Southeast Atlantic in a north and northwest direction.

Observations on abundance, distribution and seasonality of yellowfin tuna in Indian seas as revealed by exploratory surveys during 1983-88.

Sudarsan,-D.; John,-M.E.; Somvanshi,-V.S.

B (Book); K (Conf COLLECTIVE-VOLUME-OF-WORKING-DOCUMENTS.-VOL.-3.-PRESENTED-AT-THE-EXPERT-CONSULTATION-ON-STOCK-ASSESSMENT-OF-TUNAS-IN-THE-INDIAN-OCEAN,-HELD-IN-MAURITIUS,-22-27-JUNE-1988. FAO-UNDP-Indo-Pacific-Tuna-Dev.-and-Manage.-Programme,-Colombo-Sri-Lanka 1988. pp. 251-261

The findings are presented of exploratory tuna fishing activities conducted in the Indian Ocean to determine the exploitation of the yellowfin tuna (Thunnus albacares) stock in the Indian EEZ. Catch rates were encouraging and prospects for development of the fishery are good.

Atlas of industrial tuna longline and purse-seine fisheries in the Indian Ocean.

G (Map); N (Nume COLOMBO-SRI-LANKA-IPTP 1988. 59 pp

The atlas, which shows the location of tuna fishing grounds in the Indian Ocean giving densities of catch, effort and catch rate, is presented in 3 parts as follows: 1) quarterly average catch, effort and CPUE by species for longline fisheries; 2) annual average catch, effort and CPUE by species and decade for longline fisheries; and 3) quarterly catch, effort and CPUE by species for purse-seine fisheries.

Report of Workshop on Small Tuna, Seerfish and Billfish in the Indian Ocean, Colombo, Sri Lanka, December, 9-11, 1987.

B (Book); K (Conf COLOMBO-SRI-LANKA-IPTP 1988. 123 pp

Abstracts of the 6 status reports and 10 research papers presented at the Workshop are cited individually in this issue of ASFA.

Some considerations on the yellowfin tuna stock status.

Hallier,-J.P.; Marsac,-F.

B (Book); K (Conf COLLECTIVE-VOLUME-OF-WORKING-DOCUMENTS.-VOL.-3.-PRESENTED-AT-THE-EXPERT-CONSULTATION-ON-STOCK-ASSESSMENT-OF-TUNAS-IN-THE-INDIAN-OCEAN,-HELD-IN-MAURITIUS,-22-27-JUNE-1988. FAO-UNDP-Indo-Pacific-Tuna-Dev.-and-Manage.-Programme,-Colombo-Sri-Lanka 1988. pp. 40-49

An examination is made of the status of the yellowfin tuna (Thunnus albacares) stock in the Indian Ocean by studying variations of catches by age, fishing effort and CPUE. Data are given for artisanal, purse seine and longline sectors of the fishery. Findings indicate that full exploitation of this stock not been reached, and that it may be possible to increase fishing effort.

The Maldivian tuna fishery -- an update.

Hafiz,-A.; Anderson,-R.C.

B (Book); K (Conf COLLECTIVE-VOLUME-OF-WORKING-DOCUMENTS.-VOL.-3.-PRESENTED-AT-THE-EXPERT-CONSULTATION-ON-STOCK-ASSESSMENT-OF-TUNAS-IN-THE-INDIAN-OCEAN,-HELD-IN-MAURITIUS,-22-27-JUNE-1988. FAO-UNDP-Indo-Pacific-Tuna-Dev.-and-Manage.-Programme,-Colombo-Sri-Lanka 1988. pp. 334-344

A brief outline is given of the tuna fishery of the Maldives; tuna account for nearly 90% of the country's fish landings. Most of the catch is of skipjack and yellowfin which are taken mainly by small, mechanized livebait pole-and-line vessels.

Growth and migration of juvenile yellowfin tuna (Thunnus albacares in the Central Indian Ocean.

Anderson,-R.C.

B (Book); K (Conf COLLECTIVE-VOLUME-OF-WORKING-DOCUMENTS.-VOL.-3.-PRESENTED-AT-THE-EXPERT-CONSULTATION-ON-STOCK-ASSESSMENT-OF-TUNAS-IN-THE-INDIAN-OCEAN,-HELD-IN-MAURITIUS,-22-27-JUNE-1988. FAO-UNDP-Indo-Pacific-Tuna-Dev.-and-Manage.-Programme,-Colombo-Sri-Lanka 1988. pp. 28-39

Substantial catches of juvenile yellowfin tuna (Thunnus albacares) are made in Maldives, Sri Lanka and southern India. By analysis of modal progression between length frequency samples from these countries, a growth rate of 2.9 plus or minus 0.4 cm/month is estimated for yellowfin between 30 cm and 70 cm fork length. The data are, however, also consistent with growth at half this rate. On the basis of seasonal changes in fishing areas a model of juvenile yellowfin migration in the Central Indian Ocean is proposed. This envisages a broad band of young this in the equatorial waters moving east and west in phase with the seasonally changing monsoon currents. Around maldives, Sri Lanka and southwest India concentrations of yellowfin build up off exposed western coasts in the southwest monsoon and eastern coasts in the north east monsoon.

Study on the operation of tuna long line for catching fresh tuna in Indonesia.

Bahar,-S.; Gafa,-B.

B (Book); K (Conf COLLECTIVE-VOLUME-OF-WORKING-DOCUMENTS.-VOL.-3.-PRESENTED-AT-THE-EXPERT-CONSULTATION-ON-STOCK-ASSESSMENT-OF-TUNAS-IN-THE-INDIAN-OCEAN,-HELD-IN-MAURITIUS,-22-27-JUNE-1988. FAO-UNDP-Indo-Pacific-Tuna-Dev.-and-Manage.-Programme,-Colombo-Sri-Lanka 1988. pp. 324-333

Since export of fresh tuna gives more benefit than that of frozen tuna, more tuna longlining has been conducted to catch certain tuna species. Three different types of tuna longlines, i.e., deep or large longline, medium or conventional longline, and mini-longline, operated by 4 fisheries companies in Benoa, Denpasar, Bali, were studied to get information on some important technological aspects of longlining and the tuna catches as well. Results shows that deep longline is more productive than any other one, due to its high possibility of finding tuna species horizontally and vertically, and its high catchability on valuable fresh tuna species such as bluefin tuna, bigeye tuna, and yellowfin tuna.

Estimates of age, growth and spawning of yellowfin tuna (Thunnus albacares) in the Philippines as determined from the examination of increments on sagittal otoliths.

Yamanaka,-K.L.

B (Book); K (Conf COLLECTIVE-VOLUME-OF-WORKING-DOCUMENTS.-VOL.-3.-PRESENTED-AT-THE-EXPERT-CONSULTATION-ON-STOCK-ASSESSMENT-OF-TUNAS-IN-THE-INDIAN-OCEAN,-HELD-IN-MAURITIUS,-22-27-JUNE-1988. FAO-UNDP-Indo-Pacific-Tuna-Dev.-and-Manage.-Programme,-Colombo-Sri-Lanka 1988. p. 27

During March and June 1987, 550 otoliths from yellowfin tuna (Thunnus albacares) between 15.4 and 79.0 cm in forklength were collected from landing sites in General Santos City and stored for ageing. The daily formation of sagittal otolith increments was validated for Central Pacific yellowfin between 25.0 and 40.0 cm in forklength. The increment structure of southern Philippine sagittae, was analogous to that observed for Central and Eastern Pacific therefore increment counts on sagittae were taken as a direct estimate of age in days. Data indicate 2 linear stanzas of growth for both forklength and weight. Inflection points occur at 33.5 cm and 113 days and 3000.0, gm and 360 days and correspond to body form and fish density transitions.

Recent trend of tuna fisheries in Indonesia with special reference to Indian Ocean side.

Naamin,-N.

B (Book); K (Conf COLLECTIVE-VOLUME-OF-WORKING-DOCUMENTS.-VOL.-3.-PRESENTED-AT-THE-EXPERT-CONSULTATION-ON-STOCK-ASSESSMENT-OF-TUNAS-IN-THE-INDIAN-OCEAN,-HELD-IN-MAURITIUS,-22-27-JUNE-1988. FAO-UNDP-Indo-Pacific-Tuna-Dev.-and-Manage.-Programme,-Colombo-Sri-Lanka 1988. pp. 309-323

The important role that the tuna fishery plays in the Indonesian fishery industry and in the country's economy is discussed in detail. Tuna and tuna-like species exploited in the western part of Indonesian waters comprise 4 groups: tunas; skipjack; tongkol (tuna-like fish); and mackerel. Fishing gear used and production/export trends are detailed. The exploitation of tuna for fresh tuna products is also examined, outlining the fishing grounds, fishing methods and bait used.

Atlas of the tuna fisheries in the Indian Ocean and Southeast Asian regions.

G (Map) COLOMBO-SRI-LANKA-IPTP 1988. 62 pp

The atlas, which covers tuna species caught in substantial quantities by the small-scale fisheries in the IPTP region, is presented in 5 parts as follows: 1) maps of species and their distribution; 2) country maps, showing total catch and species composition, fishing gear and fishing vessel data, fishing grounds and seasons; 3) maps showing species catch and size composition for yellowfin and skipjack tunas in the Indian Ocean; 4) maps summarizing catch and size composition for each tuna species by country; and 5) maps summarizing the current production and potential yield of neritic tunas in the region.

Review of national fisheries for the Sultanate of Oman.

bin-Amour-Al-Barwani,-B.

B (Book); K (Conf COLLECTIVE-VOLUME-OF-WORKING-DOCUMENTS.-VOL.-3.-PRESENTED-AT-THE-EXPERT-CONSULTATION-ON-STOCK-ASSESSMENT-OF-TUNAS-IN-THE-INDIAN-OCEAN,-HELD-IN-MAURITIUS,-22-27-JUNE-1988. FAO-UNDP-Indo-Pacific-Tuna-Dev.-and-Manage.-Programme,-Colombo-Sri-Lanka 1988. pp. 262-264

The status of tuna stocks in Oman coastal waters is discussed, considering yellowfin, longtail and kawakawa. Development programs implemented by the government are considered, analyzing in particular the progress made in the collection of statistics.

Recent trends in Atlantic tropical tuna fisheries. The recovery of the yellowfin stock.

Fonteneau,-A.

B (Book); K (Conf COLLECTIVE-VOLUME-OF-WORKING-DOCUMENTS.-VOL.-3.-PRESENTED-AT-THE-EXPERT-CONSULTATION-ON-STOCK-ASSESSMENT-OF-TUNAS-IN-THE-INDIAN-OCEAN,-HELD-IN-MAURITIUS,-22-27-JUNE-1988. FAO-UNDP-Indo-Pacific-Tuna-Dev.-and-Manage.-Programme,-Colombo-Sri-Lanka 1988. pp. 60-67

This document presents a short review of the status of fisheries and yellowfin (Thunnus albacares) stock in the eastern Atlantic. The fisheries are stable since 1984 when the FIS and Spanish purse seiners went to the Indian ocean. The major cause of this departure was the low yellowfin catch rates suffered by purse seiners during 1983 and 1984. Present analysis shows that at this time the yellowfin stock was heavily exploited more or less at the level of MSY within the exploited area. During this period an important anomaly of the environment was observed and characterized by a deepening of the thermocline.

Fishing of big pelagic fishes around fish aggregating devices in Mauritius.

Roullot,-J.; Venkatasami,-A.; Soondron,-S.

B (Book); K (Conf COLLECTIVE-VOLUME-OF-WORKING-DOCUMENTS.-VOL.-3.-PRESENTED-AT-THE-EXPERT-CONSULTATION-ON-STOCK-ASSESSMENT-OF-TUNAS-IN-THE-INDIAN-OCEAN,-HELD-IN-MAURITIUS,-22-27-JUNE-1988. FAO-UNDP-Indo-Pacific-Tuna-Dev.-and-Manage.-Programme,-Colombo-Sri-Lanka 1988. pp. 233-250

FADs have been set around Mauritius since 1985 in the coastal waters at depths from 900 to 3000 mts and between 2.5 to 12 nm. from the coast. Meant to be used by the artisanal fishery, FADs were also visited by the sports vessels and amateur fishermen. Catch data were collected from these fisheries and supplemented by the more complete data recorded by the project vessels. Over 330 tons of pelagic fish was caught around the FADs last year and the catch per boat of the artisanal fishery manned by 2 or 3 fishermen was between 40 and 56 kgs daily. The main fishing methods were trolling, hand lining and longlining, and the predominant species in the catch of the project boats were the dolfin-fish while it was the yellowfin tuna which had the main share in the catch of the artisanal fishermen.

Tuna fisheries and resources in the west coast of Thailand, Andaman Sea.

Veera-Boonragsa

B (Book); K (Conf REPORT-OF-THE-2nd-SOUTHEAST-ASIAN-TUNA-CONFERENCE-AND-3rd-MEETING-OF-TUNA-RESEARCH-GROUPS-IN-THE-SOUTHEAST-ASIAN-REGION,-KUALA-TERENGGANU,-MALAYSIA,-22-25-AUGUST,-1988. FAO-UNDP-Indo-Pacific-Tuna-Dev.-and-Manage.-Programme,-Colombo-Sri-Lanka 1988. pp. 51-66

Small tuna in the west coast of Thailand have played an important role for 5-6 years, due to the corresponding growth in demand of tuna canneries. As demand has grown, the price of small tunas has also risen. Small tunas are mainly exploited by purse seines. This fishery contributed approximately 97% in the total landing of small tunas from all gear types during 1985-1987. The rapid growth in small catch has continued; it increased from 2,880 tons in 1983 to 13,249 tons in 1987 and were accounted for 4.4% and 12.1% in the total pelagic landings in the mentioned year respectively. The catch rate of small tunas increased during 1985-1987.

Weight dependence of arsenic concentration in the Arabian Sea tuna fish.

Ashraf,-M.; Jaffar,-M.

J (Journal-Article) BULL.-ENVIRON.-CONTAM.-TOXICOL. 1988. vol. 40, no. 2, pp. 219-225

The objective of the present investigation was to estimate the arsenic concentration in the edible muscle of Thunnus thynnus and Thunnus toggel , as they have great commercial value. These fish are widely available along the coastal line of Pakistan and are consumed abundantly in large bulk. Thus, it was felt justifiable on the basis of safety of human health that data, in the first instance, be obtained on arsenic concentration in tuna as a function of weight to check whether the metal distribution was species-specific or it depended on individual mode of development.

Results on the experimental purse seine fishing with FADs in the Indian Ocean by R/V Nippon Maru .

Watanabe,-Y.; Tsunekawa,-T.; Takahashi,-M.; Tabuchi,-M.; Sugawara,-T.

B (Book); K (Conf COLLECTIVE-VOLUME-OF-WORKING-DOCUMENTS.-VOL.-3.-PRESENTED-AT-THE-EXPERT-CONSULTATION-ON-STOCK-ASSESSMENT-OF-TUNAS-IN-THE-INDIAN-OCEAN,-HELD-IN-MAURITIUS,-22-27-JUNE-1988. FAO-UNDP-Indo-Pacific-Tuna-Dev.-and-Manage.-Programme,-Colombo-Sri-Lanka 1988. pp. 227-232

The results are presented of experimental purse seine fishing for tuna in the Indian Ocean using 2 types of fish attracting devices (payao and raft). Catch data are given for the periods 1985-86 and 1986-87. Findings indicate good possibility for Japanese single purse seiners fishing for skipjack in the Indian Ocean.

Trend of tuna catches and profiles of tuna fisheries in the Southeast Asian region.

Sakurai,-T.

B (Book); K (Conf REPORT-OF-THE-2nd-SOUTHEAST-ASIAN-TUNA-CONFERENCE-AND-3rd-MEETING-OF-TUNA-RESEARCH-GROUPS-IN-THE-SOUTHEAST-ASIAN-REGION,-KUALA-TERENGGANU,-MALAYSIA,-22-25-AUGUST,-1988. FAO-UNDP-Indo-Pacific-Tuna-Dev.-and-Manage.-Programme,-Colombo-Sri-Lanka 1988. p. 95

The Southeast Asian region consisting of the Philippines, Indonesia, Thailand and Malaysia is one of the rich areas in the world in tuna and tuna-like species resources. IPTP/FAO statistics shows that the total catch of the region was 695 thousand MT for 1985 which was more than that of Atlantic Ocean and Indian Ocean being 604 thousand MT and 495 MT respectively. The total catch of tuna and tuna-like species in the region has increased from 300 thousand MT in 1976 to 706 thousand MT in 1986.

Experiment of drift gillnets for tunas.

Matsunaga,-Y.; Somyos-Soodhom

B (Book); K (Conf REPORT-OF-THE-2nd-SOUTHEAST-ASIAN-TUNA-CONFERENCE-AND-3rd-MEETING-OF-TUNA-RESEARCH-GROUPS-IN-THE-SOUTHEAST-ASIAN-REGION,-KUALA-TERENGGANU,-MALAYSIA,-22-25-AUGUST,-1988. FAO-UNDP-Indo-Pacific-Tuna-Dev.-and-Manage.-Programme,-Colombo-Sri-Lanka 1988. pp. 140-144

A brief account is given of a survey conducted to investigate the feasibility of skipjack drift gill netting in the Andaman Sea. Fishing operations and species caught are outlined.

Indian Ocean and Southeast Asian tuna fisheries data summary for 1986.

B (Book); N (Num IPTP-DATA-SUMM. COLOMBO-SRI-LANKA-IPTP 1988. no. 8, 103 pp

Tuna fishery statistics are presented for the Indian Ocean and Southeast Asian regions for 1986. Catch data are given according to species, country and gear for the period 1974-86; national statistics for all the countries in the region are also included. The number of tuna-fishing crafts in the national fleets are given.

Development of a multi-cohort analysis method and its application to the Indian Ocean yellowfin tuna length composition.

Wang,-Chien-Hsiung; Tanaka,-S.

J (Journal-Article) BULL.-FAR-SEAS-FISH.-RES.-LAB.-ENYOSUIKENPO. 1988. no. 25, pp. 1-72

A new multi-cohort model with the use of fishing effort as a tuning factor was developed and applied to yellowfin tuna (Thunnus albacares) data of the Japanese longline fishery in the Indian Ocean from 1952 to 1980. The length compositions were converted to age compositions by means of normal curve fitting. The result of analysis showed a decrease of recruitment and population size. However, it should be noted that catches by the surface fisheries were neglected in the calculations.

The Maldivian livebait fishery.

Anderson,-R.C.; Hafiz,-A.

B (Book); K (Conf COLLECTIVE-VOLUME-OF-WORKING-DOCUMENTS.-VOL.-3.-PRESENTED-AT-THE-EXPERT-CONSULTATION-ON-STOCK-ASSESSMENT-OF-TUNAS-IN-THE-INDIAN-OCEAN,-HELD-IN-MAURITIUS,-22-27-JUNE-1988. FAO-UNDP-Indo-Pacific-Tuna-Dev.-and-Manage.-Programme,-Colombo-Sri-Lanka 1988. pp. 18-26

An examination is made of current knowledge in the Maldivian livebait fishery. The fishing methods used are described, detailing bait fish species available for use by the Maldivian fisherman; 3 major categories dominate the fishery: Caesicnidae; Spratelloides; and, Apogonidae. Daily and annual bait catch estimates and tuna catch per unit bait data are given. Interactions between the pole-and-line fisheries for bait and for tuna are considered briefly.

Distribution of yellowfin and bigeye tunas by the Korean longline fishery in the Indian Ocean.

Yang,-W.-S.; Park,-Y.-C.

B (Book); K (Conf COLLECTIVE-VOLUME-OF-WORKING-DOCUMENTS.-VOL.-3.-PRESENTED-AT-THE-EXPERT-CONSULTATION-ON-STOCK-ASSESSMENT-OF-TUNAS-IN-THE-INDIAN-OCEAN,-HELD-IN-MAURITIUS,-22-27-JUNE-1988. FAO-UNDP-Indo-Pacific-Tuna-Dev.-and-Manage.-Programe,-Colombo-Sri-Lanka 1988. pp. 89-93

Distribution of yellowfin (Thunnus albacares) and bigeye (T. obesus) tunas by year and month, and by IPTP sub-area in the Indian Ocean was studied by catch per unit effort based on the data from the Korean tuna longline fishery from 1975 to 1985. CPUE of yellowfin tuna was high in area 1 (Bay of Bengal) and 3 (east coast of Africa) during 1980 to 1985. Bigeye's CPUE, however, was apparently and 6 (south of 10 degree S) from 1975 through 1985. By month, in area 3 CPUE of yellowfin tuna was much higher during January to March from 1983 to 1985, and for bigeye, it was increased greatly from September to December in area 4 and 6.

Results of the tuna sampling programme at 3 sites in the west of Sri Lanka.

Forster,-R.

B (Book); K (Conf COLLECTIVE-VOLUME-OF-WORKING-DOCUMENTS.-VOL.-3.-PRESENTED-AT-THE-EXPERT-CONSULTATION-ON-STOCK-ASSESSMENT-OF-TUNAS-IN-THE-INDIAN-OCEAN,-HELD-IN-MAURITIUS,-22-27-JUNE-1988. FAO-UNDP-Indo-Pacific-Tuna-Dev.-and-Manage.-Programme,-Colombo-Sri-Lanka 1988. p. 389

A sampling programme to monitor the landings of large pelagic fish was initiated at 3 sites on the west coast of Sri Lanka in August 1986. Landings were monitored every other day to November 1987 and every third day thereafter. The large pelagic fishery targets a number of species with a variety of fishing gears. The principal species are skipjack tuna, yellowfin tuna, billfish and shark. The gillnet is the most important gear at all 3 sites, especially during the southwest monsoon. Combination gillnets/longlines are used during the northeast monsoon at Negombo and more recently at Beruwela. The use of combination gillnets/handlines have increased during the 1987-88 northeast monsoon at Beruwela and to a lesser extent at Negombo. There has been an increase in the duration of fishing trips from about 1 night to 3 nights at Negombo and Beruwela during the reporting period.

Tuna tagging programme proposal in Maldives, India and Sri Lanka.

B (Book); K (Conf COLLECTIVE-VOLUME-OF-WORKING-DOCUMENTS.-VOL.-3.-PRESENTED-AT-THE-EXPERT-CONSULTATION-ON-STOCK-ASSESSMENT-OF-TUNAS-IN-THE-INDIAN-OCEAN,-HELD-IN-MAURITIUS,-22-27-JUNE-1988. 1988. pp. 164-170

The tuna fishery has long been of vital importance to the Republic of Maldives. Tuna fishing in other areas of the Indian Ocean has expended dramatically in recent years, and is likely to exposure even more in the near future. The 2 main species involved, skipjack (Katsuwonus pelamis) and yellowfin (Thunnus albacares) tuna, are highly migratory. It is therefore likely that there is some degree of interaction between these fisheries. The Government of Maldives is concerned that high levels of fishing in other areas of the Indian Ocean may adversely affect tuna catches in the Maldives. As a first step towards addressing this potentially serious threat, it is proposed that an investigation of skipjack and yellowfin tuna migrations in the Central Indian Ocean be carried out. Tuna tagging is the most appropriate method for this. A 12-month tuna tagging program for the Maldives is outlined.

Tunas and their food: A view from a lower link of the food chain.

Roger,-C.

B (Book); K (Conf COLLECTIVE-VOLUME-OF-WORKING-DOCUMENTS.-VOL.-3.-PRESENTED-AT-THE-EXPERT-CONSULTATION-ON-STOCK-ASSESSMENT-OF-TUNAS-IN-THE-INDIAN-OCEAN,-HELD-IN-MAURITIUS,-22-27-JUNE-1988. FAO-UNDP-Indo-Pacific-Tuna-Dev.-and-Manage.-Programme,-Colombo-Sri-Lanka 1988. pp. 385-388

An examination is made of the potential richness of oceanic regions with respect to tuna fishery resources. Following a brief account of tuna nutrition, examination of the stomach contents of fish normally found in tuna stomachs is discussed as an indirect approach of assessing the potential richness of different oceanic regions. The abundance of zooplankton and micronekton in plankton samples provides an assessment of the potential richness as they are the food of prey found in tuna stomachs.

(The marlin sport fishery in the Maldives from 1976 to 1986.).

Cayre,-P.; Stequert,-B.

B (Book); K (Conf COLLECTIVE-VOLUME-OF-WORKING-DOCUMENTS.-VOL.-3.-PRESENTED-AT-THE-EXPERT-CONSULTATION-ON-STOCK-ASSESSMENT-OF-TUNAS-IN-THE-INDIAN-OCEAN,-HELD-IN-MAURITIUS,-22-27-JUNE-1988. FAO-UNDP-Indo-Pacific-Tuna-Dev.-and-Manage.-Programme,-Colombo-Sri-Lanka 1988. pp. 128-139

The game fishing catches recorded by the main sport fishing centres in Mauritius from 1976 to 1986, are examined. The reported catches include individual weights all the billfishes and some information for other harvested species. The Indian Ocean blue marlin (Makaira mazara) and the black marlin (M. indica) are the most important target species (respectively 53.7% and 14.5% of the catches). An analysis is made of the length and weight structure of the black and blue marlins exploited off Mauritius.

On Soviet fishery and studies of tunas in the Atlantic Ocean.

Ovchinnikov,-V.V.

B (Book); K (Conf COLLECTIVE-VOLUME-OF-WORKING-DOCUMENTS.-VOL.-3.-PRESENTED-AT-THE-EXPERT-CONSULTATION-ON-STOCK-ASSESSMENT-OF-TUNAS-IN-THE-INDIAN-OCEAN,-HELD-IN-MAURITIUS,-22-27-JUNE-1988. FAO-UNDP-Indo-Pacific-Tuna-Dev.-and-Manage.-Programme,-Colombo-Sri-Lanka 1988. pp. 382-384

Details are given of studies conducted by the Soviet fleet regarding the tuna resources of the Atlantic Ocean. The following areas were covered: 1) state of tuna stocks and fishery; 2) purse seine fishery in the Sierra Leone area; 3) longline fishery; 4) trawling fishery; 5) population structure and stock units; 6) parasitological studies; and 7) development of methods for hydrometeorological provision of tuna fisheries.

Estimation of effective fishing effort and overall fishing intensity and stock assessment of Indian Ocean albacore (Thunnus alalunga), 1962-1986.

Lee,-Ying-Chou; Liu,-Hsi-Chiang

B (Book); K (Conf COLLECTIVE-VOLUME-OF-WORKING-DOCUMENTS.-VOL.-3.-PRESENTED-AT-THE-EXPERT-CONSULTATION-ON-STOCK-ASSESSMENT-OF-TUNAS-IN-THE-INDIAN-OCEAN,-HELD-IN-MAURITIUS,-22-27-JUNE-1988. FAO-UNDP-Indo-Pacific-Tuna-Dev.-Manage.-Programme,-Colombo-Sri-Lanka 1988. pp. 109-118

This paper deals with the stock assessment of the Indian albacore (Thunnus alalunga) stock by using the Pella-Tomlinson stock production model to analyze catch and effort statistics dating from 1962 to 1986. The nominal effort was adjusted into effective fishing effort and overall fishing intensity by Honma's technique, and to assess the stock resource under the combinatorial pair of shape parameter coefficient m and significant age group k.

Age characters of albacore, Thunnus alalunga , in the Indian Ocean.

Lee,-Ying-Chou; Kuo,-Chin-Lau

B (Book); K (Conf COLLECTIVE-VOLUME-OF-WORKING-DOCUMENTS.-VOL.-3.-PRESENTED-AT-THE-EXPERT-CONSULTATION-ON-STOCK-ASSESSMENT-OF-TUNAS-IN-THE-INDIAN-OCEAN,-HELD-IN-MAURITIUS,-22-27-JUNE-1988. FAO-UNDP-Indo-Pacific-Tuna-Dev.-and-Manage.-Programme,-Colombo-Sri-Lanka 1988. pp. 99-108

The characteristics of scale, otolith, vertebra, and spine, and their suitability for age-reading of albacore, Thunnus alalunga , are discussed. The scale, vertebra and spine are thought to be suitable for age-reading. The scale from the ventral-posterior portion and upper measurement axis will be considered. The 18-20th vertebrae and its measurement axis of the dorsal-posterior side will also be adopted.

Preliminary results on yellowfin spawning in the western Indian Ocean.

Karpinski,-B.; Hallier,-J.P.

B (Book); K (Conf COLLECTIVE-VOLUME-OF-WORKING-DOCUMENTS.-VOL.-3.-PRESENTED-AT-THE-EXPERT-CONSULTATION-ON-STOCK-ASSESSMENT-OF-TUNAS-IN-THE-INDIAN-OCEAN,-HELD-IN-MAURITIUS,-22-27-JUNE-1988. FAO-UNDP-Indo-Pacific-Tuna-Dev.-and-Manage.-Programme,-Colombo-Sri-Lanka 1988. pp. 50-59

An examination is made of data obtained regarding the yellowfin tuna (Thunnus albacares) caught by the purse seine fishery of the Seychelles and processed at the tuna cannery. Sex ratio, maturity and spawning, size-at-first maturity and larvae occurrence were investigated. The data obtained are used to discussed the spawning characteristics of the yellowfin tuna stock.

The tuna fisheries of Mauritius (1988).

Munbodh,-M.; Ramcharrum,-B.

B (Book); K (Conf COLLECTIVE-VOLUME-OF-WORKING-DOCUMENTS.-VOL.-3.-PRESENTED-AT-THE-EXPERT-CONSULTATION-ON-STOCK-ASSESSMENT-OF-TUNAS-IN-THE-INDIAN-OCEAN,-HELD-IN-MAURITIUS,-22-27-JUNE-1988. FAO-UNDP-Indo-Pacific-Tuna-Dev.-and-Manage.-Programme,-Colombo-Sri-Lanka 1988. pp. 380-381

The Mauritius tuna fishery is comprised of the following sectors: 1) purse seine; 2) longline; 3) artisanal off-lagoon and sports fishery. A brief account is given of the activities of these sectors since 1986.

Tuna longlining in Seychelles 1984-1988.

Lestang,-J.N.-de

B (Book); K (Conf COLLECTIVE-VOLUME-OF-WORKING-DOCUMENTS.-VOL.-3.-PRESENTED-AT-THE-EXPERT-CONSULTATION-ON-STOCK-ASSESSMENT-OF-TUNAS-IN-THE-INDIAN-OCEAN,-HELD-IN-MAURITIUS,-22-27-JUNE-1988. FAO-UNDP-Indo-Pacific-Tuna-Dev.-and-Manage.-Programme,-Colombo-Sri-Lanka 1988. pp. 356-363

Tuna fishing activities conducted by South Korean longliners in Seychelles waters are described, examining data for the period 1984-88 regarding catch rates, catch composition and production trends.

Taiwanese tuna fisheries in Indian Ocean and undergoing researches on the resources (1986 national report of the ROC).

Lee,-Jen-Chyaan; Yeh,-Shean-Ya; Kuo,-Chin-Lau

B (Book); K (Conf COLLECTIVE-VOLUME-OF-WORKING-DOCUMENTS.-VOL.-3.-PRESENTED-AT-THE-EXPERT-CONSULTATION-ON-STOCK-ASSESSMENT-OF-TUNAS-IN-THE-INDIAN-OCEAN,-HELD-IN-MAURITIUS,-22-27-JUNE-1988. FAO-UNDP-Indo-Pacific-Tuna-Dev.-and-Manage.-Programme,-Colombo-Sri-Lanka 1988. p. 379

Tuna fishing activities conducted by Taiwanese longliners and gillnetters in the Indian Ocean during 1985 and 1986 are summarized. Research activities conducted regarding the assessment of the albacore stock are also briefly discussed.

Comparison of fishing performance by longline and purse seine fisheries on yellowfin tuna in the Indian Ocean.

Suzuki,-Z.

B (Book); K (Conf COLLECTIVE-VOLUME-OF-WORKING-DOCUMENTS.-VOL.-3.-PRESENTED-AT-THE-EXPERT-CONSULTATION-ON-STOCK-ASSESSMENT-OF-TUNAS-IN-THE-INDIAN-OCEAN,-HELD-IN-MAURITIUS,-22-27-JUNE-1988. FAO-UNDP-Indo-Pacific-Tuna-Dev.-and-Manage.-Programme,-Colombo-Sri-Lanka 1988. pp. 82-88

An examination is made of the statistics of the purse-seine and longline fisheries for yellowfin tuna (Thunnus albacares) in the Indian Ocean. Catch, fishing effort, CPUE and catch by age are compared for the 2 sectors. Both fisheries have shown stable fishing in recent years, although the difference in age composition of the yellowfin caught by the 2 fisheries delays the occurrence of a possible adverse effect by the purse seine sector on the longline fishery by 2-3 years. Environmental conditions such as the El Nino may also effect the recruitment of yellowfin. It is suggested that these factors should be taken into account in interpretation of the apparent stability of the fisheries.

The tuna purse seine fishery of the western Indian Ocean (1983 to 1987).

Lablache,-G.; Lestang,-J.N.-de

B (Book); K (Conf COLLECTIVE-VOLUME-OF-WORKING-DOCUMENTS.-VOL.-3.-PRESENTED-AT-THE-EXPERT-CONSULTATION-ON-STOCK-ASSESSMENT-OF-TUNAS-IN-THE-INDIAN-OCEAN,-HELD-IN-MAURITIUS,-22-27-JUNE-1988. FAO-UNDP-Indo-Pacific-Tuna-Dev.-and-Manage.-Programme,-Colombo-Sri-Lanka 1988. pp. 364-378

A summary is made of data available for the tuna purse seine fishery in the western Indian Ocean for the period 1983-87. Characteristics of the fishery are described; catch and effort statistics, catch rates and fishing grounds are detailed. Future prospects are examined briefly and research programmes implemented by the Seychelles Fishing Authority cover the following aspects: 1) tuna statistics; 2) tuna biology; and 3) research cruises.

Production model analysis and preliminary application of virtual population analysis on the Indian bigeye tuna.

Miyabe,-N.

B (Book); K (Conf COLLECTIVE-VOLUME-OF-WORKING-DOCUMENTS.-VOL.-3.-PRESENTED-AT-THE-EXPERT-CONSULTATION-ON-STOCK-ASSESSMENT-OF-TUNAS-IN-THE-INDIAN-OCEAN,-HELD-IN-MAURITIUS,-22-27-JUNE-1988. FAO-UNDP-Indo-Pacific-Tuna-Dev.-and-Manage.-Programme,-Colombo-Sri-Lanka 1988. pp. 74-81

An examination is made of the stock status of Indian bigeye tuna (Thunnus obesus) using catch and effort data of the Japanese (1952-85), Taiwanese (1967-85) and Korean (1975-82) longline fisheries. Preliminary virtual population analysis was also attempted with the catch-at-size data from the Japanese longline fishery (1965-85). Findings imply the Indian bigeye stock to be still in good condition, although close monitoring is necessary due to the high level of exploitation.

IPTP data record

B (Book); N (Num IPTP-DATA-REC. COLOMBO-SRI-LANKA IPTP 1989 vol. 2, 459 pp

This publication contains historical data on tuna catch and effort and size frequency, including industrial longline and purse seine fisheries as well as artisanal fisheries covering the Indian Ocean and Southeast Asia region. It includes data received after November 1989 up to data.

Size group distribution studies of small tuna from the exploratory fishing survey in 1989

Poreeyamond,-D.; Tantivara,-C.

B (Book); K (Conf REPORT-OF-THE-3RD-SOUTHEAST-ASIAN-TUNA-CONFERENCE,-BALI,-INDONESIA,-22-24-AUGUST,-1989. FAO-UNDP-Indo-Pacific-Tuna-Development-and-Management-Programme,-Colombo-Sri-Lanka COLOMBO-SRI-LANKA IPTP 1989 pp. 84-108

A discussion is presented on a purse-seining survey conducted in the Andaman Sea EEZ of Thailand during the period January-April 1989. Results showed frigate tuna (Auxis thazard) and kawakawa (Euthynnus affinis) to be the most abundant species; the size of the tuna ranged 32-36 cm. Length weight relationships were determined for yellowfin, skipjack, kawakawa and frigate.

Report of the Workshop on Tuna and Seerfishes in the North Arabian Sea Region. Muscat, Sultanate of Oman, 7-9 February, 1989.

B (Book); K (Conf COLOMBO-SRI-LANKA-IPTP 1989. 109 pp

The report describes the topics discussed at the workshop and includes country reports regarding the tuna fisheries in the six participating countries: Pakistan, Somalia, Sri Lanka, Yemen Democratic Republic, the United Arab Emirates and Oman. Eleven research paper were also presented at the workshop.

Oman's large pelagic species: Management and research considerations

Dudley,-R.G.

B (Book); K (Conf REPORT-OF-THE-3RD-SOUTHEAST-ASIAN-TUNA-CONFERENCE,-BALI,-INDONESIA,-22-24-AUGUST,-1989. FAO-UNDP-Indo-Pacific-Tuna-Development-and-Management-Programme,-Colombo-Sri-Lanka COLOMBO-SRI-LANKA IPTP 1989 pp. 139-142

Large pelagic species form the mainstay of Oman's fisheries. Scomberomorus commerson, Thunnus tonggol, T. albacares and other large pelagic species account for almost 50% of the catches. Large pelagics research at Oman's Marine Science and Fisheries Center is directed toward the improvement of information concerning stock condition, stock identification and biology of major species, and at improving the management of these species as a sustainable natural resource.

Analyses of southern bluefin tuna tag-recapture information

Hearn,-W.S.

B (Book); K (Conf AUSTRALIAN-SOCIETY-FOR-FISH-BIOLOGY-TAGGING-WORKSHOP.-TAGGING-SOLUTION-OR-PROBLEM. Hancock,-D.A.-ed. CANBERRA,-A.C.T.-AUSTRALIA AUSTRALIAN-GOVERNMENT-PUBLISHING-SERVICE 1989 no. 5 pp. 129-133

PROC.-BUR.-RURAL-RESOUR. no. 5

CSIRO conducted a tagging programme on southern bluefin tuna in South and Western Australian waters in 1983-84. That 40 percent of tagged fish were caught and reported within 4 years is confirmation of that the fishery is heavily exploited. Results indicated that the probability of shedding a tag actually declined over the first few years, an anomaly that reveals that expertise in tagging has more to do with the effects of shedding on results than does the analytical method employed. However, a method was developed for estimating natural and fishing mortality rates, yield per recruit, and interactions among fisheries. The methods do not model the fishing process, nor require a parametric model of growth, are valid for non-homogeneous populations, and do not require a model to be constructed for geographic migration between populations.

Trend of tuna landings in the Indian Ocean.

Sakurai,-T.

J (Journal-Article); J.-MAR.-BIOL.-ASSOC.-INDIA. 1989. vol. 31, no. 1-2, pp. 1-19

Species composition of tunas and tuna-like fishes, their catch by different gears, catch trend of different species from 1952 to 1985 from different areas in the Indian Ocean are elaborately discussed in this paper.

Trace metal content of six Arabian Sea fish species using a direct nitric acid based wet oxidation method.

Ashraf,-M.; Jaffar,-M.

J (Journal-Article) TOXICOL.-ENVIRON.-CHEM. 1989. vol. 19, no. 1-2, pp. 63-68

A simple wet oxidation procedure, based on the use of nitric acid alone is presented for the estimation of trace metals in marine fish by atomic absorption method. Six Arabian Sea fish species, salmon, tuna, silver pomfret, black pomfret, lontail tuna and Indian oil-sardine were analyzed for their trace metal content. The nearshore fish species caught off the Karachi coast were analyzed for nickel, copper, manganese, mercury, iron, chromium, cadmium, lead, zinc and arsenic. The results are quoted at plus or minus S confidence level and are compared statistically with those attained by common wet oxidation and dry ashing methods in terms of standard deviation and coefficient of variation based on replicate measurements.

Stock assessment of migratory fish species based on localized data -- oceanic skipjack tuna pole and line fishery at Minicoy as a case study.

Pillay,-P.; Gopakumar,-G.

B (Book); K (Conf CONTRIBUTIONS-TO-TROPICAL-FISH-STOCK-ASSESSMENT-IN-INDIA.-PAPERS-PREPARED-BY-THE-PARTICIPANTS-AT-THE-FAO-DANIDA-ICAR-NATIONAL-FOLLOW-UP-TRAINING-COURSE-ON-FISH-STOCK-ASSESSMENT.-COCHIN,-INDIA,-2-28-NOVEMBER-1987. Venema,-S.C.;Zalinge,-N.P.-van-eds. 1989. pp. 127-142

The highly migratory nature of the skipjack tuna (Katsuwonus pelamis) coupled with inadequacy of data which is likely to cover only a fringe of its entire geographical distribution range poses problems in the estimation of population parameters and stock size of this species. The present study is an attempt to evaluate estimates of these parameters based on pole and line fishery data collected during 1985 and 1986 at Minicoy, Lakshadweep only. Problems encountered in the estimation of migratory stocks as exemplified by skipjack tuna are presented and discussed.

On mercury and selenium in fish blood. 2. The differences of the levels of mercury and selenium in blood of tuna between two different fishing locations and between two species.

Kai,-N.; Ueda,-T.; Takeda,-Y.; Nagatomo,-K.

J (Journal-Article) J.-SHIMONOSEKI-UNIV.-FISH.-SUISANDAI-KENPO. 1989. vol. 38, no. 1, pp. 7-10

The difference between both fishing locations, and between both species in the levels of mercury and selenium in blood of 2 species of tunas, (Thunnus albacares and T. obesus) from the Indian and the Pacific Oceans, were presented. There was no significant difference between both fishing locations in the selenium level in each tuna. On the other hand, the mercury level in big-eye was significantly high compared with that in yellow fin in each fishing location. There was, however, no difference between both species in the selenium level in each fishing location. The molar ratio (Se/Hg) of selenium content (Se) to total mercury content (T-Hg) correlated negatively with T-Hg in the blood of both species, and also in both fishing locations.

An introductory method for gaining access to the indigenous knowledge of fishermen

Piercer-Colfer,-C.J.; Al-Mamry,-J.

B (Book); K (Conf REPORT-OF-THE-3RD-SOUTHEAST-ASIAN-TUNA-CONFERENCE,-BALI,-INDONESIA,-22-24-AUGUST,-1989. FAO-UNDP-Indo-Pacific-Tuna-Development-and-Management-Programme,-Colombo-Sri-Lanka COLOMBO-SRI-LANKA IPTP 1989 pp. 196-199

This paper describes a method which can be used by nonspecialists to begin studying fishermen's knowledge. The method-an open-ended interviewing technique--is described, with examples using our experience among Omani fishermen from the Sur area. The specific topic we were investigating was fishermen's knowledge and beliefs about kingfish (Scomberomorus commerson), one of Oman's most valuable fisheries resources.

Some considerations on the population dynamics of yellowfin tuna, Thunnus albacares (Bonnaterre) in Indian seas.

John,-M.E.; Reddy,-K.S.N.

B (Book); K (Conf STUDIES-ON-FISH-STOCK-ASSESSMENT-IN-INDIAN-WATERS. Fishery-Surv.-of-India,-Bombay-India BOMBAY-INDIA FSI 1989. no. 2 pp. 33-54

SPEC.-PUBL.-FISH.-SURV.-INDIA. no. 2

Results of a study on population dynamics of yellowfin tuna, Thunnus albacares in Indian seas based on data collected in longline survey is presented in the paper. The survey covered oceanic waters of the Indian EEZ and adjacent areas, during 1983-88. Length-weight relationship of yellowfin tuna is described as W 0.000049557 L super(2.8055). The Von Bertalanffy parameters obtained are L approaches infinity 175 cm and K 0.29 (year/l). Natural mortality coefficient is estimated as 0.74. In view of data limitations the results are to be considered only as prefatory.

Indian Ocean and Southeast Asian tuna fisheries data summary for 1987.

B (Book); N (Num IPTP-DATA-SUMM. COLOMBO-SRI-LANKA-IPTP 1989. no. 9, 108 pp

Statistics regarding the tuna and tuna-like fisheries in the Indo Pacific region during the year 1987 are detailed. The summary report is presented in 2 parts, the first providing catch statistics by species, by country, and by species, country and gear together with national statistics for the various countries involved in the area, and the second providing fishing craft statistics for individual countries.

Indian Ocean Fishery Commission. Report of the fifth session of the Committee for the Development and Management of Fisheries in the Southwest Indian Ocean. Curepipe, Mauritius, 14-16 November 1988.

B (Book); K (Conf FAO-FISH.-REP.-FAO-RAPP.-PECHES. ROME-ITALY-FAO 1989. no. 419, 76 pp

This document presents the final report of the Fifth Session of the Indian Ocean Fishery Commission's Committee for the Development and Management of Fisheries. Major topics discussed were: action on major recommendations and decisions of the Fourth Session, a review of the state of marine fishery resources, research, development of national capacities in tuna fisheries, progress and constraints in the development and management of fisheries, follow-up to the FAO World Conference on Fisheries Management and Development, a review of the structure, functions and responsibilities of the Committee and cooperation with other international organizations concerned with living marine resources and environment in the region.

Tuna fishing in the Indian Exclusive Economic Zone (EEZ); a commercial possibility.

Gokhale,-S.V.

B (Book); K (Conf PROCEEDINGS-OF-THE-NATIONAL-SYMPOSIUM-ON-UTILIZATION-OF-LIVING-RESOURCES-OF-THE-INDIAN-SEAS.-DECEMBER-19-21,-1987,-CENTRAL-INSTITUTE-OF-FISHERIES-EDUCATION,-BOMBAY. Srivastava,-U.S.-ed. 1989. pp. 131-147

An account is given of the commercially important species of tuna in the Indian Ocean, their present status and maximum sustainable yield. The findings of a survey conducted in the Indian EEZ during the period May 1985-March 1986 regarding catch rates and catch composition are discussed with respect to commercial potential of the tuna fishing industry.

Report of the Conference for the Adoption of a Draft Agreement for the Establishment of the Indian Ocean Tuna Commission. Rome, 3-7 April 1989.

B (Book); K (Conf FAO-FISH.-REP. 1989. no. 423, 49 pp

The FAO Draft Agreement, under consideration by the Conference, was the result of the recommendations of the Tenth Session of the IOFC Committee for the Management of Indian Ocean Tuna held in Mauritius in 1988. The Conference was held to examine the main underlying issues associated with the agreement. These included: area of competence, species, objectives and functions, information, finance, headquarters, subsidiary bodies, and legal framework. The Conference agreed on the need for further consultation before a draft agreement for the establishment of the Indian Ocean Tuna Commission could be adopted.

Existing policy and present status of deep sea fishing in India.

Sarma,-B.C.

B (Book); K (Conf PROCEEDINGS-OF-THE-NATIONAL-SYMPOSIUM-ON-UTILIZATION-OF-LIVING-RESOURCES-OF-THE-INDIAN-SEAS.-DECEMBER-19-21,-1987,-CENTRAL-INSTITUTE-OF-FISHERIES-EDUCATION,-BOMBAY. Srivastava,-U.S.-ed. 1989. pp. 115-122

There is scope in India to increase the catch significantly through introduction of resource specific deepsea fishing vessels, creation of proper infrastructural facilities and development of internal and export marketing channels. At present the number of deepsea fishing vessels in the country is only 134 excluding chartered foreign fishing vessels. The Government proposes to increase the number to 500 during the 7th Plan period through acquisition, charter of foreign fishing vessels and joint venture. A new policy on charter of foreign fishing vessels and joint venture in deepsea fishing was declared by the Government in January, 1987. The present deepsea fishing industry is mainly shrimp oriented, other economically exploitable resources are mainly tuna, squids and cuttlefish and should encourage introduction of vessels for exploitation of these resource.

Status of marine fishing industry in Lakshadweep.

Varghese,-G.; Shanmugham,-P.

B (Book); K (Conf PROCEEDINGS-OF-THE-NATIONAL-SYMPOSIUM-ON-UTILIZATION-OF-LIVING-RESOURCES-OF-THE-INDIAN-SEAS.-DECEMBER-19-21,-1987,-CENTRAL-INSTITUTE-OF-FISHERIES-EDUCATION,-BOMBAY. Srivastava,-U.S.-ed. 1989. pp. 87-100

The fisheries development in Lakshadweep is largely governed by the level and type of fishing effort expanded for the exploitation of the tuna and sharks, abundantly seen around the oceanic waters of the islands and submerged reefs. A review of the developmental schemes launched by the Government during the last 25 years and its impact on the fish production and economic progress of the local inhabitants is attempted.

Tuna larvae abundance: Comparative estimates from concurrent Japanese and Australian sampling programs.

Davis,-T.L.O.; Jenkins,-G.P.; Yukinawa,-M.; Nishikawa,-Y.

J (Journal-Article) FISH.-BULL. 1989. vol. 87, no. 4, pp. 976-981

In this paper we compare catches of tuna larvae by traditional Japanese methods with those developed by CSIRO Division of Fisheries for quantitative surveys. A series of simultaneous twos were made by the CSIRO, FRV Soela and the FSFRL, FRV Shoyo Maru on the southern bluefin (Thunnus thynnus) tuna spawning grounds in the east Indian Ocean in January 1987.

(The R.V. Alis "Indothon 01" cruise in the north of the Seychelles Islands: Environmental conditions and purse seine fishing).

Marsac,-F.; Piton,-B.; Lablache-Carrara,-G.; Shah,-N.J.; Dupouy,-C.; Dessier,-A.; Dandonneau,-Y.

B (Book) MAHE-SEYCHELLES-SFA 1989. 62 pp

The marine area off Somalia, North of the Seychelles Islands (Indian Ocean), exhibits hydrological patterns that promote the concentration of tuna (especially skipjack, but also yellowfin and bigeye) around flotsam, at the end of the southwest monsoon and during the intermonsoon (Sep-Oct). Physical and chemical parameters collected during the R.V. Alis "Indothon 01" cruise (Oct 3-17, 1987) are analysed and the purse seine catch rates recorded during Sep and Oct 1987 are examined in relation to the hydrological patterns of the area.

(Regional examples of application. 5.4. Tropical tuna fisheries in the western Indian Ocean.).

Marsac,-F.

B (Book); N (Num SATELLITE-GEOSENSING-AND-OCEANIC-TUNA-FISHERIES.. TELEDETECTION-SATELLITAIRE-ET-PECHERIES-THONIERES-OCEANIQUES. Le-Gall,-J.-Y.-ed. 1989. no. 302 pp. 111-125

FAO-DOC.-TECH.-PECHES. no. 302

An examination is made of data regarding the tuna fisheries in tropical waters of the western Indian Ocean and oceanographic conditions, for the period 1983-86. Catch distribution and yields of industrial seiners operating in the region are discussed and applications of satellite obtained data in the improved exploitation of tunas in the area are considered.

State of art of marine fisheries in India.

Devaraj,-M.

B (Book); K (Conf PROCEEDINGS-OF-THE-NATIONAL-SYMPOSIUM-ON-UTILIZATION-OF-LIVING-RESOURCES-OF-THE-INDIAN-SEAS.-DECEMBER-19-21,-1987,-CENTRAL-INSTITUTE-OF-FISHERIES-EDUCATION,-BOMBAY. Srivastava,-U.S.-ed. 1989. pp. 101-114

Estimates of marine fishery potential and production in India are critically examined and measure suggested for minimising existing production gaps for inshore as well as offshore fisheries. Emphasis is needed on diversification of fishing, products and markets. In spite of considerable advances made in mariculture technology for oysters, mussels and clams, there has not been any worthwhile commercial development owing to ineffective technology transfer and lack of institutional finance and government subsidy. The manpower required for various marine fisheries development activities exists, but skill required for certain operations like high sea tuna fishing, pearl culture and intensive shrimp farming will have to be developed.

Tuna sampling programme in Sri Lanka.

B (Book); N (Num COLOMBO-SRI-LANKA-IPTP 1989. 109 pp

The results are presented of a sampling programme conducted in Sri Lanka in order to obtain information of catch/effort, species composition and size frequency for tuna and tuna like species caught by artisanal fisheries operating in the west coast of the country. The type of boat and gear used are also described. During the 2 year period, August 1986 - July 1988, some 19 species of tunas and 8 non-tuna species were identified and their catches and fishing efforts were recorded by boat types at 3 landing sites: Kandakuliay, Negombo and Beruwala.

Tropical tuna -- surface fisheries in the Indian Ocean.

Stequert,-B.; Marsac,-F.

B (Book); N (Num FAO-FISH.-TECH.-PAP. ROME-ITALY-FAO 1989. no. 282, 238 pp

Although few data are available, Indian Ocean tuna resources are becoming the object of an increasingly active fishery. Between 1980 and 1985 catches grew from 275,000 t to almost 450,000 t, a 60% increase. Catches of tropical surface tuna species, mainly skipjack and yellowfin, nearly doubled during the same period, from 156,000 t to almost 300,000 t. Present knowledge on the biology of the main species of tuna in the Indian Ocean, the oceanographic environment and its influence on production is summarized. The main artisanal fisheries are described country by country. Results of the many surveys carried out by pole-and-line fishing, with live bait, and purse-seining or through aerial survey are analysed.

Report of the Conference for the Adoption of a Draft Agreement for the Establishment of the Indian Ocean Tuna Commission. Rome, 3-7 April 1989.

B (Book); K (Conf FAO-FISH.-REP. 1989. no. 423, 29 pp

The FAO Draft Agreement, under consideration by the Conference, was the result of the recommendations of the Tenth Session of the IOFC Committee for the Management of Indian Ocean Tuna held in Mauritius in 1988. The Conference was held to examine the main underlying issues associated with the agreement. These included: area of competence, species, objectives and functions, information, finance, headquarters, subsidiary bodies, and legal framework. The Conference agreed on the need for further consultation before a draft agreement for the establishment of the Indian Ocean Tuna Commission could be adopted.

Oceanographic observations and exploratory fishings in the East China Sea, the eastern Indian Ocean, and the Central Pacific Ocean.

B (Book); N (Num DATA-OCEANOGR.-OBS.-EXPLOR.-FISH.-SHIMONOSEKI-UNIV.-FISH. 1989. no. 15, 42 pp

Findings obtained during cruises undertaken by 2 research vessels of Shimonosekei University of Fisheries during 1988 in order to obtain oceanographic data are presented. Together with the observations made in the eastern Indian Ocean, East China Sea and the Central Pacific, results of detective echo-survey and trial fishing of selected seamounts on the Tonga Ridge II are also given.

Data report on the vertical and horizontal distribution of tuna larvae in the East Indian Ocean, January-February 1987.

Davis,-T.L.O.; Clementson,-L.A.

B (Book) REP.-CSIRO-MAR.-LAB. 1989. no. 206, 41 pp

The ichthyoplankton catch data and hydrographic data collected on SO 1/87 in January-February 1987 on board FRV Soela are presented in this report. Our objective was to assess methods of estimating the abundance of southern bluefin tuna (Thunnus maccoyii) larvae on the spawning grounds in the eastern Indian Ocean. Sampling was designed to investigate the scale and intensity of patchiness, the extent to which tuna larvae go below the mixed layer, and their diel vertical distribution patterns in the mixed layer.

Mercury in scalp hair of Maldivians.

Renzoni,-A.

J (Journal-Article) MAR.-POLLUT.-BULL. 1989. vol. 20, no. 2, p. 93

Hair samples from Maldive islanders were examined for mercury content and the results compared to other areas of the Indian Ocean region. Maldivians have unusually high levels of mercury compared to other isolated island peoples, comparable to those of industrialized and heavily populated Singapore. Seafood, especially skipjack tuna (Katsuwonus pelamis), in the diet of Maldivians is implicated as the probable source, in the form of methyl mercury.

Workshop on upwelling and associated phenomena.

Marsac,-F.

B (Book) 12th-INTERNATIONAL-TRAINING-COURSE-IN-COOPERATION-WITH-THE-GOVERNMENT-OF-ITALY.-CONTRIBUTION-OF-REMOTE-SENSING-TO-MARINE-FISHERIES.-ROME,-ITALY,-11-30-MAY-1987. Travaglia,-C.;McComb,-M.-comps. 1989. no. 49 pp. 185-187

RSC-SER. no. 49

An outline is given of various exercises undertaken in the western Indian Ocean investigating wind stress and upwelling. The application of such data together with surface temperature charts in the determination of potentially productive tuna fishing grounds is examined briefly.

An appropriate management policy for the domestic tuna fishery in the Maldives.

Sathiendrakumar,-R.

J (Journal-Article) ASIAN-FISH.-SCI. 1989. vol. 2, no. 2, pp. 163-175

The main prospect for economic development of the Maldives lies in the possibility of exploitation of the economic potential of its marine resources. Tuna fishing plays an important role in the development of the Maldives. Various policy instruments available to the Maldivian tuna fishery authorities are reviewed in order to select those best suited for the economically efficient exploitation of tuna within the range of operation of the domestic tuna boats. In the Maldivian context, price control is selected as the appropriate policy instrument, even though licensing of tuna boats is also a possibility in the short-run. Price control is based on levying a tax on catches and is oriented towards economic efficiency. The article explains the methodology used in determining the optimal tax which would maximize the economic benefit of the fishery to the Maldivian society.

Fishing efficiency of Korean regular and deep longline gears and vertical distribution of tunas in the Indian Ocean.

Gong,-Yeong; Lee,-Jang-Uk; Kim,-Yeong-Seung; Yang,-Won-Seok

J (Journal-Article) BULL.-KOREAN-FISH.-SOC. 1989. vol. 22, no. 2, pp. 86-94

Yellowfin (Thunnus albacares) and bigeye (T. obesus) tunas have been targeting and the most important species for the Korean tuna longline fishery in the Indian Ocean. This study is aimed to analyse the fishing efficiency of the regular and the deep longlines and the vertical distribution of tunas, and the weight composition by fishing depth based on the data from Korean tuna longline fishery from 1973 to 1980 and from 1984 to 1986 in the Indian Ocean. It was found that the deep longline gear on bigeye tuna was significantly different from the regular longline gear on yellowfin tuna in the whole Indian Ocean. Yellowfin tuna and billfishes were chiefly distributed at the shallow layer and bigeye at the deep layer. The weight composition of yellowfin and bigeye tunas by depth showed that the deeper the depth, the larger the bigeye distributed.

Trend of tuna landings in the Indian Ocean.

Sakurai,-T.

J (Journal-Article) J.-MAR.-BIOL.-ASSOC.-INDIA. 1989. vol. 31, no. 1-2, pp. 1-19

Species composition of tunas and tuna-like fishes, their catch by different gears, and catch trend of different species from 1952 to 1985 from different areas in the Indian Ocean are discussed.

Interim report on 1988 tuna catch statistics in the Indian Ocean and Southeast Asian regions.

R (Report); N (Nu COLOMBO-SRI-LANKA-IPTP 1989. 65 pp

Statistics are presented regarding tuna catches in the Indian Ocean and Southeast Asian region during the period 1976-88. Catch data are given according to species, country and also by species, country and gear.

Maldivian exploratory offshore fishing survey -- feasibility assessment.

Waheed,-A.; Anderson,-R.C.

J (Journal-Article) RASAIN. 1989. no. 9, pp. 144-153

Details are given of a survey conducted in the Maldives to determine the feasibility of carrying out commercial multiday fishing in the outer waters of the EEZ using drifting gillnets and pelagic longlines. Shark, billfish and tuna were the major species caught. The cost and earnings of the survey and ways in which catches might be increased to improve earnings are considered.

(Concarneau (Brittany, France) and the French tropical tuna fishing.).

Couliou,-J.-R.; Piriou,-N.

J (Journal-Article) NOROIS. 1989. vol. 36, no. 144, pp. 357-375

This paper presents the growth of french tropical tuna fishing. Started in 1954, this fishing became a speciality of Concarneau where are located major fishing companies. More than fish canning industry, the presence of very wellknown crews near the port explains this fact. The great fisheries are along Guinea Gulf coast (from Angola to Mauritania) and in the Indian Ocean (around Seychelles Islands) but some sailors work also in West Pacific Ocean from Indonesia. Nowadays, 30 seiner tuna ships catch yellow fish and skip jack. After 1975, many difficulties (overfishing, new maritime boundaries, recession on tuna market) have limited the profitability of the shipowners. Prosperity came back in 1986 with the rise of the tuna prices and allow now new investments which require the shipyards of Concarneau for a large part.

Seychelles tuna bulletin. Third quarter 1989.

B (Book); N (Num SEYCHELLES-TUNA-BULL. VICTORIA-SEYCHELLES-SFA 1989. 16 pp

Catch statistics are presented for the purse seiner and longliner tuna fisheries in the western Indian Ocean during the third quarter of 1989.

Seychelles tuna bulletin. First quarter 1989.

B (Book); N (Num SEYCHELLES-TUNA-BULL. 1989. no. 1, 16 pp

Data are presented regarding the catches of purse seiners and longliners fishing for tuna in the Western Indian Ocean during the first quarter of 1989. A significant increase occurred in the number of vessels active in the region, as compared to the same period in the previous year, and catch rates also reached a record high.

Seychelles tuna bulletin: Second quarter 1989.

B (Book); N (Num SEYCHELLES-TUNA-BULL. VICTORIA-SEYCHELLES-SFA 1989. 16 pp

The number of purse seiners active in the western Indian Ocean during the second quarter of 1989 remained at 47 in April and May, dropping to 46 in June. This represents a significant increase in the number of vessels compared to same period last year when an average of 38 vessels were in operation. Fishing results obtained during the second quarter were mediocre compared to the exceptionally high catches made at the beginning of the year. Record catch rates averaging 26 mt/day during the first quarter dropped from 20 mt/day in April to a mere 9 mt/day in May. These results are however not unusual for this time of the year. Daily catch rates for the second quarter averaged 16 mt/day, reaching the same level as in 1987, whereas 18 mt/day was reported during the same period in 1988. The proportion of yellowfin in the catch remained low at 30% in April, 20% in May and recovering slightly in June (47%).

Stock assessment of Indian Ocean yellowfin tuna (Thunnus albacares) based on data from a sport fishery.

Pitcher,-T.J.; Hemphill,-S.C.

J (Journal-Article) FISHBYTE. 1989. vol. 7, no. 3, pp. 15-17

An assessment is made of the Indian Ocean yellowfin tuna (Thunnus albacares) stock, using data from a sport fishery in the Pemba Channel off the Kenya-Tanzania border in conjunction with commercial catch figures for the Indian Ocean. The long-term maximum sustainable yield is estimated to be around 113,000 tons/annum; data indicate that catch levels of yellowfin tuna in the Indian Ocean exceed the MSY by a dangerous amount.

Pesticide residues in marine fishes.

Radhakrishnan,-A.G.; Antony,-P.D.

J (Journal-Article) FISH.-TECHNOL.-SOC.-FISH.-TECHNOL.-COCHIN. 1989. vol. 26, no. 1, pp. 60-61

Pesticide residues in 4 marine fishes, black pomfret (Parastromateus niger), mackerel (Rastrelliger kanagurta), marine vala (Chirocentrus sp.) and tuna (Euthynnus affinis) are reported. Highest concentration is found in black pomfret followed by tuna, vala and mackerel. The contents of various pesticides present in fish under study are well below the action level prepared by FDA to cause any health hazard.

(Ecuadorian fisheries.).

Bail,-J.-Le

J (Journal-Article) PECHE-MARIT. 1989. vol. 68, no. 1336, pp. 697-700

Since the year 1950, Ecuadorian fisheries have developed dramatically, especially tuna and shrimp fisheries and Ecuador became a fishing power, reaching the 5th place in Latin America, but the development of industrial fisheries occurred at the expense of artisanal fisheries and inland markets. Today the artisanal fishery is in danger of disappearing and industrial fishery is unstable.

(Species and their fisheries in the intertropical zone. 2.2. species and tuna fisheries in the tropical waters of the Western Indian Ocean.).

Marsac,-F.

B (Book); N (Num SATELLITE-GEOSENSING-AND-OCEANIC-TUNA-FISHERIES.. TELEDETECTION-SATELLITAIRE-ET-PECHERIES-THONIERES-OCEANIQUES. Le-Gall,-J.-Y.-ed. 1989. no. 302 pp. 21-29

FAO-DOC.-TECH.-PECHES. no. 302

An account is given of the current state of exploitation of tuna by artisanal and industrial techniques in the western section of the Indian Ocean. Four species are involved in the fisheries -- Thunnus alalunga, T. albacares, T. obesus and Katsuwonus pelamis . Details are also given of the hydroclimate of the environment, describing the surface currents, temperature, salinity and dissolved oxygen.

The fisheries sector in the economy of the Seychelles.

Ghosh,-R.N.

B (Book) ECONOMIC-PLANNING-AND-PERFORMANCE-IN-INDIAN-OCEAN-ISLAND-STATES. Appleyard,-R.T.;Ghosh,-R.N.-eds. CANBERRA-AUSTRALIA AUSTRALIAN-NATL.-UNIV. 1990. no. 2 pp. 111-120

INDIAN-OCEAN-POLICY-PAP. no. 2

Estimates of the Seychelles marine resources differ widely. For example, estimates of the demersal resource, in terms of total biomass of maximum sustainable yield (MSY) available, range between 42,000 tons and 80,000 tons. However stocks on some parts of the plateau may have reached their optimum level of exploitation and therefore any increase in the fishing effort must be undertaken with caution. It is generally agreed that a total annual catch of 7000 tons would be within the "safe margin" of exploitation; the current annual catch is well below this safe limit. Demersal varieties consist mainly of grouper and snapper, varieties which proliferate off banks at the edge of the continental shelf. The successful exploitation of a deep water shrimp resource, recently discovered on the edge of the Mahe plateau, depends upon total stock, overseas markets and competitive costs of operation. Seaweed is another potential resource, although little research has been done on the economics of that industry. Since the proclamation of the EEZ in 1977, industrial fishing of pelagic (open sea) fish species (mainly three types of tuna: yellowfin, skipjack and bigeye) by foreign fishing vessels operating off the continental shelf has increased significantly.

Underwater visibility of a branch line of longline gear to tuna in the Bay of Bengal.

Morinaga,-T.; Koike,-T.; Matsuike,-K.

J (Journal-Article) UMI-MER. 1990. vol. 28, no. 2-3, pp. 117-122

Under reasonable conditions of clear water (beam attenuation coefficient, 0.14m) and high illumination (2,000 lx), the inherent contrast of a nylon leader (no.150, monofilament, 2.0 mm in diameter) is 1.1 and that of a wire leader (no.28, 3 x 3, 1.7mm in diameter) is 6.3. Supposing that the visual acuity of tuna is 0.9, a nylon leader is visible at 1.1m and a wire leader at 3.6m.

(Analysis of data collected by observers on board seiners based at the Seychelles (1986-89).).

Montaudouin,-X.-de; Hallier,-J.P.; Hassani,-S.

B (Book); N (Num TECH.-REP.-SEYCHELLES-FISH.-AUTH. VICTORIA-SEYCHELLES-SFA 1990. no. 014, 34 pp

The tuna purse seine fishery based in Seychelles is analysed using data collected by observers on board French, Spanish, Japanese and Soviet vessels. From 1986 to 1989, different types of data were recorded such as meteorological and oceanographic parameters, aspects and sizes of schools sighted, seiner activities, fishing characteristics (catch, yield, duration of fishing sets). Reliability of observers data with respect to catches is assessed by comparison with log book data from French purse seiners.

Hooks and line fishery for "kalava" at Cochin.

Mathew,-G.; Venugopal,-K.M.

J (Journal-Article) INDIAN-J.-FISH. 1990. vol. 37, no. 4, pp. 347-355

The present paper deals with the hooks and line fishery mainly for kalava, from the comparatively deeper areas of 75 to 125 m depth on the outer continental shelf off Ponnani, Cochin and Alleppey, India where the substratum is of hard rock with rocky outcrops; which is the habitat for rock cods and other perches. The hooks and line fishery for kalava starts from late November or early December and extends to the end of March, when the sea is fairly calm and the waters clear. This fishery made its appearance at Cochin in the early eighties i.e. in 1982 when the catch was only 49 tonnes and the effort 157 unit operations which made a tremendous increase to a total catch of 827.8 tonnes in the year 1987 with an effort of 2,656 fishing trips. Perches or the kalava formed 80.8% of the total hooks and line fish catch, the resting being formed by elasmobranchs, tuna, Coryphaena , seer fish etc.

(Tuna exploitation.).

Rabenomanana,-L.D.

B (Book); K (Conf REPORT-OF-THE-NATIONAL-SEMINAR-ON-POLICY-AND-PLANNING-OF-FISHERIES-DEVELOPMENT-IN-MADAGASCAR,-ANTANANARIVO,-15-19-OCTOBER-1990.. RAPPORT-DU-SEMINAIRE-NATIONAL-SUR-LES-POLITIQUES-ET-LA-PLANIFICATION-DU-DEVELOPPEMENT-DES-PECHES-A-MADAGASCAR.-ANTANANARIVO-DU-15-AU-19-OCTOBRE-1990. Andrianaivojaona,-C.;Kasprzyk,-Z.W.;Dasylva,-G.-eds. ANTANANARIVO-MALAGASY-REP. FAO 1990. pp. 200-209

A discussion is presented on the tuna stocks in Madagascar and their exploitation, describing the 3 fishing techniques in use: dragnets, fishing rods and longlines. Details are given of the various fishery agreements between Madagascar and foreign states.

On the occurrence of yellowfin tuna (Thunnus albacares) in the drift gillnet catch at Cochin.

James,-P.S.B.R.; Jayaprakash,-A.A.

B (Book); K (Conf WORKSHOP-ON-STOCK-ASSESSMENT-OF-YELLOWFIN-TUNA-IN-THE-INDIAN-OCEAN,-COLOMBO,-SRI-LANKA,-7-12-OCTOBER,-1991. COLOMBO-SRI-LANKA INDO-PACIFIC-TUNA-DEVELOPMENT-AND-MANAGEMENT-PROGRAM 1990. pp. 170-177

Juveniles and pre-adults of large growing and oceanic yellowfin tuna (Thunnus albacares) have been found to occur recently in the drift gillnet catches at Cochin. Their occurrence in the troll lines and in the drift gillnets at Tuticorin and Madras on the east coast have been reported earlier. Though the drift gillnetters were in operation at Cochin since 1969, exploiting a variety of small tunas and other pelagic fishes the appearence of the yellowfin tuna in some quantities started only from 1984. During 1984, '85, '86 and '87 they formed 15%, nil, 3.7% and 4.2% respectively of the total tuna catch of the gear. It is interesting to note that during this period yellowfins have found to occur in the drift gillnet catch at centres like Mangalore and Calicut on the west coast of India. The fishermen seemed to have extended their area of operation further deep from the existing 20-50 m depth zone. The yellowfin tunas caught are of the size range 50-114 cm. Their probable migratory pattern has been discussed.

Studies on the distribution and abundance of fish eggs and larvae off the south-west coast of India with special reference to scombroids.

George,-K.C.

B (Book) COLOMBO-SRI-LANKA IPTP 1990. 40 pp

The major objective of the present study was to assess the distribution and abundance of fish eggs and larvae along the SW coast of India and to delineate the spawning grounds and seasons for important commercial fishes, with particular reference to scombroids. The overall picture of abundance of fish eggs and larvae with special reference to scombroids are presented. This study indicated the highest spawning activity of most of the commercial species, especially the pelagic ones during the SW monsoon season. Short periods immediately prior to and after the monsoon season also showed significant spawning. Maximum spawning activity and larval life of the fishes were seen in the areas south of 12 degree N, extending from about February to November. Some amount of drifting of the fish larvae to the southern sector of the SW coast appeared to occur due to the southward surface current during the major part of the spawning period indicated. Two areas of concentration of scombroid larvae, one south of Calicut to east of Cape Comorin and a smaller concentration off Ratnagiri were seen. The larvae were present in all the months of the year, but were more abundant in the March-August period.

Analysis of Maldivian tuna fisheries data 1970-1988.

Rochepeau,-S.; Hafiz,-A.

B (Book); N (Num COLOMBO-SRI-LANKA IPTP 1990. 56 pp

The Maldivian pole and line fishery for tunas has existed for centuries and has been the mainstay in its economy. Landing statistics for this fishery has been collected since 1959 and are available in the I.P.T.P. database since 1970. These statistics are collected by total enumeration. Total counts by species and size category of the dominant species are collected daily by each island administration office. Conversion factors are used to estimate total landed weight. This paper reviews the fishery and recent development in vessel mechanization, fish collecting system and processing facilities. Landing statistics are also examined in detail by atoll groups, years and seasons to assess the following: factors contributing to the recent significant increase in catch; possible sources of errors in the current method of estimating total landed weight; and, environmental parameters affecting pole and line catches.

Reef fish and fisheries in Solomon Islands and Maldives and their interactions with tuna baitfisheries.

Blaber,-S.J.M.; Milton,-D.A.; Rawlinson,-N.J.F.; Tiroba,-G.; Nichols,-P.V.

B (Book); K (Conf TUNA-BAITFISH-IN-THE-INDO-PACIFIC-REGION.-PROCEEDINGS-OF-A-WORKSHOP,-HONIARA,-SOLOMON-ISLANDS,-11-13-DECEMBER,-1989. Blaber,-S.J.M.;Copland,-J.W.-eds. CANBERRA,-ACT-AUSTRALIA AUSTRALIAN-CENTRE-FOR-INTERNATIONAL-AGRICULTURAL-RESEARCH 1990. no. 30 pp. 159-168

ACIAR-PROC. no. 30

The interrelationships of commercial tuna baitfisheries and artisanal-subsistence reef fisheries in Solomon Islands and Maldives were studied. In Solomon Islands, baitfish comprised about 25% of the diet of 28 predatory species. In Maldives only 10 species ate baitfish. Experimental gill netting in lagoons indicated that baitfish predators formed 6-16% of catches in Solomon Islands and 22% of catches in Maldives. To simulate the subsistence fishery in Solomon Islands, fishing competitions were held. Droplining, the predominant technique, contributed most to the overall catch, although trolling was important in one area. It was concluded that most fish caught by the subsistence fishery do not eat baitfish although many of the species caught by trolling are baitfish predators. Unless there is an increase in trolling, there is little evidence that the commercial baitfishery in Solomon Islands has a direct trophic effect on the subsistence reef fishery. In Maldives at least 4 major baitfish predators are important in the developing reef fish fishery. Baitfish predators may become a significant proportion of artisanal catches in Maldives in the future.

Tuna baitfishing in Maldives.

Maniku,-H.; Anderson,-R.C.; Hafiz,-A.

B (Book); K (Conf TUNA-BAITFISH-IN-THE-INDO-PACIFIC-REGION.-PROCEEDINGS-OF-A-WORKSHOP,-HONIARA,-SOLOMON-ISLANDS,-11-13-DECEMBER,-1989. Blaber,-S.J.M.;Copland,-J.W.-eds. CANBERRA,-ACT-AUSTRALIA AUSTRALIAN-CENTRE-FOR-INTERNATIONAL-AGRICULTURAL-RESEARCH 1990. no. 30 pp. 22-29

ACIAR-PROC. no. 30

The Maldivian tuna fishery forms one of the main components of the national economy. Most of the tuna are caught by pole-and-line, which requires copious supplies of small live fish to be used as bait. Details are given of the fishing method used: the pole-and-line vessels leave the islands for baitfishing on nearby reefs just before dawn and travel to the tuna fishing grounds outside the atolls once enough bait has been collected. The vessels return with their catch in the late afternoon or early evening. Three major categories of bait fish dominate: fusiliers (Caesionidae), Spratelloides and cardinal fish (Apogonidae).

Biology of whitebait anchovies of Indian waters.

Luther,-G.

B (Book); K (Conf TUNA-BAITFISH-IN-THE-INDO-PACIFIC-REGION.-PROCEEDINGS-OF-A-WORKSHOP,-HONIARA,-SOLOMON-ISLANDS,-11-13-DECEMBER,-1989. Blaber,-S.J.M.;Copland,-J.W.-eds. CANBERRA,-ACT-AUSTRALIA AUSTRALIAN-CENTRE-FOR-INTERNATIONAL-AGRICULTURAL-RESEARCH 1990. no. 30 pp. 75-82

ACIAR-PROC. no. 30

The present status of knowledge of the biology and fishery of the whitebait anchovies of Indian waters is presented. Whitebait is a common pelagic fish commercially exploited along the Indian coast south of 17 degree N. Ten species of whitebait of 2 genera, Encrasicholina and Stolephorus , occur in Indian seas. Of these, E. devisi and S. waitei together account for the bulk (85%) of the whitebait catch. The former schools closer to the surface than the latter. E. punctifer occurs in deeper waters than the other species. The whitebait fishery generally has two seasons, May-July and October-November. However, the bulk of the catch of E. punctifer is available during June-July. Whitebait have protracted spawning seasons with intensities during March-July and November. Growth and mortality rates of E. devisi and S. waitei and length weight relationships and fecundity of the other important species have been estimated. Fish of 4-8 months age form the mainstay of the fishery of E. devisi and S. waitei , and only very few fish of these 2 species survive beyond 12 months of age. Potential yield estimates of whitebait indicate scope for a threefold increase. E. devisi and E. punctifer are hardy, can survive in captivity for 1-3 months, more so in a medium of reduced salinity, and therefore could serve as good live-bait for tuna.

Biology of tuna baitfish of Seychelles.

Hallier,-J.-P.

B (Book); K (Conf TUNA-BAITFISH-IN-THE-INDO-PACIFIC-REGION.-PROCEEDINGS-OF-A-WORKSHOP,-HONIARA,-SOLOMON-ISLANDS,-11-13-DECEMBER,-1989. Blaber,-S.J.M.;Copland,-J.W.-eds. CANBERRA,-ACT-AUSTRALIA AUSTRALIAN-CENTRE-FOR-INTERNATIONAL-AGRICULTURAL-RESEARCH 1990. no. 30 pp. 60-69

ACIAR-PROC. no. 30

Several surveys have been carried out on the Seychelles tuna baitfishes: on the Mahe Plateau in offshore areas and in coastal areas. On the Mahe Plateau, 2 species Decapterus maruadsi and D. macrosoma are a suitable size for use as baitfish (< 15 cm) when juvenile. D. maruadsi is more abundant but undergoes seasonal fluctuations in abundance. It spawns from March to June. After one year D. maruadsi fork length reaches 14-15 cm, and after 2 years, 21-22 cm when it spawns. The stock was assessed at 55,000 tonnes. D. macrosoma is present all year round but in small amounts. Spawning seems to occur from March-April to September with a maximum in June-July. It only reaches 10 cm FL after one year and 17 cm after two years when it spawns. The stock is estimated at 2000 tonnes. In coastal areas, two species, Herklotsichthys punctatus and Atherinomorus lacunosus were the most abundant baitfish species. H. punctatus apparently spawns more or less all year round. A. lacunosus has 2 well marked spawning seasons, one in April-June and another in September-December.

Biology of whitebait anchovies of Indian waters.

Luther,-G.

B (Book); K (Conf TUNA-BAIT-FISH-IN-THE-INTO-PACIFIC-REGION.-PROCEEDINGS-OF-THE-WORKSHOP,-HONIARA,-SOLOMON-ISLANDS,-11-13-DECEMBER,-1989. Blaber,-S.J.M.;Copland,-J.W.-eds. 1990. no. 30 pp. 75-82

ACIAR-PROC. no. 30

The present status of knowledge of the biology and fishery of the whitebait anchovies of Indian waters is presented. Whitebait is a common pelagic fish commercially exploited along the Indian coast south of 17 degree N. Ten species of whitebait of two genera Encrasicholina and Stolephorus occur in Indian seas. Of these E. devisi and S. waitei together account for the bulk (85%) of the Whitebait catch. The former schools are closer to the surface than the latter. E. punctifer occurs in deeper water than the other species. The whitebait fishery generally has two seasons, May-July and October-November. Whitebait have protracted spawning seasons with intensities during March-July and November. Growth and mortality rates of E. devisi and S. waitei and length-weight relationships and fecundity of the other important species have been estimated. Fish of 4-8 months age form the mainstay of the fishery of E. devisi nad S. waitei and only very few fish of these two species survive beyond 12 months of age. Potential yield estimates of whitebait indicate scope for a threefold increase.

Age and growth of major baitfish species in Solomon Islands and Maldives.

Milton,-D.A.; Blaber,-S.J.M.; Rawlinson,-N.J.F.; Hafiz,-A.; Tiroba,-G.

B (Book); K (Conf TUNA-BAITFISH-IN-THE-INDO-PACIFIC-REGION.-PROCEEDINGS-OF-A-WORKSHOP,-HONIARA,-SOLOMON-ISLANDS,-11-13-DECEMBER,-1989. Blaber,-S.J.M.;Copland,-J.W.-eds. CANBERRA,-ACT-AUSTRALIA AUSTRALIAN-CENTRE-FOR-INTERNATIONAL-AGRICULTURAL-RESEARCH 1990. no. 30 pp. 134-140

ACIAR-PROC. no. 30

Otoliths of the major baitfish species in Solomon Islands and Maldives were examined and the number of increments counted. The number of increments in the otoliths were related to length in all species. Several experiments were undertaken to validate that increments were deposited daily. The results of these experiments are discussed, in relation to the growth curves of each species derived from counts of otolith increments. For Stolephorus species, these curves were not consistent with those inferred from length-frequency analysis. Possible reasons for these differences are discussed. Growth increments in Spratelloides delicatulus have been previously validated as daily. Growth in this species and other Spratelloides species was rapid and fish do not live more than 5 months. There was good agreement between the inferred growth curves from length-frequency analysis and those derived from daily aging. Growth varied between sites and countries for these, and other baitfish species. However, these differences were not related to the intensity of baitfishing, but probably reflected differences in the local environment at each site.

Reproductive biology of Spratelloides delicatulus , S. gracilis and Stolephorus heterolobus from Solomon Islands and Maldives.

Milton,-D.A.; Blaber,-S.J.M.; Tiroba,-G.; Leqata,-J.; Rawlinson,-N.J.F.; Hafiz,-A.

B (Book); K (Conf TUNA-BAITFISH-IN-THE-INDO-PACIFIC-REGION.-PROCEEDINGS-OF-A-WORKSHOP,-HONIARA,-SOLOMON-ISLANDS,-11-13-DECEMBER,-1989. Blaber,-S.J.M.;Copland,-J.W.-eds. CANBERRA,-ACT-AUSTRALIA AUSTRALIAN-CENTRE-FOR-INTERNATIONAL-AGRICULTURAL-RESEARCH 1990. no. 30 pp. 89-98

ACIAR-PROC. no. 30

The reproductive biology of 3 major tuna baitfish species: Spratelloides delicatulus, S. gracilis and Stolephorus heterolobus was compared between Solomon Islands and Maldives. Spratelloides gracilis and Stolephorus heterolobus matured at a smaller size in Solomon Islands than Maldives or other parts of their range. All species had protracted spawning seasons in both countries. In Solomon Islands, fish spawned continuously throughout the year with one or two periods of peak activity S. gracilis and S. heterolobus from Maldives had a single spawning season within the atolls and their reproductive cycle may be linked with the monsoons and prevailing winds. Sex-ratios of S. delicatulus and S. heterolobus from Solomon Islands and Maldives showed a male bias among small length classes with the proportion of females increasing with length. This pattern was reversed in S. gracilis , which had an excess of females in most length classes. The temporal pattern of sex-ratio of S. delicatulus and S. heterolobus were also male biased and reflected the length ranges examined. There was little intraspecific variation in fecundity for any of the species in this study, except Stolephorus heterolobus from Vona Vona, which had more, smaller eggs than fish from other sites, including Maldives. In Solomon Islands, there was no difference in batch fecundity between the 3 species which suggests that their relative abundance may depend on the frequency of spawning and hence, total egg production or recruitment success.

Preparation of dry-salted tuna Euthynnus spp.

J (Journal-Article); J.-MAR.-BIOL.-ASSOC.-INDIA. 1990. vol. 32, no. 1-2, pp. 266-268

Good quality dry salted tuna was prepared by treating with antifungal agents like sodium propionate and calcium propionate. Propionate treatment was found to enhance the shelf life of dried tuna considerably.

Feeding ecology of larvae of southern bluefin, albacore and skipjack tunas (Pisces: Scombridae) in the eastern Indian Ocean.

Young,-J.W.; Davis,-T.L.O.

J (Journal-Article) MAR.-ECOL.-PROG.-SER.. 1990. vol. 61, no. 1-2, pp. 17-29

Copepod nauplii, calanoids, cyclopoids and cladocerans (all Crustacea) were the main prey of the larvae of southern bluefin Thunnus maccoyii and albacore tuna T. alalunga in the eastern Indian Ocean, although the importance of each prey type differed between the 2 species. Cannibalism was found in post-flexion T. maccoyii . Skipjack tuna Katsuwonus pelamis larvae fed mainly on appendicularians and fish larvae. T. maccoyii selected for copepod nauplii and corycaeids and against calanoids. T. alalunga selected for corycaeids and against calanoids. K. pelamis selected for appendicularians. The 2 Thunnus species fed only by day, with peaks in feeding in the early morning and late afternoon. The gut evacuation time of T. alalunga was estimated at ca 4 h. Indexes of feeding success in T. maccoyii were positively correlated with zooplankton biomass, which suggests food was limited.

Fishing methods of Kalpeni Island, Lakshadweep, India.

Anand,-P.E.V.

J (Journal-Article) FISH.-CHIMES. 1990. vol. 10, no. 3, pp. 48-51, 53+

The findings are presented of a study conducted investigating the current fishing methods in use in Kalpeni Island. Other than traditional tuna fishing by pole and line using live bait, various other traditional fishing methods are used, which are classified as follows: drive-in gear; falling gear; covering gear; entangling gear; wounding gear; light fishing; seine nets; traps; line fishing; and fishing without gear.

Options for the management of tuna fisheries in the Indian Ocean.

Burke,-W.T.; Christy,-F.T.,Jr.

B (Book) FAO-FISH.-TECH.-PAP. 1990. no. 315, 73 pp

The study examines possible options for the management of the tuna fisheries in the Indian Ocean. It begins with an assessment of the issues with regard to the 4 main functions of fisheries management: (1) the acquisition of information; (2) regulation of fisheries; (3) enforcement of the management measures; and (4) the allocation of the net benefits from the regime. The issues are examined in terms of both economic and legal aspects. Possible approaches to the resolution of these issues are addressed. This includes discussion of existing arrangements in other areas of the oceans, which have largely failed to achieve effective management and to produce benefits to the members. It is concluded that new conceptions and approaches to management are required to achieve optimum benefits from the fisheries.

Patterns of horizontal distribution of the larvae of southern bluefin (Thunnus maccoyii) and other tuna in the Indian Ocean.

Davis,-T.L.O.; Jenkins,-G.P.; Young,-J.W.

J (Journal-Article) J.-PLANKTON-RES. 1990. vol. 12, no. 6, pp. 1295-1314

The fine- to coarse-scale distribution patterns of tuna larvae in the east Indian Ocean were investigated by a combination of continuous transect sampling using surface tows and random sampling using double oblique tows. Thunnus maccoyii was the most abundant species. Lloyd's index of patchiness was consistently high for all tuna species, ranging from 3.0 to 5.2 for T. maccoyyii . There was no change in the index when tow distance was doubled to 1200 m, which suggests that the dominant patch size was somewhat larger than the larger sampling interval. Sampling larvae at the same site 4 days apart resulted in estimates of abundance that differed by an order of magnitude. Abundance estimated from a single station would depend largely on what day the station was occupied and where the sample was taken in relation to a patch.

Seychelles tuna bulletin. Second quarter 1990.

B (Book); N (Num SEYCHELLES-TUNA-BULL. VICTORIA-SEYCHELLES-SFA 1990. 15 pp

The number of purse seiners active in the Western Indian Ocean decreased sharply from 54 in the first quarter of 1990 to 44 by June. This, however, still represents an increase in the number of active vessels from the same period last year. Fishing results continued to be poor throughout the second quarter, showing only a slight improvement in June. Catch rates were an all time low since 1985 averaging 10.3 MT/day for the quarter. The proportion of yellowfin in the catch decreased to 25% in April, 23% in May and then recovered remarkably in June (80%).

An application of satellite-derived sea surface temperature data to the Australian fishing industry in near real-time.

Myers,-D.G.; Hick,-P.T.

J (Journal-Article) INT.-J.-REMOTE-SENS. 1990. vol. 11, no. 11, pp. 2103-2112

A four-year project conducted from 1981 to 1985 examined the application of satellite-derived near real-time sea surface temperature data in assisting the Tuna fishing industry located along the southwestern coast of Australia. The satellite imagery employed was obtained from the NOAA series of polar orbiting satellites. Since the southern bluefin tuna is a pelagic species, it had been anticipated that a good correlation would be found between sea surface temperatures and catches. Early experimental results tended to confirm that view, but a number of anomalies existed in those results. It is now suggested that a weak correlation exists between temperature and catches, but this is due to localized factors. A theory justifying this assumption is given.

Seychelles tuna bulletin. First quarter 1990.

B (Book); N (Num SEYCHELLES-TUNA-BULL. VICTORIA-SEYCHELLES-SFA 1990. 15 pp

The number of purse seiners active in the western Indian Ocean peaked to an all-time high for the first quarter of 1990 ranging from 50 in January to 53 in March. This represents an increase over the same period last year when an average of 48 vessels were in operation. Fishing results were rather poor throughout the first quarter of this year. Catch rates increased only slightly from a low of 8.18 mt/day in December 1989 to 16.7 mt/day in March 1990. The proportion of yellowfin in the catch however increased considerably from 39% in December to 67% in February 1990, with a corresponding decrease in the proportion of skipjack in the catch.

(High sea fishery: A tidal cycle with the "Chevalier d'Assa" from Lorient Keroman.).

Knockaert,-C.

J (Journal-Article) EQUINOXE. 1990. no. 31, pp. 4-8

There are two kinds of fishing boats in France: those for the artisanal fishery, which fish on the continental shelf, 24 to up to 96 h along; and those for industrial fishery. Among these latter ones, there are 34-55 m trawlers for cod, saithe, burbot, and whiting; up to 70 m trawlers equipped for purse seining and freezing of tuna, which fish in the Indian Ocean and in the high African seas; and those up to 90 m which go fishing for up to 4 months, with 60 seamen. A fishing journey is described.

Seychelles tuna bulletin. Fourth quarter 1989.

B (Book); N (Num SEYCHELLES-TUNA-BULL. VICTORIA-SEYCHELLES-SFA 1990. 16 pp

The number of purse seiners active in the western Indian Ocean increased to 51 during the last quarter of 1989, this being the highest number of vessels recorded in this fishery so far. The overall fishing performance of the fleet throughout the year is comparable to that obtained in previous years. The fishing results however were not as good as that obtained during 1988. Daily catch rates averaged 18.6 MT, compared to 22 MT in 1988 and 17.9 MT in 1987. Skipjack was the predominant species caught, comprising 67% of the catch with a corresponding marked decrease in the proportion of yellowfin from 47% in 1988 to 31% in 1989. The change in yellowfin availability is believed to be caused by unfavourable oceanographic conditions rather than due to stock depletion, whereby the fish remained deeper and thus less accessible to the fishing vessels. The cumulative catch by purse seiners in the western Indian Ocean now stands at 221,017 tonnes for 1989.

Thirty years of fisheries development in Lakshadweep.

B (Book); O (Revi KAVARATTI-INDIA-DEP.-OF-FISHISHERIES 1990. 89 pp

This monograph reviews the progress achieved in the fisheries sector of Lakshadweep during the last 30 years. It gives a detailed account of the history of fishery development, resources and future plans. It is of special importance to those who are interested in tuna fishing as this is the only area of India where tuna fishing is conducted on a large scale. A detailed description of the pole-and-line tuna fishing, as practised in Lakshadweep, is presented. Prospects for the export of marine products from Lakshadweep, and the effects of fisheries development on the economy, are also described.

Indian Ocean and Southeast Asian tuna fisheries data summary for 1988.

B (Book); N (Num IPTP-DATA-SUMM. COLOMBO-SRI-LANKA-IPTP 1990. no. 10, 95 pp

Annual catch statistics, by species, country and gear, are presented together with annual fishing craft statistics for the tuna fisheries in the Indian Ocean and Southeast Asian regions for the year 1988.

Exploratory fishing for large pelagic species in the Maldives.

Anderson,-R.C.; Walheed,-A.

B (Book) MADRAS-INDIA-BOBP 1990. 47 pp

This paper discusses the aims, methodology and findings of the project "Exploratory tuna fishing in the Maldives" TCP/MDV/6651(1). It was established in 1987 as part of a TCP (technical cooperation) agreement between the FAO and the government of Maldives. The project was completed in December 1988. The project was executed by the Marine Research Station of the Ministry of Agriculture and Fisheries with some support from the BOBP (Bay of Bengal Programme for Fisheries Development). Useful information was obtained on the status of pelagic fish stocks, and on the feasibility of operating multi-day gillnet-cum-longline offshore fishing trips. Data were also obtained on offshore tuna and sharks.

Indian Ocean Fishery Commission. Report of the Eleventh Session of the Committee for the Management of Indian Ocean Tuna. Bangkok, Thailand, 9-12 July 1990.

B (Book); K (Conf FAO-FISH.-REP.-FAO-RAPP.-PECHES. ROME-ITALY~-FAO 1990. no. 439, 47 pp

Major topics discussed at this 11th session were: action on major recommendations and decisions of the Tenth Session; review of the state of tuna resources: need for management measures; large-scale pelagic driftnet fishing in the Indian Ocean; and long-term institutional arrangements for the management of Indian Ocean tuna.

Age, growth rate, and growth trajectory determined from otolith microstructure of southern bluefin tuna Thunnus maccoyii larvae.

Jenkins,-G.P.; Davis,-T.L.O.

J (Journal-Article) MAR.-ECOL.-PROG.-SER. 1990. vol. 63, no. 1, pp. 93-104

Otolith microstructure of larvae of southern bluefin tuna, Thunnus maccoyii , collected from the east Indian Ocean in January/February 1987 was examined using light and scanning electron microscopy. Daily formation was verified by examining the growth of the marginal increment on otoliths of larvae collected on 6 successive days. Most of the larvae sampled came from a single cohort which spawned over 2 d. The daily progression of increment number for this cohort was further evidence that increments were formed daily. Larvae ranged from ca 7 to 18-d-old; the larval stage appeared to last ca 20 d. Growth curves could not be fitted to plots of size-at-age due to a large variance in size-at-age and violation of assumptions for parametric tests. Back-calculation of individual growth trajectories was possible because growth of sagittae was exponential relative to body length, and there was a strong linear relationship between log otolith radius and standard length (R super(2) = 0.91).

The Maldivian tuna fishery

Hafiz,-A.

J (Journal-Article); RASAIN 1990 no. 10, pp. 166-157

An account is given of the tuna fishery in the Maldives. Most of the catch is of Skipjack tuna (Katsuwonus pelamis) and yellowfin tuna (Thunnus albacares) which are caught mainly by small, mechanized, live bait pole and line vessels; frigate tuna (Auxis thazard) and little tuna (Euthynnus affinis) are also caught. Statistics are included for number of vessels, fishing effort, and catches.

The hourly variations of the depth of hooks and the hooking depth of yellowfin tuna (Thunnus albacares), and bigeye tuna (Thunnus obesus), of tuna longline in the eastern region of the Indian Ocean.

Nishi,-T.

J (Journal-Article) MEM.-FAC.-FISH.-KAGOSHIMA-UNIV.-KAGOSHIMADAI-SUISANGAKUBU-KIYO. 1990. no. 39, pp. 81-98

Hourly variations of the depth of hooks in the tuna long-line and the hooking depth of tunas and marlins were investigated. The results of the analysis are as follows: (1) the patterns of hourly variations of the depth recordings were classified into three categories of A, B and C; (2) the main hooking stratum of yellowfin tuna (Thunnus albacares) was estimated to be at the depths of 120 m to 150 m; and (3) the main hooking stratum of bigeye tuna (Thunnus obesus) was estimated to be at the depths of 140 m to 170 m.

Report of the Expert Consultation on Stock Assessment of Tuna in the Indian Ocean, Bangkok, 2-6 July, 1990

B (Book); K (Conf COLOMBO-SRI-LANKA IPTP 1990 96 pp

The report gives an account of topics discussed at the Consultation under the following main headings. Review of national fisheries and research programmes; Report of the Indo-Pacific tuna development and management programme; Review of scientific papers on biological study and stock status - yellowfin and skipjack tunas (overview of fisheries; stock evaluation, yellowfin tuna; stock evaluation, skipjack tuna); bigeye tuna, albacore and southern bluefin tuna (bigeye tuna, albacore, southern bluefin tuna): small tunas, seerfish and billfish (description of fisheries, small tunas, seerfish, billfish); Interaction and tagging experiment; Drift gillnet fishery; Review of status of IPTP database; and, Review of progress in research.

Diel patterns of vertical distribution in larvae of southern bluefin Thunnus maccoyii , and other tuna in the East Indian Ocean.

Davis,-T.L.O.; Jenkins,-G.P.; Young,-J.W.

J (Journal-Article) MAR.-ECOL.-PROG.-SER.. 1990. vol. 59, no. 1-2, pp. 63-74

Vertical distributions of larvae of 3 tuna species were investigated in the East Indian Ocean. In the presence of a strong pycnocline, the entire depth range of tuna larvae could be covered by sampling the mixed layer by both day and night. A small proportion of tuna larvae were found below the mixed layer when the pycnocline was weak. Thunnus maccoyii and T. alalunga larvae moved into the surface layers during the day. Katsuwonus pelamis , however, moved into deeper water during the day. All species of tuna were more evenly dispersed in the mixed layer at night. Greater numbers and larger larvae of T. maccoyii and K. pelamis were captured at night, indicating marked differences in net avoidance between day and night. No evidence of increased avoidance during the day was found in T. alalunga .

Introduction of mechanical water sprayers for tuna fishing

Anderson,-R.C.; Waheed,-A.

J (Journal-Article) RASAIN 1990 no. 10, pp. 125-124

The pole-and-line tuna fishery is an important source of employment in the Maldives; the mechanization of the fleet has been a major factor in increasing fish catches in spite of falling numbers of fishermen. During 1990 a new development started which allows further reductions in crew size - the use of mechanical water sprayers. The introduction of mechanical sprayers effectively allows the boats to operate with 2 fewer crew, who previously were required to spray water from either side of the rudder.

Seychelles tuna bulletin. Fourth quarter 1990.

B (Book) SEYCHELLES-TUNA-BULL. VICTORIA-SEYCHELLES~-SFA 1990. 14 pp

The number of purse seiners active in the western Indian Ocean averaged 41 during the fourth quarter compared to 49 vessels during the same period last year. Fishing activity was high during the first half of the year with a record of 54 vessels present in Feb and Mar. The overall fishing results for the year were not as good as those previously recorded in the last three years. The overall catches for the year showed increased proportions of yellowfin at 46% with a corresponding decline in skipjack (52%) compared to 31% and 67% respectively in 1989. The cumulative catch by purse seiners in the Western Indian Ocean based on logbooks received by 31st Dec, now stands at 193,000 MT for 1990. During 1990 fishing agreements with the European Community and the Soviet Fishing Company (SOVRYFLOT) were renewed for a two year period. Seven additional purse-seiners (six Spanish, one French) were operating under private licenses.

Stock assessment of albacore resource in the Indian Ocean.

Liu,-Hsi-Chiang; Lee,-Ying-Chou

B (Book); K (Conf THE-SECOND-ASIAN-FISHERIES-FORUM.-PROCEEDINGS-OF-THE-SECOND-ASIAN-FISHERIES-FORUM,-TOKYO,-JAPAN,-17-22-APRIL-1989. Hirano,-R.;Hanyu,-I.-eds. 1990. pp. 861-864

This paper concerns the stock condition and the size distribution of the Indian albacore (Thunnus alalunga) resource based on Taiwanese longline catch and effort statistics. The size compositions from different geographic localities indicate that seasonal movement among latitudes are apparent. The conversion coefficient of 0.3876 appears suitable to convert the deep longline effort into an equivalently regular longline effort. The best fit of Pella-Tomlinson production model is at m = 1.001 and k = 4. The production analysis shows that the current catch level is about 60% over the estimated MSY (15,840 t), and the current effort level is about 37% higher than the estimated level (144 million effective hooks) to achieve the MSY, therefore some more detailed studies are needed to reassess this stock.

Summary results of the offshore fishing survey

Anderson,-R.C.

J (Journal-Article) RASAIN 1990 no. 10, pp. 130-136

The findings are presented of an offshore fishery survey conducted in the Maldives during the year December 1987-November 1988, in order to test the feasibility of commercial multiday fishing in the zone 30-100 miles offshore using drifting gillnets and pelagic tuna and shark longlines. Of the 3 fishing gear used, only shark longline showed real commercial promise. The catch rate for sharks was nearly 5 sharks per 100 hooks. The most common species caught was the silky shark (Carcharhinus falciformis), followed by the oceanic white tip shark (C. longimanus).

(Variations in tuna selling prices by species and by size category 1970-1987 - possible effects on changes in fishing strategies of seiners.).

Fonteneau,-A.

J (Journal-Article); COLLECT.-VOL.-SCI.-PAP.-ICCAT-RECL.-DOC.-SCI.-CICTA-COLECC.-DOC.-CIENT.-CICAA. 1991. vol. 36, pp. 409-426

This paper reviews tropical tuna prices, by species and size categories, during recent years. The prices used in this study are those paid to the owners of the French and Ivorian purse seiners by the French tuna trading company, SOVETCO. During 1983 and 1984, the market price of skipjack (Katsuwonus pelamis) was very low compared to yellowfin (Thunnus albacares) thus, the observed change in target species from yellowfin to skipjack cannot be due to economic factors. Catch rates in value are also calculated by fishing areas. The catch rates in value of purse seiners in the Atlantic and in the Indian Ocean during the critical period (1983-1984) are also compared.

(The overexploitation of yellowfin stocks in 1984: A myth or reality.).

Fonteneau,-A.

J (Journal-Article); COLLECT.-VOL.-SCI.-PAP.-ICCAT-RECL.-DOC.-SCI.-CICTA-COLECC.-DOC.-CIENT.-CICAA. 1991. vol. 36, pp. 348-379

This paper reviews the changes in the yellowfin (Thunnus albacares) stock status in the eastern Atlantic during recent years. All available data on this stock are used in this analysis, especially those collected during the Yellowfin Year Program. Special focus is placed on the end of 1983 and 1984, during which very low catch rates were observed in the adult fishery. Using global and analytical approaches, it has concluded that the very low 1984 adult catch rates do not correspond to a very low biomass, but in fact to a very low catchability of the adult stock. Consequently, the adult stock suffered low fishing mortality; fishing effort and fishing mortality have remained reduced since 1985, because many purse seiners departed to and remain in the new fishing areas of the Indian Ocean. The fishing effort presently estimated for yellowfin in the eastern Atlantic is quite high, and only slightly less than the fishing effort which produces the maximum sustainable yield.

The age structure of narrow-barred Spanish mackerel (Scomberomorus commerson) and kawakawa (Euthynnus affinis) stocks from length data (SEAC/90/15).

Yesaki,-M.

B (Book); K (Conf COLLECTIVE-VOLUME-OF-WORKING-DOCUMENTS-PRESENTED-AT-THE-FOURTH-SOUTHEAST-ASIAN-TUNA-CONFERENCE-HELD-IN-BANGKOK,-THAILAND,-27-30-NOVEMBER-1990. 1991. pp. 94-104

A discussion is presented on the age structure of Scomberomorus commerson and Euthynnus affinis , examining the homogeneity of cohorts in length frequencies of stocks captured off Oman and Malaysia. The length frequencies of E. affinis were simulated by computer for comparison with the actual frequencies and to assess the homogeneity of the simulated cohorts. The use of mean lengths of cohorts in grouped length frequency distributions appears to be a reliable method of estimating growth of large pelagics.

On the fluctuation of yellowfin tuna (Thunnus albacares) resources in the Indian Ocean.

Nishida,-T.

J (Journal-Article) BULL.-JAP.-SOC.-FISH.-OCEANOGR.-SUISAN-KAIYO-KENKYU. 1991. vol. 55, no. 4, pp. 339-347

Historical catch, CPUE and fork length data of yellowfin tuna (YFT) were analyzed for 3 types of fisheries (industrial longline fisheries (LL), industrial purse seine fisheries (PS) and artisanal fisheries (AF)) operating in the Indian Ocean, in order to investigate fluctuations in the YFT resource.

Distribution of bigeye tuna in the Indian Ocean as seen from tuna longline catches.

Mohri,-M.; Manamoto,-E.; Takeuchi,-S.

J (Journal-Article) NIPPON-SUISAN-GAKKAISHI-BULL.-JAP.-SOC.-SCI.-FISH. 1991. vol. 57, no. 9, pp. 1683-1687

Distribution of bigeye tuna Thunnus obesus in the Indian Ocean is discussed by using the catch-and-effort data of Japanese tuna longline fishery from 1967 to 1985. According to the average numbers of catches in individual 5-degree squares in the Indian Ocean, the catch distribution was recognized in a wide area between Lat. 25 degree N and 40 degree S. The higher catch tended to be observed in the western and eastern tropical regions and in the southern higher latitude regions. The areas with low catches were observed in the mid-latitude area between the tropical region and the north high latitude region, the Arabian Sea, north of Bengal Bay, and in the high latitude areas extending from east to west between Lat. 35 degree S and 50 degree S. These results were similar to the catch distribution patterns of bigeye tuna caught by longline fishery obtained in the Pacific and Atlantic Oceans, with some minor differences in the longitudinal direction.

Seychelles tuna bulletin. Third quarter 1991.

B (Book); N (Num VICTORIA-SEYCHELLES SFA 1991. 14 pp

The number of purse seiners active in the western Indian Ocean increased slightly from 42 at the end of the last quarter to 45 in September. Fishing results improved slightly in the third quarter, with the average catch rates increasing from 15.8 MT/day in the second quarter to an average of 19.0 MT/day in the third quarter. The fishing pattern for the third quarter showed that fishing effort was concentrated between 5 degrees north and 5 degrees south of the Equator in the vicinity of the Northern sector of the Seychelles EEZ. Fifty-six % of the third quarter catch was composed of skipjack which compares favourably with the catch of this species for the same period last year. Moreover, as in previous years, the catch of yellowfin declined from 60% in July to 39% in August and 18% in September. The cumulative catch by purse seiners operating in the Western Indian Ocean as determined from seiner logbooks received by the 30th September 1991 now stands at 155,912 MT.

Fin fishery considerations: In the management of the proposed Great Australian Bight Marine Park.

Jones,-K.

J (Journal-Article) SAFISH. 1991. vol. 15, no. 4, pp. 11-12, 15

A summary is given of a paper presented at a Symposium on The Great Australian Bight held in May 1991 regarding the importance of finfish fisheries in the region; 3 finfish fisheries were discussed - the commercial marine scalefish fishery, the recreational beach rod-and-line fishery for mulloway (Argyrosomus hololepidotus) and Australian salmon (Arripis truttaceus), and commonwealth managed southern bluefin tuna (Thunnus maccoyii). The fishery biology of mulloway and Australian salmon in relation to the management of a proposed marine park is also examined.

An interim analysis of the data on tuna tagging collected by R/V Nippon Maru in the Indian Ocean, 1980-1990 (SEAC/90/17).

Yano,-K.

B (Book); K (Conf COLLECTIVE-VOLUME-OF-WORKING-DOCUMENTS-PRESENTED-AT-THE-FOURTH-SOUTHEAST-ASIAN-TUNA-CONFERENCE-HELD-IN-BANGKOK,-THAILAND,-27-30-NOVEMBER-1990. 1991. pp. 107-124

Selected specimens of skipjack (Katsuwonus pelamis), yellowfin (Thunnus albacares) and bigeye tunas (T. obesus), caught by R/V Nippon Maru were tagged with dart tags and released during survey cruises in the Indian Ocean from 1980 to 1990. A total of 193 tags were recovered over 1-91 days from their release, resulting in a recovery rate of 2.67% as a whole. Overall recovery rate by species was 1.57% for skipjack, 3.04% for yellowfin, and 3.50% for bigeye tunas, respectively. The estimated distances of their moves were 203.3 km for skipjack. 182.0 km for yellowfin, and 103.5 km for bigeye tunas in average. The migration pattern of each species in the region was examined by analysing the time-spatial information collected through those tagging experiments.

Report and preliminary results of the tagging programme of natural drift logs in the tuna purse seine fishery area of the Western Indian Ocean (SEAC/90/18).

Cayre,-P.; Marsac,-F.

B (Book); K (Conf COLLECTIVE-VOLUME-OF-WORKING-DOCUMENTS-PRESENTED-AT-THE-FOURTH-SOUTHEAST-ASIAN-TUNA-CONFERENCE-HELD-IN-BANGKOK,-THAILAND,-27-30-NOVEMBER-1990. 1991. pp. 125-133

The drift and fishing sequences of 64 logs are discussed and support the hypothesis of a 15 day period necessary to renew the exploitable concentration of tunas around logs. The survey of tagged natural drifting logs in the Western Indian Ocean has provided qualitative and quantitative information on the surface circulation. These first observations are quite consistent with the major patterns already described in the literature. In the future, such deployments should be pursued with a more intensive sampling effort in order to identify possible long range movements, especially between the Mozambique Channel and the Somali basin.

Maldivian tuna tagging programme (SEAC/90/22).

Rochepeau,-S.

B (Book); K (Conf COLLECTIVE-VOLUME-OF-WORKING-DOCUMENTS-PRESENTED-AT-THE-FOURTH-SOUTHEAST-ASIAN-TUNA-CONFERENCE-HELD-IN-BANGKOK,-THAILAND,-27-30-NOVEMBER-1990. 1991. pp. 155-172

Details are given of tagging activities conducted in the Maldives in January 1990 in order to determine the movements of skipjack (Katsuwonus pelamis) and yellowfin (Thunnus albacares) in the region and also to estimate population parameters such as growth and mortality. Vessels, gears and fishing methods, tagging equipment, tagging forms and data processing are described.

A proposal for a large-scale tuna tagging programme in the Indian Ocean (1st draft) (SEAC/90/23).

B (Book); K (Conf COLLECTIVE-VOLUME-OF-WORKING-DOCUMENTS-PRESENTED-AT-THE-FOURTH-SOUTHEAST-ASIAN-TUNA-CONFERENCE-HELD-IN-BANGKOK,-THAILAND,-27-30-NOVEMBER-1990. 1991. pp. 173-177

Details are given of a proposed large scale tagging programme to be conducted in the Indian Ocean in order to provide information regarding the skipjack (Katsuwonus pelamis), bigeye (Thunnus obesus) and yellowfin (T. albacares). The following aspects are to be covered: stock structure and status; short and long-term movements; population parameters; and fisheries interactions between industrial longline and purse seine fisheries as well as small scale fisheries and industrial purse seine fisheries. The plan of operation is outlined, describing tagging activities, baiting activities, training and biological samples to be carried out.

Preliminary report on the tuna tagging program in Maldives, January-October 1990 (SEAC/90/24).

Waheed,-A.

B (Book); K (Conf COLLECTIVE-VOLUME-OF-WORKING-DOCUMENTS-PRESENTED-AT-THE-FOURTH-SOUTHEAST-ASIAN-TUNA-CONFERENCE-HELD-IN-BANGKOK,-THAILAND,-27-30-NOVEMBER-1990. 1991. pp. 178-192

An account is given of the activities of a tuna tagging programme conducted in the Maldives during the period January-October 1990 concerning the skipjack (Katsuwonus pelamis) and the yellowfin (Thunnus albacares). During the 7 surveys carried out in this period, some 6307 skipjack and 1324 yellowfin tunas were tagged.

The status of exploratory tuna fishing survey by FRTV Chulabhorn in the Andaman Sea, 1990 (SEAC/90/29).

Dhammasak-Poreeyanond,

B (Book); K (Conf COLLECTIVE-VOLUME-OF-WORKING-DOCUMENTS-PRESENTED-AT-THE-FOURTH-SOUTHEAST-ASIAN-TUNA-CONFERENCE-HELD-IN-BANGKOK,-THAILAND,-27-30-NOVEMBER-1990. 1991. pp. 226-230

Details are given of a purse seine survey conducted in the Andaman Sea in order to collect data regarding the abundance of small tuna. Major species caught were skipjack (Katsuwonus pelamis), yellowfin (Thunnus albacares), frigate tuna (Auxis thazard) and kawakawa (Euthynnus affinis). Catch composition and length frequency distribution data are included.

Seychelles tuna bulletin. Fourth quarter 1991.

B (Book); N (Num SEYCHELLES-TUNA-BULL. VICTORIA-SEYCHELLES SFA 1991. 14 pp

Purse seiner activity in western Indian Ocean (WIO) increased from 50 seiners in October to 54 in November and dropped off to 46 in December. The overall longliner activity in the WIO was very low for 1991. October produced the highest total catch for 1991 at 27257 mt. There was a marked drop-off in catches and catch rates after October in the industrial Purse Seine Fishery. Overall the fishing results during the 4th quarter 1991 were poorer than the results during the same period in 1990. The catch composition for the 4th quarter was skipjack - 72.6%, yellowfin - 24.3%, other species accounted for 3.1% of the total. The cumulative catch for Purse Seiners operating in the WIO in 1991 was 206556 mt and for the 4th quarter 49126 mt. The tuna fishery industry in the western Indian Ocean region is presently passing through an evolutionary stage in that organizations such as the Indo-Pacific Tuna Programme (IPTP) and Association Thoniere (AT) are establishing new monitoring, data collections, data analysis and tuna fisheries development programs.

Oceanographic observations and exploratory fishings in the eastern Indian Ocean and the western and central Pacific Ocean.

B (Book); N (Num DATA-OCEANOGR.-OBS.-EXPLOR.-FISH.-SHIMONOSEKI-UNIV.-FISH. 1991. no. 17, 56 pp

The publication contains the data and results of 2 cruises conducted by the Koyo Maru and also the 2 cruises conducted by the Tenyo Maru during the year 1990 in the Pacific and Indian Oceans. Oceanographic observations and tuna longling fishery data are presented.

Fishery, biology and status of stock of yellowfin tuna.

Pillai,-P.P.P.; Koya,-K.P.S.; Yohannan,-T.M.

B (Book); K (Conf WORKSHOP-ON-STOCK-ASSESSMENT-OF-YELLOWFIN-TUNA-IN-THE-INDIAN-OCEAN,-COLOMBO,-SRI-LANKA,-7-12-OCTOBER,-1991. COLOMBO-SRI-LANKA INDO-PACIFIC-TUNA-DEVELOPMENT-AND-MANAGEMENT-PROGRAM 1991. pp. 40-49

The yellowfin tuna, Thunnus albacares constitutes about 5% of the total tuna landing in India, and as an average more than 60% of its landings in the small-scale fishery sector is being made by the surface fishery in Lakshadweep. The recent catch by the longline vessels operating in the Indian EEZ is around 3100 tonnes. The seasonality in the catch of this species in the pole and line and troll line fisheries is discussed based on the NE and SW monsoon fishery data. In the present communication, the trend of fishery for yellowfin tuna in Lakshadweep, some aspects of its biology such as length-weight relation, size distribution and population dynamics are presented and discussed.

Population characteristics of tuna live baits in Lakshadweep.

Gopakumar,-G.; Pillai,-P.P.; Said-Koya,-K.P.

J (Journal-Article); J.-MAR.-BIOL.-ASSOC.-INDIA. 1991. vol. 33, no. 1-2, pp. 255-277

Availability and abundance of both migratory and resident species of tuna live baits in desired quantity during the fishing season in the lagoons and adjacent waters coupled with their location, capture and transportation determine the success or failure of pole and line tuna fishery. It is evident that at Minicoy, capture and effective utilisation of different species of live baits has been in vogue since more than a century but in the northern group of islands where mechanised pole and line fishery is prevailing since 1963, the aimed live bait species are sprats, which are collected from shallow sand flats from near or above coral reefs. The present study reveals the occurrence and abundance of other suitable live baits with desired qualities in the deeper parts of the lagoonal ecosystem in the northern islands, the utilization of which would reduce substantial fishing pressure on the local fragile baitfish stock of sprat. Fishery and population characteristics of seventeen species of tuna live baits collected from areas of importance to tuna pole and line fishery in the Lakshadweep are presented and discussed. Evaluation of different species is made based on their body form, colouration, behaviour pattern and survival in captivity. Habitat and seasonal distribution pattern and catch rate of different bait species are communicated. Data needs for stock assessment of these species are emphasised and strategies for the development and management of baitfish fishery in the Lakshadweep is discussed.

Basic fisheries statistics 1990

J (Journal-Article); RASAIN 1991 no. 11, pp. 162-149

Statistics are presented for the marine fisheries of the Maldives for the year 1990. Data are given regarding the fishermen and fishing fleet, the number of fishing units, number of fishing trips, fish production by vessel and by species. Catch per effort data are also provided for the tuna fisheries.

The status of fisheries for small tunas in India.

James,-P.S.B.R.; Jayaprakash,-A.A.

J (Journal-Article); J.-MAR.-BIOL.-ASSOC.-INDIA. 1991. vol. 33, no. 1-2, pp. 182-193

The tuna resources presently exploited in India essentially comprise the small tunas such as Euthynnus affinis, Auxis thazard, A. rochei, Thunnus tonggol and Katsuwonus pelamis . The non-mechanised and mechanised crafts engaged in the fishery have their operational range upto 50 m depth zone. The drift/gillnets, hooks and lines and purse seines presently employed by these units are multispecies gear and tunas form part of the catch. The pole and line units in Lakshadweep exploit mainly skipjack and young yellowfin tunas. Over the years the catch has increased considerably. The average catch (1984-86) was 28,093 tonnes. E. affinis, Auxis spp. and K. pelamis constituted 55%, 16% and 13% respectively of the total tuna catch. The Statewise, seasonwise distribution and abundance of small tunas are briefly mentioned. The results of the studies on stock assessment indicated that higher yield could be expected from the present fishing zone especially with respect to E. affinis and Auxis spp. Augmenting production should be through diversification of the effort as well as expansion of the fishing to the shelf edge. The pole and line fishing in Lakshadweep also offers scope for future expansion. The need for correlating the environment with the fishery at the microlevel has been stressed.

On a new distributional record of the dogtooth tuna Gymnosarda unicolor Rueppell from the Calicut coast, India.

Sivadas,-M.; Balasubramanian,-K.K.

J (Journal-Article) J.-MAR.-BIOL.-ASSOC.-INDIA. 1991. vol. 33, no. 1-2, p. 451

The Dogtooth tuna Gymnosarda unicolor Rueppell is reported for the first time from the main land coast of India having earlier been reported only from Lakshadweep and Andaman waters.

Collective volume of working documents. Vol. 6. Presented at the Workshop on Stock Assessment of Yellowfin Tuna in the Indian Ocean, 7-12, October, 1991, Colombo, Sri Lanka.

B (Book); K (Conf COLOMBO-SRI-LANKA IPTP 1991. 197 pp

Abstracts of the 24 papers presented at the Workshop are cited individually.

The estimation of theoretical population levels for natural populations

Ragen,-T.J.

B (Book); U (Thesi DISS.-ABST.-INT.-PT.-B-SCI.-and-ENG. 1991 vol. 51, no. 11, 192 pp

The focus of this dissertation was the estimation of theoretical reference levels such as K, the environmental carrying capacity, and MNPL, the maximum net productivity level, for three fishes off Southern California and for the northern fur seal (Callorhinus ursinus) population of St. Paul Island, Alaska. The estimation techniques were based on computer modeling of historical population trends. The assessment of these theoretical reference levels for nature populations is fundamentally important to the development and testing of concepts in theoretical ecology and population dynamics. In the first study, maximum-likelihood estimates of pre-exploitation biomass were made for the white seabass (Atractoscion nobilis) and the yellowtail (Seriola lalandei) by assuming that development of corresponding commercial fisheries led to a shift in size distributions of these fishes, as indicated by records of the Avalon Tuna Club, Santa Catalina Island, California. Pre-exploitation biomass for Southern California populations of both these fishes was estimated to be about 20,000 tons. The pre-exploitation biomass of the giant sea bass (Stereolepis gigas) was estimated to be 1300 tons. Due to insufficient natural history information, this estimate was based on commercial catch records only. In the second study, estimates of theoretical reference levels for the northern fur seal population of St. Paul Island were based on computer simulations of pup production from 1912 to 1970, repetitive simulations were used to construct frequency distributions of estimates for MNPL, K, the number of pups born at MNPL and K, and the ratio MNPL/K. These distributions serve as a measure of the confidence that can be placed in single estimates of reference levels, and thereby provide a general context within which these reference levels can be evaluated. The final study of this dissertation investigated the pelagic migration of northern fur seal pups. Results indicated that initial migration paths for these pups are more widely dispersed than previously assumed. This information contributes to the understanding of northern fur seal life histories. A fuller understanding of life history information will eventually facilitate more accurate modeling of northern fur seal population dynamics. (DBO)

Status report of Japanese tuna fisheries in the Indian Ocean (TWS/90/58).

Suzuki,-Z.

B (Book); K (Conf COLLECTIVE-VOLUME-OF-WORKING-DOCUMENTS,-VOL.-4,-PRESENTED-AT-THE-EXPERT-CONSULTATION-OF-STOCK-ASSESSMENT-OF-TUNAS-IN-THE-INDIAN-OCEAN-HELD-IN-BANGKOK,-THAILAND,-2-6-JULY-1990. 1991. pp. 498-499

A brief account is given of the Japanese tuna fisheries in the Indian Ocean, which are composed of 2 types: longlining and purse seining. Fishing grounds are described and catch and effort data provided, outlining also data collection and compilation methods.

Relationship between sea-surface temperature (SST) and fish catch data: A feasibility study.

Narain,-A.; Dwivedi,-R.M.; Kumari,-B.; Chaturvedi,-N.; Solanki,-H.U.; Mankodi,-P.C.; Sudarsan,-D.; et-al.

B (Book); K (Conf PROCEEDINGS-OF-THE-NATIONAL-WORKSHOP-ON-FISHERY-RESOURCES-DATA-AND-THE-FISHING-INDUSTRY,-14-15-OCTOBER,-1988,-VISAKHAPATNAM. Sudarsan,-D.;Somvanshi,-V.S.-eds. BOMBAY-INDIA FISHERY-SURVEY-OF-INDIA 1991. pp. 19-26

The relationship between georeferenced fish catch data (collected by Fishery Survey of India) and the sea-surface temperature derived from the digital data of NOAA-AVHRR as well as 100 km MCSST charts has been studied. The highest fish catch was found to be associated with a distinct temperature gradient seen on the SST image i.e. off Bombay and relatively lower catch associated with more or less uniform temperatures seen off Goa and lowest catch values associated with uniform warm temperatures off Cochin. Some correlation was observed (r super(2) = 0.49) between tuna and SST with almost no correlation in the case of mackerel.

Report of the Fourth Southeast Asian Tuna Conference, Bangkok, Thailand, 27-30 November, 1990

B (Book); K (Conf COLOMBO-SRI-LANKA IPTP 1991 30 pp

The report gives an account of the topics discussed at the Meeting under the following main headings: Summary of status reports - Indonesia, Malaysia, Philippines, Thailand and others; Experience and research papers - statistics, fisheries, fish processing, biological studies, stock assessment and socio-economic; Tagging programmes - overview, Western Pacific, Indian Ocean, Large scale tuna tagging proposal and general discussion.

Pelagic and oceanic resources of the Indian EEZ.

Sivaprakasam,-T.E.

B (Book); K (Conf PROCEEDINGS-OF-THE-NATIONAL-WORKSHOP-ON-FISHERY-RESOURCES-DATA-AND-THE-FISHING-INDUSTRY,-14-15-OCTOBER,-1988,-VISAKHAPATNAM. Sudarsan,-D.;Somvanshi,-V.S.-eds. BOMBAY-INDIA FISHERY-SURVEY-OF-INDIA 1991. pp. 108-127

The midwater/pelagic trawling surveys show large stocks of horse mackerel, ribbon fish, pomfrets and elasmobranch stocks along the northwest coast. Availability of ribbonfish and pomfrets along the east coast also has now been confirmed. The purse-seining surveys have also indicated the availability of pelagic stocks along both east and west coasts of India. As regards the oceanic resources the south-west coast is one of the richest tuna grounds which is within the EEZ, followed by the lower east coast.

(Purse seine fishing: Evolution of equipment and summary of a decade of seine fishing.)

Stequert,-B.; Marsac,-F.

B (Book) DIDACT.-INST.-FR.-RECH.-SCI.-DEV.-COOP. PARIS-FRANCE ORSTOM 1991 39 pp

This handbook is a update of the first publication. The technique of purse seine fishing in the Indian ocean is detailed and the authors emphasize on the evolution of this technique: equipment and tuna fisheries programme.

Catches and landings of tuna in Mauritius from 1987 to 1989 and description of the 1989 Mauritian purse seine fishery (distribution and size composition of the catches) (TWS/90/60).

Cayre,-P.; Norungee,-D.; Begue,-C.

B (Book); K (Conf COLLECTIVE-VOLUME-OF-WORKING-DOCUMENTS,-VOL.-4,-PRESENTED-AT-THE-EXPERT-CONSULTATION-OF-STOCK-ASSESSMENT-OF-TUNAS-IN-THE-INDIAN-OCEAN-HELD-IN-BANGKOK,-THAILAND,-2-6-JULY-1990. 1991. pp. 283-292

In this document the statistics of tuna landings made in Mauritius from 1987 (13,800 tons) to 1989 (16,800 tons) by longliners (1987: 7213 tons; 1988: 7305 tons; 1989: 8195 tons) and the two Mauritian purse-seiners (1987: 6592 tons; 1988: 6847 tons; 1989: 8592 tons), illustrate the importance of Port Louis as a tuna landing port. The statistical network, set by the Regional Tuna Project (Indian Ocean Commission) since 1987, allows to produce a description of the Mauritian purse-seine fishery for 1989. The use of constructed logs (Payaos), as a way to concentrate tunas before setting, by these two purse-seiners on a regular basis, make this fishery particularly interesting to describe. The size structures of the yellowfin, skipjack and bigeye tuna exploited are analysed by areas and quarters strata.

Tuna longline fishing: A report of new design tuna longline fishing gear and a fishing ground survey on board the Shinyo-Maru in the Bay of Bengal.

J (Journal-Article) SEAFDEC-NEWSL. 1991. vol. 14, no. 1, pp. 6-7

Details are given of the findings of experiments conducted on board the Shinyo-Maru in the Bay of Bengal by the Tokyo University of Fisheries during February 1991 regarding tuna longline fishing operations and tuna fishing ground observations. Studies were conducted concerning the following aspects: fishing gear design and construction, fishing operations and techniques, catch and preservation; and, the electronic equipment necessary for fishing operations. Oceanographic surveying, investigating parameters including temperature, salinity, dissolved oxygen, and sigma-T, was carried out using XBT and CTD equipment.

Indian Ocean yellowfin tuna stock assessment

Anderson,-R.C.; Hafiz,-A.

J (Journal-Article); RASAIN 1991 no. 11, pp. 199-177

A summary is given of major findings of a workshop regarding the stock assessment of yellowfin tuna (Thunnus albacares) in the Indian Ocean held in Colombo, Sri Lanka, in October 1991. The status of the fishery and the current status of knowledge regarding yellowfin biology are reviewed and recommendations made regarding further work to be conducted to improve future stock assessments.

Commercial tuna fishing in the Indian Ocean.

Gokhale,-S.V.

J (Journal-Article) SEAFOOD-EXPORT-J. 1991. vol. 23, no. 3, pp. 23-28

Though a considerable number of studies on scientific aspects of tuna fishing in Indian Ocean, such as species composition, catch per unit effort, and area covered, have been conducted, very little information is available on the commercial aspects or economic viability of tuna fishing in Indian Ocean. This paper critically reviews the economic viability of tuna fishing in the Indian Ocean on the basis of available data and suggests that commercial tuna longlining in the EEZ of India shows a low rate of capture. It suggests that purse seining with foreign collaboration around Seychelles should be carried out for comparison and emphasizes the need for an experiment on an industrial scale to calculate profitability.

Review of tuna fisheries in India: Status paper (TWS/90/20).

James,-P.S.B.R.

B (Book); K (Conf COLLECTIVE-VOLUME-OF-WORKING-DOCUMENTS,-VOL.-4,-PRESENTED-AT-THE-EXPERT-CONSULTATION-OF-STOCK-ASSESSMENT-OF-TUNAS-IN-THE-INDIAN-OCEAN-HELD-IN-BANGKOK,-THAILAND,-2-6-JULY-1990. 1991. pp. 359-369

An update of information regarding the status of the Indian tuna fishery is provided. Details are given of fishing craft and gear, and production trends of the small scale and oceanic sectors. Current research activities are also outlined.

The Spanish fisheries method for the study and analysis of the tropical tunas in the Indian Ocean (TWS/90/73).

Parajua-Aranda,-J.I.

B (Book); K (Conf COLLECTIVE-VOLUME-OF-WORKING-DOCUMENTS,-VOL.-4,-PRESENTED-AT-THE-EXPERT-CONSULTATION-OF-STOCK-ASSESSMENT-OF-TUNAS-IN-THE-INDIAN-OCEAN-HELD-IN-BANGKOK,-THAILAND,-2-6-JULY-1990. 1991. pp. 293-303

A brief account is given of studies conducted by the Spanish Institute of Oceanography regarding the tuna stocks in the Indian Ocean. Main species caught were Thunnus albacares and Katsuwonus pelamis . Data obtained during the campaigns included: control of size of the catches; fishing areas; description and sizes of the species; and CPUE. The data collected for analysis came from 2 different sources, the first from logbooks maintained by the skippers of each vessel and the second from the sampling made in the port at the time of transshipment.

Preliminary study on the fecundity of skipjack tuna from the waters adjacent to Pelabuhan Ratu (TWS/90/25).

Uktolseja,-J.C.B.; Purwasasmita,-R.

B (Book); K (Conf COLLECTIVE-VOLUME-OF-WORKING-DOCUMENTS,-VOL.-4,-PRESENTED-AT-THE-EXPERT-CONSULTATION-OF-STOCK-ASSESSMENT-OF-TUNAS-IN-THE-INDIAN-OCEAN-HELD-IN-BANGKOK,-THAILAND,-2-6-JULY-1990. 1991. pp. 22-33

This preliminary study deals with the fecundity of skipjack tuna, Katsuwonus pelamis , from Pelabuhan Ratu, West Java, in July 1987. The ovaries of 7 female skipjack were analyzed to describe the fecundity and ova diameter. The average fecundity was found to be 822,176 eggs, ranging from 542,981 to 1,282,950 eggs for fish ranging from 40.3 cm to 47.4 cm. The average diameter of eggs was 0.3865 mm ranged from 0.2184 to 0.5928 mm. The ova diameter frequency from ovary stage III (late maturing) indicated that the skipjack tuna are multiple spawners. There are no significant difference in the distributions of ova diameter between right and left ovaries for the same fish.

Analysis of Maldivian tuna fisheries data 1979-1988 (TWS/90/11).

Rochepeau,-S.; Hafiz,-A.

B (Book); K (Conf COLLECTIVE-VOLUME-OF-WORKING-DOCUMENTS,-VOL.-4,-PRESENTED-AT-THE-EXPERT-CONSULTATION-OF-STOCK-ASSESSMENT-OF-TUNAS-IN-THE-INDIAN-OCEAN-HELD-IN-BANGKOK,-THAILAND,-2-6-JULY-1990. 1991. p. 278

The Maldivian pole and line fishery for tunas has existed for centuries and has been the mainstay in its economy. Landing statistics for this fishery has been collected since 1959 and are available in the I.P.T.P. database since 1970. These statistics are collected by total enumeration. Total counts by species and size category of the dominant species are collected daily by each island administration office. Conversion factors are used to estimate total landed weight. This paper reviews the fishery and recent development in vessel mechanization, fish collecting system and processing facilities. Landing statistics are also examined in detail by atoll groups, years and seasons to assess the following: factors contributing to the recent significant increase in catch; possible sources of errors in the current method of estimating total landed weight; and environmental parameters affecting pole and line catches.

Morphometric and body weight comparisons among yellowfin tuna, Thunnus albacares (Bonnaterre, 1788), from the waters adjacent to Simeuleu and Enggano islands, Celebes and Molucca seas (TWS/90/26).

Uktolseja,-J.C.B.

B (Book); K (Conf COLLECTIVE-VOLUME-OF-WORKING-DOCUMENTS,-VOL.-4,-PRESENTED-AT-THE-EXPERT-CONSULTATION-OF-STOCK-ASSESSMENT-OF-TUNAS-IN-THE-INDIAN-OCEAN-HELD-IN-BANGKOK,-THAILAND,-2-6-JULY-1990. 1991. pp. 34-46

This paper describes the population structure of yellowfin tuna, Thunnus alhacares , caught by longline vessels from the Indonesian waters. A total of 127 yellowfin (Thunnus albacares) were collected from the waters adjacent to Simeuleu and Enggano islands, Celebes Sea and Molucca Sea to examine the morphometric and body weight comparison to know their population structures. The measurements used were fork length, total length, head length, body depth, penduncle depth, and body weight. Each measurement was related to fork length by regression analysis where each relationship was considered a character. There is no sexual difference in morphometric measurements and body weight of yellowfin tuna within group. The results of the Analysis of Covariance (ANCOVA), Principal Component Analysis (PCA) and Cluster Analysis suggested that the yellowfin tuna from those waters mention above bordered by 90-135 LE belongs to a single population.

Relation between tuna-catches and oceanic condition in Bengal Bay.

Kurita,-Y.; Saotome,-Y.; Kasuga,-I.; Hayashi,-T.

J (Journal-Article) BULL.-JAP.-SOC.-FISH.-OCEANOGR.-SUISAN-KAIYO-KENKYU. 1991. vol. 55, no. 1, pp. 18-24

Tuna long-line fishing and observations of CTD and XBT were carried out at 7 stations simultaneously in Bengal Bay, during the period 13-19 Feb 1990, in order to study the relationships between tuna distribution and environmental factors such as salinity and dissolved oxygen. The thickness of uniform layer of each factor beneath the sea surface was 30 m for salinity and 80 m for temperature and dissolved oxygen. Altogether, 62 yellowfin tunas and 18 marlins were caught at depths between 65 and 120 m, which were the boundary layer between the surface uniform layer and the sharp gradient layer of the temperature and dissolved oxygen.

(Regional tuna project n degree 1: Progress report.).

B (Book); K (Conf PROCEEDINGS-OF-THE-REGIONAL-TUNA-CONFERENCE.. ACTES-DE-LA-CONFERENCE-THONIERE-REGIONALE. Le-Gall,-J.Y.;Reviers,-X.-de;Roger,-C.-eds. 1991. pp. 117-142

COLLOQ.-SEM.-INST.-FR.-RECH.-SCI.-DEV.-COOP.

This progress report presents the objectives of the tuna fishery project in the Indian Ocean: fishery management, exploratory fishing, catching methods, fishery development, fish aggregating devices, tagging, biological and physical environment studies.

A review of Indian Ocean fisheries for skipjack tuna, Katsuwonus pelamis , and yellowfin tuna, Thunnus albacares .

Parks,-W.W.

J (Journal-Article) MAR.-FISH.-REV. 1991. vol. 53, no. 1, pp. 1-9

Skipjack tuna, Katsuwonus pelamis , and yellowfin tuna, Thunnus albacares , together comprise the most important component of Indian Ocean tuna catches. Catches of these species by Indian Ocean fisheries have been increasing over the last decade and totaled 262,300 metric tons (t) in 1986. Skipjack tuna was the most important species at 32 percent of the total tuna catch in 1986; yellowfin tuna was the second most important at 25 percent. Skipjack tuna are found throughout the Indian Ocean from the Gulf of Arabia in the north to lat. 40 degree S. Yellowfin tuna are also distributed throughout the ocean to about lat. 50 degree S.

Status of the tuna fisheries in Mauritius (TWS/90/70).

Venkatasami,-A.

B (Book); K (Conf COLLECTIVE-VOLUME-OF-WORKING-DOCUMENTS,-VOL.-4,-PRESENTED-AT-THE-EXPERT-CONSULTATION-OF-STOCK-ASSESSMENT-OF-TUNAS-IN-THE-INDIAN-OCEAN-HELD-IN-BANGKOK,-THAILAND,-2-6-JULY-1990. 1991. pp. 502-503

A brief account is given of the Mauritius tuna fisheries, which involves longlining, purse seining and artisanal activities. Tuna transshipment by longliners at Port Louis and purse seine catches for the period 1985-89 are included.

Length-weight relationships for yellowfin (Thunnus albacares) and skipjack (Katsuwonus pelamis) from western Indian Ocean (TWS/90/48).

de-Montaudouin,-X.; Hallier,-J.P.; Hassani,-S.

B (Book); K (Conf COLLECTIVE-VOLUME-OF-WORKING-DOCUMENTS,-VOL.-4,-PRESENTED-AT-THE-EXPERT-CONSULTATION-OF-STOCK-ASSESSMENT-OF-TUNAS-IN-THE-INDIAN-OCEAN-HELD-IN-BANGKOK,-THAILAND,-2-6-JULY-1990. 1991. pp. 47-65

FDL-FL-weight relationships are established on yellowfin (Thunnus albacares) and skipjack (Katsuwonus pelamis) using data collected at Victoria's cannery (Seychelles) and on board French, Spanish, Japanese and Soviet purse seiners. Freezing, fish size and sex's impact on biometric relationships are assessed. Results from the cannery and purse seiners are compared. This analysis provides biometric equations on yellowfin and skipjack, and FDL-FL-weight conversion tables for yellowfin.

Review of aspects of southern bluefin tuna biology, population and fisheries.

Caton,-A.

B (Book); K (Conf WORLD-MEETING-ON-STOCK-ASSESSMENT-OF-BLUEFIN-TUNAS:-STRENGTHS-AND-WEAKNESSES. Deriso,-R.B.;Bayliff,-W.H.-eds. Inter-American-Tropical-Tuna-Comm.,-La-Jolla,-CA-USA LA-JOLLA,-CA-USA-I-ATTC 1991. no. 7 pp. 181-350

SPEC.-REP.-I-ATTC. no. 7

The review covers the following aspects of the southern bluefin tuna (Thunnus maccoyi): classification; early life history; trophic relationships; aging and growth of juveniles and adults; maturation and spawning; stock structure, distribution and migration; natural mortality; the southern bluefin tuna fisheries; catch, catch composition and effort data collection arrangements; trends in catch, catch composition, effort and catch rate; status of the population; and tag releases and recoveries.

The recent drop in the yellowfin catches by the Western Indian Ocean purse seine fishery: Overfishing or oceanographic changes? (TWS/90/50).

Marsac,-F.; Hallier,-J.P.

B (Book); K (Conf COLLECTIVE-VOLUME-OF-WORKING-DOCUMENTS,-VOL.-4,-PRESENTED-AT-THE-EXPERT-CONSULTATION-OF-STOCK-ASSESSMENT-OF-TUNAS-IN-THE-INDIAN-OCEAN-HELD-IN-BANGKOK,-THAILAND,-2-6-JULY-1990. 1991. pp. 66-83

The yellowfin tuna (Thunnus albacares) purse seiner catch in the western Indian Ocean increased during the period 1981-88, but then suffered a drop in 1989. An examination is made of the reasons behind this drop, considering the possible effect of environmental conditions on abundance trends and yellowfin catchability. A description is given of the hydroclimatic trend during the past 10 years in the region, examining the relationship between CPUE and the surface and subsurface oceanographic conditions.

Observation on the recently developed offshore fisheries for skipjack and yellowfin tunas in Sri Lanka (TWS/90/17).

de-Silva,-J.; Dayaratne,-P.

B (Book); K (Conf COLLECTIVE-VOLUME-OF-WORKING-DOCUMENTS,-VOL.-4,-PRESENTED-AT-THE-EXPERT-CONSULTATION-OF-STOCK-ASSESSMENT-OF-TUNAS-IN-THE-INDIAN-OCEAN-HELD-IN-BANGKOK,-THAILAND,-2-6-JULY-1990. 1991. pp. 304-313

An account is given of data obtained during a sampling programme conducted at Beruwela and Negombo in Sri Lanka during the period August 1986-June 1989 regarding the fisheries for skipjack (Katsuwonus pelamis) and yellowfin (Thunnus albacares). Information collected included trip duration, number of fish by species, length frequency data, number of boats operation and class of boats.

Stock analysis of bigeye and yellowfin tunas based on longline fishery data (TWS/90/59).

Miyabe,-N.; Suzuki,-Z.

B (Book); K (Conf COLLECTIVE-VOLUME-OF-WORKING-DOCUMENTS,-VOL.-4,-PRESENTED-AT-THE-EXPERT-CONSULTATION-OF-STOCK-ASSESSMENT-OF-TUNAS-IN-THE-INDIAN-OCEAN-HELD-IN-BANGKOK,-THAILAND,-2-6-JULY-1990. 1991. pp. 84-90

An examination is made of the status of the yellowfin (Thunnus albacares) and bigeye (T. obesus) stocks in the western Indian Ocean using longlining catch, fishing effort and CPUE data for the period 1952-88. Findings indicate the bigeye stocks to be in a healthy condition as up to 1988, and suggest that further monitoring should be conducted regarding the yellowfin to determine reasons behind the low catches and CPUEs observed in 1989.

The study of the handline fishery on the west coast of Sri Lanka with special reference to the use of dolphin for locating yellowfin tuna (Thunnus albacares) (TWS/90/18).

de-Silva,-J.; Boniface,-B.

B (Book); K (Conf COLLECTIVE-VOLUME-OF-WORKING-DOCUMENTS,-VOL.-4,-PRESENTED-AT-THE-EXPERT-CONSULTATION-OF-STOCK-ASSESSMENT-OF-TUNAS-IN-THE-INDIAN-OCEAN-HELD-IN-BANGKOK,-THAILAND,-2-6-JULY-1990. 1991. pp. 314-324

A description is given of the method of handline fishing, introduced in Sri Lanka in 1985, which targets on yellowfin (Thunnus albacares) associated with dolphin schools. Three species of dolphins were identified as being associated with yellowfin: Stenella coeruleoalba, S. longirostris and S. attenuata . Reasons for such associations are not fully understood; it is believed that feeding may be responsible as the feed and feeding habits of tunas and dolphins are similar. The catch of yellowfin associated with dolphin schools tends to have larger size fish, thus being more profitable for the fishermen.

Tuna fishing on log associated schools in the western Indian Ocean: An aggregation behaviour (TWS/90/66).

Hallier,-J.P.

B (Book); K (Conf COLLECTIVE-VOLUME-OF-WORKING-DOCUMENTS,-VOL.-4,-PRESENTED-AT-THE-EXPERT-CONSULTATION-OF-STOCK-ASSESSMENT-OF-TUNAS-IN-THE-INDIAN-OCEAN-HELD-IN-BANGKOK,-THAILAND,-2-6-JULY-1990. FAO-UNDP-Indo-Pacific-Tuna-Development-and-Management-Programme,-Colombo-Sri-Lanka 1991. pp. 325-342

Tuna commonly gather under floating objects drifting at sea surface. Purse seiners in the western Indian Ocean try to use this behaviour to their advantage. About half of their catch is made on "log associated" schools. This fishery as well as the log associated schools and tunas are distinguished from tuna fishing on non-associated schools. These differences are well documented and the underlying tuna behaviour is tentatively approached. Some consequences of these differences are analysed such as species composition correction procedures or the assessment of tuna catch by size.

The Maldivian tuna fishery: An update (TWS/90/12).

Hafiz,-A.

B (Book); K (Conf COLLECTIVE-VOLUME-OF-WORKING-DOCUMENTS,-VOL.-4,-PRESENTED-AT-THE-EXPERT-CONSULTATION-OF-STOCK-ASSESSMENT-OF-TUNAS-IN-THE-INDIAN-OCEAN-HELD-IN-BANGKOK,-THAILAND,-2-6-JULY-1990. 1991. pp. 343-350

An update of recent information on the Maldivian tuna fisheries is provided. Catch statistics for the skipjack (Katsuwonus pelamis), yellowfin (Thunnus albacares), bigeye (T. obesus) and small tunas, seerfish and billfish are discussed, considering data up to 1988.

Tuna fisheries in Sri Lanka -- an update (TWS/90/14).

Dayaratne,-P.; de-Silva,-J.

B (Book); K (Conf COLLECTIVE-VOLUME-OF-WORKING-DOCUMENTS,-VOL.-4,-PRESENTED-AT-THE-EXPERT-CONSULTATION-OF-STOCK-ASSESSMENT-OF-TUNAS-IN-THE-INDIAN-OCEAN-HELD-IN-BANGKOK,-THAILAND,-2-6-JULY-1990. 1991. pp. 341-358

An update of recent information regarding the Sri Lankan tuna fisheries is provided. Details are given of fishing craft and gear, production trends, fishing operations, species composition of the catch, research activities and development plans.

Sexual maturity, spawning and fecundity of the yellowfin tuna (Thunnus albacares) of the western Indian Ocean (TWS/90/68).

Hassani,-S.; Stequert,-B.

B (Book); K (Conf COLLECTIVE-VOLUME-OF-WORKING-DOCUMENTS,-VOL.-4,-PRESENTED-AT-THE-EXPERT-CONSULTATION-OF-STOCK-ASSESSMENT-OF-TUNAS-IN-THE-INDIAN-OCEAN-HELD-IN-BANGKOK,-THAILAND,-2-6-JULY-1990. 1991. pp. 91-107

The findings are presented of a study conducted to investigate certain aspects of the biology of the reproduction of yellowfin (Thunnus albacares) populations in the western Indian Ocean. The following aspects were studied: sex ratio; sexual maturity and length at first maturity; sexual cycle and spawning; and fecundity.

Status of the IPTP database and its problems involved (TWS/90/6).

Sakurai,-T.

B (Book); K (Conf COLLECTIVE-VOLUME-OF-WORKING-DOCUMENTS,-VOL.-4,-PRESENTED-AT-THE-EXPERT-CONSULTATION-OF-STOCK-ASSESSMENT-OF-TUNAS-IN-THE-INDIAN-OCEAN-HELD-IN-BANGKOK,-THAILAND,-2-6-JULY-1990. 1991. pp. 272-277

A description is given of the present status of the IPTP database and the problems involved in the collecting of statistics. Suggestions for further improvement in the future are also included. The species covered, coverage area and types of data required in the database are outlined.

Marine fishery resources in the Exclusive Economic Zone of India with special reference to deepsea fishing.

Sudarsan,-D.

J (Journal-Article) SEAFOOD-EXPORT-J. 1991. vol. 23, no. 7, pp. 18-25

Estimation of fishery resources potential, identifying of the component stocks and assessment of the respective stock size are essential elements for determining appropriate exploitation strategies for fisheries development. Among the diverse techniques and different data bases used for assessment of fishery potential, the most direct are those based on resource surveys. From the results obtained in the survey conducted by Fishery Survey of India during the past two decades the fishery potential of Indian EEZ is assessed as 3.92 million tonnes. Of this, the demersal stocks from approximately equals 1.93 million tonnes, the coastal pelagic stocks 1.74 million tonnes and oceanic resources 0.25 million tonnes. The potential pelagic stocks in the offshore waters are the coastal tunas, carangids, ribbon fish and pelagic sharks. Among the oceanic resources, yellowfin tuna and skipjack are estimated to support an annual yield of over one lakh tonnes each.

(Proceedings of the Regional Tuna Conference.).

Le-Gall,-J.Y.; Reviers,-X.-de; Roger,-C.-(eds.)

B (Book); K (Conf COLLOQ.-SEM.-INST.-FR.-RECH.-SCI.-DEV.-COOP. PARIS-FRANCE-ORSTOM 1991. 143 pp

This conference organized by the Commission de l'Ocean Indien deals with different the following aspects of tuna (Thunnidae) fisheries: catching methods, economics, legislation, biology and ecology, stock assessment, and research projects.

Seychelles tuna bulletin. Second quarter 1991.

B (Book) SEYCHELLES-TUNA-BULL. VICTORIA-SEYCHELLES~-SFA 1991. 14 pp

The number of purse seiners active in the western Indian Ocean for the second quarter of 1991 averaged at 40. This represents a marked decline when compared to the 1990 second quarter average of 48 vessels. The decline in purse seiner activity in the Seychelles region may be attributed to shifting fishing patterns and weather conditions, however it is expected that the fishing activity will resume the levels achieved in past years. Although the number of vessels has declined, the average catch per vessel increased and the 1991 total tuna catch in the western Indian Ocean up to Jun stands at 91410 mt, which is only marginally behind the total up to Jun in 1990.

(Impact of tuna fishing development on the economic and social life of the Seychelles.).

Michaud,-P.

B (Book); K (Conf PROCEEDINGS-OF-THE-REGIONAL-TUNA-CONFERENCE.. ACTES-DE-LA-CONFERENCE-THONIERE-REGIONALE. Le-Gall,-J.Y.;Reviers,-X.-de;Roger,-C.-eds. 1991. pp. 33-38

COLLOQ.-SEM.-INST.-FR.-RECH.-SCI.-DEV.-COOP.

The geographical redeployment of the French and Spanish tuna fleets in the Indian Ocean in 1983 and 1984 has had a considerable impact on the economic and social life of Seychelles. The utilization of the port of Victoria as a transhipment centre for purse seiners and longliners has created numerous jobs as stevedores, seamen, technicians in naval repair, etc. This activity has brought to the country an increasing amount of foreign exchange. This development of industrial tuna activity in Seychelles has only been possible as a result of considerable investment by Government in various infrastructure notably in the port sector.

(Tuna fisheries in the Indian Ocean: Evolution of fishing gear.).

Hallier,-J.P.

B (Book) PROCEEDINGS-OF-THE-REGIONAL-TUNA-CONFERENCE.. ACTES-DE-LA-CONFERENCE-THONIERE-REGIONALE. Le-Gall,-J.Y.;Reviers,-X.-de;Roger,-C.-eds. 1991. pp. 43-53

COLLOQ.-SEM.-INST.-FR.-RECH.-SCI.-DEV.-COOP.

After an introduction to the main tuna species, the basic tuna fishing techniques are briefly presented and illustrated especially those in use in the Indian Ocean artisanal and industrial fisheries. Catch per species, per area and per fishing technique from 1971 to 1988 are discussed. Some particular artisanal fisheries and the last tuna stock status are brought in.

(Fishing aggregating devices and small-scale fisheries.).

Cayre,-P.

B (Book); K (Conf PROCEEDINGS-OF-THE-REGIONAL-TUNA-CONFERENCE.. ACTES-DE-LA-CONFERENCE-THONIERE-REGIONALE. Le-Gall,-J.Y.;Reviers,-X.-de;Roger,-C.-eds. 1991. pp. 54-59

COLLOQ.-SEM.-INST.-FR.-RECH.-SCI.-DEV.-COOP.

This paper presents fish aggregating devices and their efficiency in artisanal fishing in the Indian Ocean.

An assessment of kawakawa (Euthynnus affinis) stock on the west coast of Sri Lanka.

Dayaratne,-P.; de-Silva,-J.

J (Journal-Article) ASIAN-FISH.-SCI. 1991. vol. 4, no. 2, pp. 219-226

The kawakawa (Euthynnus affinis) stock on the west coast of Sri Lanka was assessed by using length data collected from the drift gill net fishery. Sampling was carried out at three major landing sites from August 1986 to July 1987. Data were analyzed using the ELEFAN computer package. A relative yield-per-recruit analysis showed that a higher yield could be obtained if efforts were increased. These results together with catch data analysis suggest that the kawakawa stock on the west coast of Sri Lanka is not fully exploited.

Behaviour of yellowfish tuna (Thunnus albacares) and skipjack tuna (Katsuwonus pelamis) around fish aggregating devices (FADs) in the Comoros Islands as determined by ultrasonic tagging.

Caure,-P.

J (Journal-Article) AQUAT.-LIVING-RESOUR.-RESSOUR.-VIVANTES-AQUAT. 1991. vol. 4, no. 1, pp. 1-12

An ultrasonic tagging program for tuna was conducted in 1988 and 1989 within the Regional Tuna Project of the Indian Ocean Commission. Three yellowfish and six skipjack tuna were tagged with temperature or depth sensitive transmitters in the North-western part of the Mozambique Channel (12 degree S-44 degree E) around Anjouan island (Comoros Archipelago) where several fish aggregating devices (FADs) were previously moored. The horizontal and vertical movements observed during 8 tracks (3 yellowfish and 5 skipjack tuna) whose duration was between 3 and 24 hours, are analyzed in terms of swimming depth, temperature encountered and position of the tracked tuna relative to the FAD or coast line. Comparison between recorded depth of tracked tuna and echosounded fish indicated tracked tuna were schooling.

(Political and technological implications of new fishing technology of tuna Thunnus alalunga : Gillnets and Midwater trawls.).

Le-Gall,-J.Y.

B (Book); K (Conf PROCEEDINGS-OF-THE-REGIONAL-TUNA-CONFERENCE.. ACTES-DE-LA-CONFERENCE-THONIERE-REGIONALE. Le-Gall,-J.Y.;Reviers,-X.-de;Roger,-C.-eds. 1991. pp. 66-72

COLLOQ.-SEM.-INST.-FR.-RECH.-SCI.-DEV.-COOP.

The use and effects of drifnets fishing in South and North Pacific, Indian Ocean, Mediterranean Sea, East Atlantic, involving fishery disputes which are recounted in this paper.

Livebait resources in Lakshadweep (TWS/90/22).

Pillai,-P.P.

B (Book); K (Conf COLLECTIVE-VOLUME-OF-WORKING-DOCUMENTS,-VOL.-4,-PRESENTED-AT-THE-EXPERT-CONSULTATION-OF-STOCK-ASSESSMENT-OF-TUNAS-IN-THE-INDIAN-OCEAN-HELD-IN-BANGKOK,-THAILAND,-2-6-JULY-1990. 1991. pp. 1-21

A discussion is presented on the status of the live baitfish resources in the different islands in Lakshadweep, describing the crafts, gears and fishing methods used and the bait species and their spatial distribution. Fishery interactions and management policy in the fishery are also considered.

(Physiology and study of tuna behaviour: Practical applications of results.).

Cayre,-P.

B (Book); K (Conf PROCEEDINGS-OF-THE-REGIONAL-TUNA-CONFERENCE.. ACTES-DE-LA-CONFERENCE-THONIERE-REGIONALE. Le-Gall,-J.Y.;Reviers,-X.-de;Roger,-C.-eds. 1991. pp. 61-65

COLLOQ.-SEM.-INST.-FR.-RECH.-SCI.-DEV.-COOP.

This paper describes some examples of the adaptation of tuna to their environment and observation methods in the Indian Ocean.

Statistics of Spanish tropical tuna fleet in the Indian Ocean, 1984-1989 (TWS/90/51).

Pallares,-P.

B (Book); K (Conf COLLECTIVE-VOLUME-OF-WORKING-DOCUMENTS,-VOL.-4,-PRESENTED-AT-THE-EXPERT-CONSULTATION-OF-STOCK-ASSESSMENT-OF-TUNAS-IN-THE-INDIAN-OCEAN-HELD-IN-BANGKOK,-THAILAND,-2-6-JULY-1990. 1991. pp. 279-282

Some statistics (catch, effort, CPUE) of the Spanish tropical tuna purse seine fleet in the Indian Ocean are presented, that show the evolution of this recent fishery which began in 1984.

Morphological development of larvae of longtail tuna.

Nishikawa,-Y.; Ueyanagi,-S.

J (Journal-Article); BULL.-NATL.-RES.-INST.-FAR-SEAS-FISH.-ENYOSUIKENHO. 1991. no. 28, pp. 1-13

Morphological development of larval longtail tuna, Thunnus tonggol is described based on 15 specimens (3.8-5.8 mm in standard length) collected from western coastal waters of Australia and from the Bay of Thailand. The larvae are characterized by having unique melanophore patterns on the head and along the ventral margin of tail, and are distinguished from the larvae of all other tunas. Distribution of larvae is restricted to nearshore shallow waters. A key to the larvae of Indo-Pacific species of genus Thunnus is presented.

Collective volume of working documents, Vol. 4, presented at the Expert Consultation on Stock Assessment of Tunas in the Indian Ocean held in Bangkok, Thailand, 2-6 July 1990.

B (Book); K (Conf COLOMBO-SRI-LANKA FAO 1991. 503 pp

This volume contains the 53 documents presented at the Consultation, abstracts of which are cited individually.

Density dependence of larval growth of a marine fish, the southern bluefin tuna, Thunnus maccoyii .

Jenkins,-G.P.; Young,-J.W.; Davis,-T.L.O.

J (Journal-Article) CAN.-J.-FISH.-AQUAT.-SCI. 1991. vol. 48, no. 8, pp. 1358-1363

Competition for food among larvae and subsequent reduction in growth rates has been proposed as a mechanism to explain the apparent density-dependent control of some exploited marine fish populations, but has received little support from field data. Growth of larvae of southern bluefin tuna, Thunnus maccoyii , in the East Indian Ocean was significantly different among stations sampled randomly within a 20-km radius. Growth rate was positively correlated with feeding rate but not with temperature, indicating that larvae were food limited to a varying degree. A negative correlation between growth rate and abundance suggested that food limitation was density dependent.

Advection, dispersion and mortality of a patch of southern bluefin tuna larvae Thunnus maccoyii in the East Indian Ocean.

Davis,-T.L.O.; Lyne,-V.; Jenkins,-G.P.

J (Journal-Article) MAR.-ECOL.-PROG.-SER. 1991. vol. 73, no. 1, pp. 33-45

Mortality rate of southern bluefin tuna larvae Thunnus maccoyii was determined from measurements of a large, high density patch of larvae in the East Indian Ocean made in January-February 1987. An advection-diffusion-mortality model that improves on elliptical spread models was used to model changes in the patch over a period of 6 d. The patch at the start of sampling consisted of a distinct cohort of larvae 7 to 8 d old. Diffusion in subsequent 2 d intervals was slow (1.02 to 1.5 m super(2)/s) but within the bounds observed for patch scales in the order of a few kilometres wide. Intensifying southwesterly winds were opposed by advection with a southwestward drift of about 6 cm/s. Instantaneous mortality (Z) was estimated to be 0.66/d (a daily survival rate of 52%).

Seychelles tuna bulletin. Third quarter 1990.

B (Book); N (Num SEYCHELLES-TUNA-BULL. VICTORIA-SEYCHELLES-SFA 1991. 15 pp

The number of purse seiners active in the western Indian Ocean increased from a low of 41 at the end of the last quarter to 45 vessels in Sep. Fishing results improved slightly with daily catch rates for the third quarter averaging 22 MT, increasing from 17.7 MT/day in Aug to 31.5 MT/day in Sep. The fishing pattern for the third quarter showed that fishing effort was concentrated between 5 degrees north and 5 degrees south of the equator in the vicinity of the northern sector of the Seychelles EEZ. Some 55% of the third quarter catch was made up by skipjack tuna compared to 58% for the second quarter. This is partly due to the high catch of yellowfin during Jul. However the proportion of yellowfin tuna declined sharply to 22% in Aug and 15% in Sep. The cumulative catch by purse seiners operating in the western Indian Ocean as determined from seiner logbooks received by the 30th of Sep 1990, now stands at 121,390 MT.

Seychelles tuna bulletin. First quarter 1991.

B (Book) SEYCHELLES-TUNA-BULL. VICTORIA-SEYCHELLES-SFA 1991. 13 pp

The number of purse seiners vessels active in the western India Ocean remained constant at 43 from Jan to Mar. To date, the fishing results appear to be better than those of the same period in 1990 with the catch rates being substantially higher. Yellowfin tuna made up 88% of the catch in Jan and Feb dropping down to 67% in Mar, which is the expected trend during this time of the year. The total catch for purse seiners fishing in the western Indian ocean for 1990 was 221260 MT which indicates a slight decrease in catch compared to 1989. The cumulative catch for the first quarter of 1991 based on purse seiner logbooks now stands at 37684 MT.

Observation report on tuna longline fishing operation and fishing ground survey in the Bay of Bengal on board the Shinyo-Maru , 9-28 February 1991.

Aussanee-Munprasit,; Suppachai-Ananpongsuk,; Chitjaroon-Tantivala,; Supatr Sriphanpaiboon,; Pairaj-Thaochalee,; Thagoon-Anugul,

B (Book) RES.-PAP.-SER.-TRAIN.-DEP.-SOUTHEAST-ASIAN-FISH.-DEV.-CENT. SAMUTPRAKARN-THAILAND~-SEAFDEC-TRAINING-DEP. 1991. no. 28, 23 pp

Details are given of studies conducted on board the Shinyo-Maru in the Bay of Bengal in order to observe a new type of tuna longline fishing and also the operation of modern oceanographic equipment, including CTD and XBT. Fishing gear design and construction, fishing operation and fishing techniques, and catch and preservation are described, together with observations made regarding the tuna fishing grounds.

Exploratory fishing for large pelagic species in Sri Lanka.

Maldeniya,-R.; Suraweera,-S.L.

B (Book); N (Num MADRAS-INDIA~-BOBP 1991. 56 pp

This paper discusses the execution and findings of a project that sought to "obtain information on the availability of surface and deep-swimming tuna in Sri Lanka" and on the technical feasibility of the exploitation of those species by "small-to-medium size craft in the 25 to 100 nm range of the EEZ". The project was carried out during 1987-1988. It was executed by the National Aquatic Resources Agency (NARA) of Sri Lanka with technical assistance from the Bay of Bengal Programme for Fisheries Development (BOBP). Under the project, exploratory fishing was conducted with Negombo and Galle as bases using a boat provided by the Ministry of Fisheries. Gillnets, troll lines and longlines were the fishing gears used.

(Hydroclimate and tuna resources in tropical areas.).

Marsac,-F.

B (Book); K (Conf PROCEEDINGS-OF-THE-REGIONAL-TUNA-CONFERENCE.. ACTES-DE-LA-CONFERENCE-THONIERE-REGIONALE. Le-Gall,-J.Y.;Reviers,-X.-de;Roger,-C.-eds. 1991. pp. 79-90

COLLOQ.-SEM.-INST.-FR.-RECH.-SCI.-DEV.-COOP.

The monitoring of physical parameters linked to tuna research permits to improve the stock assessment and the knowledge of the relationships between tuna and their environment.

Incidence of juvenile bigeye tuna (Thunnus obesus) among the tuna catches in south-west coast of Sri Lanka (TWS/90/72).

Maldeniya,-R.; Dayaratne,-P.; Boniface,-B.

B (Book); K (Conf COLLECTIVE-VOLUME-OF-WORKING-DOCUMENTS,-VOL.-4,-PRESENTED-AT-THE-EXPERT-CONSULTATION-OF-STOCK-ASSESSMENT-OF-TUNAS-IN-THE-INDIAN-OCEAN-HELD-IN-BANGKOK,-THAILAND,-2-6-JULY-1990. 1991. pp. 108-110

An account is given of information collected during a study conducted in the southwest coast of Sri Lanka, September 1988 to August 1989, to identify the bigeye (Thunnus obesus) among the catch of small yellowfin (T. albacares) tuna. The number of yellowfin and bigeye sampled and their percentage composition are given, together with the length frequency distributions of the samples.

Population characteristics of kingfish Scomberomorus commerson in inshore waters of Kenya (TWS/90/43).

Nzioka,-R.M.

B (Book); K (Conf COLLECTIVE-VOLUME-OF-WORKING-DOCUMENTS,-VOL.-4,-PRESENTED-AT-THE-EXPERT-CONSULTATION-OF-STOCK-ASSESSMENT-OF-TUNAS-IN-THE-INDIAN-OCEAN-HELD-IN-BANGKOK,-THAILAND,-2-6-JULY-1990. 1991. pp. 200-207

The findings are presented of a study conducted to evaluate the status of kingfish (Scomberomorus commerson) populations in Kenyan coastal waters in order to provide estimates of the various population parameters needed for more effective exploitation of the species. Gonad examination suggests that spawning takes place all the year round with peaks in May and October associated with rainfall. Sexual maturity is attained when the fish is 50 cm TL for both males and females. A period of abundance from November to March may be associated with post-spawning feeding migration. The fish has a very low natural mortality rate, z = 0.13.

Present situation in the Soviet tuna fishing in the Indian Ocean, the systems of the fishing statistics collection and of the tuna investigations.

Romanov,-E.V.; Bashmakov,-V.F.; Budylenko,-C.A.; Korkosh,-V.V.

B (Book); K (Conf COLLECTIVE-VOLUME-OF-WORKING-DOCUMENTS,-VOL.-4,-PRESENTED-AT-THE-EXPERT-CONSULTATION-OF-STOCK-ASSESSMENT-OF-TUNAS-IN-THE-INDIAN-OCEAN-HELD-IN-BANGKOK,-THAILAND,-2-6-JULY-1990. 1991. pp. 409-416

An account is given of the Soviet purse seine tuna fishery in the Indian Ocean, describing the system of collecting fishery statistics. This system is based on 2 methods of data transmission to regional research institutes: the first uses radio reporting and the second uses information released by the shipowners on shore, based on shipboard catch documents. Details are also provided of tuna investigations conducted in the Indian Ocean by regional research institutes.

The Seychelles observer program (1986-1989) (TWS/90/46).

de-Montaudouin,-X.; Lablache,-G.

B (Book); K (Conf COLLECTIVE-VOLUME-OF-WORKING-DOCUMENTS,-VOL.-4,-PRESENTED-AT-THE-EXPERT-CONSULTATION-OF-STOCK-ASSESSMENT-OF-TUNAS-IN-THE-INDIAN-OCEAN-HELD-IN-BANGKOK,-THAILAND,-2-6-JULY-1990. 1991. pp. 208-215

An examination is made of data collected during an observer programme regarding tunas conducted in the Seychelles during the period 1986-89. The different types of data which were collected by the observers at sea, such as frequency of schools sighted, seiner activities, and fishing characteristics (catch, yield, duration of fishing sets) are compared with those observations given on logbooks from French purse seiners, which were found to be a reliable source of information. Findings indicate that the present sampling of the fleet and coverage rate ranging from 2.5% to 6.2%, can provide an adequate picture of activities at sea, fishing activities as well as hydrographic conditions.

Catches of tuna in the Western Pacific, 1965-1988, and the status of skipjack and yellowfin stocks (TWS/90/29).

B (Book); K (Conf COLLECTIVE-VOLUME-OF-WORKING-DOCUMENTS,-VOL.-4,-PRESENTED-AT-THE-EXPERT-CONSULTATION-OF-STOCK-ASSESSMENT-OF-TUNAS-IN-THE-INDIAN-OCEAN-HELD-IN-BANGKOK,-THAILAND,-2-6-JULY-1990. 1991. pp. 417-428

Following an account of the catches of tuna in the Western Pacific during the period 1965-88, an examination is made of the current status of the yellowfin (Thunnus albacares) and the skipjack (Katsuwonus pelamis), considering catch trends and CPUE data for the region.

Status of the Korean tuna longline fishery in the Indian Ocean (TWS/90/52).

Park,-Y.C.

B (Book); K (Conf COLLECTIVE-VOLUME-OF-WORKING-DOCUMENTS,-VOL.-4,-PRESENTED-AT-THE-EXPERT-CONSULTATION-OF-STOCK-ASSESSMENT-OF-TUNAS-IN-THE-INDIAN-OCEAN-HELD-IN-BANGKOK,-THAILAND,-2-6-JULY-1990. 1991. pp. 492-497

An examination is made of the current situation of the Korean tuna longline fishery in the Indian Ocean, reviewing the following aspects: fishing vessels, fluctuation of catch and CPUE, fishing ground and length composition of the major tuna species.

Purse seine set durations and their effects on the searching effort of western Indian Ocean purse seine fishery (TWS/90/49).

de-Montaudouin,-X.; Hallier,-J.-P.

B (Book); K (Conf COLLECTIVE-VOLUME-OF-WORKING-DOCUMENTS,-VOL.-4,-PRESENTED-AT-THE-EXPERT-CONSULTATION-OF-STOCK-ASSESSMENT-OF-TUNAS-IN-THE-INDIAN-OCEAN-HELD-IN-BANGKOK,-THAILAND,-2-6-JULY-1990. 1991. pp. 216-229

Fishing set durations of the tuna purse seine fishery based in Seychelles is analysed using data collected by observers on board vessels. The final aim is to assess searching times and corresponding abundance indices. Equations of purse seine set durations in relation to the catch per set are formulated for any given year, flag or possible type of fishing set (log/tree). Equations are compared, and parameters influencing them are examined: purse seiner size, sea condition, fish size, amount of fish discarded. The impact of fishing durations on global catches is assessed.

Possible interactions between the purse seine and baitboat skipjack fisheries in the Indian Ocean (TWS/90/67).

Fonteneau,-A.; Hallier,-J.P.

B (Book); K (Conf COLLECTIVE-VOLUME-OF-WORKING-DOCUMENTS,-VOL.-4,-PRESENTED-AT-THE-EXPERT-CONSULTATION-OF-STOCK-ASSESSMENT-OF-TUNAS-IN-THE-INDIAN-OCEAN-HELD-IN-BANGKOK,-THAILAND,-2-6-JULY-1990. 1991. pp. 266-271

This paper analyses the potential interactions between the skipjack (Katsuwonus pelamis) purse seine fisheries and the Maldivian artisanal skipjack fishery. This analysis is based on the trends of skipjack catches by sizes in the two fisheries. A simulation model is utilized to test the interaction effects between fisheries operating on mixing fraction of stocks, exerting each one a given local fishing mortality. The preliminary conclusions from this analysis is that there is presently little or no negative action from the purse seine increased catches on the Maldivian fishery. This situation can be explained by a low mixing rate between the two areas, a low exploitation rate, or a combination of those two factors. This may be related to the relatively short exploited life of skipjack and to the moderate distance covered by this species in its migrations, as suggested by tagging and recovery results in other oceans.

Results of the tagging operations conducted within the Regional Tuna Project (Indian Ocean Commission) in 1988 and 1989 (TWS/90/61).

Cayre,-P.; Ramcharrun,-B.

B (Book); K (Conf COLLECTIVE-VOLUME-OF-WORKING-DOCUMENTS,-VOL.-4,-PRESENTED-AT-THE-EXPERT-CONSULTATION-OF-STOCK-ASSESSMENT-OF-TUNAS-IN-THE-INDIAN-OCEAN-HELD-IN-BANGKOK,-THAILAND,-2-6-JULY-1990. 1991. pp. 261-265

The tagging program undertaken by the Regional Tuna Project (Indian Ocean Commission) was not very successful (955 tunas tagged), in regards of the investments made: 5 tagging cruises from a chartered purse-seiner. Despite the small number of recoveries observed (n = 15), some interesting hypotheses can still be formulated: growth rates of yellowfin and bigeye tuna seem similar to those observed in the Atlantic Ocean, growth rate of skipjacks over 45 cm (Fl.) seems quite low, tunas exploited in the western part of the Indian Ocean belong to a single stock. The Comoros Islands area, which appears to be located on an important migratory route, and the use of small, locally based embarcations to perform tagging operations all year round on a regular basis, should be considered as a major object of a new tagging program, at least if the costly chartering of an industrial bait-boat is not considered for the near future. Due to its immediate efficiency in enhancing the knowledge on stock structure and several biological parameters, intensive tagging operations should still be considered as a priority in the Indian Ocean.

Activities of the SPC Tuna and Billfish Assessment Programme (TWS/90/27).

B (Book); K (Conf COLLECTIVE-VOLUME-OF-WORKING-DOCUMENTS,-VOL.-4,-PRESENTED-AT-THE-EXPERT-CONSULTATION-OF-STOCK-ASSESSMENT-OF-TUNAS-IN-THE-INDIAN-OCEAN-HELD-IN-BANGKOK,-THAILAND,-2-6-JULY-1990. 1991. pp. 401-408

An account is given of the activities of the SPC Tuna and Billfish Assessment Programme (TBAP), which involve 2 projects: the Tuna and Billfish Research Project and the Fishery Statistics Project. The South Pacific albacore (Thunnus alalunga) research group and the FAO expert consultation on interactions of Pacific Ocean tuna fisheries are also discussed. A list is given of TBAP publications for the period 1988-90.

The status of artisanal tuna fishery in Kenya (TWS/90/42).

Nzioka,-R.M.

B (Book); K (Conf COLLECTIVE-VOLUME-OF-WORKING-DOCUMENTS,-VOL.-4,-PRESENTED-AT-THE-EXPERT-CONSULTATION-OF-STOCK-ASSESSMENT-OF-TUNAS-IN-THE-INDIAN-OCEAN-HELD-IN-BANGKOK,-THAILAND,-2-6-JULY-1990. 1991. pp. 472-477

A discussion is presented on the artisanal tuna fishery in Kenya; the main species are skipjack (Katsuwonus pelamis), yellowfin (Thunnus albacares), little tuna (Euthynnus affinis), and frigate (Auxis thazard). Details are given of an examination of fish catch data recorded during the period 1982-88. Findings show yellowfin to be the most abundant, being caught in oceanic waters.

Tuna research activities of the Seychelles Fishing Authority (TWS/90/47).

Lablache,-G.

B (Book); K (Conf COLLECTIVE-VOLUME-OF-WORKING-DOCUMENTS,-VOL.-4,-PRESENTED-AT-THE-EXPERT-CONSULTATION-OF-STOCK-ASSESSMENT-OF-TUNAS-IN-THE-INDIAN-OCEAN-HELD-IN-BANGKOK,-THAILAND,-2-6-JULY-1990. 1991. pp. 489-491

Following a brief account of the role of the Seychelles Fishing Authority, details are given of major tuna research activities conducted regarding fisheries monitoring and assessment, and also development research. Tuna statistics, biological sampling programme, observer programme, fish aggregating devices, and joint research with "Association thoniere" are covered.

The status of tuna in Somalia (TWS/90/40).

Dubad,-O.H.A.

B (Book); K (Conf COLLECTIVE-VOLUME-OF-WORKING-DOCUMENTS,-VOL.-4,-PRESENTED-AT-THE-EXPERT-CONSULTATION-OF-STOCK-ASSESSMENT-OF-TUNAS-IN-THE-INDIAN-OCEAN-HELD-IN-BANGKOK,-THAILAND,-2-6-JULY-1990. 1991. pp. 465-471

A discussion is presented on the current situation regarding the tuna fisheries of Somalia. The dominating species are yellowfin (Thunnus albacares), longtail (T. tonggol), bigeye (T. obesus), bonita (Sarda orientalis), skipjack (Katsuwonus pelamis) and Spanish mackerel (Scomberomorus commersoni). Data regarding the size and weight of the major species of tuna during a survey in the Gulf of Aden are included.

The tuna fishery of the west coast of Peninsular Malaysia (TWS/90/31).

Chee,-P.E.

B (Book); K (Conf COLLECTIVE-VOLUME-OF-WORKING-DOCUMENTS,-VOL.-4,-PRESENTED-AT-THE-EXPERT-CONSULTATION-OF-STOCK-ASSESSMENT-OF-TUNAS-IN-THE-INDIAN-OCEAN-HELD-IN-BANGKOK,-THAILAND,-2-6-JULY-1990. 1991. pp. 429-433

A fishery for tuna exists in Malaysia. Previously the tuna fishery was only harvested on a subsistence scale, while presently development is towards a commercial scale exploitation. The 1988 production of tuna in Malaysia was 26,641 metric tonnes, with 59% of this production coming from the east coast of Peninsular Malaysia. The west coast of Peninsular Malaysia and Sabah contributed to 19% each while the remaining 3% came from Sarawak. The species of tuna landed on the west coast of Peninsular Malaysia are the typical small neritic tuna, mainly Euthynnus affinis and Auxis thazard . These are caught mainly by purse seiners operating in the Malacca Straits.

Drift gillnet fishery in Sri Lanka (TWS/90/19).

Dayaratne,-P.; de-Silva,-J.

B (Book); K (Conf COLLECTIVE-VOLUME-OF-WORKING-DOCUMENTS,-VOL.-4,-PRESENTED-AT-THE-EXPERT-CONSULTATION-OF-STOCK-ASSESSMENT-OF-TUNAS-IN-THE-INDIAN-OCEAN-HELD-IN-BANGKOK,-THAILAND,-2-6-JULY-1990. 1991. pp. 230-234

A brief description is given of the small-scale drift gillnet tuna fishery in Sri Lanka, detailing the types of craft and gear, production and catch rates of target and non-target species, and species composition of the marine mammals in the incidental catch.

Present status of small tunas fisheries and resources on the west coast of Thailand, Andaman Sea (TWS/90/32).

Veera-Boonragsa

B (Book); K (Conf COLLECTIVE-VOLUME-OF-WORKING-DOCUMENTS,-VOL.-4,-PRESENTED-AT-THE-EXPERT-CONSULTATION-OF-STOCK-ASSESSMENT-OF-TUNAS-IN-THE-INDIAN-OCEAN-HELD-IN-BANGKOK,-THAILAND,-2-6-JULY-1990. 1991. pp. 434-448

A discussion is presented on the small tuna resources in the west coast of Thailand, which comprise mainly the following 3 species: Euthynnus affinis, Auxis thazard and Thunnus tonggol . Details are given of the fishing gear used, fishing grounds, landing sites, fishing seasons, size composition, catch trends and CPUE, and tuna stock assessments. Interaction between fisheries and fisheries statistics collection are also examined briefly.

Tuna longline fishery in India (TWS/90/23).

Sudarsan,-D.; John,-M.E.; Bhargava,-A.K.; Patil,-S.M.

B (Book); K (Conf COLLECTIVE-VOLUME-OF-WORKING-DOCUMENTS,-VOL.-4,-PRESENTED-AT-THE-EXPERT-CONSULTATION-OF-STOCK-ASSESSMENT-OF-TUNAS-IN-THE-INDIAN-OCEAN-HELD-IN-BANGKOK,-THAILAND,-2-6-JULY-1990. 1991. pp. 235-243

A discussion is presented on the tuna longline fishery in India. Following declaration of EEZ in 1976, the Government has permitted chartering of foreign vessels; the majority of the chartered longline fleet consists mainly of vessels of Taiwanese origin. Details are given of fishing voyages, catch composition, CPUE, stock distribution, and fishing seasons. The present level of production of tunas and billfish from Indian EEZ forms only 12 and 18% of the estimated potential of these stocks suggesting ample scope for expansion of the fishery.

Production trends in tuna fishery of Pakistan (TWS/90/35).

Majid,-A.; Ahmed,-J.

B (Book); K (Conf COLLECTIVE-VOLUME-OF-WORKING-DOCUMENTS,-VOL.-4,-PRESENTED-AT-THE-EXPERT-CONSULTATION-OF-STOCK-ASSESSMENT-OF-TUNAS-IN-THE-INDIAN-OCEAN-HELD-IN-BANGKOK,-THAILAND,-2-6-JULY-1990. 1991. pp. 449-461

An update is provided of information regarding the status of the tuna fishery in Pakistan. Trends in tuna production, species composition, seasonal variations, and CPUE are given for the 2 year period 1987-89.

Taiwanese longline and gillnet fisheries in the Indian Ocean (TWS/90/54).

Hsu,-Chien-Chung; Liu,-Hsi-Chiang

B (Book); K (Conf COLLECTIVE-VOLUME-OF-WORKING-DOCUMENTS,-VOL.-4,-PRESENTED-AT-THE-EXPERT-CONSULTATION-OF-STOCK-ASSESSMENT-OF-TUNAS-IN-THE-INDIAN-OCEAN-HELD-IN-BANGKOK,-THAILAND,-2-6-JULY-1990. 1991. pp. 244-260

A review is presented of the Taiwanese longline and drift gillnet tuna fisheries in the Indian Ocean, discussing the following aspects: historical background; size and dimensions of gear; size of fishing boats; fishing grounds; fishing season; catch figures; catch composition; CPUE seasonal variations; size of major fish caught; and unloading and transportation of products.

Status of tuna and seerfishes fisheries in Iran (TWS/90/37).

Nikouyan,-A.

B (Book); K (Conf COLLECTIVE-VOLUME-OF-WORKING-DOCUMENTS,-VOL.-4,-PRESENTED-AT-THE-EXPERT-CONSULTATION-OF-STOCK-ASSESSMENT-OF-TUNAS-IN-THE-INDIAN-OCEAN-HELD-IN-BANGKOK,-THAILAND,-2-6-JULY-1990. 1991. pp. 462-464

An examination is made of the current situation regarding the tuna and seerfish fisheries of Iran. Catch statistics are provided for the years 1985-88. Fishing craft and gear used and fishing seasons are described.

Tuna fishing trends in the western Indian Ocean (TWS/90/45).

Lablache,-G.

B (Book); K (Conf COLLECTIVE-VOLUME-OF-WORKING-DOCUMENTS,-VOL.-4,-PRESENTED-AT-THE-EXPERT-CONSULTATION-OF-STOCK-ASSESSMENT-OF-TUNAS-IN-THE-INDIAN-OCEAN-HELD-IN-BANGKOK,-THAILAND,-2-6-JULY-1990. 1991. pp. 478-488

A review is presented regarding data on the industrial tuna fishery in the western Indian Ocean, from 1981 for longliners and from 1983 for purse seiners. Fleet data, catch statistics, species composition and catch rates are given.

A brief updated stock assessment of Indian albacore by production model (TWS/90/55).

Hsu,-Chien-Chung; Liu,-Hsi-Chiang

B (Book); K (Conf COLLECTIVE-VOLUME-OF-WORKING-DOCUMENTS,-VOL.-4,-PRESENTED-AT-THE-EXPERT-CONSULTATION-OF-STOCK-ASSESSMENT-OF-TUNAS-IN-THE-INDIAN-OCEAN-HELD-IN-BANGKOK,-THAILAND,-2-6-JULY-1990. 1991. pp. 123-135

A series of catch and effort data of Indian Ocean albacore (Thunnus alalunga) were selected for the present study. The data sets included catch and effort of the Japanese longline fishery 1962-1987; the Taiwanese longline fishery 1967-1988; the Korean longline fishery 1975-1985; and the Taiwanese large-scale pelagic drift gillnet fishery 1983-1988. A time series of adjusted CPUE was used in fitting the production model. A moving average of efforts by assuming a significant year was used to adjust the effective effort and overall fishing intensity; 2 relationships between catch and effective effort and overall fishing intensity were investigated. The results show that investigation of catch using effective effort is less credible than with fishing intensity. It is concluded that overall fishing intensity gives a good estimation of MSY and optimal fishing effort.

Standardized catch per unit effort of albacore in the Indian Ocean caught by longline fisheries (TWS/90/57).

Hsu,-Chien-Chung; Liu,-Hsi-Chiang

B (Book); K (Conf COLLECTIVE-VOLUME-OF-WORKING-DOCUMENTS,-VOL.-4,-PRESENTED-AT-THE-EXPERT-CONSULTATION-OF-STOCK-ASSESSMENT-OF-TUNAS-IN-THE-INDIAN-OCEAN-HELD-IN-BANGKOK,-THAILAND,-2-6-JULY-1990. 1991. pp. 149-159

The catch and effort data base of Japanese, Taiwanese and Korean longline fisheries were applied in the generalized linear model (GLM) to adjust their catch rates. The variables of effect were constituted of fishing year, month, and ground, and the interaction among them were omitted in the present study. Owing to the assumption of normality for the random, error of GLM, the coefficient of multiple determination, R super(2), was used to investigate the multiple regression fit, and r super(2) was used to test the goodness-of-fit of the normality of standardized residuals. Fitting GLM with main effects of fishing year, month, and ground has moderate values of R super(2), and the standardized residuals are peaked but not much skewed; the normality test by r super(2) shows goodness-of-fit seems in compliance with GLM assumption. The adjusted catch rates by GLM appears in similar trend with nominal catch rates, however, the scale of adjusted catch rates is smaller than the scale of nominal catch rates, even adjusted catch rates by Honma's method as well in numerical comparison.

Yield per recruit analysis of the Indian Ocean albacore stock (TWS/90/56).

Lee,-Ying-Chou; Hsu,-Chien-Chung; Chang,-Shui-Kai; Liu,-Hsi-Chiang

B (Book); K (Conf COLLECTIVE-VOLUME-OF-WORKING-DOCUMENTS,-VOL.-4,-PRESENTED-AT-THE-EXPERT-CONSULTATION-OF-STOCK-ASSESSMENT-OF-TUNAS-IN-THE-INDIAN-OCEAN-HELD-IN-BANGKOK,-THAILAND,-2-6-JULY-1990. 1991. pp. 136-148

The Indian albacore (Thunnus alalunga) stock was analyzed by Beverton and Holt's yield per recruit model using the 1979-1988 length frequency data by Taiwanese longline fishery. Pauly's empirical equation for computing the natural mortality was also adopted, and a length-converted catch curve was applied in estimating the total mortality rate. Using the von Bertalanffy growth parameters of K = 0.1019 year super(-1), L sub(infinity) = 163.71 cm and t sub(0) = -2.0668 years, and the biennial mean surface temperature of the Indian Ocean (18.6 parallel C), the natural mortality was estimated as 0.206 year super(-1).

Yields per unit area of small tunas, seerfishes and billfishes in the Indian Ocean (TWS/90/9).

Yesaki,-M.

B (Book); K (Conf COLLECTIVE-VOLUME-OF-WORKING-DOCUMENTS,-VOL.-4,-PRESENTED-AT-THE-EXPERT-CONSULTATION-OF-STOCK-ASSESSMENT-OF-TUNAS-IN-THE-INDIAN-OCEAN-HELD-IN-BANGKOK,-THAILAND,-2-6-JULY-1990. 1991. pp. 167-173

An analysis is made of the landings of small tunas, seerfish and billfish in the Indian Ocean from 1976 to 1988. The yield per unit area model was used for countries with significant landings of these species for an approximation of exploitation levels.

Recent trends in fisheries for small tunas in Sri Lanka (TWS/90/15).

Dayaratne,-P.; de-Silva,-J.

B (Book); K (Conf COLLECTIVE-VOLUME-OF-WORKING-DOCUMENTS,-VOL.-4,-PRESENTED-AT-THE-EXPERT-CONSULTATION-OF-STOCK-ASSESSMENT-OF-TUNAS-IN-THE-INDIAN-OCEAN-HELD-IN-BANGKOK,-THAILAND,-2-6-JULY-1990. 1991. pp. 174-181

Following a brief account of the fishing craft and gear used in the Sri Lankan fishery for small tunas, an examination is made of production figures of the fishery. Catch composition, catch rates, and size composition data are discussed. The present production of small tunas in Sri Lanka contribute to about 13% of the total large pelagic fish production and 16% of the total tuna production. Further development of this fishery is thought possible as there exists potential to increase production figures.

Age and growth of kawakawa (Euthynnus affinis) based on modal lengths (TWS/90/8).

Yesaki,-M.

B (Book); K (Conf COLLECTIVE-VOLUME-OF-WORKING-DOCUMENTS,-VOL.-4,-PRESENTED-AT-THE-EXPERT-CONSULTATION-OF-STOCK-ASSESSMENT-OF-TUNAS-IN-THE-INDIAN-OCEAN-HELD-IN-BANGKOK,-THAILAND,-2-6-JULY-1990. 1991. pp. 160-166

Monthly length frequency distributions of kawakawa (Euthynnus affinis) from the Indian Ocean region grouped by 1 year intervals were used to investigate the age and growth. The modal lengths and corresponding age estimates were used with the von Bertalanffy routine to derive growth parameters.

Tuna fishery in Lakshadweep (TWS/90/21).

Pillai,-P.P.

B (Book); K (Conf COLLECTIVE-VOLUME-OF-WORKING-DOCUMENTS,-VOL.-4,-PRESENTED-AT-THE-EXPERT-CONSULTATION-OF-STOCK-ASSESSMENT-OF-TUNAS-IN-THE-INDIAN-OCEAN-HELD-IN-BANGKOK,-THAILAND,-2-6-JULY-1990. 1991. pp. 370-385

A review is made of the current situation regarding the tuna fisheries of Lakshadweep. Details are given of the fishing areas, crafts and gear, production trends, and post harvest processing and marketing. Development plans for the fishery are also outlined.

Age and growth of the Indian Ocean albacore (TWS/90/53).

Huang,-Chao-Shen; Wu,-Chi-Lun; Kuo,-Chin-Lau; Su,-Wei-Cheng

B (Book); K (Conf COLLECTIVE-VOLUME-OF-WORKING-DOCUMENTS,-VOL.-4,-PRESENTED-AT-THE-EXPERT-CONSULTATION-OF-STOCK-ASSESSMENT-OF-TUNAS-IN-THE-INDIAN-OCEAN-HELD-IN-BANGKOK,-THAILAND,-2-6-JULY-1990. 1991. pp. 111-122

Age and growth of albacore (Thunnus alalunga) was estimated by scale reading of 227 specimens sampled from Taiwanese gillnetters and longliners operated in the Indian Ocean. Almost up to 88% of all scales were aged satisfactorily. Annulus groups were recognized distinctly to 8, yet readability declined in the larger size classes. Owing to the inaccessibility of sampling albacore by months, no validation was made on time of ring formation, and a true age verification remains to be conducted. One fast growth zone with consecutive one slow growth zone was assumed as a year check on scales. A significant linear relationship was found between scale radius (R) and fork length (FL) (FL = 15.8975 + 27.8886 R). The von Bertalanffy growth equation was calculated.

Some observation on the size composition and gonad development of longtail tuna, Thunnus tonggol in Iranian waters (TWS/90/30).

Nikouyan,-A.; Firozy,-A.

B (Book); K (Conf COLLECTIVE-VOLUME-OF-WORKING-DOCUMENTS,-VOL.-4,-PRESENTED-AT-THE-EXPERT-CONSULTATION-OF-STOCK-ASSESSMENT-OF-TUNAS-IN-THE-INDIAN-OCEAN-HELD-IN-BANGKOK,-THAILAND,-2-6-JULY-1990. 1991. pp. 190-199

The findings are presented of a sampling programme conducted in Iranian waters in 1987 regarding the biology of the longtail tuna (Thunnus tonggol). Data concerning length frequency distribution, sex ratio and gonad development and maturity were obtained.

Review of the status of tuna stocks in Malaysia, 1989 (TWS/90/24).

Bidin,-R.; Hassan,-R.

B (Book); K (Conf COLLECTIVE-VOLUME-OF-WORKING-DOCUMENTS,-VOL.-4,-PRESENTED-AT-THE-EXPERT-CONSULTATION-OF-STOCK-ASSESSMENT-OF-TUNAS-IN-THE-INDIAN-OCEAN-HELD-IN-BANGKOK,-THAILAND,-2-6-JULY-1990. 1991. pp. 386-400

The tuna landings on the East Coast of Peninsular Malaysia are decreasing. The latest trend is quite obvious from the data gathered during the Indo Pacific Tuna Programme sampling program in the last 3 years. A steady decrease in landings is also recorded in Kuala Besut. The CPUE recorded so far indicates that individual fishermen have to spend more time in sea which results in higher production cost. Trolling heads the list of the fishing gears used for catching tuna which comprises 3 major species: (Thunnus tonggol, Euthynnus affinis and Auxis thazard). The sizes (fock length) for small tunas in Malaysia rarely exceed 60.0 cm. The matured female tuna is found more abundant than the matured male.

Age and growth estimates of juvenile kawakawa (Euthynnus affinis) by using daily growth increments in otolith (TWS/90/16).

Dayaratne,-P.

B (Book); K (Conf COLLECTIVE-VOLUME-OF-WORKING-DOCUMENTS,-VOL.-4,-PRESENTED-AT-THE-EXPERT-CONSULTATION-OF-STOCK-ASSESSMENT-OF-TUNAS-IN-THE-INDIAN-OCEAN-HELD-IN-BANGKOK,-THAILAND,-2-6-JULY-1990. 1991. pp. 182-189

The findings are presented of a study conducted to estimate the age of juvenile kawakawa (Euthynnus affinis) by using the primary growth increments in the otolith. Growth parameters were derived and spawning seasons determined.

Considerations of stock structure of yellowfin tuna (Thunnus albacares) in the Indian Ocean based on fishery data.

Nishida,-T.

J (Journal-Article) FISH.-OCEANOGR. 1992. vol. 1, no. 2, pp. 143-152

Yellowfin stock structure in the Indian Ocean was studied by using industrial tuna longline fishery data. Three types of test variables were used to detect stock structure, i.e., CPUE, age-specific CPUE, and coefficient of variation for size. Time-series data of test variables were compiled for six sub-areas that were arranged by dividing the whole region systematically along longitude lines every 20 degrees. Then time-series data were smoothed by moving averages, and regressed by simple models. Patterns of time-series trends were graphically and statistically compared to classify homogeneous sub-area groups. It was concluded that there are two major and two minor stocks of yellowfin tuna. The two major stocks are located at 40 degree -90 degree E and 70 degree -130 degree E respectively. The minor stocks are the far western and the far eastern stocks, which are located westward of 40 degree E and eastward of 110 degree E respectively. Neighboring stocks are intermingled in adjacent waters.

Observation report on tuna longline fishing operations in the Bay of Bengal on board 'R.V. Sumruatpramong 4', 24 February -16 March 1992

Aussanee,-Munprasit; Pisanu,-Siripitrakool

B (Book) RES.-PAP.-SER.-TRAIN.-DEP.-SOUTHEAST-ASIAN-FISH.-DEV.-CENT. SAMUTPRAKARN-THAILAND SEAFDEC-TRAINING-DEP. 1992 no. 31, 25 pp

An account is given of the observations made during tuna longline fishing operations on conducted during the period 25 February 15 March 1992 in the Bay of Bengal. Observations were made regarding the following: tuna resource survey method; survey area; fishing gear construction; fishing operation; oceanographic conditions of the fishing ground.

Present status of exploitation of fish and shellfish resources: Tunas and billfishes

James,-P.S.B.R.; Pillai,-P.P.; Jayaprakash,-A.A.; Pillai,-N.G.K.; Gopakumar,-G.; Yohannan,-T.M.; Muthiah,-C.; Kulkarni,-G.M.; Kemparaju,-S.

B (Book) MONSOON-FISHERIES-OF-THE-WEST-COAST-OF-INDIA:-PROSPECTS,-PROBLEMS-AND-MANAGEMENT. Rao,-P.V.;Murty,-V.S.;Rengarajan,-K.-eds. Central-Marine-Fisheries-Research-Inst.,-Cochin-India COCHIN,-INDIA CMFRI 1992 no. 45 pp. 56-84

CMFRI-BULL. no. 45

Despite the fact that several communications in the past have dealt with the trend of tuna fishery at different centres along the west coast of India, no directed attempt has been made till date to study the tuna fishery during the southwest monsoon period along the coast to synthesise and prospects. The present communication deals with their trend, general fishery, craft and gear employed in the fishing, fishing grounds, seasonal variation in each catch, effort and catch rate and characteristics during premonsoon, monsoon and postmonsoon seasons. In addition, the species composition and length composition of major species during different seasons and available information of the spawning biology of tunas along the west coast of India are also dealt with. The effect of tuna fishing demand and price structure during monsoon period as compared to other seasons and the management measures are also presented and discussed.

Recruitment processes

Hancock,-D.A.-(ed.); Glaister,-J.P.

B (Book); K (Conf PROC.-BUR.-RURAL-RESOUR. CANBERRA-AUSTRALIA AUSTRALIAN-GOVERNMENT-PUBLISHING-SERVICE 1992 no. 16, 236 pp

During the general discussion at the concluding session of the 1990 workshops, the topic of recruitment processes was raised. Cogent arguments were raised that because of the amount and cost of research directed to recruitment questions in Australia, it was timely and of some urgency to identify the crucial research questions. Research on a large number of commercially significant species ranging from the well-beloved penaeid prawn through demersal fishes to tuna, has recruitment as a central issue.

Seychelles tuna bulletin

B (Book); N (Num SEYCHELLES-TUNA-BULL. VICTORIA-SEYCHELLES SFA 1992 no. 4, 21 pp

Catch statistics of purse seiners and longliners fishing tuna in the Western Indian Ocean for the period January-December 1992 are provided.

Tagging tuna.

Whitelaw,-W.

J (Journal-Article) WEST.-FISH. 1992. pp. 40-44

More than 3000 southern bluefin tuna (Thunnus thynnus) have been tagged by fisheries researchers working off the south coast of Western Australia between Cape Leeuwin and Hopetown in recent months. The tagging is part of a wider program to monitor the state of stocks around Australia, and to help in tuna ageing studies. It is hoped this information, together, with other biological and economic considerations, will help the managers of this important fishery to formulate management guidelines to optimise the environmental and economic components of the fishery.

(Summary of the results of the IPTP Working Group on the yellowfin in the Indian Ocean, Colombo, September 1991.).

Fonteneau,-A.

J (Journal-Article); COLLECT.-VOL.-SCI.-PAP.-ICCAT-RECL.-DOC.-SCI.-CICTA-COLECC.-DOC.-CIENT.-CICAA. 1992. vol. 39, no. 1, pp. 129-130

A brief account is given of the activities of the Working Group which cover the following: Data preparation; Fisheries; Schools and floating objects; Stock structure; Spawning and growth; and State of the stocks.

Fisheries and stocks of yellowfin tuna in the Pacific and Indian Oceans. Status and review of assessment methods.

Sakagawa,-G.T.; Kleiber,-P.M.

J (Journal-Article); COLLECT.-VOL.-SCI.-PAP.-ICCAT-RECL.-DOC.-SCI.-CICTA-COLECC.-DOC.-CIENT.-CICAA. 1992. vol. 38, pp. 203-217

Yellowfin tuna, Thunnus albacares , is found in tropical and subtropical waters of the major oceans. It is a species with a relatively short life span (maximum of about 6-7 years), grows rapidly to a moderate size (maximum of about 190 cm long) and forms large schools in regions of the oceans where forage is abundant. Fisheries have developed in regions where yellowfin tuna are found in large concentrations. The total world catch was 905,000 MT in 1989 and has increased by 25% over the past 5 years. This growth is largely due to expansion of purse seine fishing in all regions, but particularly in the western Indian Ocean. Currently, the Pacific Ocean contributes about 66% of the total catch, the Atlantic Ocean, 17%, and the Indian Ocean, 17%. The catch is used primarily in high-value markets, such as for canned tuna and "sashimi". Assessment methods used to determine the condition of the stocks basically rely on fisheries data rather than research survey data. The methods include production model and cohort analysis; a review is made of these methods, as well as information on the fisheries for yellowfin tuna in the Pacific and Indian Oceans, and the condition of the stocks.

A description of the South African tuna fishery in the southern Atlantic Ocean.

Penney,-A.J.; Krohn,-R.G.; Wilke,-C.G.

J (Journal-Article); COLLECT.-VOL.-SCI.-PAP.-ICCAT-RECL.-DOC.-SCI.-CICTA-COLECC.-DOC.-CIENT.-CICAA. 1992. vol. 39, no. 1, pp. 247-257

A first description of the South African baitboat fishery in the South Atlantic Ocean is presented. Albacore (Thunnus alalunga) caught off the South African west coast contribute 80-90% of the catch, with small by-catches of bigeye (T. obesus) and yellowfin tuna (T. albacares). Reported albacore catches increased from less than 500 tons in 1978 to a maximum of 5,800 tons in 1987 and then declined to 4,200 tons in 1990. Despite increasing effort, CPUE decreased from 2 tons to less than 0.8 tons per boat day from 1987 to 1990. Albacore are mainly caught on offshore banks and seamounts off the northwestern coast and appear to come entirely from the southern Atlantic albacore stock. In contrast, yellowfin tuna are caught further south and appear to come from the Indian Ocean yellowfin resource. Both species are mainly caught during the austral summer, from November to May. The length-frequency distribution of albacore caught is essentially unimodal, most fish being 70-90 cm fork length. There are indications of a decrease in the proportion of large albacore in the South African catch in recent years.

Catch status and stock management of tunas and related species in the Persian Gulf and the Sea of Oman

Nikouyan,-A.

J (Journal-Article) IRAN.-FISH.-BULL. 1992 no. 1, pp. 26-38

Tuna fishery industry in the Indian Ocean has shown a remarkable increase over the past decade which is mainly due to the improvements in the catch data collection system in various countries of the region as well as the recent development in Purse Scine fishery. The total tuna catch from all countries in the region, the Persian Gulf and the Sea of Oman, has been recorded over 56,000 mt in 1989. The total catch of seerfishes in the Indian Ocean has increased from 43,000 mt in 1976 to 104,000 mt in 1988. The total landing of seerfishes from the Persian Gulf and the Sea of Oman has also been recorded as 31,000 mt in 1989. According to estimations of the total production of tuna species per unit area of the coast line for each country in the region and the average production per unit area from whole region it has been concluded that Islamic republic of Iran can achieve an annual catch potential of 25-33 mt of tuna species. The development and management prospects of tunas and seerfishes both in Iranian waters and other regional countries along the Persian Gulf and the Sea of Oman are also discussed.

Indian Ocean and southeast Asian tuna fisheries data summary for 1990.

B (Book); N (Num IPTP-DATA-SUMM. COLOMBO-SRI-LANKA FAO-UNDP 1992. no. 12, 88 pp

The publication provides annual tuna catch statistics by species and gear, and annual fishing craft statistics by gear, type and size class of boat for the Indian Ocean and Southeast Asian regions for the year 1990.

CSIRO plans to track SBT (Southern Bluefin Tuna) ultrasonically.

Davis,-T.; Gunn,-J.

J (Journal-Article) AUST.-FISH. 1992. vol. 51, no. 6, pp. 28-29

The tracking of southern bluefin tuna (Thunnus maccoyii) ultrasonically could help scientists to use aerial surveys more effectively, thus adding to our knowledge of the recruitment of young fish. A major problem in the management of southern bluefin tuna is not knowing how many young fish recruit to the population. Aerial surveys of young fish forming surface schools in the Great Australian Bight will give one estimate of recruitment. CSIRO Division of Fisheries will use an ultrasonic tracking system to examine the small-scale vertical and horizontal movements of SBT in the Great Australian Bight.

(Study on tuna associations, particularly tuna-dolphin associations. Integration with the biology of this species of migratory fish.).

Cort,-J.L.

J (Journal-Article); COLLECT.-VOL.-SCI.-PAP.-ICCAT-RECL.-DOC.-SCI.-CICTA-COLECC.-DOC.-CIENT.-CICAA. 1992. vol. 39, no. 1, pp. 358-384

The extent of the tuna-porpoise association in the Atlantic and Indian Oceans is examined, demonstrating the current problem caused by the incidental death of porpoises in the tuna fisheries of the eastern Pacific Ocean. Valuable information on the tuna-porpoise association in these oceans is obtained from data from fisheries and scientific observers involved in research programs on board tuna boats. In the eastern Atlantic, during the observer cruises made during the Skipjack Year Program (1980-1982) and the Yellowfin Year Program (1986-1987), isolated cases are cited of tunas associated with whales but not with porpoises. A study based on logbooks from the FIS (France, Ivory Coast, Senegal) fleet from 1976-1982 recorded 10,989 sets. Of these, 144 were made next to porpoises. There are no data which confirm the mortality of these small cetaceans; however, it is demonstrated that the tuna-porpoise association in presence of yellowfin or skipjack, separately increase the probability of a null set. In the western Indian Ocean, between 1986 and 1990, none of the 1,946 sets made during observer cruises were done in the presence of porpoises. As for the data from the Spanish fleet (logbooks), from a total of 38,353 sets made during 1984 and 1989, only on three occasions is the presence of porpoises noted.

On the appearance of melanophores on lower jaw tip of longtail tuna larvae Thunnus tonggol .

Nishikawa,-Y.; Ueyanagi,-S.

J (Journal-Article) BULL.-NATL.-RES.-INST.-FAR-SEAS-FISH.-ENYOSUIKENHO. 1992. no. 29, pp. 9-11

Based on 17 specimens (5.50-9.80 mm in standard length:SL) of longtail tuna larvae Thunnus tonggol collected from the eastern Indian Ocean off western Australia, the initial size at which melanophores appeared on the lower jaw was examined. Pigmentation on the lower jaw tip of longtail tuna larvae first appeared in larvae larger than 8.75 mm SL. The lower jaw pigments are characterized by occurring on its outer-surface.

On the mass seasonal migration into the pelagic zone and distribution of the Indian Ocean swimming crab, Charybdis smithi (Crustacea, Portunidae), during the pelagic phase of its life cycle.

Zamorov,-V.V.; Spiridonov,-V.A.; Rudnev,-G.P.

J (Journal-Article) HYDROBIOL.-J. 1992. vol. 28, no. 1, pp. 1-5

Data on the distribution of the swimming crab, Charybdis smithi , including information on the distribution of this species based on finds in the gut contents of pelagic fish (yellowfin tuna, Thunnus albacares) in open waters of the West Equatorial Indian Ocean are analyzed. The migration of crabs into the pelagic zone up to hundreds of miles offshore is seasonal and peaks in the fall (northern hemisphere). The distribution of the species apparently is regulated by large-scale gyres of the West Indian Ocean and, in particular, by the vast gyre between the east coast of Africa and Chagos Archipelago, as is the case in a number of true planktonic animals.

Report of the Conference for the Adoption of a Draft Agreement for the Establishment of the Indian Ocean Tuna Commission, Rome, 22-26 June 1992.

B (Book); K (Conf FAO-FISH.-REP.-FAO-RAPP.-PECHES-FAO-INF.-PESCA. 1992. no. 482, 79 pp

In April 1989, a Conference was held to adopt a Draft Agreement for the establishment of the Indian Ocean Tuna Commission. Although considerable progress was made at the Conference, it was not possible to reach agreement on a final text. The principal matters which required further consultation were the legal framework of the new Commission and the degree of autonomy to be granted to that Commission if the Agreement were concluded under Article XIV of the Constitution of FAO. Both of these problem areas were resolved within FAO and the second Conference was held to examine the main underlying issues associated with the Draft Agreement. These included: area of competence, species, membership, objectives and functions, sessions of the Commission, observers, administration, procedures for recommending management measures, implementation, information, subsidiary bodies, finances, headquarters, cooperation with other organizations and institutions and legal framework. The Conference agreed on the Draft Agreement shown in Annex E.

Review of national tuna tagging experiments in the Philippines, Indonesia and Malaysia.

Lewis,-A.D.

B (Book); O (Revi COLOMBO-SRI-LANKA IPTP 1992. 54 pp

Tagging programmes supported by IPTP in Philippines, Indonesia and Malaysia were reviewed and compared with a fourth programme in Maldives. Only that of the Maldives was able to fully achieve stated objectives, deficiencies identified in the others included tagging methods, publicity and tag recovery mechanisms. Nonetheless, useful preliminary results were obtained in each case. Recommendations were made for future tagging involving both neritic and oceanic tuna species in the southeast Asian region.

Options for the management of tuna fisheries in the Indian Ocean.

Burke,-W.T.; Christy,-F.T.,Jr.

B (Book) FAO-DOC.-TECH.-PECHES. 1992. no. 315, 87 pp

The study examines possible options for the management of the tuna fisheries in the Indian Ocean. It begins with an assessment of the issues with regard to the four main functions of fisheries management: (1) the acquisition of information; (2) regulation of fisheries; (3) enforcement of the management measures; and (4) the allocation of the net benefits from the regime. The issues are examined in terms of both economic and legal aspects. Possible approaches to the resolution of these issues are then addressed. This includes discussion of existing arrangements in other areas of the oceans, which have largely failed to achieve effective management and to produce benefits to the members. It discusses, in speculative and theoretical terms, the new approaches that might be taken. It concludes that new conceptions and approaches to management are required to achieve optimum benefits from the fisheries.

Results of the tuna tagging programme conducted in the Maldives during 1990.

Yesaki,-M.; Waheed,-A.

B (Book) COLOMBO-SRI-LANKA IPTP 1992. 23 pp

A tuna tagging programme was conducted in the Maldives during 1990 by the Marine Research Section (MRS) of the Ministry of Fisheries and Agriculture with assistance from the Indo-Pacific Tuna Development and Management Programme (IPTP). Tagging operations were conducted aboard small-scale pole-and-line fishing vessels during 8 cruises. A total of 9,941 fish were tagged during these cruises, of which 81% were skipjack (Katsuwonus pelamis) and 19% were yellowfin (Thunnus albacares). To the end of February 1992, 1,407 skipjack and 128 yellowfin have been recovered. A high percentage of the skipjack (98%) and yellowfin (86%) were recaptured in the Maldives. Only 33 skipjack and 18 yellowfin were captured from outside the Maldives; 68% of the skipjack were recovered within the first month after release and the longest at liberty (to the end of February 1992) was 582 days. The attrition rate of skipjack returns was 25.5% per month. Tag recoveries in Sri Lanka and, to a lesser extent in the western Indian Ocean, suggest skipjack and yellowfin tuna move with the prevailing currents.

Power to detect linear trends in dolphin abundance: Estimates from tuna-vessel observer data, 1975-89

Edwards,-E.F.; Perkins,-P.C.

J (Journal-Article) FISH.-BULL. 1992 vol. 90, no. 3, pp. 625-631

Power analysis provides a method to quantify the probability of not detecting low rates of change in abundance over a specified time-period. It also provides a method, in cases where no statistically-significant trends are apparent, for determining the steepness of change necessary for tis statistical detection given observed variability in the data, i.e., its detectable trend. We use power analysis here to assess the efficacy of weighted linear-regression analysis for estimating linear trends in abundance of eight stocks of eastern tropical Pacific Ocean dolphins. While it is instructive to evaluate the power of conclusions about observed trends, it is perhaps even more important to determine the magnitude of change required for detection of a trend, given observed variability in the dolphin abundance estimates. Therefore, we also calculate detectable trends, in addition to power of observed trends.

Report of the Workshop on Stock Assessment of Yellowfin Tuna in the Indian Ocean, 7-12 October 1991, Colombo, Sri Lanka.

B (Book); K (Conf COLOMBO-SRI-LANKA IPTP 1992. 90 pp

The report is presented under the following major headings: review of working papers; reports of the working group meetings; review of the national yellowfin tuna fisheries in the Indian Ocean; review of database; review of biological parameters; creation of catch-at-length data; status of stock; and recommendations.

Predatory fish and their prey -- an overview of trophic interactions in the fish communities of the west and south coasts of South Africa.

Smale,-M.J.

B (Book); K (Conf BENGUELA-TROPHIC-FUNCTIONING. Payne,-A.I.L.;Brink,-K.H.;Mann,-K.H.;Hilborn,-R.-eds. 1992. vol. 12 pp. 803-821

S.-AFR.-J.-MAR.-SCI.-S.-AFR.-TYDSKR.-SEEWET.

Fish communities over continental shelves are of three types: pelagic, rocky reef and soft substrata. The pelagic community of the South African west coast is dominated by clupeiform fish, which are the principal prey of snoek, the dominant piscivorous teleost in the area, and other fish, including tuna and pelagic sharks. Keystone prey species are broadly similar on the South Africa south and west coasts, but predator composition differs. Studies of rocky reef fish suggest that the fauna of the South Coast is more diverse than that of the West, the West Coast having fewer species and only two reef fish species being taken in linefisheries. Feeding interactions of some of the dominant species have been established, but the status of commercially less important fish such as elasmobranchs and small species is poorly known. The community and feeding interactions of fish living over soft substrata are better known and part of this fauna is taken by demersal trawlers. The two species of Cape hake dominate the communities on both coasts, but the fauna is more diverse on the Cape south coast. Generally, much of the present ichthyological knowledge is derived from the ecologically narrow perspective of commercial fisheries. Nevertheless, the patterns of diversity appear to conform to previous work, which has indicated a lower species diversity in the Atlantic than in the Indian Ocean. Knowledge of commercially unimportant fish is fragmentary, and understanding of the ecological interactions on the South Coast generally lags that of the West.

Pole-and-line fishing for albacore.

Chapman,-L.

J (Journal-Article) AUST.-FISH. 1992. vol. 51, no. 8, pp. 17-20

Interest is growing in targeting albacore (Thunnus alalunga) off southeastern Australia to diversify fishing operations. In our March issue the author employed by the Bureau of Rural Resources to assess the feasibility of an albacore fishery, wrote about trolling for albacore. Here, Lindsay looks at pole-and-line gear using live and/or dead bait. Pole-and-line fishing, with mainly live bait, was used around Australia's southern coastline for more than 30 years to catch southern bluefin tuna. As the catches of southern bluefin declined and individual transferable quotas were introduced, the use of poles diminished and contracted to the higher catch areas off South Australia, and to a lesser extent, southern Western Australia. Now in the 1990s, poles are being used again off south-eastern Australia to catch skipjack tuna, and to a lesser extent, albacore and yellowfin tuna.

The industrial fisheries of the Seychelles.

Yannotti,-E.S.

J (Journal-Article) INFOFISH-INT. 1992 no. 2, pp. 30-34

The commercial fishery of the Seychelles has developed spectacularly since 1986. Situated in the middle of the tuna fisheries in the Indian Ocean, the capital Victoria is the most important landing and transshipment port in the southwest of the Indian Ocean. The tuna resources are exploited by tuna fleets from France, Spain, the Russian Federation, Mauritania and others. These fishing operations bring in some 7 million US dollars in fishing licences and rights. There is no doubt that the fishery will continue to be an major sector of the country's economy, and could compete with the tourist industry, which is currently the number one sector.

(Tuna fisheries and floating devices: Situation in the world and prospects: Summary of knowledge and gaps.)

Fonteneau,-A.

B (Book); K (Conf MEETING-ON-BEHAVIOUR-AGGREGATION-25-26-JUNE-1992.#ACTION-INCITATIVE-COMPORTEMENT-AGREGATIF-AICA:-COMPTE-RENDU-DE-REUNION-25-26-JUIN-1992. Stretta,-J.M.-ed. Institut-Francais-de-Recherche-Scientifique-pour-la-Developpement-en-Coop.,-Montpellier-France.-Dep.-Terre-Ocean-Atmospherique Montpellier-France ORSTOM 1992 vol. 43, no. 9 pp. 33-60

DOC.-ORSTOM-MONTP. vol. 43, no. 9

This paper makes a point of the present situation in the world about tuna fisheries associated with floating objects.

(Research linked to commercial fisheries.)

Hallier,-J.P.

B (Book); K (Conf MEETING-ON-BEHAVIOUR-AGGREGATION-25-26-JUNE-1992.#ACTION-INCITATIVE-COMPORTEMENT-AGREGATIF-AICA:-COMPTE-RENDU-DE-REUNION-25-26-JUIN-1992. Stretta,-J.M.-ed. Institut-Francais-de-Recherche-Scientifique-pour-la-Developpement-en-Coop.,-Montpellier-France.-Dep.-Terre-Ocean-Atmospherique Montpellier-France ORSTOM 1992 vol. 43, no. 9 pp. 61-80

DOC.-ORSTOM-MONTP. vol. 43, no. 9

This study deals with the relationships between purse seining fisheries and floating objects. Graphics of average catches per type of school, size frequency distribution of tunas from logs and free school are presented.

Development of the stock-fishery model for yellowfin tuna (Thunnus albacares) in the Indian Ocean.

Nishida,-T.

J (Journal-Article) BULL.-JAP.-SOC.-FISH.-OCEANOGR.-SUISAN-KAIYO-KENKYU. 1992. vol. 56, no. 3, pp. 263-270

A stock-fishery dynamic model was developed for yellowfin tuna (YFT) (Thunnus albacares), which includes information on three types of fisheries i.e., long-line fisheries (LL), purse seine fisheries (PS) and artisanal fisheries (AF). Since immature and adult YFT are interacted and surface fisheries (PS + AF) exploit the immature while LL harvests the adult, this model was intentionally developed to explain dynamics between these two groups. It was found that this model fits better as more accurate PS data and less inaccurate AF data are included. It is concluded that this model is adequate to explain YFT population dynamics as long as the input information is accurate.

The environmental conditions of the tuna's maneuvering sphere in the Bay of Bengal.

Morinaga,-T.; Imazeki,-A.; Takeda,-S.; Arakawa,-H.

J (Journal-Article) UMI-MER. 1992. vol. 30, no. 1, pp. 5-16

In order to obtain information on the environmental conditions of the maneuvering sphere of tuna in the Bay of Bengal, the Indian Ocean, a series of investigations was conducted on board the T/S Shinyo-maru of Tokyo University of Fisheries, in February 1987. As a result, it can be said that the tunas' living sphere of the Bay of Bengal is located in the shallowest water compared with any other tuna-fishing grounds all over the world. The reason of such a phenomenon may attribute to the location of the dissolved oxygen minimum locating in the subsurface layer of this oceanic water.

Seychelles tuna bulletin. First quarter 1992.

B (Book) SEYCHELLES-TUNA-BULL. VICTORIA-SEYCHELLES SFA 1992. 15 pp

Catch statistics are presented for the purse seine and longline tuna fisheries of the Seychelles. Data are provided monthly for the period January 1991-March 1992.

(Coastal fisheries in the waters of Reunion Island.)

Biais,-G.; Taquet,-M.

B (Book) REPERES-OCEAN PLOUZANE-FRANCE IFREMER-CENTRE-BREST,-SERVICE-DES-EDITIONS 1992 no. 2, 77 pp

The authors deal with the coastal fisheries in the Reunion Island. In a first chapter they describe the geographical environment of this island (volcanism, climate, cyclones, hydrology, currents water masses) which has an influence on fisheries results. The second and third chapter describe the commercial species of the Reunion island (pelagic fishes: Scombridae as Thunnus albacares, Katsunonus pelamis, Euthynnus affinis, Thunnus obesus, Gymnosarda unicolor, Thunnus alalunga, other fishes as Xiphias gladius, Makaira mazara, Istiophorus platypterus. The fourth chapter deals with the fishing gears and the catching methods. The fifth chapter is devoted to fishery economics, financing.

[Commercial species of sharks in the Indian Ocean]

Gubanov,-E.P.; Timokhin,-I.G.

B (Book); K (Conf RESOURCES-OF-TUNAS-AND-RELATED-SPECIES-IN-THE-WORLD-OCEAN-AND-PROBLEMS-OF-THEIR-RATIONAL-UTILIZATION.-SYR'-EVYE-RESURSY-TUNTSOV-I-SOPUTSTVUYUSHCHIKH-OB"EKTOV-PROMYSLA-MIROVOGO-OKEANA-I-PROBLEMY-IKH-RATSYONAL'-NOGO-ISPOL'-ZOVANIYA. Yakovlev,-V.N.;Romanov,-E.V.;Lebedeva,-N.A.;Trushyn,-Yu.K.;Timokhin,-I.G.;Trotsenko,-B.G.;Korkosh,-V.V.;eds. KERCH-UKRAINE YUGNIRO 1993 pp. 111-112

Indian Ocean sharks with commercial value are divided into three groups: 1) coastal bottom and near-bottom sharks inhabiting shelf; 2) inhabitants of areas with bottom elevations (banks, shoals, under-water mountains), depth drop-offs on the continental and island slopes and, 3) inhabitants of the pelagic zone in the high-seas. Representatives of the first group, the most various in their species composition, are fished with nets of different construction, with hook-and-line gears, midwater and bottom trawls. The following sharks are fished more or less in this group: Orectolobidae, Odontaspididae, Sciliorhinidae, Triakidae, Squalidae, Squatinidae. Representatives of the second group are fished with long-lines (set and drifting). The following sharks are among them: Odontaspididae, Lamnidae, Alopiidae, Carcharhinidae, Sphyrnidae, Dalatiidae. Representatives of the third group are fished with drifting pelagic long-lines, being accompanying species in tuna long-line fisheries. This group includes the following sharks: Lamnidae, Alopiidae, Carcharhinidae, Sphyrnidae. The sharks of the third group may be of the greatest interest for the national fisheries as they may be harvested beyond 200 mile economic zones. These sharks form abundant concentrations in the surface layers of waters, making from 20 to 80% of by-catch in tuna long-line fisheries. (DBO).

[Species, length-weight composition and some features of biology of tunas from purse seine catches in the north-western Indian Ocean]

Korkosh,-V.V.; Timokhin,-I.G.; Zhuk,-N.N.; Pankratov,-S.A.

B (Book); K (Conf RESOURCES-OF-TUNAS-AND-RELATED-SPECIES-IN-THE-WORLD-OCEAN-AND-PROBLEMS-OF-THEIR-RATIONAL-UTILIZATION.-SYR'-EVYE-RESURSY-TUNTSOV-I-SOPUTSTVUYUSHCHIKH-OB"EKTOV-PROMYSLA-MIROVOGO-OKEANA-I-PROBLEMY-IKH-RATSYONAL'-NOGO-ISPOL'-ZOVANIYA. Yakovlev,-V.N.;Romanov,-E.V.;Lebedeva,-N.A.;Trushyn,-Yu.K.;Timokhin,-I.G.;Trotsenko,-B.G.;Korkosh,-V.V.;eds. KERCH-UKRAINE YUGNIRO 1993 pp. 99-101

Biological material was collected by Southern Scientific Research Institute of Marine Fisheries & Oceanography (YugNIRO), Kerch, Ukraine ichthyologists as observers on board tuna purse seiners of the Kaliningrad Authority of Trawling Fleet (Kaliningrad, Russia) BST Rodina, Tiora in July-August 1991. Total catch of these vessels in this period was 650 t, including tunas -- 620 t (95.8%). A total of 1931 individuals of tunas were measured; 332 individuals were analyzed. Only schools associated with floating objects were caught by fishing vessels in this period. Skipjack tuna (Katsuwonus pelamis) -- 66.2%, and yellowfin tuna (Thunnus albacares) -- 24.5% were predominant in catches. Bigeye tuna (Thunnus obesus) and by-catch species had the share of 5.1 and 4.2% respectively. When analyzing materials from fishing vessels a strict correlation between value of biomass of harvested schools and shares of skipjack or yellowfin tuna in them was determined. In catches of more than 20 t, skipjack tuna was predominant in all the schools (69% of all the catch), followed by yellowfin tuna (23.2%), bigeye tuna - 5.4%. With catches less than 20 t the share of skipjack tuna was only 47.1%, the share of yellowfin tuna was sharply increased up to 30.5% (the share of bigeye tuna was 3.1%). In some cases a share of yellowfin tuna in these catches reached 86.5%. In small mass schools an increased share of by-catch was observed -- up to 15.5%. Stomachs of all tunas under examination were empty as all the sets were made before dawn, i.e. before feeding of fish. (DBO).

[On age and growth of yellowfin tuna in the Indian Ocean]

Romanov,-E.V.; Smirnov,-M.V.; Korkosh,-V.V.

B (Book); K (Conf RESOURCES-OF-TUNAS-AND-RELATED-SPECIES-IN-THE-WORLD-OCEAN-AND-PROBLEMS-OF-THEIR-RATIONAL-UTILIZATION.-SYR'-EVYE-RESURSY-TUNTSOV-I-SOPUTSTVUYUSHCHIKH-OB"EKTOV-PROMYSLA-MIROVOGO-OKEANA-I-PROBLEMY-IKH-RATSYONAL'-NOGO-ISPOL'-ZOVANIYA. Yakovlev,-V.N.;Romanov,-E.V.;Lebedeva,-N.A.;Trushyn,-Yu.K.;Timokhin,-I.G.;Trotsenko,-B.G.;Korkosh,-V.V.;eds. KERCH-UKRAINE YUGNIRO 1993 pp. 101-103

In order to compare estimation of yellowfin tuna (Thunnus albacares) age by different methods, vertebrae of 234 individuals were used and 206 cross-sections of the first spine of first dorsal fin of this fish were revised. On the preparations of cross-sections a nuclei, a porous central part of the cross-section and interchanging dark and light zones were found. Dark and light zones, the most evident in the central and rear part of sine cross-section; it is considered by us as growth zones. In 82.5% of revised cross-sections eligibility of growth zones was rather satisfactory, in 17.5% it was difficult due to a great number of additional rings. It has especially strong impact on age determination of fish from older age groups. Data obtained by two methods made possible to have estimations of age and growth rate with very close results available. It gave an opportunity to use widely rays of tuna first dorsal fin to determine age without destruction of the commercial condition of fish on fishing vessels. Coefficient of correlation for samples including fish which age was determined by rays and vertebrae made 0.99, mean standard error was 0.06. Values of parameters of von Bertalanffy equation were L sub(infinity) = 190.4 cm, t sub(0) = -0.128 x 10 super(-3); k = 0.352. (DBO).

[Some aspects of reproductive biology of tunas in the Indian Ocean]

Timokhina,-O.I.

B (Book); K (Conf RESOURCES-OF-TUNAS-AND-RELATED-SPECIES-IN-THE-WORLD-OCEAN-AND-PROBLEMS-OF-THEIR-RATIONAL-UTILIZATION.-SYR'-EVYE-RESURSY-TUNTSOV-I-SOPUTSTVUYUSHCHIKH-OB"EKTOV-PROMYSLA-MIROVOGO-OKEANA-I-PROBLEMY-IKH-RATSYONAL'-NOGO-ISPOL'-ZOVANIYA. Yakovlev,-V.N.;Romanov,-E.V.;Lebedeva,-N.A.;Trushyn,-Yu.K.;Timokhin,-I.G.;Trotsenko,-B.G.;Korkosh,-V.V.;eds. KERCH-UKRAINE YUGNIRO 1993 103

Analysis of collected and processed material from longline catches made possible to review some aspects of reproductive biology of tunas in the equatorial zone of the Indian Ocean (10 degree S-10 degree N, 43-70 degree E), the Saya-de-Malha Bank included. Three tuna species yellowfin (Thunnus albacares), bigeye (T. obesus), skipjack (Katsuwonus pelamis) tunas -- were objects for study. All the tuna species were characterized by predominance of males in catches, however, proportion of sex for skipjack tuna is close to 1:1. Maturation of yellowfin tuna takes place at the age of 3 years old, bigeye tuna at the age of 3-4 years old. Length at which all the individuals reach maturity stage is the same for all tuna species and equal to 120 cm. Minimum length of mature females of skipjack tuna is 42 cm, that for bigeye tuna 70 cm, and yellowfin tuna 52 cm. (DBO).

[Squid value in the feeding of yellowfin tuna (Thunnus albacares Bonnaterre, 1788) in the Western Indian Ocean]

Zamorov,-V.V.; Chesalin,-M.V.; Dotsenko,-T.V.

B (Book); K (Conf RESOURCES-OF-TUNAS-AND-RELATED-SPECIES-IN-THE-WORLD-OCEAN-AND-PROBLEMS-OF-THEIR-RATIONAL-UTILIZATION.-SYR'-EVYE-RESURSY-TUNTSOV-I-SOPUTSTVUYUSHCHIKH-OB"EKTOV-PROMYSLA-MIROVOGO-OKEANA-I-PROBLEMY-IKH-RATSYONAL'-NOGO-ISPOL'-ZOVANIYA. Yakovlev,-V.N.;Romanov,-E.V.;Lebedeva,-N.A.;Trushyn,-Yu.K.;Timokhin,-I.G.;Trotsenko,-B.G.;Korkosh,-V.V.;eds. KERCH-UKRAINE YUGNIRO 1993 pp. 104-105

Squids from 4 families of Oegopsida suborder were found as food components for tuna. In the area off Kenya (1 degree -6 degree S, 46 degree -52 degree E), Ommastraephidae (Sthenoteuthis oualaniensis, Ornithoteuthis volatilis)(Index of Relative Importance, IRI = 288.9), Onychoteuthidae (Onychoteuthis banksi)(14.6), Enoploteuthidae (Ancistrocheirus alessandrini)(3.3), and Octopoteuthidae (Octopodoteuthis megaptera)(1.16) were observed. In the area of the Saya-de-Malha Bank (8 degree 30'-11 degree 00S, 56 degree -60 degree N), Ommastraephidae (S. oualaniensis, O.volatilis)(221.7), and Onychoteuthidae (O. Banksi)(15.1) were noted. Independent to the area, depth of fishing and tuna size, S. oualaniensis is the most important food component among squids. (DBO).

[Resource state assessment, distribution and biological characteristics of tunas in waters of the western Madagascar]

Korkosh,-V.V.

B (Book); K (Conf RESOURCES-OF-TUNAS-AND-RELATED-SPECIES-IN-THE-WORLD-OCEAN-AND-PROBLEMS-OF-THEIR-RATIONAL-UTILIZATION.-SYR'-EVYE-RESURSY-TUNTSOV-I-SOPUTSTVUYUSHCHIKH-OB"EKTOV-PROMYSLA-MIROVOGO-OKEANA-I-PROBLEMY-IKH-RATSYONAL'-NOGO-ISPOL'-ZOVANIYA. Yakovlev,-V.N.;Romanov,-E.V.;Lebedeva,-N.A.;Trushyn,-Yu.K.;Timokhin,-I.G.;Trotsenko,-B.G.;Korkosh,-V.V.;eds. KERCH-UKRAINE YUGNIRO 1993 pp. 37-39

A research cruise in Madagascar waters was carried out from August 1987 to January 1988 on board R/V Nikolaj Reshetnyak (22nd cruise). Area of operations was divided into 3 parts: 1) North-western -- from Cape Ambre to Cape Saint-Andre; 2) Central western -- from Cape Saint-Andre to Cape Saint-Vincent; 3) South-western -- from Cape Saint-Vincent to Cape Saint-Marie. During the expedition 40 long-line sets were made, 17050 hooks were set, 6 hydrologic sections were carried out. In long-line catches 23 species of fish from 12 families, including 6 species of sharks (oceanic whitetip shark (Carcharhinus longimanus), silky shark (C. falciformis), tiger shark (Galeocerdo cuvier), blue shark (Prionace glauca), bigeye thresher (Alopias superciliosus), shortfin mako (Isurus oxyrinchus)) and 4 species of tuna (yellowfin, bigeye, albacore and skipjack (Thunnus albacares, T. obesus, T. alalunga, Katsuwonus pelamis)) were registered. In the north-western part long-line operations were carried out twice -- in October and December. Catch of tuna per unit effort remained the same in mass, however, yellowfin tuna in October made 96.4% of catch of fish in this group. Catch rate (per 100 hooks) varied from 7.7 to 122.5 kg, including tunas from 5.4 to 82 kg in October and from 4.2 to 58.8 kg in December. In the central western part in the period from 26 November till 10 December, catch rate varied from 17 to 210.3 kg, on average 118 kg, including tunas from 9.8 to 147.8 kg, on average 87.4 kg. Hook rate was equal to 1.94. In the south-western part in the period from 10 till 21 November catch rate varied from 14.4 to 85.3 kg. Average hook rate was 0.3. Low catches in this area depended on complex of unfavourable environmental factors. (DBO).

[Results of tuna and floating objects tagging in the Indian Ocean]

Romanov,-E.V.; Smirnov,-M.V.; Zhuk,-N.N.

B (Book); K (Conf RESOURCES-OF-TUNAS-AND-RELATED-SPECIES-IN-THE-WORLD-OCEAN-AND-PROBLEMS-OF-THEIR-RATIONAL-UTILIZATION.-SYR'-EVYE-RESURSY-TUNTSOV-I-SOPUTSTVUYUSHCHIKH-OB"EKTOV-PROMYSLA-MIROVOGO-OKEANA-I-PROBLEMY-IKH-RATSYONAL'-NOGO-ISPOL'-ZOVANIYA. Yakovlev,-V.N.;Romanov,-E.V.;Lebedeva,-N.A.;Trushyn,-Yu.K.;Timokhin,-I.G.;Trotsenko,-B.G.;Korkosh,-V.V.;eds. KERCH-UKRAINE YUGNIRO 1993 pp. 87-93

Study of movements of both commercial species and accompanying objects and species with which tunas may form 'associated' schools showed that the tuna often associated with living objects in the ocean (whales, dolphins, large sharks, turtles) or non-living objects. Schools associated with non-living floating objects are of great commercial value, the harvesting of which exceeds a half of the total catch in some areas of the World ocean. With regard to the fact that associations may exist for a long period of time, character of migration processes is likely to be dependent on trajectories of drifts of floating objects mainly which in its turn are determined by the character of circulation of surface layer of waters. The fact of simultaneous catch of two yellowfin tunas (Thunnus albacares) in the Gulf of Aden marked with tags of dart type deserves special attention. This fact proves stability of tuna shoals as interpopulation formations and their potential existence without destruction and mixing with other shoals for a rather long period of time. (DBO).

[Fish concentrations near floating objects, their species composition and some features of their biology]

Timokhin,-I.G.; Korkosh,-V.V.

B (Book); K (Conf RESOURCES-OF-TUNAS-AND-RELATED-SPECIES-IN-THE-WORLD-OCEAN-AND-PROBLEMS-OF-THEIR-RATIONAL-UTILIZATION.-SYR'-EVYE-RESURSY-TUNTSOV-I-SOPUTSTVUYUSHCHIKH-OB"EKTOV-PROMYSLA-MIROVOGO-OKEANA-I-PROBLEMY-IKH-RATSYONAL'-NOGO-ISPOL'-ZOVANIYA. Yakovlev,-V.N.;Romanov,-E.V.;Lebedeva,-N.A.;Trushyn,-Yu.K.;Timokhin,-I.G.;Trotsenko,-B.G.;Korkosh,-V.V.;eds. KERCH-UKRAINE YUGNIRO 1993 pp. 82-86

The development of purse seine fishery in the Indian Ocean is closely connected with use of drifting objects in the vicinity of which fish schools are concentrated. Along with tunas which are the base of catches accompanying fish species are caught as well. Fish of 25 species from 17 families (Lamnidae, Carcharhinidae, Sphyrnidae, Mobulidae, Sphyraenidae, Carangidae, Coryphaenidae, Kyphosidae, Platacidae, Gempylidae, Scombridae, Istiophoridae, Xiphiidae, Nomeidae, Balistidae, Monacanthidae, Diodontidae) were found in purse seine catches in addition to 5 species of tunas (Thunnus albacares, Katsuwonus pelamis, T. obesus, T. alalunga, Auxis thazard). Jacks (4 species) are predominant by the number of species in by-catches, yellowtail (Seriola dumereli) and rainbow runner (Elagatis bipinnulatus) being the most abundant. Dolphin (Coryphaena hippurus) stands out by the greatest frequency of occurrence; the number of individuals of this species in the vicinity of floating objects may exceed 100. Sharks (Carcharhinus falciformis, C. longimanus) made a considerable amount of catch (by weight) -- from 0.1 to 35% of the total catch. The concentration of accompanying fish in accumulations near floating objects which often make a considerable part of the catch may be used as the additional reserve for food products. (DBO).

[Composition of tuna schools associated with floating objects in the Western Indian Ocean]

Budylenko,-G.A.

B (Book); K (Conf RESOURCES-OF-TUNAS-AND-RELATED-SPECIES-IN-THE-WORLD-OCEAN-AND-PROBLEMS-OF-THEIR-RATIONAL-UTILIZATION.-SYR'-EVYE-RESURSY-TUNTSOV-I-SOPUTSTVUYUSHCHIKH-OB"EKTOV-PROMYSLA-MIROVOGO-OKEANA-I-PROBLEMY-IKH-RATSYONAL'-NOGO-ISPOL'-ZOVANIYA. Yakovlev,-V.N.;Romanov,-E.V.;Lebedeva,-N.A.;Trushyn,-Yu.K.;Timokhin,-I.G.;Trotsenko,-B.G.;Korkosh,-V.V.;eds. KERCH-UKRAINE YUGNIRO 1993 pp. 80-82

Tuna caught in the vicinity of floating objects of natural and artificial origin are the base of catches of the Soviet tuna purse seine fleet in the western Indian Ocean in summer. Floating objects are regularly found in the commercial area northwards and north-eastwards to Seychelles located between 0-10 degree N and 50-60 degree E in the zone of north-eastern currents. Skipjack tuna (Katsuwonus pelamis) is the prevalent species (50-94%) in schools associated with floating objects in summer. Schools with predominance of yellowfin tuna (Thunnus albacares)(50-86%) are found more rare. Sometimes bigeye (T. obesus)(1-20%) and albacore (T. alalunga)(1-9%) tunas are present in by-catches. Perhaps, ratio of different species in catches does not always reflect the real composition of log-associated schools because the whole school often cannot be caught. Special attention should be paid to the fact that there is a considerable amount of small-sized immature yellowfin tunas in catches made near floating objects. Thus, individuals with weight of 1-5 kg (immature) in summer 1989 made up about 57% of the total catch of this species. In 1990 for the same period and area this figure increased up to 82%. In 1991, according to the materials of observers of Southern Scientific Research Institute of Marine Fisheries & Oceanography (YugNIRO), Ukraine, a considerable amount of small-sized immature yellowfin tuna was found in catches. Undoubtedly, increase in the number of immature individuals in catches may have negative impact on the state of its stock. (DBO).

[Species, length-weight composition and some features of tuna biology in different types of schools]

Gubanov,-E.P.; Tatarinov,-Yu.P.

B (Book); K (Conf RESOURCES-OF-TUNAS-AND-RELATED-SPECIES-IN-THE-WORLD-OCEAN-AND-PROBLEMS-OF-THEIR-RATIONAL-UTILIZATION.-SYR'-EVYE-RESURSY-TUNTSOV-I-SOPUTSTVUYUSHCHIKH-OB"EKTOV-PROMYSLA-MIROVOGO-OKEANA-I-PROBLEMY-IKH-RATSYONAL'-NOGO-ISPOL'-ZOVANIYA. Yakovlev,-V.N.;Romanov,-E.V.;Lebedeva,-N.A.;Trushyn,-Yu.K.;Timokhin,-I.G.;Trotsenko,-B.G.;Korkosh,-V.V.;eds. KERCH-UKRAINE YUGNIRO 1993 pp. 77-80

Analysis of work of tuna purse seine fishing fleet in the Indian Ocean made possible to specify three types of tuna schools: free-swimming (non-associated), associated with floating objects (of natural or artificial origin) and associated with marine mammals (whales, dolphins, etc.). Free schools consist of one tuna species mainly. As a rule, these are either large-sized yellowfin tunas (Thunnus albacares) or skipjack (Katsuwonus pelamis); only in some catches up to 5% of their total quality fall to the share of bigeye tuna (T. obesus). Concerning skipjack tuna supposition should be made that its appearance in free schools is only the intermediate stage before finding appropriate floating objects or estranging from the floating objects at the day time. Schools associated with floating objects are notable for the most specific diversity and considerable variations of length-weight characteristics of fish in them. Structure of such schools differs greatly depending on fishing areas. Thus, in the equatorial area, the exclusive economic zone (EEZ) of the Seychelles and sites northwards the equator, schools near the floating objects are represented mainly by skipjack tuna (70-90%), the rest fall on the share of yellowfin tuna of different size and to the much less extent juveniles of bigeye tuna and frigate tuna (Auxis thazard). Such schools with yellowfin tuna predominance (45-50%) in much rare occurred. On the southern sites (4-7 degree S) between the EEZ of the Seychelles and the Chagos Archipelago yellowfin tunas of different size was predominant in catches. Share of skipjack tuna does not exceed 35% and bigeye and bullet tunas were fished rarely. Schools associated with whales are one of the most considerable ones in biomass (up to 80-100 t). They were found most often in the southern part of the economic zone of the Seychelles and open waters northwards Saya-de-Malha bank (6-9 degree S, 55-65 degree E). Composition of whale-associated schools may be both monospecific (skipjack or large-sized yellowfin tunas) and heterogenous (skipjack-yellowfin, with predominance of the former, or yellowfin-bigeye). They were found in the fishing area in March-April as a rule. Frigate mackerel and silky shark were in by-catches usually. (DBO).

[Search and fisheries of tuna surface schools associated with floating objects]

Korkosh,-V.V.; Zhuk,-N.N.

B (Book); K (Conf RESOURCES-OF-TUNAS-AND-RELATED-SPECIES-IN-THE-WORLD-OCEAN-AND-PROBLEMS-OF-THEIR-RATIONAL-UTILIZATION.-SYR'-EVYE-RESURSY-TUNTSOV-I-SOPUTSTVUYUSHCHIKH-OB"EKTOV-PROMYSLA-MIROVOGO-OKEANA-I-PROBLEMY-IKH-RATSYONAL'-NOGO-ISPOL'-ZOVANIYA. Yakovlev,-V.N.;Romanov,-E.V.;Lebedeva,-N.A.;Trushyn,-Yu.K.;Timokhin,-I.G.;Trotsenko,-B.G.;Korkosh,-V.V.;eds. KERCH-UKRAINE YUGNIRO 1993 pp. 74-77

In modern tuna fisheries application of fish aggregating devices (FADs) is widely distributed. There are many various constructions down to devices creating artificial upwelling or attracting fish by means of light and sound. In the Western Indian Ocean tuna fisheries was almost completely aimed at fishing schools near the floating objects in summer (May-September) due to rare occurrence of other school types and complicity of their search owing to the unfavourable meteorological conditions. Analysis of work of Soviet tuna purse seine vessels from Kaliningrad Authority of Trawl Fleet (KUTF) in July-September 1991 demonstrated that 78.8% of tunas were caught in schools associated with floating objects. Biomass of the school near floating objects was varied within wide range reaching more than 100 t. It should be noted that fish concentrated near the floating objects only in the case of their location on productive sites, otherwise (when the floating objects were taken away into less productive waters) schools abandoned floating objects. (DBO).

[Oceanographic prerequisites of formation of concentrations of large pelagic predators in waters of Mozambique Channel]

Lanin,-V.I.

B (Book); K (Conf RESOURCES-OF-TUNAS-AND-RELATED-SPECIES-IN-THE-WORLD-OCEAN-AND-PROBLEMS-OF-THEIR-RATIONAL-UTILIZATION.-SYR'-EVYE-RESURSY-TUNTSOV-I-SOPUTSTVUYUSHCHIKH-OB"EKTOV-PROMYSLA-MIROVOGO-OKEANA-I-PROBLEMY-IKH-RATSYONAL'-NOGO-ISPOL'-ZOVANIYA. Yakovlev,-V.N.;Romanov,-E.V.;Lebedeva,-N.A.;Trushyn,-Yu.K.;Timokhin,-I.G.;Trotsenko,-B.G.;Korkosh,-V.V.;eds. KERCH-UKRAINE YUGNIRO 1993 pp. 72-74

The second joint Soviet-Mozambique expedition in 1978-1979 making annual cycle of the studies in the pelagic waters of the Mozambique made it possible to obtain unique data on peculiarities in distribution of large pelagic predators -- objects of long-lining. Oceanographic prerequisites for formation of productivity in each area are described. Area 'A' is the north of Mozambique Channel (Western Indian Ocean). Formation of fish concentrations take place in poor expressed surface frontal zone dividing equatorial and southern tropic surface water masses. Average catch for 100 hooks in winter in the southern hemisphere (July-September) was 116 kg, maximum of 147 kg. In catches yellowfin tuna (Thunnus albacares) prevailed. In area 'B', formation of productivity is connected with impact of orography of the coastal line on the Mozambique current and as a result between 15 degree and 17 degree S cyclonic curve or whirlwind forms in the central part of which waters rich in biogenous matters raise. Average catches in winter were 131 kg, (maximum 224 kg per 100 hooks) in summer, respectively, 110 and 165 kg. Tunas (T. albacares, T. obesus, T. alalunga) made up to 50-60% of catch, the rest were sharks and billfishes (Istiophoridae, Xiphiidae). Area 'C' is the shelf of the Sofala Bank with depths less than 200 m between 18 degree and 21 degree S. Formation of productivity is connected with influx of organic matters containing in the discharge of the largest Mozambique rivers and with raising of subsurface waters rich in biogenous matters along the continental slope. Sharks and billfishes prevailed in catches. Area 'D' is located in the vicinity of the Isle Bazaruto between 21 degree and 23 degree S. Formation of productivity is determined by raising of biogenous matters from subsurface layers. Average catches per 100 hooks made 111 kg in winter and 143 kg in summer; maximum ones, respectively, 172 and 230 kg. Tunas prevailed. In area 'E', formation of bioproductivity takes place between 25 degree and 27 degree S in the frontal zones dividing tropic Mozambique and subtropic water masses. Dense fish concentrations with average catches of 150 and with maximum ones up to 328 kg per 100 hooks form directly in the subsurface frontal zone, width of which was 15-25 miles. Tunas and sharks were predominant in the catches. (DBO).

[Oceanological prerequisites for formation of concentrations of large pelagic predators in the Indian Ocean]

Gubanov,-E.P.; Paramonov,-V.V.

B (Book); K (Conf RESOURCES-OF-TUNAS-AND-RELATED-SPECIES-IN-THE-WORLD-OCEAN-AND-PROBLEMS-OF-THEIR-RATIONAL-UTILIZATION.-SYR'-EVYE-RESURSY-TUNTSOV-I-SOPUTSTVUYUSHCHIKH-OB"EKTOV-PROMYSLA-MIROVOGO-OKEANA-I-PROBLEMY-IKH-RATSYONAL'-NOGO-ISPOL'-ZOVANIYA. Yakovlev,-V.N.;Romanov,-E.V.;Lebedeva,-N.A.;Trushyn,-Yu.K.;Timokhin,-I.G.;Trotsenko,-B.G.;Korkosh,-V.V.;eds. KERCH-UKRAINE YUGNIRO 1993 pp. 69-71

The specific feature of the North-Western Indian Ocean, where main tuna long-line and purse seine fisheries take place, is seasonal variability of water circulation connected with periods of north-eastern and south-western monsoons. Somali and Monsoon currents have significant impact on formation of tuna concentrations. Significant difference in biological state and species composition of objects of long-line and purse fishing defines difference in conditions of formation of their concentrations. Concentrations, fished by purse seines, are the mixture of small tunas (Katsuwonus, Auxis, Euthynnus) and juveniles of large tunas (Thunnus albacares, Thunnus obesus) and with a small share of billfishes (Istiophoridae, Xiphiidae) and other associated fishes (triggerfish Canthidermis maculatus, rainbow runner Elagatis bipinnulatus, dolphin fish Coryphaena hippurus). Using satellite images of ocean surface temperature made possible to determine that concentrations have bent for local warm 'spots' standing out against a background of colder waters. Long-line is a passive fishing gear, even rather scarce tuna concentrations inhabiting in the depth range of 80-380 m as well as large sharks and billfishes are fished with it. The border dividing ecological niches of inhabiting of these two species is a layer of surface minimum of oxygen (Ivshin et al., 1971). Tunas migrating in the vicinity of gradient zones or in the parallel direction are the most available for fishing off, therefore search of gradient zones is the main task during tuna fisheries. Long-line sets between nearly located temperature maximum and minimum are the most promising. (DBO).

[State of fisheries, stock assessment of tunas and billfishes in the Atlantic Ocean]

Ovchinnikov,-V.V.

B (Book); K (Conf RESOURCES-OF-TUNAS-AND-RELATED-SPECIES-IN-THE-WORLD-OCEAN-AND-PROBLEMS-OF-THEIR-RATIONAL-UTILIZATION.-SYR'-EVYE-RESURSY-TUNTSOV-I-SOPUTSTVUYUSHCHIKH-OB"EKTOV-PROMYSLA-MIROVOGO-OKEANA-I-PROBLEMY-IKH-RATSYONAL'-NOGO-ISPOL'-ZOVANIYA. Yakovlev,-V.N.;Romanov,-E.V.;Lebedeva,-N.A.;Trushyn,-Yu.K.;Timokhin,-I.G.;Trotsenko,-B.G.;Korkosh,-V.V.;eds. KERCH-UKRAINE YUGNIRO 1993 pp. 32-33

Due to the reduction in fishing effort in the Atlantic, connected with moving of majority of tuna fishing fleets for fisheries in the Indian Ocean, stocks of tunas (target species for purse fisheries) increased. Mathematical modelling with application of Butterwort's dynamic model (Fox and Schaefer's variants), carried out in AtlantNIRO (Kaliningrad, Russia), show that in the current year at maximum sustainable yield biomass of yellowfin tuna (Thunnus albacares) is 325800 tons and skipjack tuna (Katsuwonus pelamis) 186200 tons i.e. at the level of the last 3 years. (DBO).

[Some results and opportunities for trawl fisheries in open waters of the south-western Indian Ocean]

Ivanin,-N.A.

B (Book); K (Conf RESOURCES-OF-TUNAS-AND-RELATED-SPECIES-IN-THE-WORLD-OCEAN-AND-PROBLEMS-OF-THEIR-RATIONAL-UTILIZATION.-SYR'-EVYE-RESURSY-TUNTSOV-I-SOPUTSTVUYUSHCHIKH-OB"EKTOV-PROMYSLA-MIROVOGO-OKEANA-I-PROBLEMY-IKH-RATSYONAL'-NOGO-ISPOL'-ZOVANIYA. Yakovlev,-V.N.;Romanov,-E.V.;Lebedeva,-N.A.;Trushyn,-Yu.K.;Timokhin,-I.G.;Trotsenko,-B.G.;Korkosh,-V.V.;eds. KERCH-UKRAINE YUGNIRO 1993 pp. 39-40

Materials, collected in 1981-1984 during trawl fisheries of redbait (Emmelichthys nitidus) and horse mackerel (Trachurus picturatus) on banks of Western Indian Ridge (South Western Indian Ocean), demonstrated that tuna catches of vessels of large trawler RTMS type were usually equal to 0.1-0.9 tons per an hour of trawling. Bigeye tuna (Thunnus obesus) was prevalent. It was fished off over mounts of banks in the mornings mainly. Albacore (Th. alalunga), yellowfin tuna (Th. albacares) and skipjack tuna (Katsuwonus pelamis) were met in catches in small quantities. The largest catches took place in December - January. Trawl sets were made with midwater rope trawls 110/468. At the trawling speed of 5.5-5.8 knots vertical aperture of trawls reached 45-50 m. Layers from the surface down to 110 m were fished where at night redbait and horse mackerel concentrated and the largest catches were observed in the layer of 30-50 m. All the materials make possible consideration to develop trawl fisheries in open waters of the South-Western Indian Ocean and in other parts of the Indian Ocean. (DBO).

[Some specific features of long-line fisheries in the Indian Ocean]

Gubanov,-E.P.; Paramonov,-V.V.

B (Book); K (Conf RESOURCES-OF-TUNAS-AND-RELATED-SPECIES-IN-THE-WORLD-OCEAN-AND-PROBLEMS-OF-THEIR-RATIONAL-UTILIZATION.-SYR'-EVYE-RESURSY-TUNTSOV-I-SOPUTSTVUYUSHCHIKH-OB"EKTOV-PROMYSLA-MIROVOGO-OKEANA-I-PROBLEMY-IKH-RATSYONAL'-NOGO-ISPOL'-ZOVANIYA. Yakovlev,-V.N.;Romanov,-E.V.;Lebedeva,-N.A.;Trushyn,-Yu.K.;Timokhin,-I.G.;Trotsenko,-B.G.;Korkosh,-V.V.;eds. KERCH-UKRAINE YUGNIRO 1993 pp. 34-35

Long-line fisheries in the Indian Ocean has old traditions. Japanese vessels started fisheries in the eastern part of the ocean in 1952, and in the western - in 1956. In 1964 Soviet vessels began their activities in the ocean, in 1954 it was Taiwan and in 1966 - South Korea. Although at present long-line fisheries has been pressed by purse fisheries to a great extent it continues to develop. South Korean, Japanese and Taiwan vessels are engaged in main fisheries. They are autonomous tuna fishing vessels equipped with modern devices and landing fish products in the nearest foreign port. Soviet long-line vessels operated in the Indian Ocean till January 1988. Stake at tuna motherships carried fishing boats turned to be unsuccessful - such vessels were unprofitable that resulted in ceasing of fisheries. According to the data on operations of both Soviet and foreign vessels the main fishing areas were and now remain the north-western Indian Ocean. The basic target species of long-line fisheries are yellowfin (Thunnus albacares) and bigeye (Th. obesus) tunas. Activities of Soviet search and fishing vessels allowed to specify some peculiarities of fisheries in this part of the ocean. Thus, an increase in catches was often observed in transitional periods between monsoons as in this time tunas migrated and in this very period of migrations they were active, hungry and they are fished off well with long-lines. During summer monsoon tuna concentrations are most often met near seamounts (Saya-de-Malha Bank, Equator Seamount) and as a whole they shift towards the shelf. Such concentrations are characterized by increased share of small tunas - kawakawa (Euthynnus affinis), skipjack tuna (Katsuwonus pelamis), frigate and bullet tunas (Auxis spp.), sharks and sometimes billfishes. For recent years some reduction in catches made by purse seiners is observed that may result in activization of long-liners which makes possible to fish off rather scarce concentrations that cannot be fished off with neither fishing gear. (DBO).

[Sharks and tuna fisheries]

Litvinov,-F.F.

B (Book); K (Conf RESOURCES-OF-TUNAS-AND-RELATED-SPECIES-IN-THE-WORLD-OCEAN-AND-PROBLEMS-OF-THEIR-RATIONAL-UTILIZATION.-SYR'-EVYE-RESURSY-TUNTSOV-I-SOPUTSTVUYUSHCHIKH-OB"EKTOV-PROMYSLA-MIROVOGO-OKEANA-I-PROBLEMY-IKH-RATSYONAL'-NOGO-ISPOL'-ZOVANIYA. Yakovlev,-V.N.;Romanov,-E.V.;Lebedeva,-N.A.;Trushyn,-Yu.K.;Timokhin,-I.G.;Trotsenko,-B.G.;Korkosh,-V.V.;eds. KERCH-UKRAINE YUGNIRO 1993 pp. 30-32

The term 'tuna and accompanying species' covers in general three taxonomic groups with different abundance and range: tunas and other Scombridae; billfishes (Istiophoridae); sharks (Selachimorpha). Due to the similar requirements to food components (species for fish feeding) and environment they are harvested together as usual and 'net' specialized fishery of one group is hardly possible (excluding few exotic methods of fishing). Representatives of the first two groups are thoroughly registered by ICCAT and I-ATTC statistics, and the state of their stocks is subject to assessment periodically, if required, measures of regulation are applied. ICCAT registers up to 22 species, I-ATTC - 7 main species, neither of these organizations have not registered sharks till now. FAO experts are unanimous in the opinion that registration of large predatory pelagic sharks, which accompany tunas during main fisheries, is not carried out properly and does not reflect real state of affairs and does not allow to assess state of their stocks duly. Meanwhile, by-catch is rather considerable and in some cases it exceeds catch of main target species: by data of commercial statistics in 80-ies sharks comprised 25-30% of by-catches of the Soviet tuna motherships, by data of observers on the same vessels - from 50 to 70 %. Observations of tuna purse fishery in the Atlantic and Indian Ocean shows the shark to be a constant species in by-catches, their share varies in the range 5-20%. Impact of tuna fisheries on sharks is poorly studied due to the lack of fisheries statistical information. As sharks are K-strategists and by type of reproduction they are closer to mammals than to tunas (vivaparity, intrauterine development, etc.), general non-control influence on them on the side of fisheries may result in quick overfishing of species and destruction of some species. As a rule, capacities of vessels in many tuna fishing fleets do not allow to process and freeze of sharks so their greater part is taken away. During long-line fisheries some released sharks have a chance to survive (often hooks were found in the mouth cavity, gullet and even in the wall of the pericardium), whereas during purse fisheries the main stock of sharks perish. It should be stated that tuna fisheries has not the best impact on sharks. On the one hand due to the specific character of tuna fishing conditions it is impossible to avoid by-catch of sharks, on the other hand owing to the specialization of vessels it is not possible to utilise this valuable resource for food and expensive product to the complete extent. It is hoped that attraction of such international structure as ICCAT, I-ATTC, FAO, CITES, etc. turn out to be successful in solution of this problem. (DBO).

[Prospects of national tuna purse fisheries development in the Pacific Ocean]

Karyakin,-K.A.; Vizer,-A.V.

B (Book); K (Conf RESOURCES-OF-TUNAS-AND-RELATED-SPECIES-IN-THE-WORLD-OCEAN-AND-PROBLEMS-OF-THEIR-RATIONAL-UTILIZATION.-SYR'-EVYE-RESURSY-TUNTSOV-I-SOPUTSTVUYUSHCHIKH-OB"EKTOV-PROMYSLA-MIROVOGO-OKEANA-I-PROBLEMY-IKH-RATSYONAL'-NOGO-ISPOL'-ZOVANIYA. Yakovlev,-V.N.;Romanov,-E.V.;Lebedeva,-N.A.;Trushyn,-Yu.K.;Timokhin,-I.G.;Trotsenko,-B.G.;Korkosh,-V.V.;eds. KERCH-UKRAINE YUGNIRO 1993 pp. 26-27

The first pilot expeditions of the Pacific Scientific Research Institute of Marine Fisheries & Oceanography (TINRO) and Pacific Authority of Searching and Research Fleet (TURNIF) in mid 70-ies for tuna purse fisheries by medium-sized vessels SRTM brought no positive results, although in the process of work areas of tuna commercial concentrations were revealed. These expeditions demonstrated the complete uselessness of both vessels of such type and their fishing equipment for this type of fisheries. However, even after appearance in 1981 specially designed tuna purse seiners tuna fisheries did not turn out to be highly profitable in the system of fisheries of the USSR. In the middle of 1985, round-year tuna fishing expedition in the equatorial part of the Pacific was organized which consists of 5 large tuna fishing seiners (BST). Since then on a number of vessels taking part in fisheries simultaneously varied in the range from 2 to 6. Search and fisheries were carried out in high-seas, outside from exclusive economic zones in the area between 5 degree N - 10 degree S from 137 degree E to 140 degree E. Under agreements with Kiribati (1985-1986) and Vanuatu (1987-88) fishing operations were permitted in exclusive economic zones of these island states. From 1985 till 1987 annual catch of tuna was doubled and reached 9000 tons in 1987, however, further fishing situation in the Pacific in the areas available for fishing became worse and vessels had to explore areas in the western Indian ocean from 1989. At present tuna fishing fleet is replenished with seiners of new generation, 5 such vessels should be bought of the Far East shipowners. Taking into account 5 available BST the total number in the expedition would be 10 seiners which could reach 2500 - 3000 tons of tuna per vessel annually if the licence was available. (DBO).

[Distribution and biology of tiger shark (Galeocerdo cuvier) and hammerhead shark (Sphyrna tudes) in the Indian Ocean]

Gubanov,-E.P.; Timokhin,-I.G.; Ivanin,-N.A.

B (Book); K (Conf RESOURCES-OF-TUNAS-AND-RELATED-SPECIES-IN-THE-WORLD-OCEAN-AND-PROBLEMS-OF-THEIR-RATIONAL-UTILIZATION.-SYR'-EVYE-RESURSY-TUNTSOV-I-SOPUTSTVUYUSHCHIKH-OB"EKTOV-PROMYSLA-MIROVOGO-OKEANA-I-PROBLEMY-IKH-RATSYONAL'-NOGO-ISPOL'-ZOVANIYA. Yakovlev,-V.N.;Romanov,-E.V.;Lebedeva,-N.A.;Trushyn,-Yu.K.;Timokhin,-I.G.;Trotsenko,-B.G.;Korkosh,-V.V.;eds. KERCH-UKRAINE YUGNIRO 1993 pp. 119-121

A brief description are given of the biology and distribution of the tiger shark (Galeocerdo cuvier) and hammerhead shark (Sphyrna tudes) in the Indian Ocean. It is noted that tiger sharks were caught by longline research vessels in water layers from 20 to 280 m depth. Total length (TL) of the tiger sharks in the catches was from 70 to 385 cm, weight from 4 to 450 kg. In the stomach of the species Bivalvia, Cephalopoda, pelagic crabs, lobsters, fishes, turtles, and mammals (dolphins). Hammerhead shark was often caught by longline in the depth of 90-160 m. Length of hammerhead sharks varied from 160 to 260 cm (TL), weight from 28-110 kg. Some data on reproduction biology of both species are presented. (DBO).

[Purse seine tuna fisheries in the western part of the Indian Ocean]

Budylenko,-G.A.

B (Book); K (Conf RESOURCES-OF-TUNAS-AND-RELATED-SPECIES-IN-THE-WORLD-OCEAN-AND-PROBLEMS-OF-THEIR-RATIONAL-UTILIZATION.-SYR'-EVYE-RESURSY-TUNTSOV-I-SOPUTSTVUYUSHCHIKH-OB"EKTOV-PROMYSLA-MIROVOGO-OKEANA-I-PROBLEMY-IKH-RATSYONAL'-NOGO-ISPOL'-ZOVANIYA. Yakovlev,-V.N.;Romanov,-E.V.;Lebedeva,-N.A.;Trushyn,-Yu.K.;Timokhin,-I.G.;Trotsenko,-B.G.;Korkosh,-V.V.;eds. KERCH-UKRAINE YUGNIRO 1993 pp. 28-30

Recent trends of purse seine tuna fishery development in the Western Indian Ocean are described. Seasonal and inter-annual variations of species composition are noted. Variations in catch per unit effort of Soviet fleet in different years are explained. Comparison of per boat catches of Soviet and foreign vessels were made. (DBO).

[Biooceanographic aspects of formation of tuna concentrations in the North-Western Indian Ocean in the period of the south-western monsoon of 1991]

Zhuk,-N.N.; Klyausov,-A.V.; Kochergin,-A.T.

B (Book); K (Conf RESOURCES-OF-TUNAS-AND-RELATED-SPECIES-IN-THE-WORLD-OCEAN-AND-PROBLEMS-OF-THEIR-RATIONAL-UTILIZATION.-SYR'-EVYE-RESURSY-TUNTSOV-I-SOPUTSTVUYUSHCHIKH-OB"EKTOV-PROMYSLA-MIROVOGO-OKEANA-I-PROBLEMY-IKH-RATSYONAL'-NOGO-ISPOL'-ZOVANIYA. Yakovlev,-V.N.;Romanov,-E.V.;Lebedeva,-N.A.;Trushyn,-Yu.K.;Timokhin,-I.G.;Trotsenko,-B.G.;Korkosh,-V.V.;eds. KERCH-UKRAINE YUGNIRO 1993 pp. 63-65

In the area of fisheries conducted by 6 Soviet purse seine tuna vessels in the Indian Ocean (6 degree S-6 degree N, 43 degree -66 degree E) during south-western monsoon (July-November) of 1991 data collection on board R/V Ignat Pavluchenkov was carried out. Data collections over environmental parameters including meteorological observations, measurements of ocean surface temperature, currents speed and directions for 150 m depth relatively ocean surface (by means of Doppler current sensor FURUNO CI-30), drifting of floating objects as well as data collection on biology and length-weight characteristics of tunas were made. Some biooceanographic aspects of formation of tuna concentrations and other pelagic predators in the period of observations are presented. Cyclonic whirlwinds take away different organisms from the area of Somali upwelling which are concentrated within its boundaries. This conclusion is proved by the analysis of food of tunas in this area rather remote from Somali upwelling. Thus, pelagic crab (Charybdis smithi) and fishes of Carangoides genus (typical representatives of coastal waters) were found often in their nutrition. The specified area between exclusive economic zones of Somalia, Seychelles and adjacent waters are one of the most productive area for fisheries of pelagic predators during the south-western monsoon and at the same time one of the less studied area in fisheries and oceanographic respect. (DBO).

Fishery and biology of yellowfin tuna occurring in oceanic fishery in Indian seas

John,-M.E.; Sudarsan,-D.

B (Book) TUNA-RESEARCH-IN-INDIA. Sudarsan,-D.;John,-M.E.-eds. BOMBAY-INDIA FSI 1993 pp. 39-61

This paper presents an account of the oceanic fishery for yellowfin tuna (Thunnus albacares) in the Indian EEZ and summarized the information on biological aspects of the stock studied in course of exploratory surveys.

Satellite remote sensing for tuna fishing in Indian waters

Kumari,-B.; Raman,-M.; Narain,-A.; Sivaprakasam,-T.E.

B (Book) TUNA-RESEARCH-IN-INDIA. Sudarsan,-D.;John,-M.E.-eds. BOMBAY-INDIA FISH.-SURV.-INDIA 1993 pp. 157-166

An attempt has been made to understand the distribution of tuna in response to one environmental parameter namely temperature using NOAA advanced very high resolution radiometer data and develop a fishing strategy. Besides this, it was observed that thermal features which can indicate the presence of fronts marked by horizontal gradients of temperature are also important as they affect the tuna distribution. SST maps were generated for different seasons using NOAA-AVHRR data. The temperature observed during the study period ranged from 23 degree C to 29 degree C. The CPUE for the same fishing season was plotted on the SST images. It was also observed that almost all the data points were located near the edges of surface thermal fronts ranging from 27-29 degree C. The results of this study confirm the basic understanding that most of the species of tunas have a preferential temperature range, which in Indian water is observed to be 27-29 degree C. NOAA satellite data with a wider swath (2500 km) and higher repeativity (twice in day) can very well monitor the potential areas of tuna abundance in the EEZ and beyond and thus help in strategic tuna fishing in Indian waters.

Pattern of spatial and seasonal fluctuations in temperature profile in Indian EEZ and its influence on tuna fishing

Nair,-K.N.V.; Muraleedharan,-P.M.

B (Book) TUNA-RESEARCH-IN-INDIA. Sudarsan,-D.;John,-M.E.-eds. BOMBAY-INDIA FISH.-SURV.-INDIA 1993 pp. 167-180

The distribution and the congregation of tuna are known to be influenced by several environmental and biotic factors. The distribution of yellowfin tuna (Thunnus albacares) in the world oceans is between 40 degree N and 40 degree S (FAO, 1983). The vertical distribution of Thunnus sp. generally extends down to a depth of 150 m as revealed from commercial longline operations, although occurrences as deep as 380 m have also been reported. Temperature is the dominant factor influencing the distribution of yellowfin tuna. The present paper deals with the spatial and seasonal fluctuations in oceanic temperature profile off the west coast of India and their influence on tuna fishing.

Effect of environmental fluctuations on coastal tuna fisheries

Rajagopalan,-M.S.; James,-P.S.B.R.; Pillai,-G.K.

B (Book) TUNA-RESEARCH-IN-INDIA. Sudarsan,-D.;John,-M.E.-eds. BOMBAY-INDIA FISH.-SURV.-INDIA 1993 pp. 149-155

Along the south west coast of India seasonal abundance and migration towards coastal area by pelagic species such as oil sardine and mackerel are governed by several meteorological and oceanographic parameters such as seawater temperature, salinity, pH, upwelling, nutrient concentration and plankton production in turn influenced by wind, rainfall and coastal currents. As regards coastal species of tunas such as Euthynnus affinis, Auxis thazard, Auxis rochei and Sarda orientalis, abundanced by their total catch and catch per effort, indicate certain seasonal trends. An attempt is made to correlate the general environmental parameters with the abundance of coastal tunas based on the data collected at Cochin, Calicut and Vizinjam.

Fishery, biology and stock assessment of small tunas

James,-P.S.B.R.; Pillai,-P.P.; Pillai,-N.G.K.; Jayaprakash,-A.A.; Gopakumar,-G.; Kasim,-M.; Sivadas,-M.; Koya,-K.P.S.

B (Book) TUNA-RESEARCH-IN-INDIA. Sudarsan,-D.;John,-M.E.-eds. BOMBAY-INDIA FISH.-SURV.-INDIA 1993 pp. 123-148

In the present study, the data collected on the catch, effort, C/E, species composition and length frequency distribution of Euthynnus affinias, Auxis thazard, Auxis rochei, and Thunnus tonggol during the period 1989 to '91 have been synthesised for estimating the stock of the above species from the inshore area along the mainland of India. For raising the catch and for the purpose of utilizing different models, the state wise catch data were taken from the Fishery Resources Assessment Division of CMFRI, Cochin, India.

Fishery, biology and stock assessment of skipjack tuna in Indian seas

Yohannan,-T.M.; Pillai,-P.P.; Koya,-K.P.S.

B (Book) TUNA-RESEARCH-IN-INDIA. Sudarsan,-D.;John,-M.E.-eds. BOMBAY-INDIA FISH.-SURV.-INDIA 1993 pp. 77-95

In India the oceanic skipjack, Katsuwonus pelamis (Linnaeus) forms a significant fishery only in Lakshadweep islands. The infrastructural facilities now available in these islands are insufficient to except any major improvement in its fishery. As this group of islands are increasingly coming to focus in the national context with a view for further development, the fisheries sector will have to get its due importance. Tunas constitute 78.7% of the total marine fish catch from Lakshadweep. Skipjack tuna is the most important component of tuna catch with a percentage contribution of more than 75. Hence, this species is of prime importance in any planning for development of fisheries. This paper is a review of the results of these studies for guidance in planning future research.

[New data on feeding of lancetfish Alepisaurus ferox Lowe, 1833]

Zamorov,-V.V.; Romanov,-E.V.

B (Book); K (Conf RESOURCES-OF-TUNAS-AND-RELATED-SPECIES-IN-THE-WORLD-OCEAN-AND-PROBLEMS-OF-THEIR-RATIONAL-UTILIZATION.-SYR'-EVYE-RESURSY-TUNTSOV-I-SOPUTSTVUYUSHCHIKH-OB"EKTOV-PROMYSLA-MIROVOGO-OKEANA-I-PROBLEMY-IKH-RATSYONAL'-NOGO-ISPOL'-ZOVANIYA. Yakovlev,-V.N.;Romanov,-E.V.;Lebedeva,-N.A.;Trushyn,-Yu.K.;Timokhin,-I.G.;Trotsenko,-B.G.;Korkosh,-V.V.;eds. KERCH-UKRAINE YUGNIRO 1993 pp. 115-116

Longnose lancetfish (Alepisaurus ferox Lowe, 1833) was caught with pelagic long-line in the western Indian Ocean, in the area of Saya-de-Malha Bank and Ahalega Islands (the northern part of the economic zone of Mauritius). A total of 103 individuals were caught and analyzed by techniques of the Southern Scientific Research Institute of Marine Fisheries & Oceanography (YugNIRO), Kerch, Ukraine. Fishes of 22 families were noted as nutrient components, including 7 families for the first time. Almost all the fish were represented by juveniles in one specimen, which in some cases impedes determination close to species: Gonostomatidae -- Bonopartia pedaliota, the mean length is 6 cm; Caproidae -- Antigonia sp. -- 2.8 cm; Chaetodontidae -- Chaetodon sp. -- 2.2 cm; Scombridae -- Thunnus albacares -- 37 cm; Citharidae -- Citharoides macrolepis -- 4.4 cm; Pleuronictidae -- 7 cm; Triacanthodidae -- Triacanthodes sp. -- 1.5 cm. Of the most interest is the eating of yellowfin tuna juvenile of 37 cm long (FL) and 693 g in weight by lancetfish (the fork length of fish -- 167 cm) that made 22% of the body length and 11% of the weight of the predator. Tuna was located in the stomach of the lancetfish by tail towards the mouth and was almost safe regardless several cuts of the predator's teeth. (DBO).

Large pelagic fishing in India

Pajot,-J.

J (Journal-Article) BAY-OF-BENGAL-NEWS 1993 no. 51, pp. 18-20

A brief account is given of the development of small-scale offshore large pelagic fisheries in India, with respect to exploratory fishing operations conducted by the Bay of Bengal Programme. Due to good demand and relatively high prices in domestic and export markets, pelagic shark were the main source of revenue. Tuna and billfish species were also caught, but the catch rate of these species do not compensate for the low market prices to make this fishery feasible. The importance of careful development measures to help the fisherfolk adopt the new technology and new way of life demanded by offshore fishing is stressed.

Indian Ocean and Southeast Asian tuna fisheries data summary for 1991

B (Book); N (Num IPTP-DATA-SUMM. COLOMBO-SRI-LANKA IPTP 1993 no. 13, 126 pp

This publication compiles the annual catch and fishery fleet statistics for the tuna fisheries in the Indian Ocean and the Southeast Asia Regions for the year 1991. The nominal catch data are presented by species and broad ocean areas for all tuna and tuna-like species, by type of gear, by country for all species combined, and by species, country and gear for all tunas.

Bigeye tuna in the seas around India

John,-M.E.; Sudarsan,-D.

B (Book) TUNA-RESEARCH-IN-INDIA. Sudarsan,-D.;John,-M.E.-eds. BOMBAY-INDIA FSI 1993 pp. 97-122

The distribution of bigeye tuna Thunnus obesus (Lowe, 1839) extends over the tropical and sub-tropical waters of the Pacific, Atlantic and Indian Oceans. In the Indian Ocean the species is found mainly north of latitude 30 degree S. Annual production from the Indian Ocean is of the order of 41-54 thousand tonnes in recent years (1986-1990) with an average of about 47 thousand tonnes per annum. The production of bigeye tuna by vessels amounted to 346 tonnes in 1991. Though yellowfin tuna is the target species in this fishery, the contribution of bigeye tuna was substantial in case of several vessels. Among the tunas and tuna-like fishes occurring in the Indian seas, bigeye tuna is the most priced species. In the background of the production and stock status of the species in Indian Ocean, this paper attempts to summarise the information on the distribution and abundance of bigeye tuna in the seas around India.

Fishery and biology of yellowfin tuna occurring in the coastal fishery in Indian seas

Pillai,-P.P.; Koya,-K.P.S.; Pillai,-N.G.K.; Jayaprakash,-A.A.

B (Book) TUNA-RESEARCH-IN-INDIA. Sudarsan,-D.;John,-M.E.-eds. BOMBAY-INDIA FISH.-SURV.-INDIA 1993 pp. 23-38

This paper discusses the status of the fishery, biology and stock structure of yellowfih tuna (Thunnus albacares) taken by different countries bordering the Indian Ocean. Indian catch of yellowfin funa fluctuated between 349.2 tonnes and 799.5 tonnes during the period 1987-91. In the present study the data collected from Veraval (1990-91), Cochin (1989-91), Minicoy (1989-91), Vizhingam (1989-91) and Tuticorin (1989-91) utilised to study the fishery, biology and stock structure of yellowfin tuna taken by coastal fisheries in Indian seas.

Density indices of yellowfin tuna in Indian seas as observed in longline surveys

John,-M.E.

B (Book) TUNA-RESEARCH-IN-INDIA. Sudarsan,-D.;John,-M.E.-eds. BOMBAY-INDIA FSI 1993 pp. 63-75

Exploratory surveys by tuna long lining in the Indian seas revealed that among the larger pelagics Thunnus albacares (yellowfin tuna) is the most prominent species. Results of the surveys and also commercial long lining targeted at the species indicate heterogeneity of a very high magnitude in the distribution of the stock by seasons and years in the different geographical sectors. In this paper standardised density indices are derived based on the CPUE obtained in longline surveys during 1983-1992, taking into account of the element of heterogeneity in distribution.

Pilot project for the development of the tuna fishery. Mozambique. Project findings and recommendations

R (Report) 1993 20 pp

The findings are presented of a project conducted to establish an export-oriented, semi-industrial tuna pole-and-line fishery, complemented by fisheries for baitfish, off-season deep-sea lobster and crab and shallow-water shark and linefish in Mozambique. Immediate objectives included the development and introduction of new fishing techniques and gear; activities also included the training of Mozambican fishermen, the determination of design criteria for the construction of fishing vessels, the introduction of appropriate processing methods and explore marketing channels and to determine and demonstrate the investment potential of the new fisheries.

Modelling the yellowfin tuna (Thunnus albacares) vertical distribution using sonic tagging results and local environmental parameters

Cayre,-P.; Marsac,-F.

J (Journal-Article) AQUAT.-LIVING-RESOUR.-RESSOUR.-VIVANTES-AQUAT. 1993 vol. 6, no. 1, pp. 1-14

The diurnal vertical behaviour of yellowfin tuna observed from sonic tagging experiments in the western Indian Ocean (Comoros archipelago) is compared with the vertical profiles of temperature and dissolved oxygen concentration. Two different behavioural situations: off-FAD and FAD-associated yellowfin tuna, are characterized by the relationships between swimming depth and vertical structure of temperature and dissolved oxygen concentration (i.e. depth and thickness of the mixed layer, of the thermocline layer and of the oxycline) observed in the tracking area. Gradients of both parameters are shown to be the key factors which determine the vertical swimming behaviour. From an analysis carried out on the whole oceanographic data set of the Western Indian Ocean, oxycline is found to match with the depth of the 4.2-4.3 ml/l dissolved oxygen concentration. Vertical distributions of yellowfin tuna, for both off-FAD and FAD-associated situations, are modelled by using normal-derived distributions. These models indicate the probability of the presence of yellowfin tuna, related to the vertical profiles of temperature and dissolved oxygen concentration.

Report of the Conference for the Adoption of a Draft Agreement for the Establishment of the Indian Ocean Tuna Commission, Rome, 22-26 June 1992.

B (Book); K (Conf FAO-FISH.-REP. 1993. no. 482, 37 pp

In April 1989, a Conference was held to adopt a Draft Agreement for the establishment of the Indian Ocean Tuna Commission. Although considerable progress was made at the Conference, it was not possible to reach agreement on a final text. The principal matters which required further consultation were the legal framework of the new Commission and the degree of autonomy to be granted to that Commission if the Agreement were concluded under Article XIV of the Constitution of FAO. Both of these problem areas were resolved within FAO and the second Conference was held to examine the main underlying issues associated with the Draft Agreement. These included: area of competence, species, membership, objectives and functions, sessions of the Commission, observers, administration, procedures for recommending management measures, implementation, information, subsidiary bodies, finances, headquarters, cooperation with other organizations and institutions and legal framework. The Conference agreed on the Draft Agreement shown in Annex E.

The dolphin issue in Shri (Sri) Lanka. New study puts it in a better perspective.

Joseph,-L.; Dayaratne,-P.

J (Journal-Article) BAY-OF-BENGAL-NEWS. 1993. no. 49, pp. 13-17

The findings are presented of a study conducted to estimate the total number of dolphins caught around Sri Lanka and also to assess the economic importance of dolphin catches to fisherfolk and consumers. The attitudes and perceptions of fisherfolk, traders, consumers and nonconsumers to capture and utilization of the dolphin were also investigated. Findings show relatively small numbers of dolphins to be entangled in the tuna driftnets or harpooned around Sri Lanka and thus it is concluded that none of the 14 species occurring in the area are endangered.

(Analysis of data collected during observations on board purse seiners based in the Seychelles.).

Sabadach,-B.; Hallier,-J.P.

B (Book) VICTORIA-SEYCHELLES SFA 1993. 44 pp

From 1986 to 1991, observers on board tuna purse-seiners based in Seychelles analyzed data such as oceanographic parameters, aspects of tuna (Thunnus albacares, Katsuwonus pelamis, Thunnus obesus) schools and their associated sightings, as well as fishing characteristics (success rate, catches, CPUE, species composition, duration of fishing sets). Performances of the 4 concerned countries (France, Spain, Japan, USSR) are compared.

Tuna research in India- Present status and future approach

Sudarsan,-D.

B (Book) TUNA-RESEARCH-IN-INDIA. Sudarsan,-D.;John,-M.E.-eds. BOMBAY-INDIA FSI 1993 pp. 17-22

Planned research on tunas in India perhaps started with the establishment of CMFRI in Minicoy in 1958. First attempt in compiling and consolidating scientific information on tuna in Indian waters was made by Marine Biological Association of India in 1962 at Mandapam. Till 1962, CMFRI concentrated on coastal tunas and skipjack, till the advent of specialised tuna survey and training vessels of Fishery Survey of India and Central Institute of fisheries Nautical and Engineering Training. Recent efforts may constitute an effective beginning for planned tuna research. This paper emphasizses on the present status and future prospects of tuna research in India.

Observation report on tuna purse seine fishing operations around Seychelles waters onboard Nippon-Maru, 8 November 1992 to 7 January 1993

Munprasit,-Aussanee; Chanrachkij,-Isara

B (Book) RES.-PAP.-SER.-TRAIN.-DEP.-SOUTHEAST-ASIAN-FISH.-DEV.-CENT. SEAFDEC-SAMUTPRAKARN-THAILAND 1993 no. 32, 39 pp

An account is given of the observations made during tuna purse seining fishing operations conducted during the period 8 November 1992 - 7 January 1993 in Seychelles waters. Observations were made regarding the following: fishing ground designation; searching; aggregating; fishing operation; net operations; fish preservation on board; and, research on tuna biology.

[Feeding of Alepisaurus ferox Lowe, 1833 in the western Indian Ocean]

Zamorov,-V.V.; Amelekhina,-A.M.

B (Book); K (Conf RESOURCES-OF-TUNAS-AND-RELATED-SPECIES-IN-THE-WORLD-OCEAN-AND-PROBLEMS-OF-THEIR-RATIONAL-UTILIZATION.-SYR'-EVYE-RESURSY-TUNTSOV-I-SOPUTSTVUYUSHCHIKH-OB"EKTOV-PROMYSLA-MIROVOGO-OKEANA-I-PROBLEMY-IKH-RATSYONAL'-NOGO-ISPOL'-ZOVANIYA. Yakovlev,-V.N.;Romanov,-E.V.;Lebedeva,-N.A.;Trushyn,-Yu.K.;Timokhin,-I.G.;Trotsenko,-B.G.;Korkosh,-V.V.;eds. KERCH-UKRAINE YUGNIRO 1993 pp. 117-118

The material was collected in the Southern Scientific Research Institute of Marine Fisheries & Oceanography (YugNIRO), Kerch, Ukraine tuna fishing expeditions in the Western Indian Ocean. A total of 153 individuals were caught: 50 fish in the area off Kenya (1 degree -6 degree S, 46 degree -52 degree E) in December 1986 -- January 1987 and 103 individuals in the area of Saya-de-Malha Bank -- Ahalega Islands (the economic zone of Mauritius 8 degree 30'-11 degree 00'S, 56 degree 00'-60 degree 00'E) in April-May 1987. Fishes were caught with long-lines, biological analysis was carried out by YugNIRO techniques, index of relative importance of nutrient components was calculated by formula: IRI = (number of nutrient objects(%) + mass of nutrient objects(%)) x frequency of occurence of nutrient objects(%) (Pinkas et al., 1971). Feeding spectrum of lancetfish is wider in the area of Saya-de-Malha Bank. The food bolus of fish consists of Polychaeta, squids (8 families), Octopoda (7 families), Hyperiidae (2 families), shrimps (4 families), larvae of crabs and gastropoda, fish (22 families). The mean index of stomach fulness for lancetfish was equal to 1.1. In the area off Kenya fish (3 families), Cephalopoda (2 families), Hyperiidae (1 family) and a great deal of pelagic crab Charybdis smithi (1 family) were found in stomachs of lancetfish. Although a list of feeding species is considerably shorter in the Kenya area, the index of stomach fulness is 1.4 on the account of eating of a great deal of swimming crab from concentrations existing there (autumn-winter period). The remaining species are represented by single individuals in stomachs. Only large-sized individuals raised to the very water surface, which sargasses (with positive buoyancy) in their stomachs prove. Main food components of lancetfish in the studied areas - pelagic crab C. smithi, Hyperiidae, Omosudis lowei, Alepisaurus ferox, Polychaeta. (DBO).

Tuna research in India

Sudarsan,-D.; John,-M.E.-(eds.)

B (Book) BOMBAY-INDIA FISH.-SURV.-INDIA 1993 204 pp

The invited papers covering various aspects on tuna research in India are included in this volume.

Location of tuna resources in Indian waters using NOAA AVHRR data

Kumari,-B.; Raman,-M.; Narain,-A.; Sivaprakasam,-T.E.

J (Journal-Article); INT.-J.-REMOTE-SENS. 1993 vol. 14, no. 17, pp. 3305-3309

The world demand for tuna resources is ever increasing and there is scope for better economic returns in terms of foreign exchange earnings. It is one of the least exploited resources of the Indian seas. Remote sensing based studies on the tuna environment began in the seventies in the Gulf of Guinea. This study helped to establish a fishing strategy during the eighties. But so far this has not been attempted in Indian waters. With the basic understanding that most of the species of tuna respond directly to temperature, a study using NOAA AVHRR data was carried out to locate tuna resources. Thermal data of NOAA AVHRR for eight dates in the 1989-90 season were analysed to generate sea surface temperature (SST) images. Catch per unit effort (CPUE) of tuna longline data acquired from the Fishery Survey of India pertaining to fishing conducted by chartered vessels, was plotted on the SST images. Yellowfin tuna (YFT) comprises the maximum catch plus small quantities of marlins. It was observed that almost all the data points were located near the edge of warm water (27 degree -29 degree C). A relation between average CPUE of YFT and multi-channel sea surface temperature (MCSST) charts generated by OPC (the Ocean Products Centre) of NOAA was established. It shows on an average an increasing trend in the CPUE of YFT from 26 degree C (hooking rate similar to 1 per cent) to 29 degree C (hooking rate similar to 3.65 per cent) and then shows a drop with further rise in temperature. Since YFT is known to be present in a wide range of temperatures, it can be concluded that the location of warm water edges having a gradient of about 1 degree C and the above mentioned range of temperature will be desirable in locating tuna potential areas.

[Results of the tuna and floating objects tagging programs in the Indian Ocean.]

Romanov,-E.V.; Smirnov,-M.V.; Zhuk,-N.N.

B (Book); O (Revi MAIN-RESULTS-OF-YUGNIRO-COMPLEX-RESEARH-IN-AZOV-BLACK-SEAS-REGION-AND-THE-WORLD-OCEAN-IN-1992.-OSNOVNYE-RESUL'-TATY-KOMPLEKSNYKH-ISSLEDOVANIJ-YUGNIRO-V-AZOVO-CHERNOMORSKOM-BASSEJNE-I-MIROVOM-OKEANE-1992 Yakovlev,-V.N.-eds. KERCH-UKRAINE YUGNIRO 1993 vol. 39 pp. 140-150

TR.-YUGNIRO-PROC.-SOUTH.-SCI.-RES.-INST.-

Joint tuna and related species tagging programmes carried out in the Southern Scientific Research Institute of Marine Fisheries & Oceanography (YugNIRO), Ukraine and Institute of Fisheries Research (IRI), Mozambique 1990-1991 are described. Tagging was carried out in the Western Indian Ocean on board Soviet commercial purse seine tuna vessels. Totally 260 tunas (200 yellowfin Thunnus albacares, 37 skipjack Katsuwonus pelamis, 22 bigeye T. obesus and 1 frigate Auxis thazard) were tagged. Return of tags were not observed. Results and analysis of tuna and floating debris tagging carried out by other national and international organizations are presented.

Seychelles tuna bulletin year 1993

B (Book); N (Num SEYCHELLES-TUNA-BULL. VICTORIA-SEYCHELLES SFA 1993 25 pp

This volume of tuna statistics for the West Indian Ocean (WIO) is the second to be based on the "Newtuna" program. It includes the figures for 1992 as well as 1993. Due to the necessity of rapidly publishing 1993 statistics only one volume has been produced for the whole year and not one for each quarter. In future the system of publishing a tuna Bulletin each quarter will be reverted to. Due to the inclusion of trips which started at the end of 1992 but which finished in early 1993 the 1992 total catch has been revised upwards from 273,852 Mt, published in the last Tuna Bulletin, to 278,218 Mt. The initial estimate for the total WIO purse seine tuna catch for 1993 is 263,918 Mt. However, this figure may also be revised upwards when trips starting in late 1993 and finishing in early 1994 are included in the first quarterly Tuna Bulletin of 1994.

[Marine resources of the Yemen Republic and prospects of licensed fisheries]

Kukharev,-N.N.; Rebik,-S.T.; Pinchukov,-M.A.; Isaenko,-L.A.

B (Book) MAIN-RESULTS-OF-YUGNIRO-COMPLEX-RESEARH-IN-AZOV-BLACK-SEAS-REGION-AND-THE-WORLD-OCEAN-IN-1992.-OSNOVNYE-RESUL'-TATY-KOMPLEKSNYKH-ISSLEDOVANIJ-YUGNIRO-V-AZOVO-CHERNOMORSKOM-BASSEJNE-I-MIROVOM-OKEANE-1992 Yakovlev,-V.N.-eds. KERCH-UKRAINE YUGNIRO 1993 vol. 39 pp. 108-113

TR.-YUGNIRO-PROC.-SOUTH.-SCI.-RES.-INST.-

The Yemen marine fauna is notable for its large specific diversity. In the northern Aden Gulf and in the Bab al Mandab Strait, the complexes of plankton-eating epipelagic and mesopelagic fishes (consumers of upwelling production) are the most abundant. Sardinellas (Sardinella spp.), anchovies (Engraulididae), rake-gilled mackerel (Rastrelliger kanagurta) and, besides, chub mackerel (Scomber japonicus) in the Gulf of Aden form the basis of the commercial stock. Fishes from demersal complex as well as large pelagic predators (tunas and seerfishes), developing mainly on the base of small pelagic fishes (sardinells and anchovies), reach rather high abundance, in particular in the coastal shallow zone of the northern part of the Gulf and in the Bab al Mandab Strait. In demersal complex threadfin bream (Nemipteridae), porgies (Sparidae), snappers (Lutjanidae), emperors (Lethrinidae), grunts (Haemulidae), large trevallies (Caranx spp., Carangoides spp.), sea catfishes (Ariidae), barracudas (Sphyraenidae) and others prevail. Little tunny (Euthynnus affinis), frigate mackerel (Auxis spp.) and small yellowfin tuna (Thunnus albacares) made the base of the complex of large pelagic predators. There are large resources of small Indian ruff (Psenopsis cyanea) on the continental slope of the northern part of the Gulf. Among invertebrates of the northern Gulf of Aden the following species are of the greatest commercial value: cuttlefish (Sepia pharaonis), rock lobster, deepwater lobster and shrimps. Soviet commercial fisheries in the Yemen waters were conducted in the northern Gulf of Aden from 1963. Fisheries were based on demersal fishes, from 1980 till 1990 - mainly on chub mackerel. Total yield varied in the range 30000-40000 tons, chub mackerel made 60-70%. Assessment of demersal fishes biomass in Yemen waters was made on the shelf and continental slope of the northern Aden Gulf in the depth range of 20-500 m. Regular surveys were made in the period 1980-1991 at two standard areas of the eastern part of the shelf in the area of the cape Ras-Fartak almost every year. In the period from 1980 till 1990 biomass of demersal fishes on the standard areas of registration surveys was in the stable state in the depth range 20-200 m and varied from 119000 to 182000 tons. In shallow waters (0-20 m), in the zone of the most intensive coastal fisheries surveys were not carried out. According to the data of trawl surveys in 1990, the total stock of demersal fishes on the shelf and slope of the northern Aden Gulf was determined as 530000 tons. The base of the stock on the shelf made threadfin bream, porgies, grunts, sea catfishes; on the continental slope - Indian ruff. Total allowable catch of demersal fish was 104000 tons annually. Chub mackerel stock, calculated by method of virtual populations, is estimated as 50000-60000 tons. Total allowable catch as well as possible catch is recommended to be not less 11000-13000 tons. Cuttlefish stock in 1982-1990 varied in the range 5400-22000 tons. In 1994 it was estimated by experts at the level 10000-15000 tons. About 3000 tons, may be recommended to yield. Deepwater shrimp stock in Yemen waters, according to the data of trawl surveys 1987-1991, was 2200 tons. Deepwater spiny lobster stock, was determined as 2000 tons. Thus, in Yemen waters it is possible to yield with trawls 57000 tons of fish, 3000 tons of cuttlefish and 530 tons of deepwater crustaceans.

Some observation on the length frequency distribution and gonad development of longtail tuna in Iranian waters

Nikouyan,-A.; Firozy,-A.

J (Journal-Article); IRAN.-FISH.-BULL. 1993 no. 4, p. 6

Sampling of longtail tuna (Thunnus tonggol) was conducted during each delivery of tuna catch to the tuna canning factory in Bandar-Abbas in Iran. Length frequency data was collected on a monthly basis. All individuals in the samples were examined for sex identification. The maturity stages for females were determined according to a 5 point scale, using the gonad index. Most longtail tuna captured off the coast of Iran principally from the Gulf of Oman are considerably larger ranging from 75 to 80 cm fork length. Fish below 55 cm length were not represented in the samples. This results provide no modal progression for the monthly length frequency. The possible sources creating bias in the length distribution data such as migratory nature of longtail tuna and gear selectivity are discussed. The study on the maturity stages reveals that the spawning season for longtail tuna captured in Iran from the sea of Oman extends from August through October. The possible multiple spawning season for this species has also been discussed.

The catches of bluefin tunas by Taiwanese in the Atlantic, Indian and Pacific Oceans

Hsu,-C.C.

J (Journal-Article); COLLECT.-VOL.-SCI.-PAP.-ICCAT-RECL.-DOC.-SCI.-CICTA-COLECC.-DOC.-CIENT.-CICAA 1993 vol. 40, no. 1, pp. 242-248

To comply with the Resolution of the meeting of the Bluefin Tuna Working Group in Tokyo, catches of bluefin tuna (Thunnus thynnus) by Taiwanese fisheries were clarified and reclassified by oceans. Three kinds of landing data and some information from interviews were applied and referred to for the estimates in the present work. The final results for the years 1983-1991 are shown in related tables and figures were discussed, and it was shown that they were very compatible with Japanese import records. The data on catches from the Atlantic, submitted by month and by 5x5 squares, should be raised.

Skipjack and yellowfin tuna in the Andaman Sea

Pokapunt,-W.; Lertwitayaprasit,-P.

B (Book); K (Conf COLLECTIVE-VOLUME-OF-WORKING-DOCUMENTS-PRESENTED-AT-THE-FIFTH-SOUTHEAST-ASIA-TUNA-CONFERENCE.-GENERAL-SANTOS-CITY,-1-4-SEPTEMBER,-1992.-VOLUME-7. Ardill,-J.D.-ed. FAO-UNDP-Indo-Pacific-Tuna-Development-and-Management-Programme,-Colombo-Sri-Lanka COLOMBO-SRI-LANKA IPTP 1993 pp. 99-104

This paper presents the results of skipjack (Katsuwonus pelamis) and yellowfin (Thunnus albacares) tuna surveys in the Andaman Sea by 2 research vessels using tuna purse seine and tuna long-line. The surveys were conducted during the period January to May, from 1988-1992. Small sized tunas were observed to concentrate more in the southern than in the northern area. As the survey data was limited, only 5 months, seasonal fishing could not be predicted.

Modelling the yellowfin tuna (Thunnus albacares) vertical distribution using sonic tagging results and local environmental parameters

Cayre,-P.; Marsac,-F.

J (Journal-Article) AQUAT.-LIVING-RESOUR. 1993 vol. 6, no. 1, pp. 1-14

The diurnal vertical behaviour of yellowfin tuna observed from sonic tagging experiments in the western Indian Ocean (Comoros archipelago) is compared with the vertical profiles of temperature and dissolved oxygen concentration. Two different behavioural situations: off-FAD and FAD-associated yellowfin tuna, are characterized by the relationships between swimming depth and vertical structure of temperature and dissolved oxygen concentration (i.e. depth and thickness of the mixed layer, of the thermocline layer and of the oxycline) observed in the tracking area. Gradients of both parameters are shown to be the key factors which determine the vertical swimming behaviour. From an analysis carried out on the whole oceanographic data set of the Western Indian Ocean, oxycline is found to match with the depth of the 4.2-4.3 ml.l super(-1) dissolved oxygen concentration. Vertical distributions of yellowfin tuna, for both off-FAD and FAD-associated situations, are modelled by using normal-derived distributions. These models indicate the probability of the presence of yellowfin tuna, related to the vertical profiles of temperature and dissolved oxygen concentration. A single mode distribution is fitted to describe the FAD-associated situation, and a bi-modal one for the off-FAD situation. Positions of the modes are determined by the relationship between the vertical swimming behaviour and the position of either maximum gradient of temperature or dissolved oxygen concentration. An iterative calculation of normal distribution standard error is conducted to adjust the shape of the curve to cover the entire layer in which yellowfin tuna is considered to be present. Both models were applied in a remote area, east of the Seychelles, where purse seine catches are important. The predicted vertical distribution seems to be realistic and matches the observations given by echosound pictures of tuna schools obtained in the same area by purse seiners.

The shark fisheries of the Maldives. A review

Anderson,-R.C.; Ahmed,-H.

B (Book); O (Revi MALE-MALDIVES MINISTRY-OF-FISHERIES-AND-AGRICULTURE 1993 76 pp

Shark fishing is one of the major secondary fishing activities in the Maldives. A large proportion of Maldivian fishermen fish for shark at least part-time, normally during seasons when the weather is calm and tuna scarce. Most shark products are exported, with export earnings in 1991 totalling MRf 12.1 million. There are three main shark fisheries. A deepwater vertical longline fishery for gulper shark (Kashi miyaru) which yields high-value oil for export. An offshore longline and handline fishery for oceanic shark, which yields fins and meat for export. And an inshore gillnet, handline and longline fishery for reef and other atoll-associated shark, which also yields fins and meat for export. The deepwater gulper shark stocks appear to be heavily fished, and would benefit from some control of fishing effort. The offshore oceanic shark fishery is small, compared to the size of the shark stocks, and could be expanded. The reef shark fisheries would probably run the risk of overfishing if expanded very much more. Reef shark fisheries are a source of conflict with the important tourism industry. 'Shark-watching' is a major activity among tourist divers. It is roughly estimated that shark-watching generates US $ 2.3 million per year in direct diving revenue. It is also roughly estimated that a grey reef shark may be worth at least one hundred times more alive at a dive site than dead on a fishing boat. Various recommendations are made for the resolution of conflicts between the tourism industry and shark fishermen.

Commercial tuna long lining in Indian waters

Lewis,-S.P.

B (Book); K (Conf PROCEEDINGS-OF-THE-NATIONAL-WORKSHOP-ON-LOW-ENERGY-FISHING,-8-9-AUGUST,-1991,-COCHIN. Society-of-Fisheries-Technologists,-Cochin-India COCHIN,-KERALA-INDIA SOC.-OF-FISH.-TECHNOL. 1993 pp. 82-83

FISH.-TECHNOL.-SOC.-FISH.-TECHNOL.-INDIA

Based on the experience in longlining the paper discusses the problems and economic viability of maintaining a modern longliner. The author observes exclusive tuna longline operations a failure due to the fact that the yellow fin tuna forming bulk of the catch were available for a limited period fetching low returns to reach break-even point. It is suggested that a fuel efficient, multipurpose fishing vessel is more suitable under Indian conditions.

Tuna fishery resources and their exploitation by low energy fishing techniques

Pillai,-P.P.

B (Book); K (Conf PROCEEDINGS-OF-THE-NATIONAL-WORKSHOP-ON-LOW-ENERGY-FISHING,-8-9-AUGUST,-1991,-COCHIN. Society-of-Fisheries-Technologists,-Cochin-India COCHIN,-KERALA-INDIA SOC.-OF-FISH.-TECHNOL. 1993 pp. 39-43

FISH.-TECHNOL.-SOC.-FISH.-TECHNOL.-INDIA

The tuna resources landed by the small scale fishery sector in the neritic zone of the Indian EEZ experienced an increase of about 25,000 t in 1989 over that of 20,350 t in 1984. Of these, about 53% and 13% of the total tuna landings are contributed by the SW and SE coasts of India respectively in recent years. In the present communication, the recent trend of fishery for tunas along the coasts of India as a result of mechanisation of traditional fishing crafts and introduction of mechanised-cum-sail boats are quantitatively evaluated. Diversification in the small scale fishery sector is also dealt with and the resultant increased efficiency of the gear in the catch rate of tunas is discussed.

Status of stocks of skipjack tuna and yellowfin tuna at Minicoy (Lakshadweep)

Yohanna,-T.M.; Pillai,-P.P.

B (Book); K (Conf PROCEEDINGS-OF-THE-5TH-EXPERT-CONSULTATION-ON-INDIAN-OCEAN-TUNAS,-MAHE,-SEYCHELLES,-4-8-OCTOBER,-1993. FAO-UNDP-Indo-Pacific-Tuna-Development-and-Management-Programme,-Colombo-Sri-Lanka COLOMBO-SRI-LANKA IPTP 1994 no. 8 pp. 128-131

IPTP-COLLECT.-VOL. no. 8

Oceanic skipjack, Katsuwonus pelamis constitutes 89% of the total fish landings in Minicoy Island and the contribution of yellowfin tuna, Thunnus albacares is 8.8%. Pole-and-line fishing contributes to the bulk of these catches. The seasonality of these species, their length frequency distribution, growth, mortality, yield per recruit and the status of their stocks in the Minicoy Area (Lakshadweep, India) are discussed.

National report of Spain. Istituto Espanol de Oceanografia

B (Book); K (Conf PROCEEDINGS-OF-THE-5TH-EXPERT-CONSULTATION-ON-INDIAN-OCEAN-TUNAS,-MAHE,-SEYCHELLES,-4-8-OCTOBER,-1993. FAO-UNDP-Indo-Pacific-Tuna-Development-and-Management-Programme,-Colombo-Sri-Lanka COLOMBO-SRI-LANKA IPTP 1994 no. 8 pp. 44-47

IPTP-COLLECT.-VOL. no. 8

A brief account is given of some statistics from the Spanish tropical tuna fishery in the Indian Ocean for the year 1992. Total catches and fishing effort data are provided; major species involved were skipjack (Katsuwonus pelamis), yellowfin (Thunnus albacares) and bigeye (T. obesus).

The status of tuna and seerfishes in Iran

Firoozi,-A.R.

B (Book); K (Conf PROCEEDINGS-OF-THE-5TH-EXPERT-CONSULTATION-ON-INDIAN-OCEAN-TUNAS,-MAHE,-SEYCHELLES,-4-8-OCTOBER,-1993. FAO-UNDP-Indo-Pacific-Tuna-Development-and-Management-Programme,-Colombo-Sri-Lanka COLOMBO-SRI-LANKA IPTP 1994 no. 8 pp. 47-48

IPTP-COLLECT.-VOL. no. 8

A brief account is given of the current situation regarding the tuna and seerfish fisheries in Iran. The major species caught are longtail tuna (Thunnus tonggol), kawakawa (Euthynnus affinis) and frigate tuna (Auxis thazard) in both the Persian Gulf and in the Gulf of Oman, and yellowfin (T. albacares) and skipjack (Katsuwonus pelamis) in the Gulf of Oman. Among the seerfish, Scomberomorus commerson and S. guttatus are most abundant and are considered as first class fish. Catch statistics for the period 1981-92 are provided and details given of fishing craft and gear and fishing season.

An assessment of frigate tuna (Auxis thazard) stocks in the southern waters of Sri Lanka

Dayaratne,-P.

B (Book); K (Conf PROCEEDINGS-OF-THE-5TH-EXPERT-CONSULTATION-ON-INDIAN-OCEAN-TUNAS,-MAHE,-SEYCHELLES,-4-8-OCTOBER,-1993. FAO-UNDP-Indo-Pacific-Tuna-Development-and-Management-Programme,-Colombo-Sri-Lanka COLOMBO-SRI-LANKA IPTP 1994 no. 8 pp. 72-76

IPTP-COLLECT.-VOL. no. 8

The frigate tuna (Auxis thazard) stock on the southern coastal waters of Sri Lanka was assessed using the length data collected from the drift gill net, troll line and ring net fisheries. Sampling was carried out at 6 major landing sites for the years 1990 and 1991. Data were analysed using the complete ELEFAN computer package. The growth parameters estimated were K = 1.53 and L = 59.5 cm. The natural mortality (M) was estimate at 1.949 year-1. The present level of exploitation estimated using the catch curve and cohort analysis were E = .443 and 0.469 respectively. The relative yield per recruit analysis showed that the maximum yield could be obtained at an exploitation rate of 0.721.

Population dynamics of the king seerfish Scomberomorus commerson along the Saudi Arabian Gulf coast

Kedidi,-S.M.; Fita,-N.I.; Abdulhadi,-A.

B (Book); K (Conf PROCEEDINGS-OF-THE-5TH-EXPERT-CONSULTATION-ON-INDIAN-OCEAN-TUNAS,-MAHE,-SEYCHELLES,-4-8-OCTOBER,-1993. FAO-UNDP-Indo-Pacific-Tuna-Development-and-Management-Programme,-Colombo-Sri-Lanka COLOMBO-SRI-LANKA IPTP 1994 no. 8 pp. 76-87

IPTP-COLLECT.-VOL. no. 8

Scomberomorus commerson is caught seasonally along the Saudi Arabian gulf coast. Sampling of the commercial catch was conducted between 1986 and 1992 to estimate the biological parameters of the species. Supposing that some of the exploited cohorts have entered the gulf more than once during their life span, the von Bertalanffy growth constants of the species were estimated to be L sub(infinity)=183.6 cm and K=0.26, while the Length-weight relationship constants were a=0.0056 and b=2.979. Attempts were made to conduct a yield per recruit analysis. The natural and total mortality coefficients were respectively estimated as M=0.36 and z at about 1.5. The rate of exploitation was found to be near optimum.

An updated assessment of Indian Ocean albacore stock by ASPIC

Chang,-S.K.; Hsu,-C.C.

B (Book); K (Conf PROCEEDINGS-OF-THE-5TH-EXPERT-CONSULTATION-ON-INDIAN-OCEAN-TUNAS,-MAHE,-SEYCHELLES,-4-8-OCTOBER,-1993. FAO-UNDP-Indo-Pacific-Tuna-Development-and-Management-Programme,-Colombo-Sri-Lanka COLOMBO-SRI-LANKA IPTP 1994 no. 8 pp. 102-107

IPTP-COLLECT.-VOL. no. 8

The Indian Ocean albacore (Thunnus alalunga) stock has been one of the commercially important species ever since 1950s, and was assessed by an equilibrium production model (PRODFIT) which has been criticised by many fishery scientists for some of its shortages. A multigear non-equilibrium production model that incorporated bootstrap procedure (ASPIC) is therefore applied here to reappraise the stock status of Indian Ocean albacore. The historical catch data of Taiwanese, Japanese and Korean longline fisheries, Taiwanese driftnet fisheries, and French Spanish and Ivory Coast purse seine fisheries are used in the present study. All the data have been standardized individually by generalised linear model on the factors of year, season and sub-area before being applied to the production estimation. The final results of r were estimated as 0.29 per year, K as 201 kt, MSY as 14.55 kt, BMSY as 100.5 kt and FMSY as 0. 145 per year. The biomass level of the Indian albacore stock seemed still below BMSY, more concerns on its status are still needed for the time being.

Present status of tuna fisheries in Pakistan

Majid,-A.; Imad,-A.

B (Book); K (Conf PROCEEDINGS-OF-THE-5TH-EXPERT-CONSULTATION-ON-INDIAN-OCEAN-TUNAS,-MAHE,-SEYCHELLES,-4-8-OCTOBER,-1993. FAO-UNDP-Indo-Pacific-Tuna-Development-and-Management-Programme,-Colombo-Sri-Lanka COLOMBO-SRI-LANKA IPTP 1994 no. 8 pp. 34-37

IPTP-COLLECT.-VOL. no. 8

A brief update is provided of recent information on the tuna fishery in Pakistan. Fishing craft and gear and fishing grounds are described. Tuna production trends both in the small scale sector and the commercial longline sector are outlined. Catch compositions are also detailed for the sectors.

Fishery biology and stock assessment of Scomberomorus commerson (Lacepede) from the south-west coast of India

Pillai,-P.P.; Pillai,-N.G.K.; Sathianandan,-T.V.; Elayathu,-M.N.K.

B (Book); K (Conf PROCEEDINGS-OF-THE-5TH-EXPERT-CONSULTATION-ON-INDIAN-OCEAN-TUNAS,-MAHE,-SEYCHELLES,-4-8-OCTOBER,-1993. FAO-UNDP-Indo-Pacific-Tuna-Development-and-Management-Programme,-Colombo-Sri-Lanka COLOMBO-SRI-LANKA IPTP 1994 no. 8 pp. 55-61

IPTP-COLLECT.-VOL. no. 8

On an average about 34,280 t of seerfishes were landed in India during the period 1981-92, of which Scomberomorus commerson constituted 54%, S. guttatus 45%. S. lineolatus 0.7% and Acanthocybium solandri 0.3%. Seerfishes are exploited by multimeshed drift gillnets, hooks and lines, trawl nets and to a limited extent by shore seines. Fishery, biological and population dynamics of different species have been investigated earlier mainly from the southeast coast of India, but such studies from the southwest coast are not available. In the present communication, the historical data on the Scomberomorus fishery on an all India and state-wise basis is presented, and fluctuation in the production of different species discussed during the period 1981-1992. S. commerson constitute 52-91% of the total seerfish catch along the southeast and southwest coasts, whereas S. guttatus forms 58-69% in the northeast and northwest coasts. A. solandri contribute to 60% of total seerfish catch in Lakshadweep. Data collected on the catch, effort and size composition of S. commerson during the period 1989-91 from Kerala and Karnataka (southwest coast of India) are utilised in the paper for estimating the population parameters and stock assessment of S. commerson by length converted catch analysis, length cohort analysis and Thompson and Bell Model. The results indicate that in order to reach the MSY level the present exploitation rate should be reduced.

National report of France

Pianet,-R.

B (Book); K (Conf PROCEEDINGS-OF-THE-5TH-EXPERT-CONSULTATION-ON-INDIAN-OCEAN-TUNAS,-MAHE,-SEYCHELLES,-4-8-OCTOBER,-1993. FAO-UNDP-Indo-Pacific-Tuna-Development-and-Management-Programme,-Colombo-Sri-Lanka COLOMBO-SRI-LANKA IPTP 1994 no. 8 pp. 48-52

IPTP-COLLECT.-VOL. no. 8

French tuna fishing activities are conducted from La Reunion island on the one hand and also from the purse seine industrial tuna fishery based in France on the other hand. Catch data are provided for both fisheries; yellowfin tuna (Thunnus albacares) and skipjack (Katsuwonus pelamis) are the major species involved.

Antibacterial substances from marine algae: Successive extraction using benzene, chloroform and methanol

Sastry,-V.M.V.S.; Rao,-G.R.K.*

J (Journal-Article) BOT.-MAR. 1994 vol. 37, no. 4, pp. 357-360

Three different solvents viz. benzene, chloroform, and methanol have been successively to obtain crude extracts from five different algae. These extracts were tested against both gram-positive and gram-negative bacterial strains for the antibacterial activity. The chloroform extract exhibited the greatest antibacterial activity. All the algal sampled, Saragassum wightii (Grev.) J. Ag., Padina tetrastromatica Hauck (Phaeophyceae); Gracilaria corticata J. Ag., Acanthophora delilei Lamx. (Rhodophyceae) and Halimeda tuna (Ellis et Sol) Lamx. (Chlorophyceae), were collected from the Mandapam coast on the south east coast of India at latitude 9 degree 45' N and longitude 79 degree 0' E during the winter season (second and third week of October) annually (1988, 1989, 1990).

Should we change the manner of storing fisheries statistical data?

Ardill,-D.

J (Journal-Article) INDIAN-OCEAN-TUNA-NEWS 1994 no. 4, pp. 3-4

A brief discussion in presented on the structure of forms used for fisheries statistical data storage, considering in particular the problem encountered in the collection of artisanal fishery statistics by IPTP. Computerization of the system and database structures are also examined. It is concluded that a linear database allows all the information collected by the enumerators to be stored by catering for any number of species, with no aggregations of raw data being needed, thus accomodating changes in fisheries and target species.

Biosocioeconomic assessment of the effects of fish aggregating devices in the tuna fishery in the Maldives

Naeem,-A.; Latheefa,-A.

B (Book); N (Num MADRAS-INDIA BOBP 1994 35 pp

Fish aggregating devices (FADs) have proved very successful in the Maldives, where there is a countrywide FAD installation programme by the Ministry of Fisheries and Agriculture (MOFA) underway. The main reason for the success of FADs in the Maldives is their applicability to the existing fisheries. With the motorization of the fishing fleet, the efficiency and range of operation of the fleet has increased. FADs help not only to reduce searching time and fuel costs, but they also considerably increase production. Although the aggregation of fish around FADs has been demonstrated successfully, and the merits of FAD-fishing proven, data on the cost-effectiveness of FADs are still lacking. MOFA, with the assistance of the Bay of Bengal Programme's (BOBP) regional "Bioeconomics" project (RAS/91/006), therefore, undertook to assess and quantify the impact of FADs in tuna fishing. The project installed 2 FADs in 2 separate areas in the Maldives and closely studied the biological, economic and sociological effects of them on the fisheries and on the island communities in the 2 areas. The effectiveness of the two FADs was measured by comparing data collected one year before and one year their installation. The results of the study are presented in this paper.

[The behavior of tropical tuna. Modelling using the artificial life concept.]

Dagorn,-L.

B (Book); U (Thesi RENNES-FRANCE EC.-NATL.-SUP.-AGRON. 1994 250 pp

The tuna fishery is of major economic importance. Scientists study the fishery system (fish, environment, fishermen, market) in order to propose efficient management tools for fisheries. The present work deals with tuna behavior and this research comes from the following paradox: how tuna, with high energetic needs, can survive in such poor environments such as the first 200 m (EE2s) of the tropical seas? We decide to choose some tools and concepts from the field of Artificial Life to model the tuna behavior. We have created the animat tuna (an animat is an artificial animal) to study the living tuna. Fish migrations and schooling behavior have been studied. From sea surface temperatures maps, we succeed in reproducing some movements of the tuna population in the Indian Ocean. Using an artificial neural network, managed by a genetic algorithm, the variable temperature shows a new way to study the tuna migrations. We have tried to understand how the gregarious behavior could represent an adaptation to the pelagic environment. Two models, one using the genetic algorithms and the other using the ideal free distribution theory, give some indications of possible adaptations of tuna to their environment. A study on the captures from the French tuna fleet in the Indian Ocean illustrates the relationships between the fish size and the school size (in number of individuals). A new definition of the optimal school size is advanced, with the maximization of the social benefits and the equilibrium of the energetic budget of the individuals. A coherent model of the adaptation of tuna is presented using the principle of swarm intelligence. Using realistic rules, without any decision process, the model generates a tuna school organization in relation with an optimal exploitation of food resources. Some hypothesis and knowledge about the relationships between tuna and environmental anomalies detected in their sensory field, even those not associated with strong enrichment processes (floating objects, sea-mounts, ...), are reviewed. All these models give representations of tuna performances or new theories on their adaptation. But they only constitute a part of the functional study of the tuna behavior. Some experimentations are then proposed.

Food composition of yellowfin tuna (Thunnus albacares) in Sri Lankan waters

Maldeniya,-R.

B (Book); K (Conf ANNUAL-SCIENTIFIC-SESSIONS-1993.-PROCEEDINGS-OF-THE-FIRST-ANNUAL-SCIENTIFIC-SESSIONS,-2ND-NOVEMBER-1993-NARA,-COLOMBO,-SRI-LANKA COLOMBO-SRI-LANKA NARA 1994 pp. 14-20

A total of 4181 stomachs of yellowfin tuna (Thunnus albacares) of size range (22-164 cm), mainly caught by gillnets in the period July 1984 to June 1986 were analyzed. The diet consists of fishes, euphausiids, cephalopods, crabs, other planktonic crustaceans and miscellaneous items. Auxis sp. was the highest ranking prey species followed by the invertebrates, Thysanapoda sp., Euphausia sp. and Gonioneptunus smithii. Species of Exocoetidae, Ommastrephidae and Carangidae were also important. The food spectrum of yellowfin tuna changes during ontogeny, juveniles are planktivorous and above a size of 50 cm, the tuna become piscivorous.

The second regional tuna programme of the AT (Commission de L'Ocean Indien)

Pianet,-R.

B (Book); K (Conf PROCEEDINGS-OF-THE-5TH-EXPERT-CONSULTATION-ON-INDIAN-OCEAN-TUNAS,-MAHE,-SEYCHELLES,-4-8-OCTOBER,-1993. FAO-UNDP-Indo-Pacific-Tuna-Development-and-Management-Programme,-Colombo-Sri-Lanka COLOMBO-SRI-LANKA IPTP 1994 no. 8 pp. 38-41

IPTP-COLLECT.-VOL. no. 8

A second phase of the Regional Tuna Programme (PTR2) of the Association Thoniere (AT) was funded for three years by the EDF for ORSTOM execution in collaboration with national support centres in Comoros, Madagascar, Mauritius, Seychelles and La Reunion. Eight scientific projects cover, for the western Indian Ocean tropical tunas, the collection and analysis of statistics, population dynamics, behaviour and migrations, biology, oceanographic and biological environment and fish aggregation around logs, FADs and sea mounts. The feasibility of starting an albacore fishery is also being evaluated from historical and environmental data.

Level of histamine in tuna fish (Katsuwonus pelamis) caught in a multi-day boat and stored in ice

Fonseka,-T.S.G.; Ranjini,-V.I.; Seetha,-S.K.

B (Book); Y (Sum ANNUAL-SCIENTIFIC-SESSIONS-OF-THE-NATIONAL-AQUATIC-RESOURCES-AGENCY-1994.-ABSTRACTS-OF-PAPERS COLOMBO-SRI-LANKA NARA 1994 p. 8

The findings are presented of a study conducted in Sri Lanka to determine the histamine content of skipjack tuna (Katsuwonus pelamis) caught in multi-day fishing operations and stored in ice. Only 3 samples were shown to have histamine at a level detectable, of which 2 were in the range 15-40 mg/100 while the third had a very high level of histamine, indicating temperature abuse. It is concluded that fish caught in multi-day boats and stored up to 10 days in ice are safe for human consumption with respect to histamine levels.

Tuna resources of the Madras coast with a note on the growth parameters of Euthynnus affinis (Cantor)

Srinivasarengan,-S.; Kuthalingam,-M.D.K.; Vivekanandan,-E.

J (Journal-Article) J.-Mar.-Biol.-Assoc.-India 1994 vol. 36, no. 1-2, pp. 188-193

During the years 1981-1986, an estimated annual average catch of 25 tonnes of tunas were landed by gill nets operated from commercial mechanised vessels from the Kasimedu landing centre, Madras, where all the catches from mechanised-vessels land. This catch was obtained by expending annual average of 18,209 fishing hours with a catch rate of 1.4 kg/hr. It was observed that the maximum catch and catch rate were during April. Of the five species that constituted the fishery, Euthynnus affinis (79.9%) dominated the catch followed by Katsuwonus pelamis (12.4%); Thunnus albacares, Auxis thazard and Sarda orientalis formed the rest of the catch. The Von Bertalanffy parameters of growth were calculated for E. affinis by length frequency method and the values were compared with those obtained for the species from other regions. Based on the data collected during the 6 year period, Maximum Sustainable Yield and optimum fishing effort were estimated for tunas in the commercial fishing grounds off Madras (12.80/4C, 5C and 6C, 13.80/1C,2C,3C and 4C). The MSY was 27 tonnes and the optimum fishing effort was 17,826 hours. These estimations reveal that the tuna stock of the inshore area off Madras may not stand to any further increase in fishing effort.

The plankton of the tropical western Indian Ocean as a biomass indirectly supporting surface tunas (yellowfin, Thunnus albacares and skipjack, Katsuwonus pelamis)

Roger,-C.

J (Journal-Article) ENVIRON.-BIOL.-FISHES 1994 vol. 39, no. 2, pp. 161-172

The biomass of available forage is a key factor in controlling the abundance and distribution of surface tropical tunas, as they have high energy demands and live in a poor environment. The direct estimate of this forage biomass is not possible with existing techniques. Thus we have investigated the lower link, i.e. the plankton organisms which are the food of fishes preyed upon by tunas. In a previous study, this fraction of the zooplankton has been identified, both by taxa and by size, by analysing the stomach contents of the fishes which are the preys of tunas. In this paper, we use 331 plankton samples from tuna fishing grounds of the tropical Indian ocean, to define the characteristics of the planktonic fraction actually participating in the tuna food chain. Main results are as follows: (1) Only 15-27% of the total zooplanktonic biomass (> 1 mm) is actually accessible for the fishes preyed upon by surface tunas. This `useful' part of the zooplankton is a well defined fraction of the planktonic population which remains in the 0-170 meters water layer during daylight hours. This part of the zooplankton accounts for a variable percentage of its total biomass the different geographic areas and represents the most relevant parameter to assess the potential richness of a given area for surface tunas. (2) From areas where fishing for surface tunas is poor to those where fishing is successful, it is observed that the total zooplankton biomass increases by a factor of 4 whereas the biomass of the `useful' fraction increases by a factor of 7. This disproportionate increase is due to the facts that the potential preys of fishes preyed upon by tunas represent a growing fraction of the zooplankton and that a growing proportion of this fraction remains by day in the 0-170 meter water layer, therefore becoming available for the day-feeders which comprise most of the prey-fishes of surface tunas (DBO).

Asia and the Pacific Region: Bangladesh, Indonesia, Malaysia, Maldives, Sri Lanka, Thailand. Project findings and conclusions

B (Book) Rome-Italy FAO 1994 23 pp

The results and conclusions are presented of 6 case studies conducted in the framework of the project 'Bioeconomics of small-scale fisheries in the Bay of Bengal': 1) Bangladesh -- Bio-socioeconomic assessment of the impact of estuarine set bagnet fishery on the marine fisheries; 2) Indonesia -- Bio-socioeconomics of the shrimp fisheries in Langkat District, North Sumatra Province; 3) Malaysia -- Bio-socioeconomic assessment of the shrimp fisheries in Kuala Sepetank, Perak State; 4) Maldives -- Bio-socioeconomic assessment of the impact of Fish Aggregating Devices (FADs) on tuna fisheries; 5) Sri Lanka -- Bio-socioeconomic study of the fisheries for small pelagics along the southwest coast of Sri Lanka; and, 6) Thailand -- Bio-socioeconomic assessment of the impact of Artificial Reefs (ARs) on the small-scale fisheries in Ranong Province. The findings indicated that many management measures had been introduced by almost all the member countries, but very few of them had been effectively implemented due to incomplete understanding of the problems and insufficient cooperation of the fisherfolk. The recommendations of the project are included.

The distribution pattern of yellowfin tuna in the Andaman and Nicobar Seas (India) as observed in longline surveys with a note on influence of thermal boundaries on the stock distribution

John,-M.E.; Sudarsan,-D.

B (Book); K (Conf PROCEEDINGS-OF-THE-5TH-EXPERT-CONSULTATION-ON-INDIAN-OCEAN-TUNAS,-MAHE,-SEYCHELLES,-4-8-OCTOBER,-1993. FAO-UNDP-Indo-Pacific-Tuna-Development-and-Management-Programme,-Colombo-Sri-Lanka COLOMBO-SRI-LANKA IPTP 1994 no. 8 pp. 141-146

IPTP-COLLECT.-VOL. no. 8

The distribution pattern of yellowfin tuna (Thunnus albacares) in the Andaman and Nicobar seas as observed in longline surveys during 1989-1992 is discussed. Yellowfin tuna is the most important larger pelagic species in the region. The relative density of the stock in each area and season is worked out. December to March is identified as the peak season. The northern and southern regions indicated differential abundance indices and distribution patterns. Comparison with hooking rates in other oceanic regions showed relatively higher CPUE in the Andaman and Nicobar seas. Mean length and weight of yellowfin tuna was observed as 126 cm and 37.7 kg respectively. Annual and seasonal variations of high magnitude were observed in length frequency structure. Results of the study suggest scope for developing a seasonal fishery in the area targeting on yellowfin stock. Studies on influence of sea surface temperature on distribution of yellowfin tuna indicated positive relationship between thermal boundaries and the yellowfin CPUE.

Present status of the tuna fisheries in Sri Lanka

Dayaratne,-P.

B (Book); K (Conf ANNUAL-SCIENTIFIC-SESSIONS-1993.-PROCEEDINGS-OF-THE-FIRST-ANNUAL-SCIENTIFIC-SESSIONS,-2ND-NOVEMBER-1993-NARA,-COLOMBO,-SRI-LANKA COLOMBO-SRI-LANKA NARA 1994 pp. 1-10

A description is given of the present situation regarding the tuna fisheries of Sri Lanka, giving particular reference to the changes in fishing effort, catch rates, production trends and species composition of the catches.

Age, growth and natural mortality of kawakawa (Euthynnus affinis) from the western Indian Ocean

Yesaki,-M.; Carrara,-G.

B (Book); K (Conf PROCEEDINGS-OF-THE-5TH-EXPERT-CONSULTATION-ON-INDIAN-OCEAN-TUNAS,-MAHE,-SEYCHELLES,-4-8-OCTOBER,-1993. FAO-UNDP-Indo-Pacific-Tuna-Development-and-Management-Programme,-Colombo-Sri-Lanka COLOMBO-SRI-LANKA IPTP 1994 no. 8 pp. 62-66

IPTP-COLLECT.-VOL. no. 8

The Bhattacharya routine of the LFSA programme was used to obtain the mean lengths from 2 stocks of kawakawa (Euthynnus affinis). The objectives of this study were to determine the age and growth of the two stocks by tracing the progression of mean lengths identified by the Bhattacharya method, and to estimate the coefficient of total mortality (Z) from length-based catch curves on a pseudo-cohort of an unexploited stock of kawakawa. Age classes of both stocks were easily identified and could be readily assigned to a progression series. Two spawning cohorts were observed for the Seychelles stock, one spawning in the second quarter and the other in the fourth quarter. There was one cohort during 1987 and 1988 for the Oman stock spawning in the first quarter. However, during 1986, there was a second cohort spawning in the third quarter. The growth curve functions obtained for kawakawa from Seychelles and Oman are given. The catch curve analysis for Seychelles gave a Z value of 2.24. As this stock is virtually unexploited, this estimate is taken as a first approximation of the coefficient of natural mortality, M, for kawakawa.

Yellowfin tuna tagging proposal for the western Indian Ocean

Ellway,-C.

B (Book); K (Conf PROCEEDINGS-OF-THE-5TH-EXPERT-CONSULTATION-ON-INDIAN-OCEAN-TUNAS,-MAHE,-SEYCHELLES,-4-8-OCTOBER,-1993. FAO-UNDP-Indo-Pacific-Tuna-Development-and-Management-Programme,-Colombo-Sri-Lanka COLOMBO-SRI-LANKA IPTP 1994 no. 8 pp. 216-226

IPTP-COLLECT.-VOL. no. 8

A tagging proposal is developed around stated objectives for the estimation of population parameters of the western Indian Ocean surface-fishery yellowfin (Thunnus albacares) tuna resource. Tagging of 10,000 yellowfin in the area of the fishery is estimated to generate sufficient tag recapture information to enable development of population parameters, growth estimates and fishery interaction potentials. Operational criteria for the vessel are discussed with respect to proposed fishing and baiting activities. Personnel and equipment requirements are noted in relation to tagging, tag recovery and data analysis considerations.

Analysis of Maldives Islands tuna tagging data with a spatially aggregated attrition model

Bertignac,-M.; Kleiber,-P.; Waheed,-A.

B (Book); K (Conf PROCEEDINGS-OF-THE-5TH-EXPERT-CONSULTATION-ON-INDIAN-OCEAN-TUNAS,-MAHE,-SEYCHELLES,-4-8-OCTOBER,-1993. FAO-UNDP-Indo-Pacific-Tuna-Development-and-Management-Programme,-Colombo-Sri-Lanka COLOMBO-SRI-LANKA IPTP 1994 no. 8 pp. 226-231

IPTP-COLLECT.-VOL. no. 8

A spatially aggregated attrition model was used to analyse the results of a tuna tagging programme which was conducted in 1990 by the Maldive Islands Ministry of Fisheries and Agriculture. The model predicts probabilities of the possible fates of tagged fish and the tags that they carry. The model includes two attrition parameters consisting of catchability, and combination of natural mortality plus emigration from the Maldives and tag losses. This allows those parameters to be estimated by fitting the model to tag data. Model fitting was carried out by finding the maximum of a multinomial likelihood function. On the basis of 8,033 tagged skipjack (Katsuwonus pelamis) of which 1,420 were returned a high attrition rate of 53% per month with the first month's data included in the analysis and 36% per month with the first month excluded was estimated. The estimated exploitation rate (fishing mortality as fraction of total attrition) was moderate at 22% or 16%, the first month included or excluded respectively.

Review of tuna fishery in the western part of Indonesian waters - India Ocean side

Naamin,-N.

B (Book); K (Conf PROCEEDINGS-OF-THE-5TH-EXPERT-CONSULTATION-ON-INDIAN-OCEAN-TUNAS,-MAHE,-SEYCHELLES,-4-8-OCTOBER,-1993. FAO-UNDP-Indo-Pacific-Tuna-Development-and-Management-Programme,-Colombo-Sri-Lanka COLOMBO-SRI-LANKA IPTP 1994 no. 8 pp. 9-12

IPTP-COLLECT.-VOL. no. 8

The tuna landings from Indian Ocean side (FAO Fishing Code Area 57) attained 106.746 tonnes (including tuna, skipjack, small tunas and seerfishes) in 1991, a 64% increase over 1990 or 138% over 1988. The increase of landings is in line with the growth in fishing effort, especially the number of longliners which rose from 149 in 1988 to 536 in 1991. There was a tendency of shifting of fishing strategy of a 50 GT Taiwanese longliners from using live milkfish bait targeting for yellowfin tuna (Thunnus albacares) to use of frozen or dead bait targeting for bigeye tuna (T. obsesus). At the same time the tuna caught changed from 20-40 kg yellowfin to 40-60 kg bigeye tuna. Since early 1993, the activities of tuna longliners based in Muara Elaru-Jakarta Fishing Port have slowed down. Some of longliners have moved to Benoa-Bali Fishing Base and Bungus-Padang Fishing Base. The catch rate of the longliners based in Bungus is better compared to Muara Baru Jakarta, but they are facing the problems of the availability of bait. In the last two years, the Indonesian Government has also encouraged the development of sport fishing targeting for marlin, tunas and skipjack.

Catch and size groups distribution of tunas caught by purse seining survey in the Arabian Sea, western Indian Ocean, 1993

Poreeyanond,-D.

B (Book); K (Conf PROCEEDINGS-OF-THE-5TH-EXPERT-CONSULTATION-ON-INDIAN-OCEAN-TUNAS,-MAHE,-SEYCHELLES,-4-8-OCTOBER,-1993. FAO-UNDP-Indo-Pacific-Tuna-Development-and-Management-Programme,-Colombo-Sri-Lanka COLOMBO-SRI-LANKA IPTP 1994 no. 8 pp. 53-55

IPTP-COLLECT.-VOL. no. 8

The findings are presented of a purse seining survey conducted in February 1993 along the Carlsberg Ridge in the west Indian Ocean in order to collect data regarding the abundance of tuna, fishing grounds, seasonal size distribution and oceanographic information. The catches consisted mainly of skipjack (Katsuwonus pelamis), bigeye tuna (Thunnus obesus) and yellowfin (T. albacares).

Purse seine fishery trends in the western Indian Ocean from data collected in Victoria (Seychelles), 1984-1992

Pianet,-R.

B (Book); K (Conf PROCEEDINGS-OF-THE-5TH-EXPERT-CONSULTATION-ON-INDIAN-OCEAN-TUNAS,-MAHE,-SEYCHELLES,-4-8-OCTOBER,-1993. FAO-UNDP-Indo-Pacific-Tuna-Development-and-Management-Programme,-Colombo-Sri-Lanka COLOMBO-SRI-LANKA IPTP 1994 no. 8 pp. 41-44

IPTP-COLLECT.-VOL. no. 8

A crude analysis of data collected by the Seychelles Fishing Authority and ORSTOM on the purse seiners fishing in the western Indian Ocean since 1984 when they called in at Victoria Harbour is presented. The data cover total catches, fishing effort, fishing methods, species composition and catch/effort.

Preliminary results of tuna tagging during Soviet-Mozambican tagging programme in the Indian Ocean

Romanov,-E.V.; Silva,-R.-de-P.

B (Book); K (Conf PROCEEDINGS-OF-THE-5TH-EXPERT-CONSULTATION-ON-INDIAN-OCEAN-TUNAS,-MAHE,-SEYCHELLES,-4-8-OCTOBER,-1993. FAO-UNDP-Indo-Pacific-Tuna-Development-and-Management-Programme,-Colombo-Sri-Lanka COLOMBO-SRI-LANKA IPTP 1994 no. 8 pp. 239-241

IPTP-COLLECT.-VOL. no. 8

An account is given of some preliminary results obtained during a joint Soviet-Mozambican tagging programme in international waters and in the economic zone of the Republic of the Seychelles, during the periods March-June 1990 and July-November 1991.

Yellowfin tuna fisheries in the past decade: Indian Ocean versus eastern Atlantic and eastern Pacific Oceans

Marsac,-F.

B (Book); K (Conf PROCEEDINGS-OF-THE-5TH-EXPERT-CONSULTATION-ON-INDIAN-OCEAN-TUNAS,-MAHE,-SEYCHELLES,-4-8-OCTOBER,-1993. FAO-UNDP-Indo-Pacific-Tuna-Development-and-Management-Programme,-Colombo-Sri-Lanka COLOMBO-SRI-LANKA IPTP 1994 no. 8 pp. 168-182

IPTP-COLLECT.-VOL. no. 8

In this paper, the author compares some important parameters of the yellowfin (Thunnus albacares) fisheries of the Eastern Pacific (EPO), Eastern Atlantic (EAO) and Western Indian oceans (WIO). Following a first comparative study between the Pacific and Atlantic, similar analyses are made from the data gathered during the period 1980-1992 in the Indian ocean. The tuna-environment relationships, with emphasis on the Indian Ocean particularities, are discussed. This comparison highlights several fundamental similarities between the EAO and WIO fisheries: size distribution of the catch and seasonal fishing patterns, whereas the Pacific fishery exhibits some more differences. The hypothesis of a possible genetic mixing between Atlantic and Indian Ocean yellowfin populations is suggested, since migration remains physically possible along the South African coast during the southern summer. With respect to the EAO and WIO, the comparison of some key biological parameters (sex ratio, growth) would help to test the assumption of mixing between the populations that inhabit these two oceans.

Development of fisheries for tuna and tuna-like fish in Indonesia with particular reference to the Jakarta-based tuna longline fishery

Ishida,-K.; Yamamoto,-T.; Gafa,-B.

B (Book); N (Num COLOMBO-SRI-LANKA FAO 1994 37 pp

During the period from 1977 to 1989, the production of tuna and tuna-like fishes increased from 136,000 t to 381,000 t. The relative importance of the catch of tuna and tuna-like fishes to the total marine catch increased from 12% in 1977 to 17% in 1989. The traditional fishery for skipjack tuna is by trolling under sail. These vessels were motorized in 1981. The pole and line fishery using inboard powered boats was introduced into Manado and spread to Ternate and Ambon. Since 1972, the Government has promoted the skipjack pole-and-line fishery by establishing state fishing companies at Ambon, Bitung and Sorong. The 1989 catch was 114,000 t. Neritic tunas are mainly distributed in West Indonesian waters. They are caught by various gears. The 1989 catch was 135,000 t. The large "tunas" have been caught by Indonesian fishermen in limited quantity by means of trolling or angling. After World War II, tuna resources in Indonesian waters were first exploited mainly by Japanese tuna longline boats. In 1973, a state fishing company began to operate a tuna longline fishery based on Benoa in Bali. Jakarta Fishing Port (JFP) was inaugurated in 1984. This stimulated the development of the tuna longline fishery aiming at exporting fresh tuna to Japan. The catch in 1989 was 66,000 t. The export of fresh tuna landed by local tuna boats at JFP began in late 1987. With the arrival of Taiwanese tuna longline boats in the latter half of the 1988s, the tuna longline fishery based at JFP became very active. The total number of tuna boats based at JFP reached 204 by May 1990. JFP based tuna longline boats fish in the Indian Ocean outside the Sunda Strait, which can be reached in two to three days running. A trip lasts for about 13 days, of which about 5 days are spent for running and 8 days for fishing. The exports of fresh tunas from JFP in 1989 and 1990 were 4,929 t and 5,395 t respectively, equivalent to 65% of the total export of fresh tuna of Indonesia. The remaining 35% is mostly exported through Benoa on Bali Island. Japanese or Taiwanese agents at JFP handle fresh tuna exports. The price of tuna is determined by auction.

Preliminary studies of age and growth of yellowfin tuna (Thunnus albacares) in the western Indian Ocean

Stecquert,-B.; Ramcharrun,-B.; Dean,-J.M.; Hansbarger,-J.

B (Book); K (Conf PROCEEDINGS-OF-THE-5TH-EXPERT-CONSULTATION-ON-INDIAN-OCEAN-TUNAS,-MAHE,-SEYCHELLES,-4-8-OCTOBER,-1993. FAO-UNDP-Indo-Pacific-Tuna-Development-and-Management-Programme,-Colombo-Sri-Lanka COLOMBO-SRI-LANKA IPTP 1994 no. 8 pp. 161-168

IPTP-COLLECT.-VOL. no. 8

The age of yellowfin (Thunnus albacares) from West Indian Ocean was estimated by counting daily increments on otoliths. Validation of the growth was obtained from results of tagging experiments and length-frequency data. A growth curve was then fitted and compared with results obtained in different areas. The growth obtained in this study is comparable to those obtained by authors in other oceans using the scale reading method for age determination. Studies with length-frequencies in the eastern Atlantic Ocean have also given similar results for ages greater than 2 years. However, juvenile fish seem to grow faster there than in the Indian Ocean. Compared with other studies realised in the Indian Ocean, our results are similar to those obtained in the Maldives but significantly different from those obtained by Marsac (1991) in the same area. This author used length-frequency data and assumed only one reproductive season. This method permits the calculation of the exact data of birth for each fish and confirms that yellowfin in western Indian Ocean are able to reproduce all the year, with a peak between November and March.

On feeding conditions for surface tunas (yellowfin, Thunnus albacares and skipjack, Katsuwonus pelamis) in the western Indian Ocean

Roger,-C.

B (Book); K (Conf PROCEEDINGS-OF-THE-5TH-EXPERT-CONSULTATION-ON-INDIAN-OCEAN-TUNAS,-MAHE,-SEYCHELLES,-4-8-OCTOBER,-1993. FAO-UNDP-Indo-Pacific-Tuna-Development-and-Management-Programme,-Colombo-Sri-Lanka COLOMBO-SRI-LANKA IPTP 1994 no. 8 pp. 131-135

IPTP-COLLECT.-VOL. no. 8

The food of surface tunas (yellowfin, Thunnus albacares and skipjack, Katsuwonus pelamis) of the western Indian Ocean, their feeding strategies in different environments and their relationships with planktonic biomass were studied in 1988-1989 during the Regional Tuna Project. These tunas feed mainly on small epipelagic fishes (10-90mm): the size ratio of prey-fish/tuna is close to 1/30. Tunas caught from small rapidly swimming schools contain few prey-fish (1-40, mean 12 for Yellowfin and 6 for Skipjack), which belong to various species; these tunas appear to be in search of richer areas and meanwhile they feed on what they meet. On the contrary, tunas fished by commercial purse-seiners on large schools feed heavily on Engrauliid concentrations: their stomachs contain a mean of 75 (skipjack) and 114 (yellowfin) prey-fish, almost all of the same species. These tunas therefore appear to be able to adapt their feeding strategy according to environmental conditions. It should be noticed that almost no vertically-migrating fish (such as myctophids), which inhabit the tuna biotope during the night but dwell deeper during daytime, have been found in these tuna stomachs. This fact strongly suggests that these tunas are dayfeeders.

Observations on the species composition of the large pelagic fisheries in Sri Lanka

Dayaratne,-P.

B (Book); K (Conf PROCEEDINGS-OF-THE-5TH-EXPERT-CONSULTATION-ON-INDIAN-OCEAN-TUNAS,-MAHE,-SEYCHELLES,-4-8-OCTOBER,-1993. FAO-UNDP-Indo-Pacific-Tuna-Development-and-Management-Programme,-Colombo-Sri-Lanka COLOMBO-SRI-LANKA IPTP 1994 no. 8 pp. 21-25

IPTP-COLLECT.-VOL. no. 8

Although tuna fisheries in Sri Lanka target mainly tunas, a number of other large pelagic species get caught in this fishery. This paper analyses the data collected during the period 1989-1991 through the NARA/IPTP sampling programme. The present drift gillnet fishery has 62-94% of tuna in the catches, with a highest contribution in the south. Skipjack tuna, (Katsuwonus pelamis) followed by yellowfin tuna, (Thunnus albacares) are the dominant tuna species in the fishery. The gillnet/longline combination gear fishery has a lower tuna contribution of 50%, with sharks making around 45% of the catches. In this fishery too, a high contribution (69%) of tuna were observed in the south. The three-combination gear, gillnet/longline/handline fishery has 55% of tuna contribution, but with a major portion of large yellowfin tuna. The troll line fishery in the south has 100% tuna catches, with kawakawa (Euthynnis affinis) and frigate tuna (Auxis khazard) contributing 70% and 20% respectively. The longline fishery has yellowfin tuna and billfish as the dominant species. Among the sharks, the requiem sharks (Carcharhinidae) contribute to more than 80% of the catch. The billfish group is dominated by the Indo-Pacific blue marlins (Makaira spp). Narrow-barred king mackerel and wahoo contribute significantly to the seerfish production.

Recent Taiwanese tuna fisheries in the Indian Ocean

Hsu,-C.C.; Liu,-H.C.

B (Book); K (Conf PROCEEDINGS-OF-THE-5TH-EXPERT-CONSULTATION-ON-INDIAN-OCEAN-TUNAS,-MAHE,-SEYCHELLES,-4-8-OCTOBER,-1993. FAO-UNDP-Indo-Pacific-Tuna-Development-and-Management-Programme,-Colombo-Sri-Lanka COLOMBO-SRI-LANKA IPTP 1994 no. 8 pp. 25-28

IPTP-COLLECT.-VOL. no. 8

Taiwanese tuna fisheries in the Indian Ocean commenced before 1963. Recently, Taiwanese vessels, including large and small longliners, have exploited tuna in the Indian Ocean only using conventional and deep longlining for different target species and operated in different fishing grounds. Drift netting was completely banned in December of 1992. The conventional longlining targets on albacore (Thunnus alalunga) and operates mainly in the fishing ground southward 10 degree S. On the other hand, deep longlining targets bigeye (T. obesus) and yellowfin tuna T. albacares and operates mainly in the tropical and subtropical regions northward 15 degree S. The catch is composed of albacore, bigeye, yellowfin, southern bluefin, swordfish, marlins and other species, and albacore, bigeye and yellowfin tuna are the first in species composition. Catch statistics are produced by Institute of Oceanography, National Taiwan University, and are routinely submitted to the related organizations in the three oceans.

The current status of the IPTP database

Moron,-J.; Ardill,-J.D.

B (Book); K (Conf PROCEEDINGS-OF-THE-5TH-EXPERT-CONSULTATION-ON-INDIAN-OCEAN-TUNAS,-MAHE,-SEYCHELLES,-4-8-OCTOBER,-1993. FAO-UNDP-Indo-Pacific-Tuna-Development-and-Management-Programme,-Colombo-Sri-Lanka COLOMBO-SRI-LANKA IPTP 1994 no. 8 pp. 247-254

IPTP-COLLECT.-VOL. no. 8

The coverage of the tuna catch database for the Indo-Pacific Region has improved continuously since the establishment of IPTP in 1982. Data are now available on 41 coastal and distant water fishing nations operating in the Indian Ocean and South East Asia. 18 out of 27 participating and 2 of the non-IPTP member countries reported tuna statistics during 1991. Alternative data sources are consulted by IPTP to complete the tuna statistics produced in the region. IPTP maintains 5 major databases: nominal catch, fishing boats, catch and effort, length-frequency and transhipment statistics. The forms send to the liaison officers to collect the information required for each database have been revised and instructions are included to standardized tuna data collection. IPTP is currently engaged in a critical review of historical tuna catch series stored since 1982. This report gives is a description of the major issues found by the review. These include landings reported as nominal catch, nonstandard time frames used in some countries, the species composition of tuna and tuna-like catches, lack of detail or inaccuracy in the gear categories reported and errors in catch allocation by FAO fishing area. Summaries of the status of every database by reporting and non reporting country are included, as well as a brief note about the status of the IPTP sampling programmes and tagging databases in the Indian Ocean.

Review of the national tuna fishery in India

James,-P.S.B.R.; Pillai,-P.P.

B (Book); K (Conf PROCEEDINGS-OF-THE-5TH-EXPERT-CONSULTATION-ON-INDIAN-OCEAN-TUNAS,-MAHE,-SEYCHELLES,-4-8-OCTOBER,-1993. FAO-UNDP-Indo-Pacific-Tuna-Development-and-Management-Programme,-Colombo-Sri-Lanka COLOMBO-SRI-LANKA IPTP 1994 no. 8 pp. 2-5

IPTP-COLLECT.-VOL. no. 8

The status of tuna fisheries in India and their present stock structure have been reviewed critically in the recent past by several workers. The tuna resources presently exploited in India essentially comprise the small tunas such as Euthynnus affinis. Auxis thazard, A. rochei, Thunnus tonggol, Katsuwonus pelamis in the coastal sector, and T. albacares and T. obesus in the oceanic waters. The drift gillnets, purse seines, hooks and lines, pole and lines, surface troll lines and longlines employed in the-tuna fishery. The pole and line fishery in Lakshadweep exploit mainly skipjack and yellowfin tuna. Over the years, the catch has increased considerably, the average catch of tunas and billfishes during recent years (1985-92) has been estimated at 38,873 tonnes in the coastal fishery. E. affinis, A. thazard and A. rochei, K. pelamis, T. tonggol, young ones of T. albacares, billfishes and other tunas constituted 53%, 17%, 3%, 13%, 7%. 3%. 4% and 0.3% respectively of the total catch. The summary of the results of studies conducted on stock assessment of these species (1984-88; 1989-91) are also presented, and suggestions for future development of tuna fishery in the small scale sector in India indicated in this communication.

Modelling the yellowfin tuna (Thunnus albacares) vertical distribution using sonic tagging results and local environmental parameters.

Cayre,-P.; Marsac,-F.

B (Book); K (Conf PROCEEDINGS-OF-THE-5TH-EXPERT-CONSULTATION-ON-INDIAN-OCEAN-TUNAS,-MAHE,-SEYCHELLES,-4-8-OCTOBER,-1993. FAO-UNDP-Indo-Pacific-Tuna-Development-and-Management-Programme,-Colombo-Sri-Lanka COLOMBO-SRI-LANKA IPTP 1994 no. 8 p. 188

IPTP-COLLECT.-VOL. no. 8

The diurnal vertical behaviour of yellowfin tuna (Thunnus albacares) observed from sonic tagging experiments in the western Indian Ocean (Comoros archipelago) is compared with the vertical profiles of temperature and dissolved oxygen concentration. Two different behavioural situations: off-FAD and FAD-associated yellowfin tuna, are characterized by the relationships between swimming depth and vertical structure of temperature and dissolved oxygen concentration observed in the tracking area. Gradients of both parameters are shown to be the key factors which determine the vertical swimming behaviour. Vertical distributions of yellowfin tuna, for both off-FAD and FAD-associated situations, are modelled by using normal-derived distributions. These models indicate the probability of the presence of yellowfin tuna, related to the vertical profiles of temperature and dissolved oxygen concentration. The predicted vertical distribution seems to be realistic and matches the observations given by echosound pictures of tuna schools obtained in the same area by purse seiners.

Oceanic tuna fishery in India -- recent trends

Sudarsan,-D.; John,-M.E.

B (Book); K (Conf PROCEEDINGS-OF-THE-5TH-EXPERT-CONSULTATION-ON-INDIAN-OCEAN-TUNAS,-MAHE,-SEYCHELLES,-4-8-OCTOBER,-1993. FAO-UNDP-Indo-Pacific-Tuna-Development-and-Management-Programme,-Colombo-Sri-Lanka COLOMBO-SRI-LANKA IPTP 1994 no. 8 pp. 5-9

IPTP-COLLECT.-VOL. no. 8

The recent trends in the oceanic tuna fishery in India are discussed. The fishery is exclusively by longlining, largely by vessels operating since 1985 under a charter scheme. The present level of catch from the longline fishery is about 5700 t (1992), consisting of yellowfin tuna (Thunnus albaccues) (76.7%), bigeye tuna (T. obesus) (2.5%), billfishes (11.5%) and other species. The CPUE for all fish is about 2 t per fishing day and the CPUE for yellowfin tuna, the target species, is about 1.76 t. The annual abundance index over the year shows an increasing trend, indicating the healthy state of the stock. R & D support for tuna fishing has been stepped up in recent years. Longline surveys yielded very encouraging results, indicating a relatively high level of abundance index of yellowfin in Indian waters compared to other parts of the Indian Ocean. Having fulfilled the objectives of charter to a large extent, the Government's present policy is oriented to phasing out the charter scheme in favour of joint venture and ownership enterprises.

Proceedings of the 5th Expert Consultation on Indian Ocean Tunas, Mahe, Seychelles, 4-8 October, 1993

B (Book); K (Conf IPTP-COLLECT.-VOL. COLOMBO-SRI-LANKA IPTP 1994 no. 8, 275 pp

Abstracts of the papers presented at the consultation are cited individually.

Seychelles tuna bulletin. Second quarter 1994

B (Book); N (Num SEYCHELLES-TUNA-BULL. VICTORIA-SEYCHELLES SFA 1994 26 pp

Statistics are presented regarding the tuna catches of Seychelle purse seiners and longliners fishing in the western Indian Ocean during the second quarter of the year 1994.

Report of the 5th Expert Consultation on Indian Ocean Tunas, Mahe, Seychelles, 4-8 October 1993

B (Book); K (Conf COLOMBO-SRI-LANKA IPTP 1994 31 PP

The report gives an account of topics discussed at the Consultation under the following main headings: Review of national fisheries; Review of the status of stocks and tuna biology - yellowfin tuna, skipjack tuna, bigeye tuna, albacore tuna, small tunas, seerfish and billfish, statistics, research and tuna biology; Interactions and tagging studies; Progress made in research and data collection; and, Conclusions and recommendations.

On the records of the crocodile shark Pseudocarcharias kamoharai (Pseudocarchariidae) in the Equatorial Indian Ocean.

Romanov,-E.V.; Zamorov,-V.V.

J (Journal-Article) VOPR.-IKHTIOL. 1994 vol. 34, no. 1, pp. 122-123

The paper presents a brief illustrated description of a female Pseudocarcharias kamoharai caught by a tuna longline from a depth of 72-211 m at 3 degree 22 S, 62 degree 18 E. The capture of 2 more specimens at 5 degree 115, 66 degree 11 E and 0 degree 55 N, 55 degree 14 E in different years and seasons suggests that this rare species may be a permanent resident of the western Equatorial Indian Ocean.

Estimating the impact of purse-seine catches on longline

Medley,-P.A.H.

B (Book); K (Conf INTERACTIONS-OF-PACIFIC-TUNA-FISHERIES.-VOLUME-1.-SUMMARY-REPORT-ON-PAPERS-ON-INTERACTION.-PROCEEDINGS-OF-THE-FIRST-FAO-EXPERT-CONSULTATION-ON-INTERACTIONS-OF-PACIFIC-TUNA-FISHERIES,-3-11-DECEMBER-1991,-NOUMEA,-NEW-CALEDONIA. Shomura,-R.S.;Majkowski,-J.;Langi,-S.-eds. FAO,-Rome-Italy 1994 no. 336/1 pp. 182-198

FAO-FISH.-TECH.-PAP. no. 336/1

The longline monthly catch per unit effort time series of the southwest Pacific yellowfin tuna (Thunnus albacares) stock (1980-1990) is analysed using a generalised linear model of the stock dynamics. The model accounts for changes in the catch rate which may be attributable to oceanographic effects, fishing location, and previous purse-seine catches. A simple example is given of how the parameter describing the impact of purse seine on longline might be used in the analysis of a decision to allocate the stock between two conflicting gears taking into account the uncertainty in the parameter estimation.

Interaction in the yellowfin tuna fisheries of the eastern part of Indonesian waters

Naamin,-N.; Bahar,-S.

B (Book); K (Conf INTERACTIONS-OF-PACIFIC-TUNA-FISHERIES.-VOLUME-1.-SUMMARY-REPORT-ON-PAPERS-ON-INTERACTION.-PROCEEDINGS-OF-THE-FIRST-FAO-EXPERT-CONSULTATION-ON-INTERACTIONS-OF-PACIFIC-TUNA-FISHERIES,-3-11-DECEMBER-1991,-NOUMEA,-NEW-CALEDONIA. Shomura,-R.S.;Majkowski,-J.;Langi,-S.-eds. FAO,-Rome-Italy 1994 no. 336/1 pp. 199-212

FAO-FISH.-TECH.-PAP. no. 336/1

Possible interactions in the yellowfin tuna (Thunnus albacares), fisheries of the eastern part of Indonesian waters was examined. There are 2 groups of interaction occur between fisheries: (1) interaction with other species, and (2) interaction among fishing gears. The data imply that there is interaction between stock of yellowfin tuna in the western Pacific and the stock in northeastern Indonesian waters, and there is very weak evidence of possible interactions between western Pacific and Indian Ocean stocks. In eastern Indonesian waters yellowfin caught by longlining were frequently associated with bigeye and albacore catches. Based on available data, interactions among the four types of fishing gears used for catching yellowfin (longline, purse seine, handline, and pole and line) could not significantly be detected.

An overview of interaction issues among the fisheries for southern bluefin tuna

Polacheck,-T.

B (Book); K (Conf INTERACTIONS-OF-PACIFIC-TUNA-FISHERIES.-VOLUME-1.-SUMMARY-REPORT-ON-PAPERS-ON-INTERACTION.-PROCEEDINGS-OF-THE-FIRST-FAO-EXPERT-CONSULTATION-ON-INTERACTIONS-OF-PACIFIC-TUNA-FISHERIES,-3-11-DECEMBER-1991,-NOUMEA,-NEW-CALEDONIA. Shomura,-R.S.;Majkowski,-J.;Langi,-S.-eds. FAO,-Rome-Italy 1994 no. 336/1 pp. 264-298

FAO-FISH.-TECH.-PAP. no. 336/1

The history of fisheries for southern bluefin tuna (Thunnus maccoyii) has involved a complex set of interaction issues. These include interactions between surface and longline vessels operating in the same area and season, interactions between Australian surface catches and the subsequent catches in the longline fishery from the same cohorts, interactions among longline vessels fishing in different areas, interactions among longline vessels of different nationalities, and interactions between longline and surface fisheries with respect to recruitment and future catches. The present paper reviews briefly these interaction issues and suggests future areas of research. Emphasis for the latter is directed toward better understanding of movement, migration routes, mixing rates, and site fidelity of the southern bluefin tuna.

Relationships among yellowfin and skipjack tuna, their prey-fish and plankton in the tropical western Indian Ocean

Roger,-C.

J (Journal-Article) FISH.-OCEANOGR. 1994 vol. 3, no. 2, pp. 133-141

Stomach contents of yellowfin (Thunnus albacares) and skipjack (Katsuwonus pelamis) tuna caught by trolling and purse seining in the tropical western Indian Ocean, together with those of the prey-fish found in their stomachs, have been analysed. Epipelagic fish are the main prey of these tunas, whereas no vertically migrating fish, which inhabit subsurface layers at night, have been found in their stomachs. These tunas are thus considered day-feeders. Purse-seine-caught tunas, which belong to large schools, have a much higher number of prey-fish in their stomachs than tunas caught by trolling on small schools. Similarly, prey-fish from purse-seine tunas have a much higher number of planktonic prey in their stomachs than those from troll-caught tunas. Therefore, these tunas adopt a wandering strategy in small schools when food resources are scarce and form large schools when they are abundant. The planktonic organisms found in the stomachs of prey-fish are described by taxa and sizes; they represent the fraction of the planktonic biomass actually supporting the stock of tuna. Size ratios between the three links tuna-prye-fish-plankton are very high, suggesting that these tunas benefit from a short food chain which is probably efficient from the energetic point of view.

Oceanic tuna resources

J (Journal-Article) SEAFOOD-EXPORT-J. 1994 vol. 25, no. 13, pp. 45-48

Results of tuna resources surveyed along the coasts of India (1at 15 degree N and 23 degree N, 16 degree N and 20 degree N, and 5 degree N and 15 degree N) are summarized. At all three sites yellowfin tuna was noticed to be of a larger size than at others.

The CPUE trend for albacore in Indian Ocean waters caught by the Japanese longline fishery

Uozumi,-Y.

B (Book); K (Conf PROCEEDINGS-OF-THE-5TH-EXPERT-CONSULTATION-ON-INDIAN-OCEAN-TUNAS,-MAHE,-SEYCHELLES,-4-8-OCTOBER,-1993. FAO-UNDP-Indo-Pacific-Tuna-Development-and-Management-Programme,-Colombo-Sri-Lanka COLOMBO-SRI-LANKA IPTP 1994 no. 8 pp. 147-149

IPTP-COLLECT.-VOL. no. 8

Details are given of the standardization of CPUEs of the Japanese longline fishery for albacore (Thunnus albacares) in the Indian Ocean. A General Linear Model was used accounting for the effects of areas, time and gear configurations.

Seychelles tuna bulletin. First quarter 1994

B (Book); N (Num SEYCHELLES-TUNA-BULL. VICTORIA-SEYCHELLES SFA 1994 26 pp

Statistics are presented regarding the tuna catches of Seychelle purse seiners and longliners fishing in the western Indian Ocean during the first quarter of the year 1994.

Preliminary analysis of yellowfin tuna (Thunnus albacares) resources in the Indian Ocean by the improved immature-adult dynamic model

Nishida,-T.

B (Book); K (Conf PROCEEDINGS-OF-THE-5TH-EXPERT-CONSULTATION-ON-INDIAN-OCEAN-TUNAS,-MAHE,-SEYCHELLES,-4-8-OCTOBER,-1993. FAO-UNDP-Indo-Pacific-Tuna-Development-and-Management-Programme,-Colombo-Sri-Lanka COLOMBO-SRI-LANKA IPTP 1994 no. 8 pp. 150-160

IPTP-COLLECT.-VOL. no. 8

An improved immature and adult dynamic model is developed for Thunnus albacares. The original model (1991) is the recurrence equation model. It was converted to the independent data set model (1993) to be able to detect and exclude outliers in the analyses. The revised model is further improved in this paper by including the biology information (size-at-first-maturity and sex-ratio) and the environmental information (sea surface temperature and southern oscillation index). Hence, the model becomes more practical. From this model, age specific natural morality, recruitment rate, relation between adult longline CPUE and the adult population size are estimated. Preliminary analysis are attempted.

Review of the tuna fisheries in the Andaman Sea, 1991-1992

Poreeyanond,-D.

B (Book); K (Conf PROCEEDINGS-OF-THE-5TH-EXPERT-CONSULTATION-ON-INDIAN-OCEAN-TUNAS,-MAHE,-SEYCHELLES,-4-8-OCTOBER,-1993. FAO-UNDP-Indo-Pacific-Tuna-Development-and-Management-Programme,-Colombo-Sri-Lanka COLOMBO-SRI-LANKA IPTP 1994 no. 8 pp. 28-29

IPTP-COLLECT.-VOL. no. 8

A brief review is presented on the various tuna fisheries in the Andaman Sea, during the period 1991-1992. The major fishing gear is the purse seine; fishing grounds and seasons are described and tuna production details provided. Species and size composition data are included and an examination is made of the current status of the fisheries.

The Maldivian tuna fishery -- an update

Hafiz,-A.; Anderson,-R.C.

B (Book); K (Conf PROCEEDINGS-OF-THE-5TH-EXPERT-CONSULTATION-ON-INDIAN-OCEAN-TUNAS,-MAHE,-SEYCHELLES,-4-8-OCTOBER,-1993. FAO-UNDP-Indo-Pacific-Tuna-Development-and-Management-Programme,-Colombo-Sri-Lanka COLOMBO-SRI-LANKA IPTP 1994 no. 8 pp. 30-33

IPTP-COLLECT.-VOL. no. 8

Tuna fishing remains of vital importance to the Maldives; tunas accounted for an average of 90% of the total recorded fish catch in 1990-92. Most of the catch is skipjack tuna (Katsuwonus pelamis) which is taken mainly by small mechanised pole and line vessels. Catch trends for the skipjack, yellowfin (Thunnus albacares), bigeye tuna (T. obesus) and also for small tunas, seerfish and billfish are discussed. Fleet composition and fishing effort are also detailed.

Changes in catch rates and size composition of skipjack (Katsuwonus pelamis) and yellowfin tuna (Thunnus albacares) in Sri Lankan waters

Maldeniya,-R.; Dayaratne,-P.

B (Book); K (Conf PROCEEDINGS-OF-THE-5TH-EXPERT-CONSULTATION-ON-INDIAN-OCEAN-TUNAS,-MAHE,-SEYCHELLES,-4-8-OCTOBER,-1993. FAO-UNDP-Indo-Pacific-Tuna-Development-and-Management-Programme,-Colombo-Sri-Lanka COLOMBO-SRI-LANKA IPTP 1994 no. 8 pp. 189-191

IPTP-COLLECT.-VOL. no. 8

Details are given of the changes in catch rates and size frequency distribution of skipjack (Katsuwonus pelamis) and yellowfin (Thunnus albacares) in Sri Lanka waters during the period 1989-91. The importance of such information in the further development of the fishery is discussed.

Russian tuna fisheries in the Indian Ocean

Leontiev,-S.

B (Book); K (Conf PROCEEDINGS-OF-THE-5TH-EXPERT-CONSULTATION-ON-INDIAN-OCEAN-TUNAS,-MAHE,-SEYCHELLES,-4-8-OCTOBER,-1993. FAO-UNDP-Indo-Pacific-Tuna-Development-and-Management-Programme,-Colombo-Sri-Lanka COLOMBO-SRI-LANKA IPTP 1994 no. 8 pp. 1-2

IPTP-COLLECT.-VOL. no. 8

A brief review is presented of the Russian tuna fisheries in the Indian Ocean, which involves 23 commercial purse-seiners. Fishing areas and catch and fishing effort data are described, together with the seasonal dynamics of the fishery. Fishery data collection and investigation are also discussed.

Tuna fishery statistics in the western Tropical Pacific: The agony and the ecstasy

Lawson,-T.

B (Book); K (Conf PROCEEDINGS-OF-THE-5TH-EXPERT-CONSULTATION-ON-INDIAN-OCEAN-TUNAS,-MAHE,-SEYCHELLES,-4-8-OCTOBER,-1993. FAO-UNDP-Indo-Pacific-Tuna-Development-and-Management-Programme,-Colombo-Sri-Lanka COLOMBO-SRI-LANKA IPTP 1994 no. 8 pp. 254-263

IPTP-COLLECT.-VOL. no. 8

Tuna fisheries in the tropical Western and central Pacific Ocean account for approximately 50% of the world catch of skipjack (Katsuwonus pelamis), yellowfin (Thunnus albacares), bigeye (T. obesus) and albacore (T. alalunga). A discussion is presented on SPC activities concerning the collection of catch and effort data. Daily catch and effort logsheets, aggregated catch and effort data, annual catch statistics by fleet and catch statistics for the high seas are examined.

Tuna research activities of the Seychelles

Hastings,-R.E.; Jacques,-R.

B (Book); K (Conf PROCEEDINGS-OF-THE-5TH-EXPERT-CONSULTATION-ON-INDIAN-OCEAN-TUNAS,-MAHE,-SEYCHELLES,-4-8-OCTOBER,-1993. FAO-UNDP-Indo-Pacific-Tuna-Development-and-Management-Programme,-Colombo-Sri-Lanka COLOMBO-SRI-LANKA IPTP 1994 no. 8 pp. 273-275

IPTP-COLLECT.-VOL. no. 8

Following a brief account of the role of the Seychelles Fishing Authority, details are given of the main objectives of the fisheries research and resource management plan, which include: to safeguard the long-term exploitation of Seychelles fisheries resources; and ensure that appropriate technologies and techniques are employed to increase the earnings of fishermen and at the same time ensure that resources are exploited on a rational basis. Past and on-going research activities are summarized.

Analysis of skipjack (Katsuwonus pelamis) tagging data in Maldives Island using a spatial tag attrition model

Bertignac,-M.

B (Book); K (Conf PROCEEDINGS-OF-THE-5TH-EXPERT-CONSULTATION-ON-INDIAN-OCEAN-TUNAS,-MAHE,-SEYCHELLES,-4-8-OCTOBER,-1993. FAO-UNDP-Indo-Pacific-Tuna-Development-and-Management-Programme,-Colombo-Sri-Lanka COLOMBO-SRI-LANKA IPTP 1994 no. 8 pp. 231-238

IPTP-COLLECT.-VOL. no. 8

A movement model is developed to analyse skipjack tagging data in Maldives. Discrete movements of fish occurring in a half degree square grid are described by a diffusion parameter. The model also deals with natural, fishing mortality and emigration from the area. A maximum likelihood approach is used to estimate parameters of the model and Monte Carlo data sets are created to estimate their confidence limits. Skipjack stocks seem to be lightly exploited and the model tends to estimate relatively low values of diffusivity compared with those obtained in other to areas. Emigration tends to be high and superior to natural mortality. Attempt to separate direction patterns in movement shows for some data sets a predominant southern movement of Skipjack during the northeast monsoon and northern movement during the southwest monsoon. Further development of the model would be to increase the grid on which the model is fitted.

Indian Ocean and Southeast Asian tuna fisheries data summary for 1992

B (Book); N (Num IPTP-DATA-SUMM. COLOMBO-SRI-LANKA IPTP 1994 no. 14, 138 pp

Statistics are presented regarding the annual nominal tuna catch and fishery fleet operating in the Indian Ocean and Southeast Asian regions during the year 1992.

An analysis of length-frequencies of Thunnus tonggol in Hormuzgan waters, Islamic Republic of Iran

Khorshidian,-K.; Carrara,-G.

B (Book); K (Conf PROCEEDINGS-OF-THE-5TH-EXPERT-CONSULTATION-ON-INDIAN-OCEAN-TUNAS,-MAHE,-SEYCHELLES,-4-8-OCTOBER,-1993. FAO-UNDP-Indo-Pacific-Tuna-Development-and-Management-Programme,-Colombo-Sri-Lanka COLOMBO-SRI-LANKA IPTP 1994 no. 8 pp. 67-72

IPTP-COLLECT.-VOL. no. 8

Yearly tuna and tuna-like catches in Iran are of the order of 26,000 t, more than 50% of which are longtail tuna. Fork length was measured on a total of 10,554 longtail tuna by the technicians of the Bandar Abbas Research Centre of the IFRTO at a number of sample sites along the coast of Hormuzgan province from January 1992 to June 1993. Total fresh weight was recorded for a subsample of individuals. Bi-monthly length-frequency distributions grouped in three centimetre class intervals gave modal distributions using the Bhattacharya method. The mean modal mid-lengths obtained through the Bhattacharya analysis were plotted against time to identify modal progression. Ages were assigned to each modal mid-length by assigning an age of 1.5 years to the smallest modal mid-length (55.15 cm) on the basis of existing knowledge on the growth of longtail tuna. The ages of the remaining mid-lengths were calculated on the basis of the time elapsed between samples and on the assumption of the existence of up to two recruitments per year. The von Bertalanffy (1934) parameters L sub(infinity) (L infinity), k and t sub(0) were then estimated by the least squares method using the set of age-at-length data obtained. A subset of the total weight-at-length data was used to calculate the length-weight relationship. The original monthly length-frequency samples were raised to the monthly total catches of Hormuzgan province and summed to obtain the estimated yearly frequency distribution of the catches. This data set, together with the growth parameters previously obtained, was used to estimate the total mortality parameter Z by using the "length converted catch curve" method (Sparre, 1989). The selection curve was then estimated by analyzing the data on the left hand side of the catch curve not used in the regression analysis when estimating Z.

Preliminary assessment of interactions in the fishery for small tunas off the South China Sea coast of Thailand and Malaysia

Bertignac,-M.; Moron,-J.

B (Book); K (Conf PROCEEDINGS-OF-THE-5TH-EXPERT-CONSULTATION-ON-INDIAN-OCEAN-TUNAS,-MAHE,-SEYCHELLES,-4-8-OCTOBER,-1993. FAO-UNDP-Indo-Pacific-Tuna-Development-and-Management-Programme,-Colombo-Sri-Lanka COLOMBO-SRI-LANKA IPTP 1994 no. 8 pp. 203-209

IPTP-COLLECT.-VOL. no. 8

Landings of small tunas from the Gulf of Thailand increased from 19,000 tonnes in 1980 to 141,000 t in 1989. Thai tuna fleets were responsible for 93% of the 1989 small tuna landings, while Malaysia accounted for the remainder. Purse seines, including luring purse seines which fish on FADs, are the most important gears in the Thai fishery and accounted for 90% of the small tuna catch. In Malaysia, 25% of the catch is made by this gear, the major fishery being by troll boats. In 1989, species composition of the small tuna catch was as follows: 50% longtail tuna (Thunnus tonggol) and 25% of kawakawa (Euthynnus affinis) and frigate tuna (Auxis thazard) respectively. This paper attempts to assess potential interactions between main fleets by estimating fishing mortality coefficients using a length-based pseudo-cohort analysis. A simulation model is then used to evaluate the impact of modifications in fishing mortalities on the production. To avoid overestimating fishing mortalities from the model, an emigration rate was included as from a certain size. Expected gains in production and CPUE predicted by the simulation model are low. The model also predicts that reducing the fishing mortality vector of Thai luring purse seines would increase the catch of the other fleets on kawakawa and frigate. This increase could attain 25% on the total kawakawa catch if the Thai tuna purse seine fishing mortality were increased at the same time.

Preliminary assessment of interactions between Indian Ocean yellowfin tuna fisheries

Bertignac,-M.

B (Book); K (Conf PROCEEDINGS-OF-THE-5TH-EXPERT-CONSULTATION-ON-INDIAN-OCEAN-TUNAS,-MAHE,-SEYCHELLES,-4-8-OCTOBER,-1993. FAO-UNDP-Indo-Pacific-Tuna-Development-and-Management-Programme,-Colombo-Sri-Lanka COLOMBO-SRI-LANKA IPTP 1994 no. 8 pp. 209-211

IPTP-COLLECT.-VOL. no. 8

A Ricker type simulation model was used to assess interactions between fisheries for yellowfin tuna (Thunnus albacares) in the Indian Ocean. The yield per recruit could thus be obtained from a variation in fishing mortality by fleet. Fishing mortality coefficients obtained during the workshop on stock assessment of Yellowfin tuna in the Indian Ocean held in Colombo, Sri Lanka, in October 1991 were used as input. The fleets selected were purse seiners, allocated to Purse Log when fishing on drifting logs and Purse School when fishing on free swimming schools, longliners, artisanal Maldives and Sri Lanka fisheries and Oman type fleets. In the simulation, two fleets seem to have significant impact on the total production. A doubling of longline and purse school fishing mortality coefficients could result in an increase of 20% in the production, whereas a reduction in their fishing mortality could lead to a decreased of 20 to 30%. The Oman type has, to a lesser extent, the same effect. The gains or losses to expect are about 5%. Large interactions are predicted by the model between longliners and purse seiners' fishing on school fish. A decrease in the fishing mortality vector of the Purse School fleet could result in a 20 to 30% increase in the catch of longline fleet. This study underlines the limitations in using a spatially aggregated model. High interactions between purse seines and longlines as predicted by the model have not been observed in reality. The introduction of a spatial dimension could be the next development in such a simulation model.

Current research on tunas in India

James,-P.S.B.R.; Pillai,-P.P.

B (Book); K (Conf PROCEEDINGS-OF-THE-5TH-EXPERT-CONSULTATION-ON-INDIAN-OCEAN-TUNAS,-MAHE,-SEYCHELLES,-4-8-OCTOBER,-1993. FAO-UNDP-Indo-Pacific-Tuna-Development-and-Management-Programme,-Colombo-Sri-Lanka COLOMBO-SRI-LANKA IPTP 1994 no. 8 pp. 199-201

IPTP-COLLECT.-VOL. no. 8

India with a coastline of 7,517 km long and with a total EEZ of 2.02 million km super(2) holds considerable scope for capture fisheries, especially the oceanic fishes such as tunas, billfishes and pelagic sharks. The Central Marine Fisheries Research Institute (ICAR) and the Fishery Survey of India (Ministry of Food Processing Industries) are the main organizations in India currently involved in the collection, analyses and dissemination of data on coastal and oceanic tuna fishery. The CMFR Institute, with 11 Research Centres and 28 field stations all along the coastline provides gear-wise and species-wise catch of tunas and other related species-wise catch of tunas and other related species collected through well accepted multi-stage, stratified random sampling technique. The 'National Marine Living Resource Data Centre' (NMLRDC) of the Institute acts as a storage centre of fishery data from many sources and disseminates the processed data to the Government and users. The Fisheries Survey of India at the four Zonal Bases at Mormugao, Cochin, Madras and Visakhapatnam, and three small bases at Porbunder, Bombay and Port Blair are aimed at studies on exploration, development and management of deep sea fishery resources, including tunas, billfishes and pelagic sharks, through surveys and technical research, the results of which provide the Government with scientific information for the formulation of deep sea fishery policy and development plans.

Artisanal tuna fishery statistics in Hormuzgan, Islamic Republic of Iran

Razmjoo,-H.

B (Book); K (Conf PROCEEDINGS-OF-THE-5TH-EXPERT-CONSULTATION-ON-INDIAN-OCEAN-TUNAS,-MAHE,-SEYCHELLES,-4-8-OCTOBER,-1993. FAO-UNDP-Indo-Pacific-Tuna-Development-and-Management-Programme,-Colombo-Sri-Lanka COLOMBO-SRI-LANKA IPTP 1994 no. 8 pp. 243-246

IPTP-COLLECT.-VOL. no. 8

Tunas form a large part of the marine artisanal fishery production from southern Iran in the Persian Gulf and in the Gulf of Oman. The coast of Hormuzgan province has been divided into 5 statistical strata: Lengeh, Qeshm Island, Bandar Abbas, Kolahi and Jask. Since 1991, field recorders have been stationed in 14 main landing sites in these strata. Data on catch and effort by species are collected for a sample of the landings. Longtail tuna Thunnus tonggol is the dominant species in the tuna catches of Hormuzgan province, followed by the 2 species of seerfish Scomberomorus guttatus, S. commerson and by yellowfin tuna Thunnus albacares. The oceanic species, yellowfin tuna, skipjack Katsuwonus pelamis and billfishes are almost exclusively caught in the eastern stratum, Jask, on the Gulf of Oman. The neritic tunas are caught in all strata. A sudden switch occurs between catches of longtail and yellowfin in the outer stratum, Jask, in August-October. A similar switch has been registered by scientists of the IFRTO in Cistan-Baluchistan province. This could be due to fishermen targeting yellowfin, rather than the neritic tunas, when this species is available. It could also indicate a movement of the neritic tunas into the Persian Gulf where catches of these species increase in this season. Interview of fishermen in Jask may help to elucidate this feature. Detailed analysis of length-frequencies by landing sites and tagging studies may also provide a picture of tuna migrations.

Does tuna school size depend on fish size?

Dagorne,-L.; Petit,-M.; Hallier,-J.P.; Cayre,-P.; Simier,-M.

B (Book); K (Conf PROCEEDINGS-OF-THE-5TH-EXPERT-CONSULTATION-ON-INDIAN-OCEAN-TUNAS,-MAHE,-SEYCHELLES,-4-8-OCTOBER,-1993. FAO-UNDP-Indo-Pacific-Tuna-Development-and-Management-Programme,-Colombo-Sri-Lanka COLOMBO-SRI-LANKA IPTP 1994 no. 8 pp. 183-187

IPTP-COLLECT.-VOL. no. 8

The aim of this study is to examine French purse seiner data in the Indian Ocean from 1984 to 1991 in order to study the relationship between the tuna size and the tuna school size. Purse seiners were chosen because catches can be considered as schools. The species studied are yellowfin tuna (Thunnus albacares), albacore tuna (Thunnus alalunga), bigeye tuna (Thunnus obesus) and skipjack tuna (Katsuwonus pelamis). Only free schools are studied. School sizes are evaluated in number of individuals which compose the school. Nonparametric statistics are computed to test if, for each fish weight class, the number of individuals in the schools varies. The results show that there are significant differences between classes, so it can be considered that tuna school size depends on fish size. While the fish size is increasing, the school size is decreasing. Some assumptions are advanced to explain this tendency. It appears that for yellowfin tuna, the evolution of the school size could be linked to access to new types of preys.

The Maldivian tuna tagging programmes

Waheed,-A.; Anderson,-R.C.

B (Book); K (Conf PROCEEDINGS-OF-THE-5TH-EXPERT-CONSULTATION-ON-INDIAN-OCEAN-TUNAS,-MAHE,-SEYCHELLES,-4-8-OCTOBER,-1993. FAO-UNDP-Indo-Pacific-Tuna-Development-and-Management-Programme,-Colombo-Sri-Lanka COLOMBO-SRI-LANKA IPTP 1994 no. 8 pp. 211-216

IPTP-COLLECT.-VOL. no. 8

A tuna tagging programme was carried out in the Maldives in 1990 from local pole-and-line vessels. A total of 9,941 fish were tagged, of which 81% were skipjack (Katsuwonus pelamis) and 19% yellowfin (Thunnus albacares). Information obtained on movements and attrition rates is summarized. Little information on growth was obtained because of poor length-at-recapture data. A second tuna tagging programme was started in the Maldives in September 1993. It is planned to tag at least 7,000 skipjack and yellowfin over an 18 month period. Based on findings and recommendations of the first programme, it is planned: (a) to tag more 'offshore' skipjack, (b) to carry out some tetracycline injecting, (c) to carry out some double tagging and (d) to obtain better recapture data.

[Statistics and estimators in the purse seine tropical tuna fisheries. Report of the ORSTOM working group meeting, Paris, 2-5 July 1991.]

Pianet,-R.

B (Book); K (Conf PROCEEDINGS-OF-THE-5TH-EXPERT-CONSULTATION-ON-INDIAN-OCEAN-TUNAS,-MAHE,-SEYCHELLES,-4-8-OCTOBER,-1993. FAO-UNDP-Indo-Pacific-Tuna-Development-and-Management-Programme,-Colombo-Sri-Lanka COLOMBO-SRI-LANKA IPTP 1994 no. 8 pp. 264-266

IPTP-COLLECT.-VOL. no. 8

For more than 20 years, ORSTOM scientists have developed elaborate procedures for compiling and processing tropical tuna statistics in the Atlantic and then Indian oceans. However, sampling design and methods of evaluation of biological parameters were often based on empirical choices, and statistical systems have tended in recent years to evolve more and more independently between both oceans. Therefore, comparison between the methods used and revaluation of their validity appeared necessary and lead to recommendations from the Scientific Committee of the "Association Thoniere" (Commission de l'Ocean Indien) as well as from the Standing Committee on Research and Statistics of the International Commission for the Conservation of Atlantic Tunas. Consequently, ORSTOM organized from 2nd to 5th July 1991, at its head office in Paris, a Working Group on "Statistics and Estimators in the Purse seine Tropical Tuna Fisheries" (GTS), gathering 28 scientists and technicians directly involved in this research, in order to compare the different approaches used and to define a common optimal strategy of work. Discussions were based on seventeen documents (Appendix III), and enriched from further analyses carried out at the meeting (the French and Spanish databases in the Atlantic and Indian oceans being available until 1990) in order to test the working methods or hypotheses.

Considerations of stock structure of yellowfin tuna (Thunnus albacares) in the Indian Ocean based on fishery data

Nishida,-T.

B (Book); K (Conf PROCEEDINGS-OF-THE-5TH-EXPERT-CONSULTATION-ON-INDIAN-OCEAN-TUNAS,-MAHE,-SEYCHELLES,-4-8-OCTOBER,-1993. FAO-UNDP-Indo-Pacific-Tuna-Development-and-Management-Programme,-Colombo-Sri-Lanka COLOMBO-SRI-LANKA IPTP 1994 no. 8 p. 147

IPTP-COLLECT.-VOL. no. 8

Yellowfin (Thunnus albacares)stock structure in the Indian Ocean was studied by using industrial tuna longline fishery data. Time-series data of test variables were compiled for six sub-areas that were arranged by dividing the whole region systematically along longitude lines every 20 degrees. Patterns of time-series trends were graphically and statistically compared to classify homogeneous sub-area groups. Two assumptions were (a) that homogeneous stocks exist longitudinally and overlap in adjacent waters, and (b) that test variables within homogeneous sub-area groups are equally affected, and hence patterns of the time-series trends are similar. After graphical screening for significant sub-area groups, analysis of covariance was applied to test homogeneity of regression parameters representing patterns of the time-series trends. The $P < 0.50$ level was recognized as a useful criterion for 'weak' test variables since masked or vague structures at the $P < 0.05$ level were likely cleared at this level in many cases. Results of this study and past stock structure studies were reviewed and compared. It was concluded that there are 2 major and 2 minor stocks of yellowfin tuna. The 2 major stocks (the western and the eastern) are located at 40 degree -90 degree E and 70 degree -130 degree E respectively. The minor stocks are the far western and the far eastern stocks (the latter possibly being a part of the Pacific stock), which are located westward of 40 degree E and eastward of 110 degree E respectively.

Catch and landing statistics of the Mauritian tuna fisheries (1987-1992) and an analysis of the skipjack tuna catch of the Mauritian purse seine fishery (1987-1992)

Norungee,-D.; Venkatasami,-A.; Lim-Shung,-C.

B (Book); K (Conf PROCEEDINGS-OF-THE-5TH-EXPERT-CONSULTATION-ON-INDIAN-OCEAN-TUNAS,-MAHE,-SEYCHELLES,-4-8-OCTOBER,-1993. FAO-UNDP-Indo-Pacific-Tuna-Development-and-Management-Programme,-Colombo-Sri-Lanka COLOMBO-SRI-LANKA IPTP 1994 no. 8 pp. 266-273

IPTP-COLLECT.-VOL. no. 8

An examination is made of statistics of the tuna fisheries of the Mauritius during the period 1987-92. The following statistics are summarized: 1) tuna landing statistics of longliners during the past 6 years; 2) tuna catch statistics of the Mauritian artisanal fishery (1985-91); 3) landing statistics of the Mauritian purse seiners from 1987 to 1992; 4) analysis of the catch and effort statistics, spatial distribution and size frequencies of skipjack tuna (Katsuwonus pelamis) from the purse seine fishery (1987-92).

An analysis of length-frequencies of Thunnus albacares in Iranian waters

Firoozi,-A.; Carrara,-G.

B (Book); K (Conf PROCEEDINGS-OF-THE-5TH-EXPERT-CONSULTATION-ON-INDIAN-OCEAN-TUNAS,-MAHE,-SEYCHELLES,-4-8-OCTOBER,-1993. FAO-UNDP-Indo-Pacific-Tuna-Development-and-Management-Programme,-Colombo-Sri-Lanka COLOMBO-SRI-LANKA IPTP 1994 no. 8 pp. 95-102

IPTP-COLLECT.-VOL. no. 8

It is estimated that 3,236 t of yellowfin tuna (Thunnus albacares) were landed in Iran in 1991. Catches of yellowfin in Iranian waters are limited to the area of the Gulf of Oman and show a marked seasonality. Since 1990, length-frequencies and other biological information were collected on a sample of 5,453 yellowfin tunas at the landing sites of Jask and Chabahar. The results obtained show a differential growth between smaller and larger individuals for both sexes, with an acceleration of growth above 75 cm. For larger individuals, the results show a faster growth rate for males than females. The preponderance of females in the intermediate lengths and the higher proportion of males in the last length classes would seem to confirm a differential growth, with males growing larger than females. The analysis of the monthly sex ratios and monthly mean lengths show that females enter the fishery in higher numbers at the beginning of the fishing season. The length-frequency distributions for both sexes show a preponderance of the large individuals in the first four months of the fishing season. From December onward, the proportion of younger fish is higher than that of older ones. The analysis of the gonad index does not show any spawning activity taking place for fish sampled from the Iranian tuna fishery.

Preliminary assessment of the narrow-barred Spanish mackerel stock off Oman using catch-at-age data obtained from length-frequency distributions by the Bhattacharya method

Bertignac,-M.; Yesaki,-M.

B (Book); K (Conf PROCEEDINGS-OF-THE-5TH-EXPERT-CONSULTATION-ON-INDIAN-OCEAN-TUNAS,-MAHE,-SEYCHELLES,-4-8-OCTOBER,-1993. FAO-UNDP-Indo-Pacific-Tuna-Development-and-Management-Programme,-Colombo-Sri-Lanka COLOMBO-SRI-LANKA IPTP 1994 no. 8 pp. 88-95

IPTP-COLLECT.-VOL. no. 8

Normal distributions, assumed to be age classes, were readily identified by the Bhattacharya method in length-frequency distributions of narrow-barred Spanish mackerel (Scomberomorus commerson) from Oman and Saudi Arabia. The age structure of catches from Oman produced by the Bhattacharya method were then input in an age-structured model to assess the status of the stock. Three cohorts were particularly strong between 1985 and 1987. These cohorts were heavily exploited in 1987 and 1988, which could explain the high level of catch during those 2 years. In 1989, the drop in the catch to 11,093 tonnes could be explained by the low numbers of recruits after 1987 and of survivors from the cohorts of 1985, 1986 and 1987. A yield per recruit analysis and short-term projections were also carried out to show the possible development of the fishery. If the present situation is maintained, the yield per recruit at equilibrium will be 1.05 kg. With a recruitment equal to the average for the years 1987 to 1989, this would correspond to a production at equilibrium of 6,599 tonnes, which is less than those of the years 1987 to 1989. It seems therefore impossible in the long term to sustain those past productions with this average recruitment. At tc=0.25 (present situation), only 8% increase in yield would be obtained with a doubling of fishing mortality. At constant fishing mortality, the same yield would be obtained with an increase in the age at first capture to 1 year. Simulations were conducted assuming recruitment at the 1989 level and at the average for the 1987-89 interval. The results confirm the drop in the catch predicted by the long-term model.

The virtual population analysis of Indian albacore stock

Lee,-Y.C.; Liu,-H.C.

B (Book); K (Conf PROCEEDINGS-OF-THE-5TH-EXPERT-CONSULTATION-ON-INDIAN-OCEAN-TUNAS,-MAHE,-SEYCHELLES,-4-8-OCTOBER,-1993. FAO-UNDP-Indo-Pacific-Tuna-Development-and-Management-Programme,-Colombo-Sri-Lanka COLOMBO-SRI-LANKA IPTP 1994 no. 8 pp. 107-116

IPTP-COLLECT.-VOL. no. 8

The Indian Ocean albacore (Thunnus alalunga) stock is analyzed to discuss the age structure and exploited status using virtual population analysis model (VPA). The results revealed that: (1) The exploited age groups of the longline fishery were from age 1 to age 8+, and targeted at the medium and old fishes. (2) The exploited age groups of gillnet fishery were also from age 1 to age 8+, and heavily targeted at the age 3 and 4 groups. (3) There was no clear relationship between the estimated stock number and longline CPUE from 1980 to 1985. However, from 1986 to 1991, the relationship between the estimated stock number, longline CPUE, and gillnet CPUE showed similar trends, i.e., the longline CPUE and gillnet CPUE can be used as stock indices of Indian Ocean albacore well from 1986 to 1991. (4) Because a lot of age 3 group was caught by surface fisheries in 1986, the estimated stock number of age 4 sharply decreased in 1987. At the same time, a lot of age 4 group was also caught by surface fisheries in 1986 and 1987, so the estimated stock number of age 5 sharply decreased in 1987 and 1988, respectively. It is concluded that the VPA analytical model can explain the stock exploitation and fluctuation of Indian Ocean albacore very well.

Purse seine fishery on floating objects: What kind of fishing effort? What kind of abundance indices?

Hallier,-J.P.

B (Book); K (Conf PROCEEDINGS-OF-THE-5TH-EXPERT-CONSULTATION-ON-INDIAN-OCEAN-TUNAS,-MAHE,-SEYCHELLES,-4-8-OCTOBER,-1993. FAO-UNDP-Indo-Pacific-Tuna-Development-and-Management-Programme,-Colombo-Sri-Lanka COLOMBO-SRI-LANKA IPTP 1994 no. 8 pp. 192-198

IPTP-COLLECT.-VOL. no. 8

A discussion is presented on the use of floating logs as a means of locating and catching tunas in the Western Indian Ocean purse seine fisheries; an average of 50% of the catch is made on tuna schools associated with floating objects (logs). The use of an abundance index to determine fishing effort for use in fishing strategy and fishery management is discussed, considering in particular the Somali Basin area.

The status of Indian Ocean albacore stock -- a review of previous work

Hsu,-C.C.

B (Book); K (Conf PROCEEDINGS-OF-THE-5TH-EXPERT-CONSULTATION-ON-INDIAN-OCEAN-TUNAS,-MAHE,-SEYCHELLES,-4-8-OCTOBER,-1993. FAO-UNDP-Indo-Pacific-Tuna-Development-and-Management-Programme,-Colombo-Sri-Lanka COLOMBO-SRI-LANKA IPTP 1994 no. 8 pp. 117-124

IPTP-COLLECT.-VOL. no. 8

The article attempts to review the biological information and evaluation of the Indian Ocean albacore (Thunnus alalunga) stock. The stock was traditionally exploited by Japanese, Korean and Taiwanese. The Taiwanese, in particular, exploited the stock by both longline gear and gillnet gear. However, gillnet was banned completely from the end of 1992. Since 1984, French, Spanish and Ivory Coast purse seiners have incidentally taken immature albacor. Therefore, the stock is mainly exploited by longline gear and purse seine for the time being. Reviewing previous work, the Indian Ocean albacore could be assumed to be one stock, and the evaluation of the stock status could be based on this assumption. Recently, studies were done by the age-structured models and using alternative assumptions in production models. The results of those studies reveal that the Indian Ocean albacore stock was highly exploited, especially by gillnetters during the late 1980's. The fishing effort of gillnetters markedly decreased and the stock biomass has gradually recovered since 1991. With the ban of gillnetting in the Indian Ocean, the stock is exploited by longline gear only, and the recovery of stock biomass is to be expected. Therefore, the Indian Ocean albacore stock could maintain its sustainable level under the current exploitation conditions following 1992.

An ASPIC analysis of Indian Ocean bigeye tuna stock

Hsu,-C.C.; Chang,-H.C.

B (Book); K (Conf PROCEEDINGS-OF-THE-5TH-EXPERT-CONSULTATION-ON-INDIAN-OCEAN-TUNAS,-MAHE,-SEYCHELLES,-4-8-OCTOBER,-1993. FAO-UNDP-Indo-Pacific-Tuna-Development-and-Management-Programme,-Colombo-Sri-Lanka COLOMBO-SRI-LANKA IPTP 1994 no. 8 pp. 124-128

IPTP-COLLECT.-VOL. no. 8

An ASPIC model developed by Prager (1991) was applied to the time series catch and effort data from 1975 to 1990 for the Indian Ocean bigeye tuna (Thunnus obesus) stock in order to evaluate the influence of production on the current status of the stock. Two fisheries involved in the exploitation of the study stock were the longline and purse seine fisheries. Only 3 sets of longline data from Japanese, Korean and Taiwanese were considered in the ASPIC analysis because the series of purse seine fishery data may not be considered as valid abundance indices due to the by-catch situation. The series of 1975-1990 was used for 2 reasons: the Japanese actually targeted on by deep longlining, and the catch was high from 1975 onward. Three longline data series were standardized by general linear model with year, season and subarea factors. The CPUEs show that Japanese and Korean series had a similar tendency, but the Taiwanese series was lower than both, as bigeye were not really targeted and data may be mixed with conventional longline effort. In the application of generalized surplus production models to assessing fish population, it has often been assumed that the stock is in equilibrium condition. Factually, in the real fishing state, the stock is rarely in equilibrium (Gulland 1983). In general, for the convenience of computation, the equilibrium was always assumed. This assumption leads to apparent overestimates of maximum sustainable yield (MSY) as a whole (Punt et al. 1991), which results in stock size decreasing. To date, most of the assessments for the bigeye species in the Indian Ocean were pursued using equilibrium global production models, such as Miyabe and Koido (1985), Miyabe (1988) Miyabe and Suzuki (1990) and Chang (1993), etc. In this document, the traditional surplus production model was abandoned, while an ASPIC algorithm (Prager 1991) is pursued without equilibrium assumption and without pooling different abundance indices to evaluate production parameters of the Indian Ocean bigeye tuna stock.

Tuna fisheries in Sri Lanka -- present trends

Dayaratne,-P.

B (Book); K (Conf PROCEEDINGS-OF-THE-5TH-EXPERT-CONSULTATION-ON-INDIAN-OCEAN-TUNAS,-MAHE,-SEYCHELLES,-4-8-OCTOBER,-1993. FAO-UNDP-Indo-Pacific-Tuna-Development-and-Management-Programme,-Colombo-Sri-Lanka COLOMBO-SRI-LANKA IPTP 1994 no. 8 pp. 16-21

IPTP-COLLECT.-VOL. no. 8

This paper describes the present trends in the tuna fisheries in Sri Lanka based on the results of the NARA/IPTP sampling programme conducted during the period 1989-1991. The main gears used were gill nets, with other combinations such as longlines and handlines contributing to around 80% of the total effort. There had been a concentration of effort in the west due to lack of infrastructure facilities in the south-west and north-west. There is a trend towards increased trip duration in the tuna fishing fleet. More than 30% of the fleet in the west conducts fishing for more than 6 days at sea, some even staying out for 18-20 days. The production from the west increased 200% in 1991 when compared to 1989, while that of the south has shown a 65% increase. The highest catch rate for 3.5 t craft type was estimated at 452.6 kg/boat night in the south in 1991. The catch rates for all craft/gear combinations were low in 1990, but in 1991 all these combinations showed higher catch rates. The catch rates in the south were generally higher than those of other areas. With the increase in the use of combination gear with the gill nets and the shift of the fishing area to offshore deeper waters the species composition of the large pelagic catches has changed, with a high percentage of sharks in the large pelagic catches.

The recent trend for Malaysian tuna fisheries in the Indian Ocean

Bidin,-R.; Hassan,-B.R.

B (Book); K (Conf PROCEEDINGS-OF-THE-5TH-EXPERT-CONSULTATION-ON-INDIAN-OCEAN-TUNAS,-MAHE,-SEYCHELLES,-4-8-OCTOBER,-1993. FAO-UNDP-Indo-Pacific-Tuna-Development-and-Management-Programme,-Colombo-Sri-Lanka COLOMBO-SRI-LANKA IPTP 1994 no. 8 pp. 12-15

IPTP-COLLECT.-VOL. no. 8

The Taiwanese tuna longline vessels, which landed their catches in Penang, Malaysia were monitored. The sampling activities were carried out beginning in July 1992. Their landings, species composition and length frequency were monitored by taking random samples. The trend in annual landings is quite stable and not much different in terms of volume for the last two years. Two main species of oceanic tuna were found in the catches, Yellowfin (Thunnus albacares) and Bigeye tuna (T. obesus). In 1992, Yellowfin tuna became the dominant species, with up to 72.5% of the total landings. Another 11.1% was comprised of bigeye tuna and 16.4% of other tuna like species and a few species of sharks. Results also indicate that yellowfin were larger than bigeye tuna.

Further studies on biological aspects of yellowfin tuna in the Indian EEZ

Sudarsan,-D.; John,-M.E.

B (Book); K (Conf PROCEEDINGS-OF-THE-5TH-EXPERT-CONSULTATION-ON-INDIAN-OCEAN-TUNAS,-MAHE,-SEYCHELLES,-4-8-OCTOBER,-1993. FAO-UNDP-Indo-Pacific-Tuna-Development-and-Management-Programme,-Colombo-Sri-Lanka COLOMBO-SRI-LANKA IPTP 1994 no. 8 pp. 135-140

IPTP-COLLECT.-VOL. no. 8

Biological research on yellowfin tuna (Thunnus albacares) is of recent origin in India. Based on samples obtained in oceanic longline surveys in Indian waters, some of the biological aspects are studied. Results of studies during the period June 1991 to June 1993 are presented. The length-weight relationship is estimated, based on a larger sample size. Length frequencies indicated differential distribution pattern in different regions, seasons and years. Studies on sex ratio confirmed the earlier observation on preponderance of males in larger length groups. Gonad index as well as group maturity values showed that spawning season is mainly from January to April. Year-to-year as well as regional variability was observed in the reproductive indices. Gut content studies showed that squids are the most dominant prey species followed by crabs and teleost fishes. Seasonal variability was observed in the food composition.

On discoveries of the crocodile shark, Pseudocarcharias kamoharai (Pseudocarchariidae), in the Equatorial Indian Ocean

Romanov,-E.V.; Samorov,-V.V.

J (Journal-Article) J.-ICHTHYOL.;VOPR.-IKHTIOL. 1994;1994 vol. 34, no. 4, pp. 155-157;vol. 34, no. 1, pp. 122-123

Verifiable finds of the crocodile shark, Pseudocarcharias kamoharai, in the Indian Ocean are known only for the Mozambique Straits (D'Aubrey, 1964; Bass et al., 1975). A report of the discovery of this species in the Bay of Bengal is in error (Compagno, 1984). Until now, this species had not been reported from the equatorial part of the Indian Ocean. On 2 July 1987, a specimen of P. kamoharai was caught in a pelagic tuna net at 3 degree 22' S and 62 degree 18' E at a depth between 72 and 211 m. This specimen is a female weighing 6.0 kg with an overall length of 1077 mm. It is preserved at Southern Research Institute of Marine Fisheries and Oceanography.

Larval cestode parasites from scombrid fishes of the Visakhapatnam coast, Bay of Bengal

Murugesh,-M.

J (Journal-Article) RIV.-PARASSITOL. 1995 vol. 56, no. 3, pp. 371-380

During the course of a survey on helminth parasites of scombrid fishes from the Visakhapatnam Coast, Bay of Bengal, a number of larval cestodes belonging to three orders, 6 families and 7 genera were recovered. The cysts were dissected out in freshwater and left till the larvae everted out completely. They were flattened and fixed in formaldehyde-acetic acid-alcohol (AFA) and stained in alum carmine. Diagrams were drawn using a camera lucida and measurements are given in micrometers. A total of 1,222 Scombrid hosts belonging to 11 species distributed over 7 genera in 4 different tribes were examined. They include Rastrelliger kanagurta (299 examined), R. faughni (25), Scomberomorus commerson (225), S. guttatus (150), S. lineolatus (3), Sarda orientalis (10), Auxis thazard (27), A. rochei (6), Katsuwonus pelamis (10), Euthynnus affinis (452) and Thunnus tonggol (15). As all the cestodes collected were larval stages and considered ubiquitous, no attempt was made to evaluate them using ecological terminology.

Report of the 6th Expert Consultation on Indian Ocean Tunas. Colombo, Sri Lanka, 25-29 September 1995

B (Book); K (Conf 1995 67 pp

The Report is presented under the following major headings: 1) Review of national fisheries; 2) Review of status of stocks and tuna biology; 3) Tagging studies; 4) Progress made in data collection systems; and 5) Any other matters, conclusions and recommendations.

The fecundity of skipjack tuna (Katsuwonus pelamis) from the western Indian Ocean.

Stequert,-B.; Ramcharrun,-B.

J (Journal-Article) AQUAT.-LIVING-RESOUR.-RESSOUR.-VIVANTES-AQUAT. 1995 vol. 8, no. 1, pp. 79-89

Using ripe ovaries from 281 females with fork lengths ranging from 43 to 73 cm, the batch fecundity of the skipjack tuna (Katsuwonus pelamis) from the western part of the Indian Ocean has been studied. The Gilson's fluid, used as a preservative and dissociative agent for oocytes, has a strong and fast action (5 days) on the shrinkage of these oocytes. Counts made with a Dollfus box on sub-samples of dissociated oocytes show that, within a single sexual maturity period (February), the fecundity of the skipjack tuna is the same whatever the geographic area: (Mozambique Channel and South of Seychelles islands). On the other hand, although a sexual activity is noted for skipjack tuna throughout the year, the individual fecundity changes with the season within a single area. The individual batch fecundity changes from 80000 eggs for a 44 cm female caught along the northwestern coast of Madagascar to 1.25 million of eggs for a large female (75 cm) caught around the Seychelles islands. The corresponding relative batch fecundity varies from 40 to 130 eggs/g body weight. For this species, four successive spawnings per year have been estimated.

Some new and known species of the genus Didymocystis Ariola, 1902 (Trematoda: Didymozoidae) from scombrid fishes of the Visakhapatnam coast, Bay of Bengal

Murugesh,-M.; Madhavi,-R.

J (Journal-Article) SYST.-PARASITOL. 1995 vol. 31, no. 1, pp. 11-24

Nine species of didymozoid trematodes referable to the genus Didymocystis Ariola, 1902 are reported from scombrid fishes of the Visakhapatnam coast, Bay of Bengal, India. They are: Didymocystis wedli from Thunnus tonggol; D. dissimilis from Katsuwonus pelamis; D. alalongae from T. tonggol; D. superpalati from T. tonggol; D. bifurcata from T. tonggol; D. oesophagicola from T. tonggol; D. pinnicola from K. pelamis; D. exiguus from Auxis thazard and Euthynnus affinis; and a new species, D. guttatus, from Scomberomorus guttatus. The genera Lagenocystis Yamaguti, 1970, Oesophagocystis Yamaguti, 1970 and Didymosulcus Pozdnyakov, 1990 are synonymised with Didymocystis. The synonymies of Univitellodidymocystis Yamaguti, 1970 and Didymocystoides Yamaguti, 1970, but not Coeliodidymocystis Yamaguti, 1970, with Didymocystis, as proposed by Pozdnyakov (1990), are accepted. Didymocystis bifasciatus (Yamaguti, 1970) is considered a synonym of D. alalongae Yamaguti, 1970 and D. philobranchia Yamaguti, 1970 of D. bifurcata Yamaguti, 1970. Of the nine species reported, eight constitute new reports from the Bay of Bengal. A key to the species of Didymocystis from scombrid fishes of the Visakhapatnam coast is presented.

Seychelles tuna bulletin. First quarter 1995

B (Book); N (Num SEYCHELLES-TUNA-BULL. MAHE-SEYCHELLES SFA 1995 38 pp

Statistics are presented regarding the tuna catches of Seychelle purse seiners and longliners fishing in the western Indian Ocean during the first quarter of the year 1995.

Seychelles tuna bulletin. Third quarter 1994

B (Book); N (Num SEYCHELLES-TUNA-BULL. MAHE-SEYCHELLES SFA 1995 26 pp

Catch statistics are presented regarding the purse seiners and longliners fishing for tuna in the Western Indian Ocean for the year 1994, including data for the period January-September.

[Surface temperature of the ocean and tuna migrations: Proposal of a new tool to utilize tagging-recapture data.]

Dagorn,-L.; Stretta,-J.M.; Petit,-M.

J (Journal-Article); COLLECT.-VOL.-SCI.-PAP.-ICCAT-RECL.-DOC.-SCI.-CICTA-COLECC.-DOC.-CIENT.-CICAA 1995 vol. 44, no. 3, pp. 278-288

Tuna are known to be able to travel long distances. Tagging data show these long movements. Two movement models are proposed, in relation to sea surface temperature map animations from the Indian Ocean, in order to try to reproduce these extensive tuna movements. Tagging data could not be concurrent with SST animations. Then, artificial tagging data were obtained from French purse seine fishery data, especially for the movement of the fishery from the Mozambique Channel to the Seychelles Islands between May and July. School positions represent artificial tagging data. The first model uses ethological knowledge, i.e. the search of thermal fronts. In some cases, this model creates some northern movements from the Mozambique Channel, but cannot be used to reproduce movements between the Mozambique Channel and the Seychelles Islands. A second model is created where tuna behavior is modelled by an artificial neural network, where the adjustments are done by a genetic algorithm. The school network receives daily information from its local environment and chooses itself its actions in order to be able to pass from the Mozambique Channel to the Seychelles Islands at the appropriate time. One neural network emerges and represents adaptive behavior able to interpret daily SST variations to mimic tuna movements. This artificial behavior can be generalized to each departure position from the Mozambique Channel (from fishery data) and this new tool is then discussed.

Seychelles tuna bulletin. Fourth quarter 1994

B (Book); N (Num SEYCHELLES-TUNA-BULL. VICTORIA-SEYCHELLES SFA 1995 37 pp

Catch statistics are presented for the purse seiners and longliners fishing for tuna in the Western Indian Ocean during the fourth quarter of 1994. The catch and effort data included are based on daily fishing log returns from the fishing vessels.

Seychelles tuna bulletin. Second quarter 1995

B (Book); N (Num SEYCHELLES-TUNA-BULL. VICTORIA-SEYCHELLES SFA 1995 39 pp

Catch statistics are presented for purse seiners and longliners fishing for tunas in the Western Indian Ocean for the second quarter of the year 1995. The data used are based on daily catch and effort returns from fishing vessels licensed to fish in the Seychelles EEZ.

Atlas of industrial tuna fisheries in the Indian Ocean

Ardill,-J.D.

B (Book); N (Num COLOMBO-SRI-LANKA FAO 1995 138 pp

Catch and effort data of industrial tuna catches in the Indian Ocean are presented in graphical format. The atlas is divided into 3 sections, corresponding to the major industrial gear types: 1) Longline; 2) Purse seine; and 3) Gillnet. The first 2 sections include data up to the year 1993, and the third covers data up to the year 1991.

Antibiotic activity of marine algae against multi-antibiotic resistant bacteria

Mahasneh,-I.; Jamal,-M.; Kashashneh,-M.; Zibdeh,-M.

J (Journal-Article) MICROBIOS 1995 vol. 83, no. 334, pp. 23-26

The antibiotic activity of six species of marine algae (Rhodophyta, Phaeophyta and Chlorophyta) against multi-antibiotic resistant (MAR) bacteria was investigated. The study shows that various degrees of activity were present in 18 out of the 24 algal extracts. The highest activity was for Rhodophyta (diameter of the inhibited zone ranged from 10-22 mm), whilst the lowest was for Chlorophyta (8-12 mm). The taxonomic trends were seen between extracts, as the best solvents were found to be ether, methanol and acetone for Rhodophyta, Phaeophyta and Chlorophyta, respectively. The importance of these results on public health are discussed.

Indian Ocean data summary, 1983-1993

B (Book); N (Num IPTP-DATA-SUMM. COLOMBO-SRI-LANKA IPTP 1995 no. 15, 124 pp

Annual nominal tuna catch and fishery fleet statistics for the Indian Ocean region are provided for the year 1993. The statistics are presented by species, by gear, by country, by year, species, country and gear, and also by species, country, year, gear and area.

Stock structure of the southern bluefin tuna Thunnus maccoyii: An investigation based on probe microanalysis of otolith composition

Proctor,-C.H.; Thresher,-R.E.; Gunn,-J.S.; Mills,-D.J.; Harrowfield,-I.R.; Sie,-S.H.

J (Journal-Article) MAR.-BIOL. 1995 vol. 122, no. 4, pp. 511-526

Analysis of the chemistry of calcified tissues has been suggested to be a source of useful information on the population structure and environmental history of fishes. We have investigated this approach as a means of determining the number of spawning areas and diversity of migration routes in the large pelagic scombrid, Thunnus maccoyii (southern bluefin tuna). Analysis was based on ontogenetic variation in the composition of sagittal otoliths, as measured using two probe microanalysers (wavelength dispersive electron probe microanalysis and proton-induced X-ray emission microanalysis), of 9 larvae collected on the single known spawning ground (NE Indian Ocean), of 29 juveniles caught at different points along the known migration routes (off western Australia, southern Australia, and South Africa), and of 14 adults caught in the high-seas fishery (off SE Australia). Fifteen elements were detected in T. maccoyii sagittae, but only six (Ca, Na, Sr, K, S, and Cl) were consistently present at concentrations above minimum detection limits. No attempt was made to measure the concentrations of C, N and O, which are assumed to also be present. Comparisons among different samples indicated that: (1) variation in the composition of the otolith primordium was unimodal and, generally, normally distributed; (2) this composition varied among specimens as a function of their size or, apparently, year-class; (3) individuals collected from widely separated locations did not differ clearly in the composition of the most recently deposited sections of their otoliths; and (4) all variation in the composition of adult otoliths was encompassed in the range of variation of juveniles collected along the major known migration route. These observations are consistent with the hypothesis of a single spawning area for T. maccoyii, but also indicate that the range of environmentally correlated variation in composition is too low to provide a robust test of the diversity of migration routes. It is not clear why this variation is so low, but we suspect that it reflects both the relative homogeneity of the pelagic environment and a weak effect of environmental factors on the concentration of elements present in otoliths at levels greater than or approximate to 1 ppm.

Back to binoculars! -- for spotting on latest French purser

J (Journal-Article) FISH.-NEWS-INT. 1996 vol. 35, no. 9, vp

The 67.3 metre and 1200 cu. metre capacity Avel Vad, France's latest tuna seiner to be built for the Indian Ocean, is relying on mast-top visual shoal spotting to go catching from East Africa to Magascar.

On the geographical distribution of some marine fish along the Indian coasts

Kunjipalu,-K.K.

J (Journal-Article) INDIAN-J.-FISH. 1996 vol. 43, no. 1, pp. 79-86

The geographical distribution of some commercially important marine fishes along the Indian coasts is presented with reference to the results of four cruises of FORV Sagar Sampada. Pelagic species like tuna, seer fish, barracuda and sharks are distributed throughout the Indian coasts. But some other species of both demersal and semi pelagic habit namely oil sardine, lesser sardines, mackerel, Bombay duck, ghol(jew fish) and Hilsa spp. have restricted distribution along these coasts. But, of late, mackerel has been reported from grounds on the northeast and northwest coasts of India, which are beyond the normal limits of pelagic fishery zones for mackerel, and are caught in demersal trawls. The reported occurrence of a deep sea sciaenid Atrobucca marleyi on the northwest coast and unusual abundance of balistids along with some other fishes indicated a continuity of ichthyofauna of east African coast to the Indian coast, which supports the theory of existence of a continuous and contiguous land mass between Africa and India in the prehistoric period and subsequent separation and drifting of land masses apart. Different types of distribution like continuous, discontinuous, divergent, lateral and spatial are also discussed.

Some interaction issues in the fisheries for tunas and tuna-like fishes of the Indian Ocean

Bertignac,-M.; Ardill,-D.

B (Book); K (Conf STATUS-OF-INTERACTIONS-OF-PACIFIC-TUNA-FISHERIES-IN-1995.-PROCEEDINGS-OF-THE-SECOND-FAO-EXPERT-CONSULTATION-ON-INTERACTIONS-OF-PACIFIC-TUNA-FISHERIES.-SHIMIZU,-JAPAN,-23-31-JANUARY-1995. Shomura,-R.S.;Majkowski,-J.;Harman,-R.F.-eds. 1996 no. 365 pp. 67-83

FAO-FISH.-TECH.-PAP. no. 365

Increases in the catch of tunas and tuna-like fishes of the Indian Ocean have raised concerns about interactions between major fisheries exploiting those species. After a short presentation of the fisheries and their recent evolution, the paper reviews the main interactions as they currently appear. Each interaction issue is classified according to the type of competition which exists: fisheries catching the fish at the same stage of their life cycle in the same general area; fisheries exploiting fish at 2 different stages of their life cycle; and, fisheries exploiting the same stock in 2 different areas. Past and current work conducted to assess interactions are described and proposals are made for future studies. These include the development of models incorporating movement, the implementation of tagging experiments and increase in the collection of statistical data from coastal fisheries.

Oceanographic research in relation with tuna fisheries assessment: The regional tuna project of the "Commission de l'Ocean Indien"

Marsac,-F.

B (Book); K (Conf Present-and-Future-of-Oceanographic-Programs-in-Developing-Countries,-Vienna-and-Honolulu. Durvasula,-S.V.-rho-ed. Visakhapatnam-India Andhra-University 1996 no. 3 pp. 158-175

Andhra-Univ.-Oceanogr.-Mem. no. 3

This paper presents results of research carried out in a regional project implemented by the "Commission de l'Ocean Indien" in the Western Indian Ocean. Focusing on tuna resources which are economically important and shared by the island countries of the region, emphasis is laid on the environmental effects affecting tuna distribution and catchability, for better assessment and utilization of these resources. Complementary means were developed, such as satellite imagery and in situ measurements (coastal stations, oceanographic cruises, drifters) compiled in detailed oceanographic databases. Therefore, the hydroclimatological changes recorded in the Indian Ocean during the past 14 years can be analyzed. It confirms the strong links between the ENSO events generated in the Central Pacific Ocean and warm events detected in the Western Indian Ocean. In particular, SST and depth of the thermocline are affected, with higher than normal temperature and deepening of the mixed layer during the El Nino years. The consequence of such anomalies on yellowfin tuna distribution is also investigated. As for recruitment, a negative effect of strong wind-induced mixing is suggested, but likely with only limited impact at the level of the stock, due to the spawning strategy of tuna (wide distribution, multiple egg releases during a single spawning season). In addition, the catchability is much affected by the changes in depth of the thermocline. When the mixed layer is being drastically reduced, the catch per unit effort on adult yellowfin tuna is much increased. From the example of the Tuna Regional Project of the "Commission de l'Ocean Indien", the author points out the great benefit of a research coordinated at a regional level by ad-hoc organizations. This type of cooperation can provide a capacity building in fully accordance with realistic development policies, so that each country becomes able to comply with the responsibility of surveying and monitoring resources and environment.

Process for the establishment of the Indian Ocean Tuna Commission

Kambona,-J.J.; Marashi,-S.H.

B (Book); W (Law- FAO-FISH.-CIRC. 1996 no. 913, 53 pp

This circular provides information on the establishment of the Indian Ocean Tuna Commission (IOTC). The need to establish a management body for Indian Ocean tuna was identified in the late 1960's and the process to realize this objective began in earnest in 1986 and ended with the adoption of the Agreement for the Establishment of the Indian Ocean Tuna Commission by the FAO Council in 1993. In 1989, a Conference to adopt the Draft Agreement was held in Rome but decided that further work on the text was needed. The two outstanding issues at this stage were the question of membership of the European Community in the future Commission and the extent of autonomy to be granted to such a body. Following the amendments to the FAO Basic Texts by the FAO Conference in November 1991, a Second Conference was held in Rome in June 1992. The Conference, subject to the clarification of some issues, reached broad agreement on the Text of a Draft Agreement. The Draft Agreement was finally approved by the FAO Council on 25 November 1993. The Agreement was circulated for acceptance in March 1994 and entered into force on 27 March 1996 upon the receipt of the Tenth instrument of acceptance by the Director-General of FAO.

A simulation model of tagging experiments for yellowfin tuna in the western Indian Ocean

Bertignac,-M.

B (Book); K (Conf STATUS-OF-INTERACTIONS-OF-PACIFIC-TUNA-FISHERIES-IN-1995.-PROCEEDINGS-OF-THE-SECOND-FAO-EXPERT-CONSULTATION-ON-INTERACTIONS-OF-PACIFIC-TUNA-FISHERIES.-SHIMIZU,-JAPAN,-23-31-JANUARY-1995. Shomura,-R.S.;Majkowski,-J.;Harman,-R.F.-eds. 1996 no. 365 pp. 162-177

FAO-FISH.-TECH.-PAP. no. 365

A simulation model of tagging experiments of yellowfin tuna (Thunnus albacares) in the western Indian Ocean was developed. Discrete movements of fish occurring in a 5 degree -square grid are described by a diffusion parameter. Monte-Carlo data sets were created to estimate confidence limits on the parameters estimated by the model (natural mortality, catchability and diffusion rate). Several levels of number of tagged fish and location of releases were tested. The development of a scheme including 2 fisheries permitted the calculation of marginal interaction parameters and their precision. For that purpose, a second model dealing with the entire population of yellowfin was also developed. As expected, preliminary results indicate that the precision of the parameters is related to the recovery rate, and that it is better to tag fish in the area with high fishing mortality. Tagging about 10,000 fish should be sufficient to obtain a precision of 10% on all parameters when only one fishery is included in the model. With two fisheries, releasing fish in both fisheries seems the best alternative if good precision is expected on all parameters simultaneously. If tagged fish are released in only one fishery, the precision on the catchability of the other fishery remains low, even with a large number of fish released (up to 20,000). Tagging enough fish in the affected fishery also seems important if the impact of one fishery on the other is to be assessed with great precision through marginal interaction coefficients. The impact of adding randomness to the reporting rate was also tested and showed that this parameter can have a strong impact on the precision of the catchability coefficient.

Monitoring landings of Taiwanese tuna longliners at Penang Harbour

Chee,-P.E.; Khoo,-S.K.

B (Book); K (Conf STATUS-OF-INTERACTIONS-OF-PACIFIC-TUNA-FISHERIES-IN-1995.-PROCEEDINGS-OF-THE-SECOND-FAO-EXPERT-CONSULTATION-ON-INTERACTIONS-OF-PACIFIC-TUNA-FISHERIES.-SHIMIZU,-JAPAN,-23-31-JANUARY-1995. Shomura,-R.S.;Majkowski,-J.;Harman,-R.F.-eds. 1996 no. 365 pp. 260-266

FAO-FISH.-TECH.-PAP. no. 365

Foreign fishing boats, particularly Taiwanese tuna longliners, are attracted to Penang because of its strategic location in the Straits of Malacca and the support of good port and communication facilities. Monitoring of the total landings of tuna by Taiwanese tuna longliners began in 1990. From mid-1992 until the end of 1993, the monitoring of tuna landed and transshipped through Penang was done more systematically with the financial support of the Indo-Pacific Tuna Development and Management Programme (IPTP). From this monitoring programme, information on total catch, species composition, and size information of the major tuna species. i.e. yellowfin tuna (Thunnus albacares, was compiled. The seasonality of fishing activities, fishing grounds and fishing vessel information were documented. The increase in longlining for yellowfin in the eastern Indian Ocean may cause possible interactions among tuna fisheries in other parts of the Indian Ocean. The information collected from this monitoring programme is important since without this documentation, a good part of the information relating to the exploitation of the tuna resources in the Indian Ocean will not be known.

Influence of purse seine fishery on longline fishery for yellowfin tuna (Thunnus albacares) in the western Indian Ocean

Nishida,-T.

B (Book); K (Conf STATUS-OF-INTERACTIONS-OF-PACIFIC-TUNA-FISHERIES-IN-1995.-PROCEEDINGS-OF-THE-SECOND-FAO-EXPERT-CONSULTATION-ON-INTERACTIONS-OF-PACIFIC-TUNA-FISHERIES.-SHIMIZU,-JAPAN,-23-31-JANUARY-1995. Shomura,-R.S.;Majkowski,-J.;Harman,-R.F.-eds. 1996 no. 365 pp. 363-380

FAO-FISH.-TECH.-PAP. no. 365

The influence of the industrial purse seine tuna fishery on the industrial longline fishery in the western Indian Ocean is examined. The 2 basic analyses carried out include a study of the temporary-spatial fluctuations of CPUE and size of yellowfin tuna (Thunnus albacares) caught by the longline fishery before and after the start of the purse seine fishery in 1982 and a study of the relationship of the longline CPUE and the purse seine catch. The results of these studies suggest that the influence of the purse seine fishery on the longline fishery is only moderate in areas of intensive purse seine fishing and that there appears to be no apparent influence of the purse seine fishery on the longline fishery outside the immediate area of intensive purse seine fishing.

Interactions between surface and longline fisheries for southern bluefin tuna based on recent tagging results: The implications of reporting rates

Polacheck,-T.; Hearn,-W.; Whitelaw,-W.

B (Book); K (Conf STATUS-OF-INTERACTIONS-OF-PACIFIC-TUNA-FISHERIES-IN-1995.-PROCEEDINGS-OF-THE-SECOND-FAO-EXPERT-CONSULTATION-ON-INTERACTIONS-OF-PACIFIC-TUNA-FISHERIES.-SHIMIZU,-JAPAN,-23-31-JANUARY-1995. Shomura,-R.S.;Majkowski,-J.;Harman,-R.F.-eds. 1996 no. 365 pp. 477-513

FAO-FISH.-TECH.-PAP. no. 365

Little direct evidence exist for large interactions between surface (purse seining and pole-and-line fishing) and longline fisheries for tunas. Results are presented from recent and ongoing tagging experiments carried out in Western Australian waters on southern bluefin tuna, Thunnus maccoyii (SBT), and compared with tagging results from the 1980s. In contrast to results obtained in the 1980s, the most recent tagging experiments suggests rapid and significant interchange of fish between the 2 fisheries as evidenced both by the relative recovery rates from the 2 types of gear and by the spatial and temporal distributions of the recoveries. Results are also presented for a limited number of SBT tagged and released from longline vessels indicating that substantial mixing occurs not only from surface fisheries into the longline fisheries but from longline fisheries into surface fisheries. The results do not support any previous speculations that the surface and sub-surface fish may constitute biologically or behavioural different components of the stock. The difference in the results from this most recent tagging program and previous ones appears to be due to increased reporting rates from longline vessels as the result of very substantial tag recovery efforts which have included extensive direct contact between vessels and scientists, observers or tag liaison personnel. Thus, over 85% of the tag recoveries from Japanese longlining are the result of such direct contacts prior to vessels returning to Japan. However, comparison of tag recovery rates from longline vessels with and without observers in the same area and season suggests that recovery rates are still below 100%. Overall, the results emphasize the critical need for well developed and extensive tag recovery programs if results from large scale tagging programs are to be used to investigate and measure interactions between fisheries. Low return rates from longline vessels should not be used as an indication of lack of interaction or lack of potential for interactions between surface and longline fisheries without a careful assessment on reporting rates.

Indian ocean tuna news

B (Book) Indian-Ocean-Tuna-News Colombo-Sri-Lanka IPTP 1996 no. 9-12, vp

The publication provides short news articles regarding the activities conducted in the Indian Ocean region related to the Indo-Pacific Tuna Programme (IPTP).

Seychelles tuna bulletin. Second quarter 1996

B (Book); N (Num SEYCHELLES-TUNA-BULL. VICTORIA-SEYCHELLES SFA 1996 39 pp

Statistics are presented regarding the tuna catches of Seychelle purse seiners and longliners fishing in the western Indian Ocean during the second quarter of the year 1996.

Seychelles tuna bulletin. First quarter 1996

B (Book); N (Num SEYCHELLES-TUNA-BULL. MAHE-SEYCHELLES SFA 1996 38 pp

Statistics are presented regarding the tuna catches of Seychelle purse seiners and longliners fishing in the Western Indian Ocean during the first quarter of the year 1996.

On some species of Halimeda Lamour. from Indian waters

Sundararajan,-M.; Selvaraju,-C.; Krishnamurthy,-V.

J (Journal-Article) SEAWEED-RES.-UTILISATION 1996 vol. 18, no. 1-2, pp. 21-33

Three species of Halimeda, H. distorta, H. tuna and H. discoidea, collected from Tamil Nadu Coast of India and one species, H. macroloba from Andaman Islands are described in detail. H. distorta (Yamada) Hillis is a new record from India.

[Report of the IPTP Meeting on Indian Ocean Tunas (Colombo, 23-29 September 1995) (SCRS/95/10)]

Fonteneau,-A.

J (Journal-Article); COLLECT.-VOL.-SCI.-PAP.-ICCAT-RECL.-DOC.-SCI.-CICTA-COLECC.-DOC.-CIENT.-CICAA. 1996 vol. 45, no. 3, pp. 334-337

A summary is provided of the major conclusions reached at the IPTP Meeting, which covered the following topics: 1) Fishery statistics; 2) Environment; 3) Biology and state of the stocks -- yellowfin, skipjack, bigeye, albacore, southern bluefin.

Reproduction of skipjack tuna (Katsuwonus pelamis) from the Western Indian Ocean

Stequert,-B.; Ramcharrun,-B.

J (Journal-Article) AQUAT.-LIVING-RESOUR.-RESSOUR.-VIVANTES-AQUAT. 1996 vol. 9, no. 3, pp. 235-247

A detailed description of the different stages of oocytes development and the developmental phases of the ovary of the skipjack tuna (Katsuwonus pelamis) are provided during several annual reproductive cycles. Skipjack tuna were sampled from commercial catches in two distinct areas of the Western Indian Ocean from February 1989 to February 1994. Samples were collected, either on board tuna purse seiners (1656 fish), or at the tuna cannery of Mauritius (4387 fish). Size at first maturity for females is 41-42 cm fork-length, and for males 42-43 cm, corresponding approximately to 1.5-year-old fish. The monthly variation of the proportion of different maturity stages of gonads assessed by visual examination shows that, whatever the month, there are always 70% of sampled females which have ovaries in the terminal stage of maturation (stage IV). The variations of the gonadosomatic index indicate that spawning of this species occurs all year round with some periods of more intense sexual activity. Histological examination of 737 ovaries indicates that postovulatory follicles (indicator of a recent spawning) are basically present during the two monsoon seasons, Northwest monsoon (from November to March) and Southeast monsoon (from the beginning of June to the end of August). The percentage of ovaries with atretic follicles is maximun during the two intermonsoon seasons (April-May and September-October). For all the period covered by this study and for the two sampled areas, the number of males is significantly greater than the number of females. The monthly variations of sex-ratio indicate that the predominance of males is more pronounced during the intense spawning periods.

Interactions of longtail tuna fisheries in the western South China Sea

Yonemori,-T.; Yanagawa,-H.; Pong,-L.Y.

B (Book); K (Conf STATUS-OF-INTERACTIONS-OF-PACIFIC-TUNA-FISHERIES-IN-1995.-PROCEEDINGS-OF-THE-SECOND-FAO-EXPERT-CONSULTATION-ON-INTERACTIONS-OF-PACIFIC-TUNA-FISHERIES.-SHIMIZU,-JAPAN,-23-31-JANUARY-1995. Shomura,-R.S.;Majkowski,-J.;Harman,-R.F.-eds. 1996 no. 365 pp. 514-529

FAO-FISH.-TECH.-PAP. no. 365

Longtail tuna (Thunnus tonggol) inhabit the coastal waters from the western Pacific Ocean to the northwestern Indian Ocean. The species mainly occurs in waters of northern Australia, East and South China Sea and North Indian Ocean (including the Red Sea and Gulf of Aden). In the South China Sea area, longtail tuna are found in abundance in the Gulf of Thailand and along the east coast of Peninsula Malaysia. Longtail tuna are caught by Thai purse seine and drift gillnet fisheries and by Malaysian purse seine, drift gillnet and hook-and-line fisheries. The total catch of longtail tuna from this general area has increased rapidly from 14,300 mt landed in 1980 to more than 100,000 mt in recent years; the increase has been the result of a dramatic increase in Thai purse seine landings. Presently about 90% of the longtail tuna catch is from the purse seine fisheries. Intensive exploitation of longtail tuna by the purse seine fishery in the western part of the South China Sea (especially in the Gulf of Thailand) indicates a possible interaction between the purse seine fishery and other fisheries. This view is suggested by recent decreasing trends in CPUE in all of the other fisheries targeting longtail tuna in the area.

Age and growth of yellowfin tuna, Thunnus albacares, from the western Indian Ocean, based on otolith microstructure

Stequert,-B.; Panfili,-J.; Dean,-J.M.

J (Journal-Article) FISH.-BULL. 1996 vol. 94, no. 1, pp. 124-134

Microincrements of otoliths of 151 yellowfin tuna, Thunnus albacares, caught in the western Indian Ocean by French and Mauritian purse seiners were used to establish growth curves. On the basis of comparisons among several otolith preparations (transverse or oblique sections, acetate replicas of the external face) and two methods of examination (light microscopy and scanning electron microscopy), we chose to observe transverse otolith sections in light microscopy to estimate age in days. The von Bertalanffy growth curve, FL = 272.7 (1 -e super(-0.176(t + 0.266))), where FL = fork length in cm and t in years, is very similar to those obtained by other investigators. It does not support the hypothesis that yellowfin tuna of the eastern Atlantic Ocean and the western Indian Ocean have two growth stanzas. Back-calculated dates of spawning show that yellowfin tuna spawn successfully throughout the year, but principally between November and March.

Community based fisheries management in Egodauyana (Panadura)

Fernando,-H.S.G.

B (Book); K (Conf REPORT-AND-PROCEEDINGS-OF-THE-SRI-LANKA-FAO-NATIONAL-WORKSHOP-ON-DEVELOPMENT-OF-COMMUNITY-BASED-FISHERY-MANAGEMENT.-COLOMBO,-3-5-OCTOBER-1994. Morris,-M.J.;Masamichi-Hotta;Atapattu,-A.R.-eds. 1996 pp. 104-112

The inshore waters around the village of Egodauyana, near Panadura on Sri Lanka's west coast, have plentiful fish resources because of the rocky environment. The live bait fishery and other fisheries depending on it (the pole and line skipjack tuna, Katsuwonus pelamis, fishery and the hand-line demersal fishery) are the main traditional fisheries in the area. The live bait fishery supplies the others with red bait (Dipterygynotus leucogrammicus), caught in inshore coastal waters, and prawn, caught in fish traps in the Panadura river. The community has developed its own informal self-management system, mainly to protect the red bait resource. Unwritten norms prohibit the capture of immature fish. If these are caught, the fishery may be closed for a fixed period. The use of certain types of gear is banned and sanctions re-imposed on those breaking the rules. Measures are also taken to protect the prawn. However, the local management system cannot cope with certain problems, such as pollution and the use by non-local fishermen of gear that is banned by the local community. Thus the responsibility for fisheries management in Egodauyana should be shared between the local community and the Government.

Age and growth of juvenile southern bluefin tuna Thunnus maccoyii based on otolith microstructure

Itoh,-Tomoyuki; Tsuji,-Sachiko

J (Journal-Article) FISH.-SCI. 1996 vol. 62, no. 6, pp. 892-896

We examined the possibility that growth increments in otolith of southern bluefin tuna Thunnus maccoyii are deposited daily and investigated the growth in the juvenile stage of this species. Among samples collected from off the west and southwest coast of Australia between 1990 and 1993, otoliths of 122 fish from 247 to 820 mm FL were observed under SEM. The number of increments of these otoliths ranged from 78 to 877. The following findings support the daily deposition of increments: 1) The features of increments in the nucleus region were the same as those of larvae which were verified as daily increments, 2) The back-calculated date of first increment deposition corresponded well with the spawning period, and 3) Growth of tag-recapture fish agreed with that from otolith examination assuming daily deposition. Growth of this species in the juvenile stage was linear and 0.761 mm/day. Estimated sizes were 508 mm FL at age 1 and 786 mm FL at age 2, which was much larger than previously estimated.

Seychelles tuna bulletin. Third quarter 1995

B (Book); N (Num SEYCHELLES-TUNA-BULL. MAHE-SEYCHELLES SFA 1996 38 pp

Catch statistics of purse seiners and longliners fishing tuna in the Seychelles EEZ, West Indian Ocean, are presented for the period January to September 1995.

Seychelles tuna bulletin. Fourth quarter 1995

B (Book); N (Num SEYCHELLES-TUNA-BULL. MAHE-SEYCHELLES SFA 1996 38 pp

Catch statistics are presented regarding the purse seiners and longliners fishing for tuna in the Western Indian Ocean for the year ending December 1995.

Indian Ocean tuna longliners

J (Journal-Article) FISH.-NEWS-INT. 1996 vol. 35, no. 5, vp

France's Indian Ocean-based low temperature longlining fleet has a new addition after French yard Chantiers Piriou of Concarneau completed the 32.8 metre long and 8.8 metre beam Sapmer. "This fishery involves freezing catches to -60 deg.C. for Japanese markets and is a relatively new one for French operators," Pascal Piriou, managing director of Chantiers Piriou, tells FNI.

Report of the tenth session of the Indian Ocean Fishery Commission. Mombasa, Kenya, 7-11 November 1994

B (Book); K (Conf FAO-FISH.-REP.-RAPP.-FAO-PECHES. ROME-ITALY FAO 1996 no. 530, 71 pp

This document is the final report of the Tenth Session of the Indian Ocean Fishery Commission, which was held in Mombasa, Kenya, from 7 to 11 November 1994. Major topics discussed were: current trends of fisheries in the Indian Ocean, sustainable use and conservation of marine living resources in the high seas focussing on recent developments in world fisheries and management of Indian Ocean Tuna, intersessional activities, the future of the Indian Ocean Fishery Commission, fisheries research needs and priorities in the Indian Ocean and collaboration with other organizations concerned with fisheries and environment matters in the Indian Ocean. The summary of the main recommendations and decisions is shown in Appendix I.

Tuna farming in South Australia

J (Journal-Article) WATER-FARM.-J. 1996 vol. 11, no. 5, pp. 3-4

The tuna farming industry in South Australia, already wrecked by a freak weather storm, is now swirling in the midst of a political storm. About 65,000 fish, worth an estimated $55 million, suffocated in their offshore cages last month when a storm stirred up sediment from the sea floor. Workers later removed about 1500 tons of dead fish from the cages. Industry critics immediately said the losses might have been caused by overstocking of the pens in Boston Bay, resulting in a buildup of feces and fish feed which killed sea grasses and depleted oxygen below the cages. One scientist said water flow in the bay was not sufficient to flush wastes from the cages and the wastes were a meter deep below the pens. Critics said the industry, which started in 1990, has been pushed by a "gold rash" mentality and has been allowed to grow without sufficient study. The Conservation Council, which has led the opposition to the pens, has demanded a full investigation and additional hearings on the state's pending aquaculture management plan. An industry official denied the overstocking charges and said the kill was simply the result of a natural disaster.

Formation of histamine in Indian mackerel, Rastrelliger kanagurta and mackerel tuna, Euthynnus affinis at ambient temperature 10 degree plus or minus 1 degree C and in ice

Vijayan,-P.K.; Balachandran,-K.K.

B (Book); K (Conf PROCEEDINGS-OF-THE-SECOND-WORKSHOP-ON-SCIENTIFIC-RESULTS-OF-FORV-SAGAR-SAMPADA. Pillai,-V.K.;Abidi,-S.A.H.;Ravindran,-V.;Balachandran,-K.K.;Agadi,-V.V.-eds. NEW-DELHI-INDIA DEPARTMENT-OF-OCEAN-DEVELOPMENT 1996 pp. 521-527

In mackerel, the formation of histamine was not significant up to a period of 10 hr at ambient temperature (26 degree C) reaching an average value of only 7.51 mg/100 g fish and increased significantly threafter. In iced mackerel the production of histamine was not significant throughout the storage period of 5 days, whereas at 10 degree C significant levels of histamine were recorded beyond 56 hr of storage. The pattern of histamine formation in mackerel tuna followed a similar trend. Significant levels of histamine were formed in fish stored beyond 14 hr at 28 degree C; while no significant levels of histamine were formed in samples stored at 10 degree C and in ice for 5 and 7 days respectively. Since histamine production is practically insignificant in ice stored fish, proper icing is the best and efficient method for preventing histamine in fish.

Comparison of standardized longline CPUE of albacore among the oceans and countries [SCRS/94/40]

Nakano,-Hideki

J (Journal-Article); COLLECT.-VOL.-SCI.-PAP.-ICCAT-RECL.-DOC.-SCI.-CICTA-COLECC.-DOC.-CIENT.-CICAA. 1996 vol. 43, pp. 273-275

The Japanese and Taiwanese albacore (Thunnus alalunga) CPUEs caught by longline fisheries are compared. For both countries CPUEs are at almost the same level in all oceans, although the levels between countries are quite different. The similarity of CPUE trends between the South Atlantic and Indian Oceans leads to some possibilities for inter-migration.

Optimum water temperatures for bigeye tuna in the Indian Ocean as seen from tuna longline catches

Mori,-Masahiko; Hanamoto,-Eiji; Takeuchi,-Shoichi

J (Journal-Article) NIPPON-SUISAN-GAKKAISHI 1996 vol. 62, no. 5, pp. 761-764

The present authors studied the optimum water temperature for bigeye tuna Thunus obesus by determining the in situ temperatures at the hook depths (i.e., the depths at which bigeye tuna were caught) by the use of tuna longline fishing and oceanographic data that bad been collected simultaneously in the Indian Ocean. The results indicated that the optimum water temperature for bigeye tuna ranges between 10 degree C and 16 degree C in the Indian Ocean, which is virtually identical to the finding of 10 degree C-15 degree C for this species in the Pacific Ocean. Moreover, the present results, were found to be considerably lower than the previously reported optimum water temperature of 20 degree C (derived from sea surface temperature data), by approximately 4 degree C-10 degree C. The present results also indicated that bigeye tuna have not been caught at depths where the temperatures were lower than 9 degree C or 10 degree C, indicating perhaps that they do not occur in waters of such low temperatures.

Report of the ninth session of the Committee for the Development and Management of the Fishery Resources of the Gulfs. Sharjah, United Arab Emirates, 6-9 April 1997

B (Book); K (Conf FAO-Fish.-Rep. Rome-Italy FAO 1997 no. 558, 33 pp

The ninth session of the Indian Ocean Fishery Commission's Committee for the Development and Management of the Fishery Resources of the Gulfs considered the following topics: intersessional activities of the 5 Working Groups established by the Committee; status of the major marine resources in the Gulfs and management needs; status of the fish trade activities in the Gulfs following the establishment of the World Trade Organization; review of the activities of regional bodies in fisheries matters in the Gulfs; future role of the Committee as an FAO regional fishery body and review of results and recommendations of the World Food Summit. The main decisions and recommendations of the meeting are summarized as follows: 1) improve the reporting of catch data and conduct randomized intensive sampling; 2) conduct ageing studies on Scomberomorus and cooperate and coordinate with the Indian Ocean Tuna Commission; 3) introduce bycatch reduction devices in the shrimp fishery and work at holding a session on regional oceanography; 4) to expand activities in aquaculture and establish a regional information system; 5) promote the preparation of a more detailed study of implications on the WTO; 6) continue to support cooperation with regional bodies concerned with fisheries and follow up the implementation of the shrimp and demersal surveys; 7) an in-depth study to be prepared on the options of restructuring the Committee for a Consultation to be held at FAO/RNE in Cairo in 6-8 months; and 8) strongly support the results and recommendations of the World Food Summit. A summary of the major recommendations is given in Appendix C. The Committee agreed to hold its next session in the Kingdom of Saudi Arabia tentatively before the end of 1999.

Seychelles tuna bulletin. First quarter 1997

B (Book); N (Num Seychelles-Tuna-Bull. 1997 41 pp

Statistics are presented regarding the tuna catches of Seychelle purse seiners and longliners fishing in the Western Indian Ocean during the first quarter of the year 1997.

Oceanographic conditions near the spawning ground of southern bluefin tuna; northeastern Indian Ocean

Matsuura,-Hiroshi; Sugimoto,-Takashige; Nakai,-Munenori; Tsuji,-Sachiko

J (Journal-Article) J.-Oceanogr. 1997 vol. 53, no. 5, pp. 421-433

Hydrographic surveys and surface current observations using satellite tracked buoys were conducted from December, 1992 to February, 1993, near the spawning ground of southern bluefin tuna, Thunnus maccoyii, in the water between Australia and Indonesia to study the larval feeding and transport environment. The surface of the observation area was covered by warm tropical water. Warm water was also observed along the west coast of Australia extending from the North West Cape. The thickness of the surface mixed layer was about 20 to 50 m and chlorophyll-a concentration in the surface mixed layer was very low. The subsurface chlorophyll maximum lay at 50-75 m. Surface geopotential anomalies along the meridional observation line west of Australia showed an eastward geostrophic flow. The trajectories of satellite tracked drifting buoys revealed a meso-scale dominating current with eddies of about 100-300 km in diameter with a weak mean westward current of about 6 cm/s. Horizontal dispersion coefficients estimated from the Lagrangian auto-correlation function increased almost linearly at first and became almost constant at about 3.6x10 super(3)m super(2)/s after about 6 days from release. The influx rate of larvae of southern bluefin tuna into the Leeuwin Current was evaluated with a simple diffusion/advection model based on the results of this observation.

Survey of elasmobranch fisheries and trade in Madagascar

Cooke,-A.J.

B (Book) The-trade-in-sharks-and-shark-products-in-the-western-Indian-and-southeast-Atlantic-Oceans Marshall,-N.T.;Barnett,-R. Nairobi-Kenya TRAFFIC-East-Southern-Africa 1997 pp. 101-130

Sharks, rays and sawfish are clearly important fisheries in Madagascar. They provide a local source of cash income, especially from the export of shark fins, and to a lesser extent, meat and oil. Production from Madagascar's shark fisheries have increased in the last decade, with sharks the subject of new targeted fisheries as well as becoming an increasingly valuable component of non-targeted fisheries and bycatch. This increase was largely driven by an increased demand for shark fin, and subsequent rise in prices paid to traditional fishers. Sharks also feature prominently as bycatch in both the pelagic tuna and coastal shrimp fisheries. The status of shark and other chondrichthyan populations has yet to be studied in any detail, with the result that there is no quantitative information on which to assess the conservation impact of current fisheries or other factors. It appears that the value of shark fin exports is being under-declared on export documentation. As a result, Madagascar may be losing an important source of foreign exchange. More comprehensive research on the status of shark populations in Madagascar is necessary in order to assess whether shark stocks are being affectd by current fishing levels. In addition controls on the export of shark products should be strengthened in order to ensure that currency regulations are adhered to and to provide information on the volume of products and species involved in international trade.

Report of the first session of the Indian Ocean Tuna Commission. Rome, Italy, 3-6 December 1996

B (Book); K (Conf FAO-Fish.-Rep. Rome-Italy FAO 1997 no. 551, 60 pp

At the first session of The Indian Ocean Tuna Commission, the Commission adopted Rules I to III, VI and X of its Rules of Procedure and deferred decision on the other rules. The Commission decided to establish a Scientific Committee pursuant to Article XII.I of the Agreement and assigned functions, composition, operation as well as financial responsibilities. The Commission furthermore decided that it was premature to create sub-commissions. Seychelles was selected to host the Secretariat of the Commission after voting by secret ballot. The Commission decided to defer decisions on the following matters to the First Special Session scheduled to be held from 24 to 26 March 1997: final adoption of the Rules of Procedure; adoption of the Financial Regulations; adoption of the Budget of the Commission; adoption of the scheme and scale of contribution; appointment of the Secretary of the Commission; relationship with other bodies; election of Officers for the biennium; the Kyoto Declaration and Plan of Action from the International Conference on Sustainable Contribution of Fisheries to Food Security.

The Maldivian tuna livebait fishery - status and trends

Anderson,-R.C.

B (Book); K (Conf Workshop-on-Integrated-Reef-Resources-Management-in-the-Maldives.-Male,-Maldives.-16-20-March,-1996. Nickerson,-D.J.-eds.;Maniku,-M.H.-eds. Madras-India BOBP 1997 pp. 69-92

The Maldivian livebait fishery is a traditional one that has been carried out for centuries. It is practiced throughout the country, and is the most important reef fishery in the Maldives. Current catches are of the order of 10,500t of livebait per year, which are used to catch almost 100,000t of tuna. Major management issues include livebait habitat destruction by coral mining, black coral collecting and as a result of livebait collection itself, the reportedly negative effects of reef fish fishing; the use of SCUBA diving gear and lights for livebait collection. There has been no concerted stock assessment, so the status of the Maldivian livebait resource is poorly known.

Workshop on Integrated Reef Resources Management in the Maldives. Male, Maldives. 16-20 March 1996

Nickerson,-D.J.-(eds.); Maniku,-M.H.-(eds.)

B (Book); K (Conf Madras-India BOBP 1997 312 pp

For much of the world's tropical population, coral reefs are synonymous with reef fish and edible marine invertebrates. Reef-related fisheries are important to small-scale fisherfolk, as a source of both protein and livelihood security for local coastal communities. In all of Asia, coral reef resources play a role in the food and livelihood security of coastal communities. Perhaps nowhere in Asia is this role more important than in the Maldives. The Republic of Maldives initiated IRRM to improve the management of its reef resources. IRRM is supported by BOBP and combines scientific and fisherfolk knowledge with the expertise and input of all Ministries with jurisdiction in areas impacting reef resources. Issue areas for management under IRRM include: 1) Reef fishery; 2) Bait fishery for the tuna pole and line fishery; 3) Coral mining; 4) Tourism and fishery interactions; and 5) Legal and institutional aspects of IRRM. The IRRM Workshop was convened to share scientific and socio-economic information on the 5 issue areas and to obtain a common understanding and agreement among the many government agencies, public interest groups and the private sector on the objectives and vision of the IRRN Programme. Participants examined the 5 issue areas and arrived at a consensus on recommendations to address each issue area. The abstracts of the papers presented at the Workshop are cited individually in this issue of ASFA.

Report of the first special session of the Indian Ocean Tuna Commission. Rome, Italy, 21-24 March 1997

B (Book); K (Conf FAO-Fish.-Rep. Rome-Italy FAO 1997 no. 554, 46 pp

The first special session of the Indian Ocean Tuna Commission adopted the scale and scheme of contributions, the budget and programme of work for 1997/1998, the procedure for the appointment of the Secretary and the Financial Regulations of the Commission. The Commission decided to discuss and approve its Rules of Procedure during its second regular session.

Time to step in... for Indian Ocean's new tuna commission

Steinman,-F.

J (Journal-Article) FISH.-NEWS-INT. 1997 vol. 36, no. 3, p. 4

The Indian Ocean Tuna Commission based in the Seychelles has been formed to protect important tuna and tuna-like species before the conservation bell tolls. Tremendous advances in fishing technology, coupled with a mounting value of catches in both domestic and export markets, have created heavy pressure on stock populations and their reproduction.

Summary status review for selected fisheries and fishery resources in the Southwest Indian Ocean (including Maldives)

Sanders,-M.J.

B (Book); K (Conf Report-of-a-Regional-Workshop-on-Fisheries-Monitoring,-Control-and-Surveillance.-Albion,-Mauritius,-16-20-December-1996. Rome-Italy FAO 1997 pp. 59-76

A review is made of information on selected fisheries and fishery resources in the Southwest Indian Ocean and the Maldives as a background to MCS (monitoring, control and surveillance) activities in the region. Emphasis is given to the exploitation of crustacean and large pelagic stocks -- shrimp, lobster, emperor fish and tuna resources are covered. The close-to-full exploitation of most of the fisheries in the region has been reflected by the implementation of more restrictive forms of management, and the associated increase of MCS activities. Recent development for achieving better management through MCS are highlighted.

Global population structure of yellowfin tuna, Thunnus albacares, inferred from allozyme and mitochondrial DNA variation

Ward,-R.D.; Elliott,-N.G.; Innes,-B.H.; Smolenski,-A.J.; Grewe,-P.M.

J (Journal-Article) FISH.-BULL. 1997 vol. 95, no. 3, pp. 566-575

Yellowfin tuna, Thunnus albacares, were sampled from one region of the Atlantic Ocean, two regions of the Indian Ocean, and six regions of the Pacific Ocean. One of the Indian Ocean collections could not be allozymically analyzed; the remaining eight collections were examined for four polymorphic allozyme loci (ADA, FH*, GPI-A*, and GPI-B*, n=540 to 677). All nine collections were examined for mitochondrial DNA variation (n=767), with two restriction enzymes (Bcl I and Eco RI) that detect polymorphic restriction sites in yellowfin tuna. Allele frequencies at three of the allozyme loci were homogeneous across collections, whereas GPI-A* showed highly significant differentiation (P<0.001). The GPI-A* data, taken together with the geographic location of the collections, suggested the existence of at least four yellowfin tuna stocks: Atlantic Ocean, Indian Ocean, west-central Pacific Ocean, and east Pacific Ocean. Mitochondrial DNA differentiation was more limited, but spatial heterogeneity of the 24 observed haplotypes over the nine regions (P=0.048) and three oceans (P=0.009) was significant. The mtDNA data did not differentiate west-central Pacific Ocean collections from east Pacific Ocean collections but did support the separation of Atlantic Ocean, Indian Ocean, and Pacific Ocean stocks.*

Fatal encephalitis due to the scuticociliate Uronema nigricans in sea-caged, southern bluefin tuna Thunnus maccoyii

Munday,-B.L.; O'-Donoghue,-P.J.; Watts,-M.; Rough,-K.; Hawkesford,-T.

J (Journal-Article) DIS.-AQUAT.-ORG. 1997 vol. 30, no. 1, pp. 17-25

A syndrome characterized by atypical swimming behaviour followed by rapid death was first reported in captive southern bluefin tuna Thunnus maccoyii (Castelnau) in the winter of 1993. The cause of this behaviour was found to be a parasitic encephalitis due to the scuticociliate Uronema nigricans (Mueller). Based on parasitological and histological findings, it is proposed that the parasites initially colonise the olfactory rosettes and then ascend the olfactory nerves to eventually invade the brain. Possible epidemiological factors involved in the pathogenesis of the disease include water temperature (<18 degree C) and the immune status of the fish.

70,000t fishery on Maldives atolls

J (Journal-Article) FISH.-NEWS-INT. 1997 vol. 36, no. 1, vp

One of the biggest artisinal tuna fisheries in the world is carried out in the Maldives where 60,000 tonnes of skipjack and up to 10,000 tonnes of yellowfin are taken each year by 800 boats. "The Maldivians have been fishing tuna for thousands of year and have used pole and line for the past 300 years," Steve Akester of fisheries consultant MacAlister Elliott and Partners tells FNI. This company, based at Lymington, England, carries out fisheries development and consultancy work on a worldwide basis. The Maldive tuna fishery is special, however, in that the atolls forming the chain of islands are the home to numerous coral reef associated shallow water species.

Vertical distribution of bigeye tuna in the Indian Ocean as seen from deep tuna longline catches

Mori,-Masahiko; Hanamoto,-Eiji; Nemoto,-Masao; Takeuchi,-Shoichi

J (Journal-Article) BULL.-JAP.-SOC.-FISH.-OCEANOGR. 1997 vol. 61, no. 1, pp. 10-17

The vertical distribution of bigeye tuna, Thunnus obesus, in the Indian Ocean was examined by using the proportion of catch on the various hooks of the deep tuna longline gear from date obtained between 1981 and 1986. The results showed that in the middle latitudes(lat.15 degree -25 degree S), as well as in the higher latitudes (south of lat.25 degree S) of the southern Indian Ocean, there were no discernible differences, by depth, in the vertical distribution of bigeye tuna. However, in the tropical region(north of lat.15 degree S), while there were some east-west variations, the distribution of bigeye tuna tended to increase with depth from 150m down to 280m, the deepest hook depth fished by the deep longline gear. Thus, in the various fishing grounds in the Indian Ocean, the data indicated that the bigeye tuna occur at very great depths, and that their vertical distribution most certainly extends beyond the maximum depth of 280m, reached by the deepest hook of the deep tuna longline gear.

Amino acids of some marine green algae of Okha Coast

Dave,-M.J.; Parekh,-R.G.

J (Journal-Article) SEAWEED-RES.-UTILISATION 1997 vol. 19, no. 1-2, pp. 21-24

Amino acids in free and combined state have been quantitatively estimated in three species of marine green algae viz., Halimeda tuna (Ell. & Sol.) Lamx., Spongomorpha indica Thivy & Vasalakshmi and Udotea indica collected from Okha Port, Gujarat, India. Two dimensional paper chromatographic technique was used for determination of aminoacids quantitatively.

The coelacanthe: a reprieve for a fossil ?

Plante,-R.

J (Journal-Article) Oceanorama-Inst.-Oceanogr.-Paul-Ricard 1997 no. 27, pp. 16-18

The discovery of a coelacanth at Anakao (Madagascar) has given a new glimmer of hope to biologists. The minds and eyes of the scientific community are now on the alert to track down these fish in other waters. Three coelacanths have been caught off the coast of South Africa. With the one caught at Anakao, that makes four. In 1995, our scientific campaign had confirmed the worst fears for one thing, the coelacanth population at Grand Comore was even smaller than had previously been thought: fewer than two hundred individuals at the time of our investigation; at the same time, coelacanth catches were on the increase. Towards the 1970s, the Fonds Europeen de Developpement (FED) and the French Scientific Cooperation organisation ORSTOM had developed a programme in the Comores aimed at offering local fishermen the means to fish in the open sea by trolling, by means of Fish Aggregation Devices (FADs), in waters 1000 to 2000 m deep. To make this possible, a parallel programme enabled fishermen to acquire seagoing canoes with outboard engines. The operation was a success. Deep sea fishes -- tuna, bonito, sailfish, big shark -- gathered under the FADs, providing the fishermen with an abundant and valuable resource, that was held in high esteem on the local market. This meant that the fishermen could give up one of their traditional fishing techniques: bottom fishing for the oilfish, Ruvettus pretiosus. It was while fishing for this species that they had accidentally caught coelacanth. All went well, and the catch rate of coelacanth had begun to drop encouragingly. But unfortunately, the FED programme was halted. The fishermen went back to fishing for oilfish, and the catch rate for coelacanth reached new heights: a dozen specimens a year caught at Grand Comore... for a total population of a few adults. This is a danger that could prove fatal, and in the short term. So what is to be done ? Ban bottom fishing altogether ? Obviously, that would be out of the question. Our feeling is that the battle must be waged on two fronts: by providing the fishermen with an alternative resource, by implanting FADs at intermediate depths closer to the coast than were the FED programme structures. The fishermen could come and fish there in simple paddle-powered canoes; by running educational campaigns which could dovetail with intelligent forms of tourism. The coelacanth has become a real symbol for the archipelago. Our aim is to set up a Coelacanth Park offering a range of facilities: information for tourists, educational facilities for local fishermen and villagers and research facilities for scientists from all over the world.

Seychelles tuna bulletin. Fourth quarter 1996

B (Book); N (Num Seychelles-Tuna-Bull. 1997 30 pp

Statistics are presented regarding the tuna catches of Seychelle purse seiners and longliners fishing in the western Indian Ocean during the fourth quarter of the year 1996.

Plasma vitellogenin and 17 beta -estradiol cycles in the skipjack tuna (Katsuwonus pelamis) of the western Indian Ocean

Stequert,-B.; Nunez-Rodriguez,-J.; Gunther,-A.; Bon,-E.; Le-Menn,-F.

J (Journal-Article) Aquat.-Living-Resour.-Ressour.-Vivantes-Aquat. 1997 vol. 10, no. 5, pp. 299-305

Vitellogenin (VTG) levels were measured in the plasma of 143 female skipjack tuna, Katsuwonus pelamis caught in the western Indian Ocean. These levels were correlated with the gonadosomatic index (GSI) and with plasma 17 beta -estradiol (E2) levels during the reproductive cycle. VTG and E2 levels were measured using a competitive immunoenzymoassay (ELISA) and a radioimmunoassay (RIA), respectively. VTG was purified from a pool of plasma obtained from females with high GSI using a double chromatography method (gel filtration and ion exchange). A specific antibody was obtained in rabbits. The VTG immunoenzymoassay developed gave an assay detection limit (90 % binding) of 15 ng.ml super(-1). Mean VTG levels ranged from 1.2 mg.ml super(-1) to 4 mg.ml super(-1). Mean monthly VTG values remained relatively elevated during the resting periods (1.2 mg.ml super(-1) in April and 1.9 mg.ml super(-1) in September), while maximum levels reached only 4 mg.ml super(-1) during the reproductive season. The highest GSI values were observed from November to March during the major reproductive season corresponding to the North monsoon and from early June to late August during the minor reproductive season corresponding to the East monsoon. Lowest GSI values were found in April-May and September-October. Mean E2 levels exhibited considerable variability among all females sampled ranging from 700 pg.ml super(-1) to 9 ng.ml super(-1). This study demonstrated that the sexual maturation was correlated with the monsoon seasons and that there was a positive correlation between monthly variations of GSI, VTG and E2 levels in the skipjack tuna population from the Western Indian Ocean.

Population dynamics of wandering albatross Diomedea exulans and Amsterdam albatross D. amsterdamensis in the Indian Ocean and their relationships with long-line fisheries: Conservation implications

Weimerskirch,-H.; Brothers,-N.; Jouventin,-P.

J (Journal-Article) BIOL.-CONSERV. 1997 vol. 79, no. 2-3, pp. 257-270

Studies carried out over the past three decades at Crozet and Kerguelen Islands in the Indian Ocean indicate that wandering albatross Diomedea exulans populations declined markedly, but since 1986 have shown slow recovery. The population of the endangered Amsterdam albatross Diomedea amsterdamensis appears to have similarly recovered since 1985, but remains close to extinction. A demographic study of the Crozet population indicates that the earlier decline was mainly the result of increased adult mortality, and secondarily of low recruitment. Satellite tracking studies of breeding birds and band recoveries of non-breeding birds indicate that during and outside the breeding season these populations are in contact with long-line fisheries, mainly the pelagic Japanese southern blue-fin tuna Thunnus maccoyii fishery and to a lesser extent the Patagonian tooth-fish Dissostichus eleginoiedes fishery operating on the Kerguelen shelf. Decreased fishing effort and a concentration outside the central Indian Ocean by the Japanese fishery during recent years has probably resulted in the slow recovery of these albatross populations as a result of improved adult survival and recruitment. Long-line fisheries still represent a major threat to great albatross populations, most of which are still declining in the Southern Ocean. Possible conservation measures to reduce mortality in the fishery and to reduce contacts between fishing units and foraging albatrosses are examined.

The tuna industry in the european market

Arnal-Monreal,-M.

B (Book); K (Conf International-tuna-conference-96:-Tuna-prospects-and-strategies-for-Indian-Ocean,-27-28-29-November-1996,-Mauritius.-LE-THON:-ENJEUX-ET-STRATEGIES-POUR-L'-OCEAN-INDIEN,-27-28-29-NOVEMBRE-1996,-MAURICE. Cayre,-P.-eds.;Le-Gall,-J.Y.-eds. Paris-France ORSTOM 1998 pp. 357-368

Colloq.-Semin.-Inst.-Fr.-Rech.-Sci.-Dev.-Coop.-

France, Spain and Italy are majors places and states for the production and consumption of tuna (raw, deepfrozen and canned products). The European Union (EU) is in charge of negociating tuna fishing licences and access rights for states members of the UE with the states members of the Indian Ocean Commission. A wide review of the concerned european policy is described giving original figures on monetary exchanges between European authorities (Fisheries department) and states from the concerned area ie south west indian ocean bordering countries.

Reproductive dynamics of southern bluefin tuna, Thunnus maccoyii

Farley,-J.H.; Davis,-T.L.O.

J (Journal-Article) Fish.-Bull. 1998 vol. 96, no. 2, pp. 223-236

We investigated the spawning dynamics of southern bluefin tuna, Thunnus maccoyii, using ovaries obtained from fish caught on the spawning ground in the northeast Indian Ocean and their main feeding grounds in the Southern Ocean, between October 1992 and June 1995. Only sexually mature southern bluefin tuna were taken on the spawning ground and were caught in every month except July, although relative abundance was low from May to August. Peaks in abundance occurred during October and February. Individuals do not spawn over the whole season, and there is a turnover of fish on the spawning ground. The presence of oocytes in all stages of development and the absence of a hiatus in the oocyte size-frequency distributions between unyolked and early yolked oocytes indicate that southern bluefin tuna have asynchronous oocyte development and indeterminate annual fecundity. The presence of either migratory nucleus or hydrated oocytes and postovulatory follicles in the ovaries of many females indicates that southern bluefin tuna are capable of multiple spawning. On the basis of the proportion of females with postovulatory follicles, it appears that females spawn on average every 1.1 days. The average spawning batch fecundity, estimated from counts of hydrated oocytes, was 6.0 million oocytes or 57 oocytes per gram of body weight.

Tuna longline fisheries and strategy of asiatic tuna fleets in the Indian Ocean

Doumenge,-F.

B (Book); K (Conf International-tuna-conference-96:-Tuna-prospects-and-strategies-for-Indian-Ocean,-27-28-29-November-1996,-Mauritius.-LE-THON:-ENJEUX-ET-STRATEGIES-POUR-L'-OCEAN-INDIEN,-27-28-29-NOVEMBRE-1996,-MAURICE. Cayre,-P.-eds.;Le-Gall,-J.Y.-eds. Paris-France ORSTOM 1998 pp. 237-272

Colloq.-Semin.-Inst.-Fr.-Rech.-Sci.-Dev.-Coop.-

Except for the traditionnal Maldive livebait skipjack fishery, Indian Ocean Tuna resources remained untapped until the deployment of longliners Japanese first, Taiwanese and South Korean next, who monopolised the catch during 30 years (1952-83). The distribution range of the four tuna species is well known to the Japanese who adapted their strategies during 1952-1965 as a function of the preference of their national market (Southern Bluefin and Bigeye) and the demand for exports (Albacore and Yellowfin), using Misaki, Tokyo, Yasui and Shimizu as the main market places. Competition from Taiwan and South Korean plus an explosion in prices induce strong hetics during 1966-1973. The adoption of deep long lines by the Koreans and the contrast between Japanese and Taiwanese marketing brought about many changes during 1974-1983. The deep 1983 market depression, which coincided with the introduction of the purse seiners, the launching of new tuna canneries in Thailand, political pressures from coastal and archipelagic states, brought to an abrupt end the monopoly of Asiatic long over Indian Ocean tuna fisheries.

Institutional framework for tuna managment in the Western Central Pacific: achievments and constraints

Tsamenyi,-M.; Aqorau,-T.

B (Book); K (Conf International-tuna-conference-96:-Tuna-prospects-and-strategies-for-Indian-Ocean,-27-28-29-November-1996,-Mauritius.-LE-THON:-ENJEUX-ET-STRATEGIES-POUR-L'-OCEAN-INDIEN,-27-28-29-NOVEMBRE-1996,-MAURICE. Cayre,-P.-eds.;Le-Gall,-J.Y.-eds. Paris-France ORSTOM 1998 pp. 413-432

Colloq.-Semin.-Inst.-Fr.-Rech.-Sci.-Dev.-Coop.-

The Central and Western Pacific Ocean (CWPO) comprise one of the greatest tuna fishing grounds in the world. Since the early 1990s, the region has accounted for over 50% of the world's supply of tuna for canning. The two organisations involved in tuna research and management in the region are the South Pacific Commission and the Forum Fisheries Agency. Although the combined efforts of the two organisations has produced some good results, there are still gaps in the institutional framework for tuna management in the region. The activities of the Forum Fisheries Agency, the main fisheries organisation in the region, do not cover all the States and territories in the CWPO region. This situation does not provide a sound framework for the sustainable management of tunas because of their highly migratory nature. The implementation of the United Nations Agreement of Straddling and Highly Migratory Fish Stocks will require cooperation among all the States and territories in the CWPO region and with distant water fishing nations operating in the region to manage the tuna stocks in the CWPO region.

Precautionary approach and tuna research: perspective from the 1995 UN agreement

Majkowski,-J.

B (Book); K (Conf International-tuna-conference-96:-Tuna-prospects-and-strategies-for-Indian-Ocean,-27-28-29-November-1996,-Mauritius.-LE-THON:-ENJEUX-ET-STRATEGIES-POUR-L'-OCEAN-INDIEN,-27-28-29-NOVEMBRE-1996,-MAURICE. Cayre,-P.-eds.;Le-Gall,-J.Y.-eds. Paris-France ORSTOM 1998 pp. 433-461

Colloq.-Semin.-Inst.-Fr.-Rech.-Sci.-Dev.-Coop.-

The precautionary approach represents a new strategic thinking about uncertainties in our knowledge of and the resulting risks for fishery resources, their environment and the related economic and social activities. The approach is likely to have substantial implications for conservation, fisheries management, operation, technology and research. New areas of desired research emphasis resulting from the adoption of the precautionary approach for tuna and tuna-like species are identified. The paper concentrates on new or rarely fulfilled requirements for research, particularly for stock assessment for target species, paying particular attention to reference points. The need for basic biological research and data collection is also emphasized, indicating studies of particular relevance. Such requirements are also addressed for non-target species and the habitat. The paper also provides research managers and scientists with some suggestions for implementing the approach for tuna and tuna-like species from the strategic and tactical point of view in the light of the present knowledge on tuna resources and the related fisheries.

Creating an agenda for research to support managment of fisheries for highly migratory species

Sibert,-J.

B (Book); K (Conf International-tuna-conference-96:-Tuna-prospects-and-strategies-for-Indian-Ocean,-27-28-29-November-1996,-Mauritius.-LE-THON:-ENJEUX-ET-STRATEGIES-POUR-L'-OCEAN-INDIEN,-27-28-29-NOVEMBRE-1996,-MAURICE. Cayre,-P.-eds.;Le-Gall,-J.Y.-eds. Paris-France ORSTOM 1998 pp. 397-412

Colloq.-Semin.-Inst.-Fr.-Rech.-Sci.-Dev.-Coop.-

The legal and political context for management of highly migratory fisheries is developing rapidly. At the same time the fisheries themselves are also changing rapidly. The recent growth of Hawaii-based longline fishery and the response of managers are used as a case study. This case illustrates a means of institution building to help insure on-going research and management capabilities and a method to design an integrated research program responsive to the needs of fishery managers. Inclusion of social and economic factors in analysis fisheries of data and fishery management are considered essential.

Interactions between tuna fisheries: an overview

Fonteneau,-A.

B (Book); K (Conf International-tuna-conference-96:-Tuna-prospects-and-strategies-for-Indian-Ocean,-27-28-29-November-1996,-Mauritius.-LE-THON:-ENJEUX-ET-STRATEGIES-POUR-L'-OCEAN-INDIEN,-27-28-29-NOVEMBRE-1996,-MAURICE. Cayre,-P.-eds.;Le-Gall,-J.Y.-eds. Paris-France ORSTOM 1998 pp. 387-396

Colloq.-Semin.-Inst.-Fr.-Rech.-Sci.-Dev.-Coop.-

This paper is a summary of some major characteristics of the interactions between tuna fisheries, following the two working groups held by the FAO on this topic: Noumea 1991 and Shimizu 1995. The major types of interactions are discussed. Those interactions are sheldom observed; in the tuna fisheries even for fisheries catching large quantities of tunas in the same or neighboring areas. various hypothesis which could explain this lack of interaction are briefly discussed. The case of potential interaction between tuna fisheries in the indian Ocean is discussed.

International fishing policy and access to tuna resources: the case of Indian Ocean commission memberships

Michaud,-P.

B (Book); K (Conf International-tuna-conference-96:-Tuna-prospects-and-strategies-for-Indian-Ocean,-27-28-29-November-1996,-Mauritius.-LE-THON:-ENJEUX-ET-STRATEGIES-POUR-L'-OCEAN-INDIEN,-27-28-29-NOVEMBRE-1996,-MAURICE. Cayre,-P.-eds.;Le-Gall,-J.Y.-eds. Paris-France ORSTOM 1998 pp. 337-356

Colloq.-Semin.-Inst.-Fr.-Rech.-Sci.-Dev.-Coop.-

The development on tuna industrial fisheries by foreign tuna fleets in the south west indian Ocean during the twenty past years impact the economy of states of the area through fishing licences policy. This study is a wide analysis of the actual status of tuna industry in the sub area and focuses on the Seychelles study case: history, past and future licencing policy, access rights, economic returns on the harbour sites and whole seychellian archipelago islands.

Evolution of swordfish longline fishery Xiphias gladius operating in the indian ocean from Reunion

Rene,-F.; Poisson,-F.; Teissier,-E.

B (Book); K (Conf International-tuna-conference-96:-Tuna-prospects-and-strategies-for-Indian-Ocean,-27-28-29-November-1996,-Mauritius.-LE-THON:-ENJEUX-ET-STRATEGIES-POUR-L'-OCEAN-INDIEN,-27-28-29-NOVEMBRE-1996,-MAURICE. Cayre,-P.-eds.;Le-Gall,-J.Y.-eds. Paris-France ORSTOM 1998 pp. 287-312

Colloq.-Semin.-Inst.-Fr.-Rech.-Sci.-Dev.-Coop.-

During the last five years the Reunion [swordfish Xiphias gladius] longline fishery has been developped rapidly, the landings are actually 1500T/year. The longline fleet size is 29 longliners (12 to 33 m) in 1996. The product is mainly exported to European market, as whole and loins. The fishing area is large from Equator to 35 degree South, but the main fishing effort is located in the South west off Reunion island. Trends of catch per unit of effort are discussed as regional fishing.

Fish aggregating devices (FAD) development in the Indian Ocean Commission members-countries: inovation or revolution in fishing strategies

Rey,-H.

B (Book); K (Conf International-tuna-conference-96:-Tuna-prospects-and-strategies-for-Indian-Ocean,-27-28-29-November-1996,-Mauritius.-LE-THON:-ENJEUX-ET-STRATEGIES-POUR-L'-OCEAN-INDIEN,-27-28-29-NOVEMBRE-1996,-MAURICE. Cayre,-P.-eds.;Le-Gall,-J.Y.-eds. Paris-France ORSTOM 1998 pp. 313-335

Colloq.-Semin.-Inst.-Fr.-Rech.-Sci.-Dev.-Coop.-

This paper attempts to assess the experimentations of Fish Aggregating Devices (F.A.D.) in the countries of the Tuna-Fish Association, considering that these devices may constitute a major innovation, able to modify noticeably the dynamics of the fish-systems in which they are placed. After a review of the main realisations, our analysis was centered on the evolution and transformation processes that F.A.D. imply in the fish systems. These processes are examined as depending of the fish resources and of the fishing tactics, as well as of the regulation modes that they may imply to solve appropriation conflicts. Attention will be put here not only on the results, in terms of efficency, but also on the determining factors of the evolution process.

Tuna fishing, processing and trade: role of the indian ocean zone

Lent,-R; Rogers,-C.; Brewster-Geisz,-K.

B (Book); K (Conf International-tuna-conference-96:-Tuna-prospects-and-strategies-for-Indian-Ocean,-27-28-29-November-1996,-Mauritius.-LE-THON:-ENJEUX-ET-STRATEGIES-POUR-L'-OCEAN-INDIEN,-27-28-29-NOVEMBRE-1996,-MAURICE. Cayre,-P.-eds.;Le-Gall,-J.Y.-eds. Paris-France ORSTOM 1998 pp. 273-286

Colloq.-Semin.-Inst.-Fr.-Rech.-Sci.-Dev.-Coop.-

World trends in tuna fishing activities and the processing and trading of tuna products are influenced by a number of driving forces. Fishing activities are influenced by factors such as resource availability, fishing technology, and output and input prices. Similarly, patterns in processing activities depend on relative costs, which are particularly affected by raw fish input availability, and relative labor costs. The market for tuna products is a worldwide market, and trade in tuna products plays a key role in the determination of equilibrium price and quantity in retail markets. The relatively recent expansion of the tuna fishery in the Indian Ocean, accompanied by developments in the processing sector in this same region, has had a significant impact on the worldwide pattern of tuna fishing and trade.

Economic impact of the industrial tuna activities and their development prospects in the member-countries of the Indian Ocean Commission

Sweenarain,-S.; Cayre,-P.

B (Book); K (Conf International-tuna-conference-96:-Tuna-prospects-and-strategies-for-Indian-Ocean,-27-28-29-November-1996,-Mauritius.-LE-THON:-ENJEUX-ET-STRATEGIES-POUR-L'-OCEAN-INDIEN,-27-28-29-NOVEMBRE-1996,-MAURICE. Cayre,-P.-eds.;Le-Gall,-J.Y.-eds. Paris-France ORSTOM 1998 pp. 209-236

Colloq.-Semin.-Inst.-Fr.-Rech.-Sci.-Dev.-Coop.-

This paper presents the results of an evaluation of the economic impact of the industrial tuna activities in the member-countries of the Indian Ocean Commission. This study, that has been undertaken by the regional Tuna Project 2, allows to quantify the economic benefits derived throughout the chain of the industrial tuna activities in terms of value added and its distribution in the different member countries of the Indian Ocean Commission. The same elements are presented at the regional level: net receipt of foreign exchange, direct and indirect employment. Additionally, an attempt to determine the degree of integration of these activities in the national economies, is presented. Generally, these economic benefits are generated by: the sale of fishing rights to foreign tuna boats, namely from the European Union, transhipment and associated port operations of foreign fleets in operation the South West Indian Ocean, the processing and canning of tuna onshore and finally, the activities of local tuna fishing enterprises although they are still at the budding stage of their development. Finally, diverse options for a coherent regional strategy to optimise economic benefits derived from the tuna exploitation and management, are proposed and discussed in the process of the development of the tuna industry in member-countries of the IOC.

Measurement and collection of economic rent in a managed tuna fishery

Owen,-A.D.

B (Book); K (Conf International-tuna-conference-96:-Tuna-prospects-and-strategies-for-Indian-Ocean,-27-28-29-November-1996,-Mauritius.-LE-THON:-ENJEUX-ET-STRATEGIES-POUR-L'-OCEAN-INDIEN,-27-28-29-NOVEMBRE-1996,-MAURICE. Cayre,-P.-eds.;Le-Gall,-J.Y.-eds. Paris-France ORSTOM 1998 pp. 195-208

Colloq.-Semin.-Inst.-Fr.-Rech.-Sci.-Dev.-Coop.-

The question of how access rights to fisheries should be structured, how the ownership of those rights should be allocated, and how returns to ownership could be realised are the primary concern for manged tuna fisheries worldwide. This question does not arise in an open access or unmanaged fishery where no fishery rent will be generated, altough some of its participants may procure othert kinds of rent of quasi-rent. This paper presents a definition of economics rent in the context of a managed tuna fishery, and distinguishes it from other types of economic rent that may be present for others factors of production involved in the industry. The measurement of fishery rent is then discussed, together with an illustration that highligths the pratical difficulties involved in deriving accurate estimates of such rent. Since fishery rent represents the return that the owner of the fish stock woulld receive in a perfectly competitive economy with a complete set of enforceable property rights over the resource, the question arises of how the resource owner can collect this rent. Alternative methodologies are reviewed, with emphasis on the pratical aspects of determining the appropriate collection mechanism. An illustration is given of how these alternative for of rent charges will affect fishermen in differents ways because of different cost structures ansd stages of development. The case for not attempting to appropriate the entire fishery rent is also summarised. Finally, the costs and benefits of operating a managed fishery for distant water fishing fleets paying access fees are examined in the context of the potential for domestic participation in the tuna fishery by the resource owner themselves.

Some comments on abundance indices and probing surveys

Labelle,-M.

B (Book); K (Conf International-tuna-conference-96:-Tuna-prospects-and-strategies-for-Indian-Ocean,-27-28-29-November-1996,-Mauritius.-LE-THON:-ENJEUX-ET-STRATEGIES-POUR-L'-OCEAN-INDIEN,-27-28-29-NOVEMBRE-1996,-MAURICE. Cayre,-P.-eds.;Le-Gall,-J.Y.-eds. Paris-France ORSTOM 1998 pp. 177-194

Colloq.-Semin.-Inst.-Fr.-Rech.-Sci.-Dev.-Coop.-

Catch-per-unit-effort (CPUE) indices are often relied upon to calibrate models used for sequential population analyses (SPA). Unfortunately, not all indices are applicable to a given context, and using the wrong one can reveal misleading trends. To improve the reliability of assessments, efforts should be made to identify suitable measures of CPUE, and conduct complementary probing surveys to compensate for the lack of coverage provided by logbook records, deficiencies in the data time series, and uncertainty on key components of the fishery.

Oceanic environment and development of industrial fisheries: from local to global scales

Marsac,-F.

B (Book); K (Conf International-tuna-conference-96:-Tuna-prospects-and-strategies-for-Indian-Ocean,-27-28-29-November-1996,-Mauritius.-LE-THON:-ENJEUX-ET-STRATEGIES-POUR-L'-OCEAN-INDIEN,-27-28-29-NOVEMBRE-1996,-MAURICE. Cayre,-P.-eds.;Le-Gall,-J.Y.-eds. Paris-France ORSTOM 1998 pp. 139-176

Colloq.-Semin.-Inst.-Fr.-Rech.-Sci.-Dev.-Coop.-

Originally, the dynamics of exploited populations only dealt with the interactions between stock and fishing pressure. Then, during the recent past years, this deterministic -- and mostly unsatisfactory -- view advanced towards more complex approaches in order to take into account the impact of the environmental variability on abundance, catchability or mortality of the fish. A comprehensive description considering the physical processes and their related effects on tuna resources is not yet completed. However, we can likely progress on topics leading to the future models, namely the search for parameters explaining most of the yield variability and the understanding of hydroclimatic mechanisms limiting the habitat of tuna. The research undertaken on this matter during the second Regional Tuna Project of the Indian Ocean (PTR 2) aimed to the assessment of the oceanic environment effects: 1) on the geographic distribution of the resource, both on the broad scale level of the fisheries and on a finer scale such as seamounts; 2) on the vertical distribution of the individuals owing to ultrasonic tagging; 3) on the catchability to fishing gears through indices computed from the fishery statistics. The subject relevant to the environmental variability will be widened to the scale of the whole Indian Ocean and to inter-oceans climatic connections in order to consider the remote effects associated with the El Nino anomalies recorded in the Pacific. An hydroclimatic index specific to the Indian Ocean is defined and its potential usefulness for identifying abnormal years with respect to the oceanic tuna fisheries is attempted.

State of the scientific knowledge on tuna resources in the western Indian Ocean

Pianet,-R.

B (Book); K (Conf International-tuna-conference-96:-Tuna-prospects-and-strategies-for-Indian-Ocean,-27-28-29-November-1996,-Mauritius.-LE-THON:-ENJEUX-ET-STRATEGIES-POUR-L'-OCEAN-INDIEN,-27-28-29-NOVEMBRE-1996,-MAURICE. Cayre,-P.-eds.;Le-Gall,-J.Y.-eds. Paris-France ORSTOM 1998 pp. 105-138

Colloq.-Semin.-Inst.-Fr.-Rech.-Sci.-Dev.-Coop.-

Main research topics and results of the regional tuna project are presented and discussed: implementation of the regional statistical network, migrations and behaviour studies through sonic tracking and feeding behaviour, tuna environment, aggregating devices fishing technics impact, seabottom and seamount hydrologic and fishing impact.

Status of tunas stocks in the Indian ocean

Pianet,-R.

B (Book); K (Conf International-tuna-conference-96:-Tuna-prospects-and-strategies-for-Indian-Ocean,-27-28-29-November-1996,-Mauritius.-LE-THON:-ENJEUX-ET-STRATEGIES-POUR-L'-OCEAN-INDIEN,-27-28-29-NOVEMBRE-1996,-MAURICE. Cayre,-P.-eds.;Le-Gall,-J.Y.-eds. Paris-France ORSTOM 1998 pp. 75-104

Colloq.-Semin.-Inst.-Fr.-Rech.-Sci.-Dev.-Coop.-

Several tuna experts consultations have been conducted on the status of tuna reources in the Indian Ocean; the recent increase of effective fishing effort by artisanal, longline and purse-seine tuna fisheries is poorly assessed; the task of the regional tuna conservation commission is defined in order to avoid large and uncontrolled fishingtuna effort on these resources.

Overview of the tuna resources and exploitation in the indian ocean

Fonteneau,-A.

B (Book); K (Conf International-tuna-conference-96:-Tuna-prospects-and-strategies-for-Indian-Ocean,-27-28-29-November-1996,-Mauritius.-LE-THON:-ENJEUX-ET-STRATEGIES-POUR-L'-OCEAN-INDIEN,-27-28-29-NOVEMBRE-1996,-MAURICE. Cayre,-P.-eds.;Le-Gall,-J.Y.-eds. Paris-France ORSTOM 1998 pp. 49-74

Colloq.-Semin.-Inst.-Fr.-Rech.-Sci.-Dev.-Coop.-

The characteristics of the tuna resources and tuna fisheries in the Indian Ocean will first be reviewed and then be compared with the same component in the Atlantic and the eastern and western Pacific Oceans. Because of its peculiar oceanographic characteristics and climate, the biological characteristics of most tunas are quite special. Those characteristics of the Indian Ocean tunas will be analyzed in relation with the environmental characteristics in the area. The fishing patterns of the Indian Ocean tuna fisheries are also quite peculiar: both the pattern of species targeted by the fisheries et the deployment of the various gears in the various areas are typical of the Indian Ocean. The scientific researches done on tunas in the Indian Ocean will be examined in relation with the research framework in the area (national and international). An efficient research, well coordinated at an international level and targeting toward a good and real time stock assessment remains a necessary factor for the conservation of the Indian Ocean tunas. Good prospects of international researches on tunas are offered by the IOTC and COI in that field; however it appears that a serious effort in the researches targeting on the stock assessment of Indian Ocean tuna stocks is now urgently required to conserve the Indian Ocean tuna resources, as few works have been done untill now in that field.

Associated species to industrial tuna fisheries in the indian Ocean

Stretta,-J.M.; Delonce,-R.; Ariz,-J.; Domalain,-G.; Santana,-J.C.

B (Book); K (Conf International-tuna-conference-96:-Tuna-prospects-and-strategies-for-Indian-Ocean,-27-28-29-November-1996,-Mauritius.-LE-THON:-ENJEUX-ET-STRATEGIES-POUR-L'-OCEAN-INDIEN,-27-28-29-NOVEMBRE-1996,-MAURICE. Cayre,-P.-eds.;Le-Gall,-J.Y.-eds. Paris-France ORSTOM 1998 pp. 369-386

Colloq.-Semin.-Inst.-Fr.-Rech.-Sci.-Dev.-Coop.-

the study of the fauna associated with tuna schools was undertaken with scientific observers on board of some european (french and spanish) tuna purse seiners. The species caught within the O.5 nautical mile band are defined as associated species to tuna school. The association of pelagic species is strongly linked with the tuna school pattern. 432 tuna purse seine sets have been analysed. Species associated with free tuna school and animals are large yellowfin and bigeye tuna (body weight over 30 gk), diodontidae, flyingfishes, and sailfishes. Species associated with natural logs are little yellowfin and bigeye tuna under 10 kg body weight, marlins, little tunas, silky sharks, triggerfishes, common dolphin fish and elagatis groupers. Important catches of kyphosidae species, wahoos, oceanic whitetip sharks, and sworfishes were performed in the artificial logs, ie specific rafts. Free schools are caught in Mozambic channel and east of Seychelles archipelago, the association with cetaceans is observed in the Seychelles area,the artificial logs (special designed rafts) are located off west Seychelles and natural logs, ie large vegetal drifting detritus, are often found in the north equatorial area and east part of Seychelles.