

# STATUS REPORT ON THE DEVELOPMENT OF TUNA RESEARCH AND DATA COLLECTION

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## ABSTRACT

*In Sri Lanka, the collection of national catch statistics is carried out by the Department of Fisheries & Aquatic Resources Development (DOF). The Marine Biological Resources Division of the National Aquatic Resources Research & Development Agency (NARA) has a parallel data-collecting system which collects biological data together with the catch statistics needed for the assessment of fish stocks. In 1994, NARA strengthened this system through the FAO/TCP project on the establishment of a monitoring system for the drift-gillnet and longline fishery in Sri Lanka. The data-collecting system of DOF had been designed 20-25 years ago and therefore needed to be revised to suit the present fisheries. The sampling programme of NARA is comprehensive, covering all craft-gear combinations for large pelagics and therefore could provide reliable tuna catch statistics. The lack of accurate information on actual number of vessels in operation is a major constraint in estimating national production. Together with the DOF, NARA has also introduced fishing logbooks for a selected number of offshore multi-day fishing boats to collect information on offshore fisheries. Attempts are also being made to collect information from the industrial tuna longliners that are permitted to land their catches in Sri Lanka.*

*The continuous monitoring of the commercial tuna fisheries for the collection of data needed for the assessment of fish stocks and detailed biological studies of the major tuna species are some of the research work presently been conducted by the MBRD of NARA. Experiments are carried out with Fish Aggregating Devices (FADs) to exploit the under-utilized large pelagic species. NARA has just begun a 2-year offshore fisheries resource survey utilizing three local multi-day fishing boats.*

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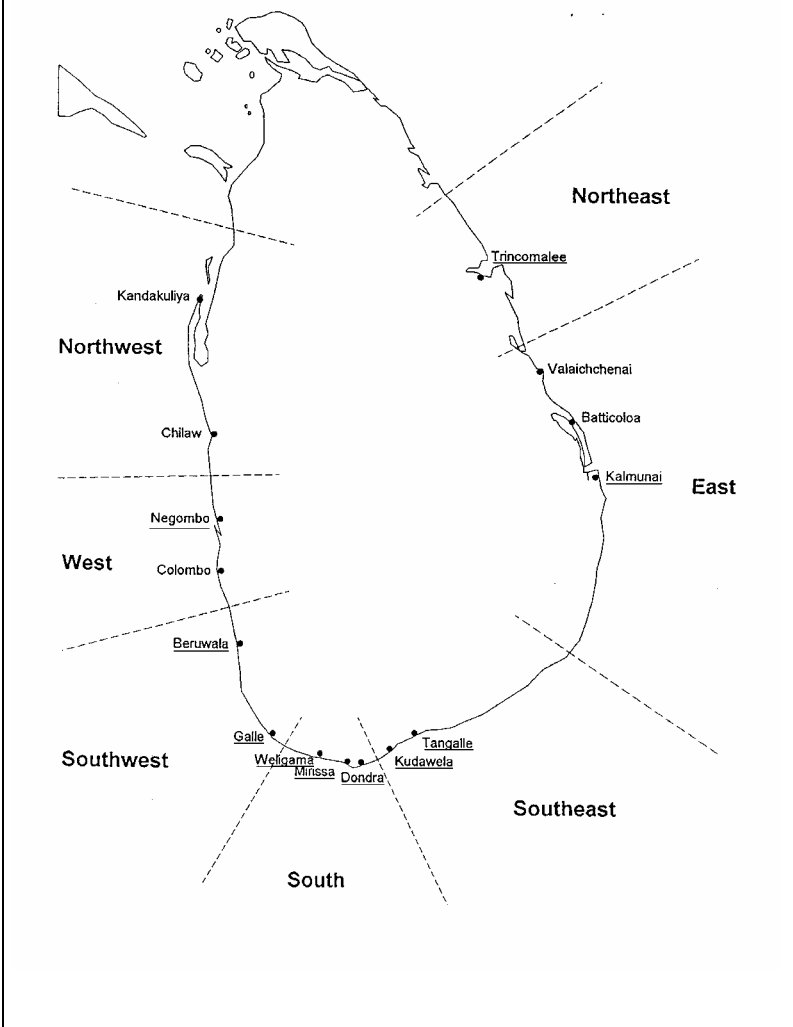
## INTRODUCTION

In Sri Lanka the management and development of aquatic resources comes under the purview of the Ministry of Fisheries and Aquatic Resources Development. The Statistical Division of the Department of Fisheries (DOF) collects island-wide data on the commercial fisheries. The Marine Biological Resources Division (MBRD) of the National Aquatic Resources Research and Development Agency (NARA), which is the research arm of the Ministry of Fisheries, also has a parallel data-collecting system which collects biological data together with the catch statistics needed for the assessment of fish stocks. These two systems are complementary to one another. Further, it is mandatory for NARA to conduct research and development activities on the aquatic resources, and therefore research on tuna is mainly carried out by the MBRD of NARA.

Research on tuna fisheries had been carried out continuously for the past 3 decades and was one of the important activities in the Research Division of the Ministry of Fisheries from the early 1960s. Several research programmes, including the monitoring of the commercial

tuna fisheries, studies on the biology of the tuna species inhabiting the coastal waters around Sri Lanka, and exploratory fishing for tunas, were some of the research activities carried out in the past. All these are well documented. When NARA was formed in 1981, the monitoring of the commercial fisheries was continued with the limited funds and the manpower available. Since 1987, the Indo-Pacific Tuna Programme (IPTP) has assisted NARA financially and technically to establish a sampling programme to monitor the tuna fisheries in the west, southwest and south. In the 1984-1986 period exploratory fishing for tunas and other large pelagic resources was carried out with financial assistance from the Bay of Bengal Programme (BOBP) of the Food and Agriculture Organization (FAO). Although the commercial tuna fisheries were continuously monitored in the past, a comprehensive sampling programme was established by NARA in 1994, with financial assistance from FAO through the FAO/NARA/TCP/Project 2251 for the establishment of a monitoring system for the drift gillnet and longline fishery in Sri Lanka.

**Figure 1.** Map of Sri Lanka indicating regions and major landing sites. Sampled sites are underlined.



stage stratified sampling system was adopted in the collection of statistics with landing centers as primary sampling units and fishing vessels as secondary units. Each Fishery Inspector is responsible for one or two sampling centers. Originally sampling was carried out twice a week (8 days a month), but was later reduced to once a fortnight (two days a month), due to various other duties the FIs have to perform. Each FI samples a predetermined maximum of 10 vessels stratified by three types (unmotorized, inboard engine, and outboard engine).

Although there have been various developments in the fisheries sector during the past 20-25 years, the same data collecting system is still continuing without taking into account these developments, particularly the increase in number of boats, development of new fisheries, changes in type of craft and gear used in fishing operations, and extension of the fishing area to further offshore. There have been significant changes in the tuna fisheries in the past decade with the development of the offshore fisheries covering the entire Exclusive Economic Zone (EEZ) of Sri Lanka. The majority of the tuna-fishing boats now stay out at sea for many days, some even staying for 15-20 days fishing in international waters. Although the sampling scheme of the DOF covers some tuna-fishing boats there is no comprehensive data collection on tuna fisheries. Also there is no complete breakdown of the catch statistics by species. Except for the catch data of yellowfin tuna and skipjack tuna, the catches of all the other tuna varieties and billfish are grouped together as other blood fish. Also catch data by type of

## DATA COLLECTION

### Data collection by the Department of Fisheries and Aquatic Resources

Data collection by the DOF dates back to late 1940s when an island-wide collection of fisheries statistics in an organized manner commenced with the deployment of 12 permanent Fisheries Inspectors (FIs) in 20 fishery districts. In the early 1950s the statistical collection system was strengthened and a permanent cadre of 24 Statistical Officers was appointed. The data collected were analyzed by a Statistical Officer released to the Department of Fisheries by the Department of Statistics.

In the early 1970s this system was improved with the assistance of FAO. The post of Statistical Officer was abolished and the Fisheries Inspectors were made responsible for the collection of fisheries statistics from the 14 jurisdictional districts in the marine sector. A total of 143 FIs were deployed in the marine sector in the 14 districts. Out of the total of around 500 coastal fish-landing centers in the country, 160 were chosen as sampling centers. A two-

vessel or gear are available.

### Data collection by the National Aquatic Resources Research & Development Agency (NARA)

Since the inception of NARA in 1981, the research staff of the MBRD have been actively engaged in the collection of tuna catch statistics. For various reasons the study areas were limited, but the monitoring of the fisheries was continued in the northwest, west, southwest, and south areas. In 1987, NARA was able to formalize the data collecting system through the establishment of a sampling programme with the technical and financial assistance from the IPTP. Six samplers who were Advanced Level qualified personnel were given training at NARA as well as in the field and were placed at the major fish-landing centers in these areas (Foster, 1987). In 1994, NARA further strengthened the sampling programme through the FAO/TCP project, where a total of 12 samplers were placed at the major fish-landing sites along the coast of Sri Lanka except the north and northwest (Figure1). These samplers are engaged full-time in data collection with 20 sampling days a month. Ten of these sampling days are used to

sample the tuna fisheries, and the other 10 days for the small pelagic fisheries. On each sampling day a total of 25 boats from a landing site are sampled, proportionately covering all the craft-gear combinations of the fisheries. The number of landings made in a month, and the number of sea days and fishing days for the fishing trip are recorded from each boat sampled. Other technical information, such as the type and size of the craft and gear information (number of panels of gillnets used, mesh size, number of hooks in longlines, bait type, *etc.*) for each sampled craft is recorded. The large pelagic catch is recorded in number and/or weight by species for 25 species and species groups. For the yellowfin and skipjack tuna catch is recorded for three size categories. The length measurements of all tuna species, billfish and seerfish in the large pelagic catch is taken from around 20 fish of each species from each craft sampled (when few fish are available all are measured). The data collected by the samplers are brought to NARA head office at the end of each month. These data are clarified and screened by the Research Officers in charge of the sampling programme before being entered into the computer database. Monitoring of the activities of the samplers is carried out by the NARA research staff by making surprise visits to each of these landing centers at least twice a month.

The estimation of the national production for the large pelagics is made by using the following three inputs in the estimation procedure:

- \* the total number of vessels engaged in fishing in the zone, by class of vessel;
- \* the average number of landings made each month, by zone and class of vessel;
- \* the average landing size of a species, by zone, month, and class of vessel.

The zones used in the analysis are given in Figure 1, and the details of production estimates in William, 1995.

#### **Data collection through logbooks**

The fisheries resources survey component of the ADB Fisheries Sector Project and the UNDP Fisheries Management Project of the DOF, together with NARA, has commenced a programme on data collection from a cross-section of the offshore multi-day fishing fleet. This programme commenced in January 1995, and a total of 122 logbooks have been distributed among the multi-day boat owners operating from the west, southwest, south and northeast. The distribution and monitoring of the logbooks is carried out by NARA research staff. These logbooks provide detailed information on the boat (size, tonnage, year of manufacture, engine type and horsepower, cost of the hull and engine), details of fishing gear used, and the type of navigation and fishing equipment. For each fishing operation, the fishing position, fishing time, and catch by species and by gear are recorded. The logbook returns have been successful so far and quality data has been provided by most of these boats. A computer database is under preparation to analyze these data.

#### **Data on the industrial fishing fleet**

The tuna catch statistics of Sri Lanka do not include the catch of the fleet of tuna longliners that are permitted to land their catch in Sri Lanka, as no continuous data are provided to the DOF by these boats. Some *ad hoc* production data are available in the DOF which could not be used in the estimation of the annual production from this fleet. Although several attempts had been made by NARA and DOF to collect the catch statistics from these boats, they have so far not been successful. It is understood that it had not been made obligatory for these fishing boats to provide such data to the Ministry of Fisheries when permits were issued. However, action has now been taken by the Ministry of Fisheries to remedy this when renewing the licenses for these boats and also for any additional tuna fishing fleets that are permitted to land their catch in Sri Lanka.

#### **TUNA RESEARCH ACTIVITIES**

NARA has been conducting research on tunas for the past decade, with more emphasis on the collection of data such as length-frequency data and catch/effort data needed for the assessment of fish stocks. More detailed biological studies have been carried out on age and growth, reproductive biology, feeding biology, migration of tunas and gear interaction. Bio-socio-economic assessments of small tuna fisheries have been carried out under a BOBP project. Exploratory fishing for tunas were also carried out with BOBP assistance.

At present NARA continues the monitoring of the large pelagic fisheries for the collection of data needed for the assessment of fish stocks and for the estimation of catch rates and fish production.

NARA has also deployed some FADs on the continental shelf edge off the southwestern coast on an experimental basis to study the possibility of exploiting tunas and underutilized large pelagics such as dolphinfish (*Coryphaena hippurus*) and rainbow runners (*Elagatis bipinnulata*) more economically.

NARA has just commenced an offshore fisheries resources survey with financial assistance from the Asian Development Bank (ADB) under the Sri Lanka Fisheries Sector Development Project of the Ministry of Fisheries and Aquatic Resources Development. Three local fishing boats of the between 38 and 52 ft will conduct 10-day fishing cruises within the EEZ of Sri Lanka for a continuous period of 2 years. Drift gillnets (30sections) and tuna longlines (500 hooks) will be used for fishing. The main objective of this survey is to study the distribution, abundance and migration of the major tuna species. By using tuna longlines at depths of 50-100 m more information on the under-utilized deep-swimming components of the yellowfin and bigeye tuna resources will be collected, and also on the economics of the fishing operations. This would help the local fishermen to diversify the fishing gear presently used to target this unutilized resource.

## **DISCUSSION**

The DOF still continues the sampling scheme that was adopted 2-3 decades ago, even though there have been significant changes in the fishing industry. As the prevailing sampling design and the intensity of stratified sampling are so poor, the estimates are not considered accurate enough to be used in resource assessment. Therefore, NARA developed a sampling scheme that collects more accurate information needed for the assessment and management of fish stocks. However, the lack of accurate information on the actual fleet size in operation has caused errors in estimating fish production in Sri Lanka. It is envisaged that the craft and gear census presently being conducted under

the UNDP Fisheries Management Project will provide this information in detail to be used in future estimates.

There has been a lot of discussion on the fisheries data collecting system in Sri Lanka at various recent fisheries fora. The need for improving the data collection by DOF and minimizing the duplication of data collection by DOF and NARA were realized. A statistical subcommittee consisting of members from DOF, NARA, IPTP, UNDP fisheries management at DOF and NARA/ADB project met on several occasions and has come up with some suggestions for the improvement of overall fisheries statistics in Sri Lanka.

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