

Methodology for the Estimation of Marine Fish Landings in India



Central Marine Fisheries Research Institute
(Indian Council of Agricultural Research)
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**METHODOLOGY
FOR THE ESTIMATION OF MARINE FISH
LANDINGS IN INDIA**

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Foreword

Information is the key input in a management system and in fisheries management, generation, access and analysis of database on the dynamic and resilient natural resource are essential and indispensable elements. Realizing the importance of a reliable database in fish stock assessment and fisheries management, the Institute initiated the process of collection of data on catch and effort along with other biological parameters based on scientific principles, way back in 1947. Data on marine fishing villages, landing centers, crafts and gears were collected that could form a frame for developing an appropriate sampling design. The first attempt in that direction was made in 1948 to collect marine fish catch statistics. Pilot surveys were conducted in 1957 along the 160 km coastline of the erstwhile Malabar Coast by the Indian Agricultural Statistical Research Institute (formerly, Indian Agricultural Research Statistics), New Delhi. The surveys were based on a three stage stratified sampling. In the year 1959 CMFRI initiated collection of marine fish statistics through a multi-stage stratified sampling design along the west coast of India.

The persistent efforts of the team of statisticians of the Institute during the past decades resulted in developing a full fledged multi-stage stratified random sampling design covering the entire coast of mainland India. This design has been operational since 1961. The sampling frame was periodically updated through all India frame surveys. Keeping in tune with the changing scenario in the fisheries sector, the sampling design was periodically updated with enhanced scope and coverage. It is matter of great pride that the procedure followed by the Institute for marine fisheries data acquisition has been internationally recognized as one of the best designs for fisheries data collection. The Institute has also disseminated the methodology to various maritime states through specialized training programmes and workshops.

This special publication describes the principles of marine fisheries statistics and documents the sampling design followed by the Institute for marine fisheries resource assessment and the methodology to estimate marine fish landings and the expended fishing effort. Details on the administration and management of the survey and various proformae used for data collection have been elaborated. The computer software developed by the Institute for estimation of marine fish landings is also explained and included in the form a CD Rom.

I am happy that my colleagues involved in the estimation of marine fish landings in India have collated all past information, logically updated, refined and brought out this publication to address the needs of various maritime states and other agencies involved in resource assessment. All those scientists who were involved in this process in the past and those who are presently associated with the task of upgrading the methodology in CMFRI deserve appreciation and acknowledgement. It is worth mentioning that this is the first ever publication from CMFRI on the methodology and administration of the sample survey including the software. I congratulate everyone who made possible this need based publication. I am confident that this publication will find its logical application by fisheries administrators and policy makers in India.



Prof. (Dr.) Mohan Joseph Modayil
Director

Cochin
8th April, 2005

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Symbols and abbreviations

d	Day
f	Effort
g	Type of unit
i	Selected unit
l	Stratum
n	Number of selected landing centre days
nl	Number of selected landing centre days in a stratum
nz	Number of zones in a region
N	Number of days (fishing days) in a month
p	Period of observation
Q	Number of centres in a zone
s	Species
U	Number of unit operations
V	Variance
\hat{W}	Estimated total landing for all species over all gears
y	Landings (catch)
\hat{Y}	Estimated total landings
CMFRI	Central Marine Fisheries Research Institute
FRAD	Fishery Resources Assessment Division
N	North
S	South
E	East
W	West
SW	Southwest
SE	Southeast
NE	Northeast
NW	Northwest
SCZ	Single Centre Zone
SIC	Scientist-in-Charge
TA	Technical Assistant

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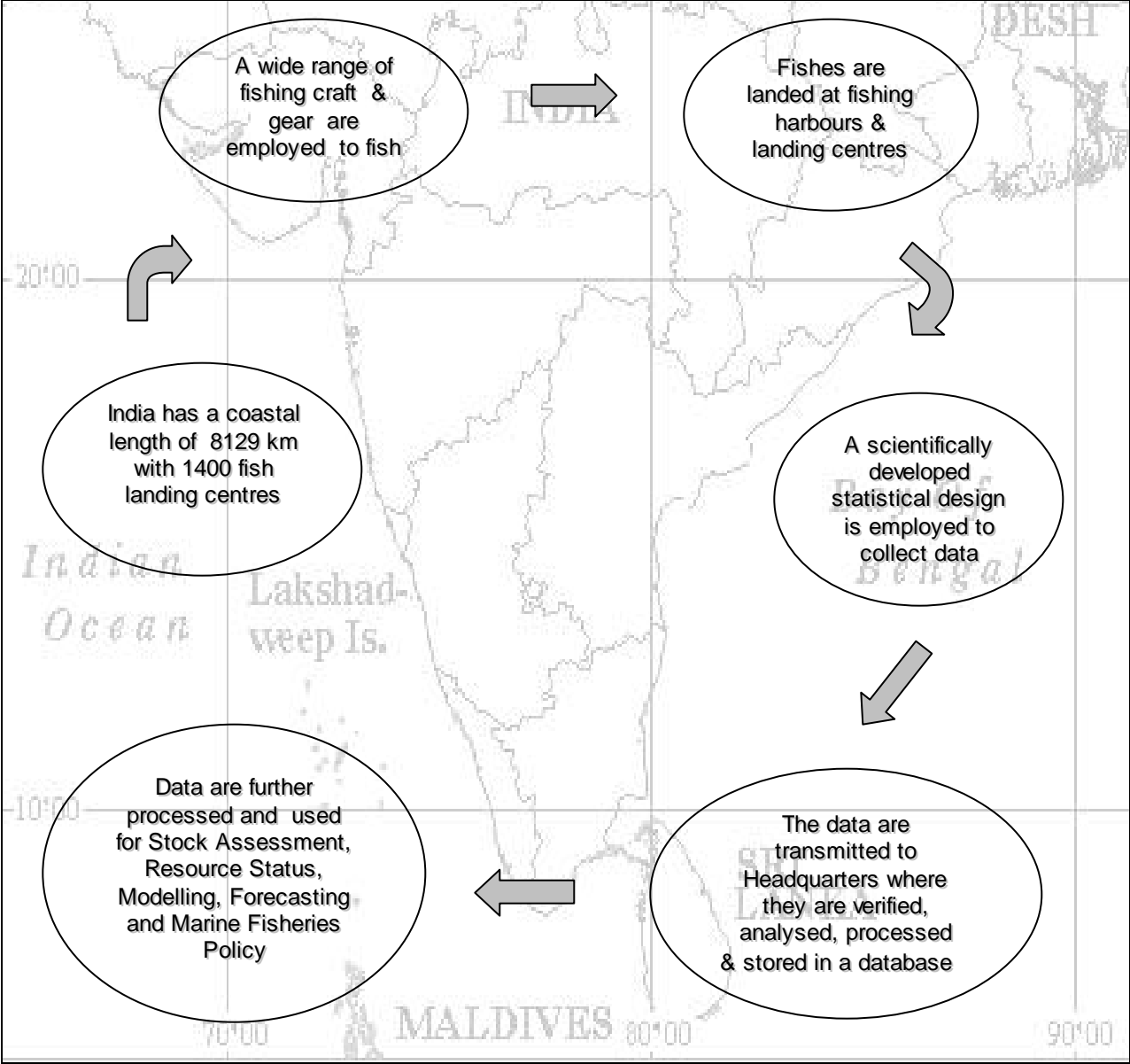
Introduction

The marine fisheries sector in India has witnessed a phenomenal growth during the last five decades both quantitatively and qualitatively. The subsistence fisheries during the early 50's which produced about 0.5 million tonnes annually has presently grown into a full grown industry producing currently about 2.7 million tones annually with a landing site value of about Rs. 13,000 crores. This increase is not only as a result of improvements in the harvesting methods, increase in the fishing effort and extension of fishing into relatively deeper regions but also increased demand resulting from trade in export of marine products as well as the ever growing domestic market demand.

Monitoring and assessment of the exploited marine fishery resources of India is one of the important mandates of the Central Marine Fisheries Research Institute (CMFRI). The effect, extent and scope of the management measures are assessed by precise and reliable fishery statistics. In order to make stock assessments relevant to site-specific fisheries management, it is essential to know what is actually being fished from the population, as this affects the ability of stocks to survive and most importantly, to reproduce and repopulate. Thus, catch and effort statistics along with biological data on fish caught by various gears form the key and essential basis for effective fisheries management. Marine fish landings in India are estimated from the sampling of commercial landings. Statistics on marine fish production are available from 1950 onwards when the Institute started nation wide sample survey for estimating the marine fish landings in the country. Keeping in pace with the changing marine fisheries scenario, the sampling procedure has been modified over the periods. The resource monitoring system is represented in the following diagram.



RESOURCE MONITORING SYSTEM



Historical background

India is among the few nations which has adopted a sampling system based on the theory of sampling for collecting the fishery catch statistics (Banerji, 1971). In the earlier days, data were collected only by trade enquiries and similar evidences, not by any scientifically planned surveys.

Soon after its inception in 1947, the Central Marine Fisheries Research Institute made attempts to evolve scientific methods for collecting marine fish catch statistics. In the beginning much information was not available on the marine fishing villages, landing centres, fishing craft and gears, which could form a frame for developing sampling plans. Besides, fishing practices differed from region to region and within regions from season to season. Keeping this in view, the Institute conducted a preliminary survey in 1948 to collect information required for formulating a sampling plan. Several pilot surveys were conducted in different regions of the country between 1950-51 and 1954-55 (Banerji and Chakraborty, 1972).

The entire coastline was divided into 12 zones each covering about 400 km length. In each zone, one assistant was posted and through a rapid survey, information on fishermen population and craft and gears was collected. To start with, a few important centres were covered and later extended to the entire coastline. From each zone three landing centres were selected and visited once each in a fortnight. On each visit, data were collected from each centre consecutively for four to five days. A boat-net combination was taken as a sampling unit. The number of units to be sampled is determined based on the information about the units that have gone for fishing. Five schedules were used for collecting various inventory and production statistics. Gearwise catches were collected. On the basis of daily record, the daily average number of units was arrived at. The product of average daily catch per unit and total number of units operated resulted in daily landings for that gear. Such estimates for all gears gave daily estimates. Zonal and national estimates for each month were obtained from these estimates. The sampling coverage was expanded in 1958 when the number of zones was increased to 20.



In early fifties, a scientific sampling study was undertaken (Panse and Sastry, 1960) along 160 km coastline of erstwhile Malabar in which 61 landing centres were grouped into 12 geographical strata. A three stage sampling design was followed. In the sampling design, a landing centre, time interval of 20 minutes and a fishing unit were first, second and third stage units respectively. One centre was selected from each stratum and was observed for one week. On each day of observation the data were recorded for 14 hrs from 0500 hrs to 1900 hrs. An hour is divided into three intervals of 20 minutes each. One interval, for counting the landing units in that interval, was selected; the rest two intervals were for collecting data on catches of the first unit landing in the two intervals. Total number of units landed and the average catch per unit of operation facilitated an estimate of total catch during the period.

Similar surveys with varying details were carried out in subsequent years along the erstwhile Travancore-Cochin, Madras, Andhra, Canara and Bombay coasts. The Central Marine Fisheries Research Institute initiated estimation of marine fish landings through a multi-stage stratified probability sampling design along the west coast of India in 1959 (Jacob *et al.*, 1982). This was subsequently extended to the entire coast in the following years. Vast experience gained by the Institute in the collection of marine fish catch statistics and the results of the pilot surveys conducted by Indian Council of Agricultural Research have gone a long way in the development of the sampling design currently followed by the Institute.



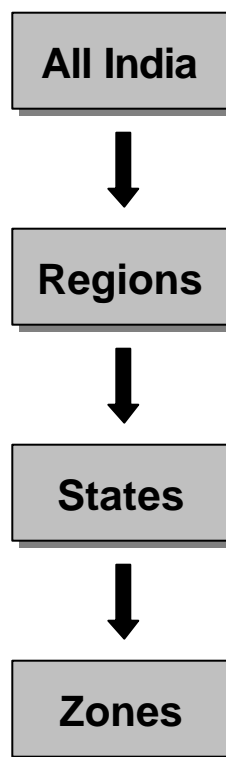
Sampling Design

India has a coastline of about 8129 km. Landing of fish takes place at numerous locations all along the coastline during day and at times during night also. There are about 3000 marine fishing villages and about 1400 landing centres along the coastline of the mainland.

The sampling design adopted by the CMFRI to estimate resource-wise/region-wise landings is based on stratified multi-stage random sampling technique, In this, the stratification is over space and time.

Over space, each maritime state is divided into suitable, non-overlapping zones on the basis of fishing intensity and geographical considerations (Fig. 1). The number of centres may vary from zone to zone. These zones have been further stratified into substrata, on the basis of intensity of fishing

Fig. 1 Stratification over space



There are some major fisheries harbours/centres which are classified as *single centre zones* for which there is an exclusive and extensive coverage. The stratification over time is a calendar month. One zone and a calendar month is a space-time stratum and primary stage sampling units are landing centre days.

If in a zone, there are 20 landing centres, there will be $20 \times 30 = 600$ landing centre days in that zone for that month (of 30 days). For observation purpose, a month is divided into 3 groups, each of 10 days. From the first five days of a month, a day is selected at random, and the next 5 consecutive days are automatically selected. From this three clusters of two consecutive days are formed. For example, for a given zone, in a given month, from the five days if the date (day) selected at random is 4, then these clusters are formed, namely, (4, 5); (6, 7) and (8, 9) in the first ten day group. In the remaining ten day groups, the clusters are systematically selected with an interval of 10 days. For example, in the above case, the cluster of observation days in the remaining groups are (14, 15), (16, 17), (18, 19) (24, 25), (26, 27) and (28, 29). Normally, in a month there will be 9 clusters of two days each. From among the total number of landing centers in the given zone, 9 centres are selected with replacement and allotted to the 9 cluster days as described earlier. Thus in a month 9 landing centre days are observed. The observation is made from 1200 hrs to 1800 hrs on the first day and from 0600 hrs to 1200 hrs on the second day, in a centre. For the intervening period of these two days, the data are collected by enquiry from 1800 hrs of the first day of observation to 0600 hrs of the 2nd day of observation of a landing centre-day, which is termed as 'night landing'. The 'night landing' obtained by enquiry on the second day covering the period of 1800 hrs of the first day to 0600 hrs of the next day are added to the day landings so as to arrive at the landings for one (landing centre day) day (24 hours).

Selection of units and recording of landings

It may not be practicable to record the catches of all boats landed during an observation period, if the number of boats/craft landings is large. A sampling of the boats/craft becomes essential. When the total number of boats landed is 15 or less, the landings from all the boats are enumerated for catch and other particulars. When the total number of boats exceeds 15, the following procedure is followed to sample the number of boats (Alagaraja, 1984):



Number of units landed	Fraction to be examined
Less than or equal to 15	100 %
Between 16 and 19	First 10 and the balance 50 %
Between 20 and 29	1 in 2
Between 30 and 39	1 in 3
Between 40 and 49	1 in 4
Between 50 and 59	1 in 5 etc.

From the boats, the catches are normally removed in baskets of standard volume. The weight of fish contained in these baskets being known, the weight of fish in each boat under observation is obtained.

Sampling scheme in a single centre zone

Normally, 16 to 18 days in a month are selected at random for observation. Depending on the type of landings, the observation is made on a cluster of 2 days or a single day itself. The sampling of units landed on a selected day is as described earlier.

Procedure for estimating marine fish landings during a month

Monthly estimate for a zone

I. Without stratification of a zone (also applicable to single centre zone)

Let N be the number of days(fishing days) in a month, Q be the number of centres in the zone and n be the number of selected landing centre days.

Let p be the number of periods of observation for the selected landing centre day.

$p = 1$ corresponds to 1200 – 1800 hrs on the first day of observation

$p = 2$ corresponds to 0600 – 1200 hrs on the second day of observation

$p = 3$ corresponds to night landings obtained by enquiry of the boats, landing after 1800 hrs on the first day and before 0600 hrs on the second day

Let N_{gdp} be the total number of craft (boat) of gear type g (**hereinafter referred to as unit**) landed during d^{th} selected landing centre day in the p^{th} period of observation.

Let n_{gdp} be the number of selected units of type g on the d^{th} landing centre day during the p^{th} period of observation.

Let y_{sgdpi} be the catch of the species s landed by the i^{th} selected unit of g^{th} type unit on d^{th} selected day during p^{th} period of observation.

Let \hat{Y}_{sgdp} be the estimated total landings of species s by unit type g on the d^{th} landing centre day during p^{th} period of observation.

Then,

$$\hat{Y}_{sgdp} = \frac{N_{gdp}}{n_{gdp}} \sum_{i=1}^{ngdp} y_{sgdpi} \dots\dots\dots (1)$$

Let \hat{Y}_{sgd} be the estimated total landings of species s by g^{th} type of unit on d^{th} day and

$$\hat{Y}_{sgd} = \sum_{p=1}^3 \hat{Y}_{sgdp} \dots\dots\dots (2)$$

[Note : The night landings (p=3) are obtained by enquiry and usually estimated by enquiry from the number of each type of unit landed and average catch per unit]

The estimated total landings (\hat{Y}_{sg}) of species s by g^{th} type of unit for the month is obtained as

$$\hat{Y}_{sg} = \frac{NQ}{n} \sum_{d=1}^n \hat{Y}_{sgd} \dots\dots\dots (3)$$

Estimated total landings (\hat{W}_d) for the selected landing centre day is obtained as

$$\hat{W}_d = \sum_s \sum_g \hat{Y}_{sgd} \text{ (summed over all gear and for all species) } \dots\dots\dots (4)$$

The estimated total landings \hat{Y}_g of all species by g^{th} type of unit for the month is obtained as

$$\hat{Y}_g = \sum_s \hat{Y}_{sg} \text{ (Summed over all species landed by } g^{\text{th}} \text{ type of unit) } \dots\dots (5)$$

The estimated total landings \hat{Y}_s of species landed by all types of units for the month is

$$\hat{Y}_s = \sum_g \hat{Y}_{sg} \text{ (Summed over all types of units) } \dots\dots\dots (6)$$

Estimated total landings \hat{Y} for the month over all types units and for all species is given by

$$\hat{Y} = \sum_g \hat{Y}_g = \sum_s \hat{Y}_s \dots\dots\dots (7)$$

Monthly estimate for a region (state)

Let \hat{Y}_{jsg} be the total estimated monthly landings of species s by g^{th} type of gear in the j^{th} zone. Then, \hat{Y}'_{sg} the estimated total landings of species s by the g^{th} type of unit for the region (state) is given by

$$\hat{Y}'_{sg} = \sum_{j=1}^{nz} \hat{Y}_{jsg} \dots\dots\dots (8)$$

Where nz is the number of zones in the region and \hat{Y}_{jsg} is given by the equation (3).

The estimated total landings \hat{Y}'_g of all species landed by g^{th} type of unit in the region for the month is given by

$$\hat{Y}'_g = \sum_s \hat{Y}'_{sg} \text{ (summed over all species landed by } g^{th} \text{ type of unit) } \dots\dots\dots (9)$$

The estimated total landings \hat{Y}'_s of species as by all types of units in the region for the month is given by

$$\hat{Y}'_s = \sum_g \hat{Y}'_{sg} \text{ (summed over all types of units) } \dots\dots\dots (10)$$

The estimated total landings for the month in the region is

$$\hat{Y}' = \sum_g \hat{Y}'_g = \sum_s \hat{Y}'_s \dots\dots\dots (11)$$

Estimate of fishing effort in the zone during a month

The fishing effort can be expressed by (1) the number of unit operations by a craft-gear combination(unit) (2) the fishing hours expended by the unit during the month, (3) the man-hours expended by the units during the month. Here, estimation procedure for (1) and (2) are given and procedure for (3) will be exactly the same as for (2).

Number of unit operations

Let N_{gdp} be the total number of units landed of type g on the d^{th} landing centre day during the p^{th} period of observation. Then, N_{gd} the total number of g^{th} type of units during d^{th} day of observation is

$$N_{gd} = \sum_{p=1}^3 N_{gdp} \dots\dots\dots (12)$$

The estimated number unit operations of g^{th} type of unit \hat{U}_g for a month is given by

$$\hat{U}_g = \frac{NQ}{n} \sum_{d=1}^n N_{gd} \dots\dots\dots(13)$$

Estimated effort in fishing hours

Let f_{gdpi} be the effort expended in actual fishing hours expended by the i^{th} selected unit of the g^{th} type of unit (craft-gear) observed on the d^{th} landing centre day during p^{th} period of observation.

Let \hat{f}_{gdp} be the estimated total effort expended by the g^{th} type unit on d^{th} selected landing centre day during p^{th} period of observation, then

$$\hat{f}_{gdp} = \frac{N_{gdp}}{n_{gdp}} \sum_{i=1}^{n_{gdp}} f_{gdpi} \dots\dots\dots (14)$$

Let \hat{f}_{gd} be the estimated effort expended by the g^{th} type of unit on d^{th} landing centre day and

$$\hat{f}_{gd} = \sum_{p=1}^3 \hat{f}_{gdp} \dots\dots\dots (15)$$

The estimated total effort (\hat{f}_g) by the g^{th} type of unit for the month is given by

$$\hat{f}_g = \frac{NQ}{n} \sum_{d=1}^n \hat{f}_{gd} \dots\dots\dots (16)$$

The estimated total effort (\hat{f}) by all types of units in a month is a zone is given by,

$$\hat{f} = \sum_g f_g \text{ (summed over all types of units) } \dots\dots (17)$$

II. Stratification in a zone

Let the zone be divided into L strata (in practice a zone is divided into 2 or 3 strata as groups of major, minor and very minor centres depending on intensity of fishing operations).

(Assumption: The number of fishing days in a month N remains the same for all strata)

Let Q_l be the number of centres in the l^{th} stratum of a given zone and n_l be the number of landing centres selected belonging to l^{th} stratum.

The estimated total landings of species s landed by g^{th} type of unit in the l^{th} stratum of a zone for the month is given by

$$\hat{Y}_{sgl} = N \frac{Q_l}{n_l} \sum_{d=1}^{n_l} \hat{Y}_{sgld} \dots\dots\dots (18)$$

where \hat{Y}_{sgld} is estimated as explained in the earlier section pertaining to zone without stratification.

$\hat{Y}_{sg} = \sum_{l=1}^L \hat{Y}_{sgl}$ is the estimated total landings of species s landed by g^{th} type of unit in the zone for the month and \hat{Y}_s , \hat{Y}_g and \hat{Y} are as given equations (5), (6) and (7)

The estimated total number of unit operations during the month by g^{th} type of unit in the l^{th} strata is given by

$$\hat{U}_{gl} = N \frac{Q_l}{n_l} \sum_{d=1}^{n_l} N_{gdl} \dots\dots\dots (19)$$

The estimated total number of unit operations for the zone in a month is given

$$\hat{U}_g = \sum_{l=1}^L \hat{U}_{gl} \dots\dots\dots (20)$$

The estimated total effort expended in terms of actual fishing hours by g^{th} type of unit in the l^{th} stratum of a zone in a month is

$$\hat{f}_{gl} = N \frac{Q_l}{n_l} \sum_{d=1}^{n_l} \hat{f}_{gdl} \dots\dots\dots (21)$$

where \hat{f}_{gdl} is obtained as given in equation (15) in the case of no stratification.

The estimated effort by g^{th} type of unit for the zone is given by

$$\hat{f}_g = \sum_{l=1}^L \hat{f}_{gl} \dots\dots\dots (22)$$

The estimated total effort f for the zone by all types of units is as given in equation (17).

Estimate of variance of total landings over all species and gear

It is assumed that variance between boats of the same gear to be negligible (Sukhatme *et.al* 1958; Panse and Sastry, 1960) within a selected landing centre day. Thus, the variance is estimated as the variance between days and given by

$$\hat{V}(\hat{y}) = \frac{N^2 Q^2}{n} V \dots\dots\dots (23)$$

$$V = \frac{1}{n-1} \left\{ \sum_{d=1}^n \hat{W}_d^2 - \frac{\left(\sum_{d=1}^n \hat{W}_d \right)^2}{n} \right\} \dots\dots\dots (24)$$

where \hat{W}_d is given by equation (4).

The standard error of the estimate can be found out from the above formula.

Administration of the survey

Plan of operation

The survey staff immediately after recruitment undergoes a training course which lasts 10-12 weeks and is posted to the survey centres. Each survey centre is housed in 1-2 room accommodation and each centre is provided with literature connected with the identification of fish, a reference collection of local fishes, crustaceans and molluscs, field notebooks and registers. At the end of every month, the survey staff receives by post, the programme of work for the following month that includes the names of landing centres to be observed and details such as date and time of observations at each landing centre. The programme is carefully designed at the headquarters by the staff of Fishery Resources Assessment Division. The field staff are instructed to send the data collected during every month so as to reach the Institute's headquarters at least by the end of first week of the subsequent month.

Supervision of data collection

Surprise inspections are carried out by the supervisory staff of the Institute and the enumerators are inspected while at work in the field and their field notebooks and diaries are scrutinized.

Observational errors their magnitude and control

The estimated zonal landings are always compared with the previous year's survey figures, and if any variation which cannot be explained is observed, the technique of interpenetrating sub-samples is adopted to detect observational errors. Observational errors are rarely encountered and when confirmed, the field staff is either called back to the headquarters for giving intensive training or he is replaced. Zonal workshops are held periodically to review the progress of work and update the sampling frame and to impart refresher courses to the field staff.

Errors due to non-response, their magnitude and control

Non-response occurs when the regular field staff is not available to observe the centre-day included in the sample. Usually, arrangements are made at the Head Quarters/ Research/ Regional Centre to minimize the non-response.



Analysis of Data

The analysis is carried out at headquarters. Before the data is processed for analysis it will be ensured that the data collection is made as per the approved schedule, by checking the appropriate proforma. The responsibilities and functions of staff at the headquarters are data coding, estimation and database management.

Data coding

As the first step, codes for the commercially important species and major resource groups and for the craft and gear are applied. A four digit code (given by the field staff) for the individual species and two digit code (given by the staff analyzing the data) for the major resource groups are assigned. Before assigning the two digit resource code, correctness of the species code is checked.

Codes for all the important species are available in *An updated code list of common Marine Living Resources of the Indian Seas, CMFRI Special Publication No.12, 2000*. The major resource groups and the species belonging to them along with resource code are given in Chapter 9.

Computerisation of data

After coding, the data are computerized and estimates of resource-wise and gear-wise landings for each zone for a month are made using the software developed by the Fishery Resources Assessment Division of the Institute. The processed data are again counter-checked for errors. When discrepancies are detected the estimation procedure is scrutinized in detail.

INSTRUCTIONS FOR FIELD WORK

Instructions

1. The programme of work for a month will be sent to the field staff from the headquarters towards the third week of the previous month. The place, date and time of observation will be indicated in the programme.
2. The official (Technical Assistant/Senior Technical Assistant/Technical Officer) should reach the landing centre at least 15 minutes before the commencement of the observation time and the official will have to make local enquiry on the number of units gone for fishing and the number of units expected to land during his observation period. This information is required for determining the number of units to be selected for observation.
3. Whether there is fishing or no fishing, the work schedule should be strictly adhered to and the official should be at the landing centre during the entire period of observation. No change in the work schedule, without the prior approval of the Head, FRAD/SIC, will be entertained.
4. In the case of landing centres comprising more than one landing point, the official may collect data at the point where maximum number of units are expected to land. The number of units landed at the other point(s) should be indicated with plus (+) sign along with the total number of units landed at the point where he makes the observation. The name of the landing point where the field staff will be making observation may be informed before hand to the Head, F.R.A.Division and the Scientist-in-Charge, concerned.
5. The data to be collected comprise (i) the total number of fishing units landed by actual count and their time of arrival (ii) the detailed specieswise breakup of landings and other ancilliary information with regard to a selected number of fishing units and (iii) data on 'night landings'. The landings after 1800 hrs. of the first day of observation and before 0600 hrs. of the second day observation have been termed 'night landings' which have to be collected in the morning of the second day by enquiry.



6. It is very essential that actual weighment of landings is made. In case the landings are heavy, at least one basket of various groups of fish should be actually weighed and the total weight should be obtained by multiplying this weight by the total number of baskets as far as practicable.

Recording of details of landings

7. Names of species of all commercially important fishes and shell fishes should be recorded. In case identification upto species level is not possible, at least generic name should be indicated. The names of fishes which come under 'Miscellaneous' may be given in foot note. Indicating fisheries resources by common names like prawns, tunnies, sharks, rays, skates etc. should be avoided. In case of doubt, local names may be used and the specimens be collected and identified at the laboratory wherever such facilities exist or sent to the headquarters for identification.
8. Name of the centre, date and time be given if the number of species do overlap to the next page/sheet.
9. Type of gear is to be specified along with the local name. Expansions of the abbreviations used for gear shall be indicated at the bottom of the form.
10. Form No. 1 or No.2 is essential for all days on which observations were made and reasons for no fishing on an observation day should be clearly indicated in Form No.1 or No.2 (as the case may be). Both sides of the form should be used.
11. Data, for a month may, be properly tagged together in the order of dates of observation. In case of combined zones, data should be separately tied as per the order (1) Your covering letter, (2) Form No.C and (3) Form No.1, Form No.2 or Form No.II in the ascending order of dates given for observation.
12. The tagged data of a particular month should be submitted to SIC/TA in charge or sent by registered post sufficiently early so as to reach the Head, F.R.A.Division, Central Marine Fisheries Research Institute, Cochin-18 at least by the 7th of the succeeding month. *The*



official should see that all the columns are properly filled up before despatching the same to Headquarters.

Types of schedules and uses

13. There are different types of fishery survey forms for collecting the data and are given in the Appendix.

Form C	For consolidated statement of units
Form 1	For non-mechanized units
Form 2	For mechanized units/motorized
Form II	For trawlers operating in major harbours
Form T	For record of time of landings

Form C is designed for the consolidated statement of number of mechanized and non-mechanized units landed on all the days of observation in a month. All days shown in the work programme should be entered in Form C and non-observation days, if any, due to leave, cancellation of tour etc. during the month should be recorded against such day and should be placed in front of the data sheets.

Form 1 is meant for non-mechanized units. Non-mechanized units are divided into two categories, i.e., Shoreseines (SS or OU) and other units. Data on Shoreseines and other units may be recorded separately.

Form 2 is meant for all types of mechanized units such as trawlers, purseseiners, gillnetters, dolnetters and country craft fitted with outboard engines. Strike out the other type (mechanized or outboard) as per the landing.

Form II is meant for more number of species (more than 30).

Form T is meant for recording the time of landings.

14. Normally, 8 days of observations are scheduled for field work and two days for cost and earnings data and the official should see that no leave is availed of during the observation

days. Official intending to proceed on leave should inform his availing of leave to the Scientist-in-Charge concerned with a copy to Headquarters, sufficiently in advance so as to make alternative arrangements to continue the programme of work, without interruption. Absence from work due to unforeseen circumstances should be promptly intimated by telegram before the commencement of the scheduled observation time.

15. Tour programme on the basis of work programme is to be sent to the respective Scientist-in-charge.

No. of units to be selected for observation

Since data of all the fishing units that landed cannot be observed for details a certain fraction should be examined in detail and record the information in the respective Fishery Survey Forms as indicated below:

Number of fishing units landed	Fraction to be examined
Less than or equal to 15	All (100%)
Between 16 and 19	First 10 Nos. all and the balance 50%
Between 20 and 29	1 in 2
Between 30 and 39	1 in 3
Between 40 and 49	1 in 4
Between 50 and 59	1 in 5 and so on

Landings by shoreseines should be recorded separately and in this case all the units should be examined in detail.

Selection of units

Depending on the fraction of selection, choose a number from the random number table. Check all the other numbers systematically at intervals appropriate to the fraction. As soon as the fishing unit for corresponding to the checked number lands, the field staff should examine and record all information in the diary.

Special instructions for entering codes in Fishery Survey Form

Fishery Survey Form 1

- 1) Codes for State, District, Zone and Centre should be given in the box provided.
- 2) **Date:** For date of observation, two digit code each should be given in the space provided for the date, month and year.

Eg:- If the date of observation is 12th February 2004, the code should be as follows:

12 02 2004

- 3) **Period:** For periods, give single digit code as given below:

1200 to 1800 hrs	1
1800 to 2400 hrs (night landings)	2
1800 to 0600 hrs (night landings)	3
0600 to 1200 hrs	4

- 4) **No. of units landed:** The number of fishing units landed should be recorded in *four digits*.

For example, if 225 units landed write 0225

- 5) **Serial Number of unit examined:** The number selected on random basis of the sampled unit should be recorded in column 2. In addition, in the column No.1 record the number of the boat in serial order in 2 digits as follows. If 14 boats are examined record 01, 02, 09, 10, 11, 14.
- 6) In column 3 enter type of craft and in Column 4 give the corresponding code in 4 digits.
- 7) In Column 5 enter type of gear and in Column 6 give the corresponding code in 4 digits
- 8) **Length of craft:** The length of the craft corrected to the first decimal may be given in Column7 in 3 digits. Eg., if the length of the craft is 9 m. record 090. If the length of the craft is 10.56 m record 106.



9) **Departure and Arrival:** Date and time of departure of fishing units may be given in Column 8. In column 9 give arrival time. In Column 10 give the duration of absence from the shore nearest to the hour in 3 digits (30 minutes and above should be recorded as one hour). Eg. If the total time of absence is 6 hrs. 30 minutes record as 007. If it is 6 hrs. and 10 m record 006.

10) **Distance of the fishing ground is the shortest distance from the shore**

Record the distance in two digits in Column 11

11) **Direction from landing centre**

Give the direction of the fishing ground from the landing centre as follows:

North - (N)	North-east - (NE)
South - (S)	South-east - (SE)
East - (E)	South-west - (SW)
West - (W)	North-west - (NW)

12) **Depth:** Record the depth in meters in two digits under Column 13

13) **No. of hauls:** Record the number of hauls (Average/hour in case of Hooks & line) in two digits under Column 14.

14) **Duration of actual fishing:** Record the duration in hours and minutes in four digits.

Duration of actual fishing is the interval between the commencement of the shooting of the net and end of hauling of the net to the craft.

Eg., if actual fishing time is 2 hrs. and 30 m., record 0230 under Column 15, the first two digits indicating hours and the last two digits minutes.



15) **Man power employed:** In Column 16 record the number of persons on board in two digits. Eg., if there are 7 persons, record 07.

16) **Species code & weight (Column 17 onwards)**

Record the species name in the top box. In the box below that, give the corresponding code. The weight should be recorded rounded to the nearest kilograms against the sampled boat. There is no restriction on digits. For prawns, lobsters and cephalopods actual weight upto single decimal may be given.

Fishery Survey Form 2

1. Excepting for columns 3, 9 and 19 the information and codes to be filled are the same as that for Fishery Survey Form 1.
2. **Name and or craft number:** Instead of name and or Registration No. of the craft, record the code for the type of mechanized craft. Eg., for trawler, record 1599.
3. **Horse power:** The horse power corrected to the nearest whole number may be given in three digits.
4. **Average trawling speed in case of trawler:** The average trawling speed in km/hr should be given in 2 digits. Trawling speed is the speed of the craft at the time of the operation of the trawl gear.
5. **Depth:** Record the depth in 3 digits.



General instructions for both Fishery Survey Forms 1 & 2

1. During the period of observation if no boats were landed, then the item against 'number of boats landed should be indicated by 0 (zero)'.
2. If all the boats arrive with 'nil' catch then the item against number of boats landed should be filled in by the no. of boats arrived. The Columns 1-16 in Fishery Survey Form 1 and 1-19 in Fishery Survey forms should be filled with required details in the code form. The rest of the columns should be left blank.
3. If the units return without operating the gear, such units may be indicated clearly.
4. If the number of sampled boats does not exceed ten and if the number of species exceeds 10 continue to record on the reverse side indicating the serial number of boat examined as in the first page leaving the columns 1-16 blank in Fishery Survey Form No.1 (Columns 1-19 blank in Fishery Survey form 2) or use Form No.II.
5. If the number of sampled boats exceeds ten continue to record data in another form indicating the serial number of the fishing unit examined as in the earlier sheet.
6. As regards night landings, the official should record the total number of units landed, average catch per unit, effort details and species composition by enquiry.
7. If a unit is operated in different depths, record the range of depths as follows:

If the range is 10-12 m record as 10/12

If it operated in the same depth, record as follows:

If the depth is 10 meters record as 10/10
8. **State of sea:** Give code 1 for calm, 2 small swell, 3 waves, 4 high waves, 5 very rough and 6 cyclonic.



9. **State of sky:** Give code 1 for clear, 2 partly cloudy, 3 cloudy, 4 overcast 5 rainy and 6 partially raining.
10. **Direction of wind:** The direction from which it comes Code 1 for North (N), 2 north-east (NE), 3 east (E), 4 south-east (SE), 5 south (S), 6 south-west (SW), 7 west (W) and 8 north-west (NW)
11. **Direction of current:** the direction to which it flows. Same terminology and codes to be used for current as in the case of direction of wind mentioned above.

Major/minor centres

- i) Centres, where **mechanized** boats operate are considered **Major centres**
- ii) Centres where only non-mechanized/motorized craft operate –
 - a) 100 and above craft - Major
 - b) below 100 - Minor

Additional instructions

1. The Assistant should record all items of information pertaining to the fish landings in the field diary during the period of observation itself.
2. In a mechanized centre if non-mechanized boats land their catches, data must be collected separately. Similarly if mechanized units land in the non-mechanized landing centres data must be collected and should be informed to Headquarters accordingly.
3. Price Statistics: Price may be recorded to the nearest rupee.
4. Information on mesh size may be given separately as and when there is any change.
5. In the case of multigear operation, data from individual gear may be recorded separately.



RAW DATA FORMAT

Raw data format for estimating fish landings in a zone/a single centre zone

Create the file in any text editor. File name should not exceed eight letters, (excluding extension, if any)

1. Enter the output filename with extension SCZ in the first line. The file name should not exceed 8 characters excluding extension. This file will hold the estimates of species-wise and gear-wise landings.
2. Enter number of fishing days in the month and enter one (1) separated by a space. If the data is for a single centre, then enter number of fishing days in the month and number of days observed separated by a space.
3. Enter the name of state without any space between the letters
4. Enter the name of district ensuring that there is no space between the letters
5. Enter zone code.
6. Enter the stratum number.
7. Enter the number of landing centres in that stratum and numbers of days observed separated by a space. (If the data is for a single centre zone then enter the stratum no as 1 and no. of landing centre and number of landing centres observed as 1 1)
8. Enter the name of landing centre (No space between the letters).
9. Enter the date (ddmmyy) of observation.
10. Enter the six digit species code, one after the other separated by a space, of which the first two corresponds to the resource, and the remaining four digits represent the corresponding species. In each line, a maximum of eight species code can be entered. In the case of more than eight species, enter the



remaining species in the next line. After entering all the species codes for the observation day, **zero (0)** must be entered as the last code separated by a space.

11. Enter the gear code without any space between the letters
12. Enter number of units landed and number of units observed of that particular gear separated by a space.
13. Enter the catch details with actual fishing hours. For the first observed unit the first line contains 9 columns in which 1st column is for fishing hours and in the remaining 8 columns enter the catches one after the other separated by a space. If more than 8 species were observed, then the remaining species' catch must be entered in the next line. Each line contains only 8 species' catch except first line. All columns should be delimited by a space.
14. Similarly enter the other selected units catch details as in Step 12.
15. If more than one gear is observed then the steps from 11 should be followed.
16. After entering the first day's observation enter the zone code.
17. If stratum number is the same, enter the stratum number as given in step 5 and repeat the steps 8 to 15.
18. If the observations are made from more than one stratum follow the steps from 5.
19. "XX" should be entered in the last line of the file.
20. Save the file.

Sample Data

I) Data with stratification (No. of strata = 2)

```

AN2FEB04.SCZ
29 1
ANDHRA-PRADESH
SRIKAKULAM
AN2
1
11 3
KOTHADIBBAPALEM
040204
180406 180410 321497 401166 391417 833999 0
NMGN
6 6
5 12 4 1 1 0 0
5 7 0 3 0 1 1
5 9 11 1 0 2 1
5 5 7 0 1 0 1
4.5 16 0 0 1 1 1
5 11 2 5 2 0 1
AN2
1
BANDARUVANIPETA
050204
060554 261341 100361 190291 301608 391417 600817 080431
833999 0
NMHL
8 4
4 32 0 0 0 0 0 0 0
0
4.5 16 0 0 0 0 0 0 0
0
4.5 61 12 0 0 0 0 0 0
0
5 38 5 0 0 0 0 0 0
0
NMGN
13 6
3 0 0 29 0 0 0 0 0
0
3 0 0 52 0 0 0 0 0
0
3.5 0 0 20 18 0 0 0 0
0
3 0 0 36 11 0 0 0 0
0
6 0 0 0 0 18 4 2 0
0
6 0 0 0 0 12 3 1 1
1
AN2
1
BANDARUVANIPETA
130204
301608 391422 321497 321511 600817 381204 501967 210472
833999 100361 0

```

NMGN
41 10
3 7 5 2 2 1 0 0 0
0 0
3 12 0 4 0 0 4 1 0
0 0
3 9 2 0 1 3 0 1 2
1 0
3 21 0 3 0 0 1 0 1
1 0
3.5 17 6 0 4 3 0 1 0
1 0
3 0 0 0 0 0 0 0 0
1 84
3 0 0 0 0 0 0 0 0
1 69
4 0 0 0 0 0 0 0 0
1 126
4 0 0 0 0 0 0 0 0
1 98
4 25 1 3 0 0 1 0 0
1 0
AN2
2
10 1
BADIVANIPETA
160204
321497 381204 301608 600817 391417 501967 833999 0
NMGN
4 4
4 9 7 5 3 1 1 1
5 2 5 8 0 4 0 1
4.5 4 0 14 1 2 0 1
4.5 2 0 5 0 5 3 1
AN2
2
BADIVANIPETA
170204
301608 210472 381204 501967 080431 321511 391422 281367
833999 0
NMGN
31 10
2.5 6 2 2 1 1 1 0 0
0
3 14 0 0 0 0 3 5 1
1
3 11 0 5 0 0 0 2 0
1
3.5 9 1 2 0 1 1 0 0
1
4 0 0 7 5 0 3 7 0
1
4 7 0 5 0 3 0 1 2
1
3 15 2 0 2 0 1 4 0
1
4 5 0 3 0 1 5 2 0
1
4 13 0 7 0 0 0 5 1
1
4.5 9 4 7 3 0 1 0 0
1
XX



II) Data without stratification (single centre zone)

SAKOCT04.SCZ

26 5

KERALA

KOLLAM

K3

1

1 1

SAKTHIKULANGARA

111004

331911 160385 765026 461953 250940 361211 600812 381200

321515 321495 290980 301605 291468 281365 080431 381236

391410 090362 765013 765011 765050 0

MDTN

1 1

12 350 290 380 15 7 10 25 8

7 4 5 4 3 4 3 2

2 5 60 40 75

MTN

5 5

6 0 110 250 4 0 25 10 0

0 2 0 2 0 0 3 0

7 20 0 0 30

6 10 200 190 0 8 15 15 4

5 0 2 0 3 0 2 0

5 10 0 0 7

6 0 190 180 10 4 20 6 0

0 3 3 0 4 0 0 0

4 15 0 0 10

6 15 175 210 7 8 35 7 4

3 0 0 3 0 10 2 0

8 15 0 0 15

6 0 165 245 4 0 40 10 0

0 4 4 0 4 0 0 0

7 18 0 0 10

K3

1

SAKTHIKULANGARA

121004

331911 160385 765026 361213 361211 600812 321495 321515

391410 281365 250940 381236 271545 291468 381200 381177

381171 291835 090362 040180 714327 210472 190346 662245

301605 292120 642151 684061 684066 684062 765013 765011

765050 694133 684016 704211 694121 684045 0

MTN

35 3

6 0 0 8 0 25 0 20 8

8 4 2 4 0 25 10 0

0 0 15 1 0 40 15 8

2 10 5 80 10 5 0 0

7 0 0 0 0 0

6 0 0 10 0 18 0 16 4

10 3 2 0 0 30 7 0



0	0	25	2	0	50	10	15	
4	10	4	70	8	10	0	0	
5	0	0	0	0	0			
6	0	0	8	0	23	0	18	5
15	4	0	4	0	18	8	0	
0	0	15	2	0	40	8	20	
5	7	8	65	15	8	0	0	
7	0	0	0	0	0			
MDTN								
82 7								
20	0	0	450	0	0	0	0	0
0	0	0	0	0	0	0	0	
0	0	0	0	0	0	0	0	
0	0	0	0	0	0	210	60	
120	0	0	0	0	0			
20	0	0	650	0	0	0	0	0
0	0	0	0	0	0	0	0	
0	0	0	0	0	0	0	0	
0	0	0	0	0	0	270	75	
110	1170	363	20	180	400			
20	400	250	450	25	0	45	4	8
0	0	5	10	4	3	10	4	
3	4	0	0	2	0	0	0	
0	0	0	0	0	0	300	90	
140	1310	400	15	210	380			
12	600	180	550	30	0	50	8	10
0	0	4	15	5	5	10	3	
4	5	0	0	3	0	0	0	
0	0	0	0	0	0	215	65	
170	0	0	0	0	0			
22	315	165	500	20	4	70	4	7
0	0	2	7	0	0	10	7	
5	3	0	0	4	0	0	0	
0	0	0	0	0	0	217	64	
145	0	0	0	0	0			
12	170	220	315	15	12	35	8	15
0	4	4	3	0	0	3	0	
0	4	0	0	0	0	0	0	
0	0	0	0	0	0	190	45	
150	0	0	0	0	0			
24	415	280	850	14	10	85	7	18
0	0	3	10	4	0	4	5	
4	7	0	0	0	0	0	0	
0	0	0	0	0	0	276	54	
167	0	0	0	0	0			
K3								
1								
SAKTHIKULANGARA								
281004								
765026	210472	160385	331911	291468	361211	190346	391410	
321515	321495	250940	291835	714327	291435	662245	292120	
281365	180400	704216	684061	684066	765013	765011	765050	
694133	694121	704211	684025	684016	0			
MTN								
69 4								
6	0	80	80	0	0	8	10	5
0	2	4	0	0	0	10	20	



5	4	2	85	10	0	0	0	
0	0	0	0	0				
6	0	110	15	0	0	4	9	2
0	3	5	0	0	0	15	7	
4	3	0	90	8	0	0	0	
0	0	0	0	0				
6	0	110	25	0	0	15	5	7
0	7	3	0	0	0	20	25	
5	5	3	120	10	0	0	0	
0	0	0	0	0				
6	0	95	10	0	0	10	6	8
0	4	4	0	0	0	19	18	
10	4	2	110	7	0	0	0	
0	0	0	0	0				
MDTN								
103 6								
20	350	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	
0	0	0	0	0	210	90	95	
1170	363	20	180	400				
20	480	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	
0	0	0	0	0	110	75	110	
1310	400	15	210	380				
22	560	10	70	300	4	10	0	0
10	3	4	2	5	2	0	0	
0	0	0	0	0	350	110	200	
0	0	0	0	0				
20	700	0	65	200	7	0	0	0
15	7	5	2	4	3	0	0	
5	4	0	0	0	195	90	152	
0	0	0	0	0				
20	672	0	50	180	4	5	0	0
10	4	4	0	3	2	10	0	
10	3	1	0	0	215	15	182	
0	0	0	0	0				
20	467	0	62	110	3	10	0	0
15	5	0	0	5	4	0	0	
0	0	0	0	0	210	110	190	
0	0	0	0	0				
K3								
1								
SAKTHIKULANGARA								
071004								
765011	765026	765050	160385	391410	210470	662245	100361	0
MTN								
22 10								
10	40	250	20	100	60	25	7	75
10	75	200	35	150	75	15	5	100
6	20	150	15	100	50	30	0	0
10	60	250	45	0	0	40	8	150
6	0	125	25	150	45	0	0	50
6	15	100	40	75	25	15	10	0
10	55	175	30	100	50	0	5	0
6	0	150	25	85	40	30	7	85
6	20	100	45	150	70	10	4	65
6	35	200	20	75	55	20	10	0



K3

1

SAKTHIKULANGARA

081004

694121 684026 694126 765011 765026 765050 160385 391410

210470 662245 100361 0

MDTN

25 4

20 100 250 350 70 300 40 0 0

0 0 0

20 75 200 400 100 250 60 0 0

0 0 0

20 0 0 0 65 300 60 0 0

0 0 0

20 0 0 0 60 325 35 0 0

0 0 0

MTN

38 6

10 0 0 0 50 175 25 50 70

30 8 80

6 0 0 0 0 200 45 100 45

25 5 100

6 0 0 0 25 250 25 75 25

40 10 65

10 0 0 0 50 200 15 50 0

20 0 50

6 0 0 0 0 350 25 0 0

0 4 85

10 0 0 0 0 225 40 125 50

60 5 75

K3

1

SAKTHIKULANGARA

191004

684062 684035 684045 765011 765026 765050 361211 600810

210470 662245 160385 391410 100361 030145 050606 833999 0

MTN

4 4

6 1 2 10 15 30 10 80 25

15 5 100 40 80 10 5 2

6 0 1 15 0 20 0 65 30

25 7 85 60 100 7 10 4

10 2 3 15 25 45 15 100 40

30 8 150 45 75 15 4 4

6 1 2 20 10 35 7 75 20

10 10 65 30 0 4 8 4

HTN

1 1

4 0 0 25 0 0 0 0 15

0 4 70 25 40 0 0 2

K3

1

SAKTHIKULANGARA

201004

694121 694122 684026 694126 704211 684062 684035 684045

765011 765026 765050 040190 361211 100361 391410 050606

030145 600810 160385 754646 704216 210470 662245 833999 0



MDTN

24 4

20	100	150	250	350	40	0	0	0
15	65	20	0	0	0	0	0	
0	0	0	0	0	0	0	0	
20	50	200	175	400	25	0	0	0
25	85	15	0	0	0	0	0	
0	0	0	0	0	0	0	0	
20	75	100	300	450	35	0	0	0
0	100	40	0	0	0	0	0	
0	0	0	0	0	0	0	0	
20	0	0	0	0	0	2	1	25
45	100	35	25	80	75	30	8	
20	0	125	10	1	30	6	4	

MTN

35 6

10	0	0	0	0	0	4	2	15
40	70	25	20	10	85	25	5	
15	30	80	4	1	20	5	4	
10	0	0	0	0	0	2	1	30
10	55	15	10	70	100	35	7	
10	20	100	8	2	35	7	2	
6	0	0	0	0	0	0	0	20
0	0	0	15	55	70	40	10	
8	45	65	5	1	25	10	4	
6	0	0	0	0	0	1	3	15
0	0	0	0	40	90	20	0	
20	35	85	0	1	40	8	2	
10	0	0	0	0	0	5	2	25
20	80	20	30	100	60	15	0	
10	40	100	4	0	20	4	4	
6	0	0	0	0	0	1	0	30
0	0	0	15	45	55	20	15	
0	25	70	7	2	15	0	2	

K3

1

SAKTHIKULANGARA

041004

765025 765050 765010 210470 281365 291005 261345 020040

461953 321485 321515 291835 290980 292120 331945 0

MDTN

116 8

10	320	150	105	75	140	18	5	7
0	0	0	0	0	0	0		
12	260	200	90	60	240	10	0	0
8	15	10	10	15	0	0		
10	120	90	120	45	95	8	4	6
12	0	0	0	12	6	400		
18	200	115	95	80	265	40	0	10
8	0	8	0	5	2	600		
16	320	165	190	105	360	25	0	6
0	0	6	0	2	2	400		
12	165	120	70	45	105	12	0	0
10	15	10	8	6	1	340		
18	250	160	260	90	70	20	0	12
0	0	0	0	0	0	0		
10	345	175	95	50	65	0	5	0



8	15	10	0	8	2	0		
MTN								
29 2								
6	115	105	225	90	120	12	3	5
0	0	0	0	0	4	0		
10	400	145	65	40	120	8	0	5
12	18	7	0	10	1	0		
K3								
1								
SAKTHIKULANGARA								
051004								
765025	765050	765010	210470	281365	291005	261345	020040	
694122	694121	694120	684026	321485	321515	391410	160385	0
MTN								
27 3								
8	200	135	40	65	125	15	7	0
0	0	0	0	0	0	0	0	
8	210	105	50	15	60	0	0	0
0	0	0	0	15	12	18	40	
10	220	115	60	65	45	18	3	8
0	0	0	0	12	15	10	25	
MDTN								
63 7								
12	450	150	95	60	205	10	0	10
0	0	0	0	0	0	0	0	
18	0	0	0	0	0	0	0	0
200	150	205	70	0	0	0	0	
20	400	165	300	95	95	20	7	10
0	0	0	0	0	0	0	0	
16	240	120	70	45	75	15	5	8
0	0	0	0	10	8	12	30	
20	0	0	0	0	0	0	0	0
240	120	180	90	0	0	0	0	
17	0	0	0	0	0	0	0	0
300	260	120	135	0	0	0	0	
12	0	0	0	0	0	0	0	0
230	180	105	40	0	0	0	0	
K3								
1								
SAKTHIKULANGARA								
051004								
491966	541936	551927	600810	351232	020040	291005	381221	
381295	020120	060545	381171	0				
OBDN								
20 5								
7	18	40	20	12	4	15	7	8
20	30	15	0					
7	12	65	10	0	6	0	0	0
0	0	0	6					
7	15	32	8	6	5	10	0	0
0	0	18	0					
7	25	60	6	0	0	0	3	0
40	0	0	8					
7	20	45	0	0	3	8	0	10
25	0	0	5					
K3								
1								



SAKTHIKULANGARA

051004

020040 020120 020023 581977 581978 600810 261345 250941

250952 381295 381171 381200 0

OBHL

3 3

16 260 120 20 70 45 48 25 60

45 45 18 25

16 140 100 18 65 0 15 18 35

65 50 15 40

16 185 90 25 40 55 25 40 25

35 25 12 20

K3

1

SAKTHIKULANGARA

141004

684045 684033 662245 321485 321515 291437 391410 714317

160385 461953 321510 180405 401166 331915 0

MTN

5 5

8 30 45 10 8 12 3 5 3

20 5 0 8 0 0

6 40 15 12 10 12 3 7 2

0 0 0 7 0 0

5 30 20 8 6 5 2 5 2

18 2 0 5 0 0

8 35 14 5 8 6 1 4 1

10 3 0 5 3 0

10 45 40 10 12 15 4 8 3

25 6 8 8 7 40

MDTN

1 1

12 45 65 15 10 12 4 0 0

25 7 8 10 5 105

K3

1

SAKTHIKULANGARA

151004

684016 694126 684026 331915 321510 281365 461953 714327

292120 401166 351232 381200 704200 381181 754630 765025

765050 765010 754646 0

MDTN

102 7

26 400 175 65 0 0 0 0 0

0 0 0 0 8 0 0 0

0 0 0

22 450 125 45 0 0 0 0 0

0 0 0 0 10 0 0 0

0 0 0

18 300 150 65 0 0 0 0 0

0 0 0 0 10 0 0 0

0 0 0

12 0 0 0 0 0 200 0 0

5 0 8 0 0 5 0 140

190 280 3

14 365 135 55 0 0 0 0 0

0 0 0 0 8 0 0 0



0	0	0						
14	385	165	95	0	0	0	0	0
0	0	0	0	6	0	0	0	
0	0	0						
10	0	0	0	200	18	115	15	5
3	5	8	10	0	7	18	60	
28	0	2						
MTN								
43	3							
8	0	0	0	200	14	45	10	7
4	3	7	5	0	4	15	40	
30	0	0						
10	0	0	0	325	15	120	8	4
3	5	5	12	1	4	10	60	
45	16	2						
10	0	0	0	225	10	105	6	4
1	5	5	5	0	6	12	75	
45	0	3						
K3								
1								
SAKTHIKULANGARA								
151004								
541936	491966	551927	310880	381200	020120	600810	381171	
020040	020100	381181	0					
OBDN								
21 5								
7	45	18	10	6	12	5	10	7
10	15	4						
7	75	25	8	5	15	12	6	5
12	0	3						
7	65	20	6	4	8	10	8	6
10	8	5						
7	70	28	8	5	10	8	10	7
6	10	4						
7	95	20	0	4	12	12	12	5
12	10	4						
XX								

CRAFT AND GEAR CODES

Most common & major gears

MECHANISED	CODE
GILLNET	
Gillnet	MGN
Bottom set gillnet	MBSGN
TRAWLNET	
Trawlnet (Single day fishing)	MTN
Trawlnet (Multi-day fishing)	MDTN
Sona boats (Single day fishing)	MSOTN
Sona boats (Multi-day fishing)	MDSOTN
SEINES	
Purseseine	MPS
Ringseine/Mattubala	MRS
BAGNET	
Bagnet (Bokshi, etc.)	MBN
Dolnet	MDOL
HOOKS & LINE	MHL
OUTBOARD	
GILLNET	
Driftnet (including Drift gillnet)	OBDBGN
Bottom set gillnet	OBBSGN
Gillnet	OBGN
Disco net	OBDIS
SEINES	
Ringseine/Mattubala	OBRS
Boatseine	OBBS
Shoreseine	OBSS
TRAWLNET	OBTN

BAGNET	
Bagnet	OBBN
Dolnet	OBDOL
Other bag type net	OBOBN
HOOKS & LINE	OBHL
OTHER OB NETS	OBOBHS
NON-MECHANISED	
GILLNET	
Driftnet, Drift gillnet	NMDGN
Bottom set gillnet	NMBSGN
Gillnet	NMGN
Disconet	NMDIS
Other gillnets (including Wallnet)	NMOGN
SEINES	
Boatseine	NMBS
Shoreseine	NMSS
Other seines	NMOS
HOOKS & LINE	NMHL
BAGNET	
Bagnet	NMBN
Dolnet	NMDOL
Other bag type nets	NMOBN
OTHERS	
Stakenet, castnet, dipnet, handpicking etc.	NMOTHs

RESOURCE GROUPS, SPECIES AND RESOURCE CODES

Groupwise list of common marine fishes, crustaceans, molluscs, marine turtles, marine mammals and seaweeds

Sl. No	Resource Code	Species group/family	Genus/Species
1	01	ELASMOBRANCHS	
	02	a. Sharks	<i>Alopias</i> ; <i>Chiloscyllium</i> ; <i>Eulamia</i> (= <i>Lamna</i>); <i>Galeocerdo</i> ; <i>Ginglymostoma</i> (= <i>Scyllium</i>); <i>Hypoprion</i> ; <i>Myrmillo</i> (= <i>Mustelus</i>); <i>Rhincodon</i> ; (= <i>Rhiniodon</i>); <i>Scoliodon</i> (= <i>Carcharias</i> , <i>Carcharhinus</i>); <i>Sphyrna</i> (= <i>Zygaena</i> , <i>Eusphyrna blochii</i>); <i>Stegostoma</i>
	03	b. Skates	<i>Pristis</i> , <i>Rhina</i> ; <i>Rhinobatos</i> ; <i>Rhynchobatus</i> ; <i>Raja</i>
	04	c. Rays	<i>Aetobatus</i> ; <i>Aetomylaeus</i> (= <i>Myliobatis</i>); <i>Amphotistius</i> (= <i>Dasyatis</i> , <i>Trygon</i>); <i>Gymnura</i> ; <i>Himantura</i> ; <i>Mobula</i> (= <i>Dicerobatis</i>); <i>Narcine</i> ; <i>Narke</i> ; <i>Pastinachus</i> ; <i>Rhinoptera</i> ; <i>Urogymnus</i>
2	05	EELS	<i>Anguilla</i> ; <i>Congrosox</i> ; <i>Gymnothorax</i> (= <i>Muraena</i>); <i>Muraenesox</i> ; <i>Thyrsoidea</i>
3	06	CATFISHES	<i>Arius</i> (= <i>Tachysurus</i> , <i>Netuma</i>); <i>Batrachocephalus</i> ; <i>Osteogeneiosus</i> ; <i>Plotosus</i>
4	07	CLUPEIDS	
	08	a. Wolf Herring	<i>Chirocentrus</i> spp.
	09	b. Oil sardine	<i>Sardinella longiceps</i>
	10	c. Other Sardines	Other <i>Sardinella</i> spp <i>S. fimbriata</i> ; <i>S. gibbosa</i> ; <i>S. sirm</i> ; <i>S. albella</i>
	11	d. Hilsa Shad	<i>Hilsa ilisha</i>
	12	e. Other Shads	Other <i>Hilsa</i> spp. (<i>Tenualosa</i> , <i>Macrura</i>)
	13	f. Anchovies	
	14		<i>Coilia</i>
	15		<i>Setipinna</i>
	16		<i>Stolephorus</i> (= <i>Anchoviella</i>)
	17		<i>Thrissina</i>
	18		<i>Thryssa</i> (= <i>Thrissocles</i> , <i>Engraulis</i>)
	19	g. Other Clupeids	<i>Kowala coval</i> (white sardine); <i>Dorosoma</i> ; <i>Chanos</i> ; <i>Dussumeria</i> ; <i>Elops</i> ; <i>Escualosa</i> (= <i>Kowala</i>); <i>Herklotsichthys</i> (= <i>Harengula</i>); <i>Ilisha</i> (= <i>Euplatygaster</i>); <i>Megalops</i> ; <i>Nematalosa</i> (= <i>Chaetossus</i>); <i>Opisthopterus</i> ; <i>Pellona</i> ; <i>Raconda</i> ; <i>Spratelloides</i>
5	20	BOMBAYDUCK	<i>Harpadon nehereus</i>
6	21	LIZARDFISHES	<i>Saurida</i> , <i>Synodus</i> ; <i>Trachinocephalus</i>
7	22	HALF BEAKS & FULL BEAKS	<i>Ablennes</i> ; <i>Hemirhamphus</i> ; <i>Hyporhamphus</i> ; <i>Tylosurus</i> (= <i>Strongylura</i> , <i>Belone</i>); <i>Rhynchorhamphus</i>
8	23	FLYING FISHES	<i>Cypselurus</i> ; <i>Exocoetus</i> ; <i>Hirundichthys</i>
9	24	PERCHES	
	25	a) Rock-Cods (Groupers)	<i>Cephalopholis</i> (= <i>Emeacentrus</i>); <i>Epinephelus</i> (<i>Serranus</i>); <i>Plectropomus</i> ; <i>Promicrops</i> ; <i>Variola</i>
	26	b) Snappers	<i>Aprion</i> ; <i>Apsilus</i> ; <i>Lutjanus</i> (<i>Lutianus</i>); <i>Pristipomoides</i>
	27	c) Pig-face Breems (Emperors)	<i>Lethrinus</i>

	28	d) Threadfin Breams	<i>Nemipterus (=Synagris)</i>
	29	e) Other Perches	<i>Acanthurus; Ambassis; Apogon; Argyrops; Caesio; Calloyodon; Cheilinus; Chilodon; Chromis; Diploprion; Dipterygonotus; Drepane; Ehippus (=Chaetodon; Tripteron); Gaterin; Gerres; Grammoplites; Gymnocranius; Holocentrus; Kurtis; Lates; Linophora; Lobotes; Mylio; (=Acanthopagrus); Pempheris; Pentaprion; Peristedion; Platycephalus; Plectorhynchus; Pomadasys (=Pristipoma); Priacanthus; Psammoperca (=Digrama); Rhabdosargus; Scatophagus; Scolopsis; Siganus; Sillago; Suggrundus; Silla gynopsis; Therapon; Thysanophrys</i>
10	30	GOATFISHES	<i>Mulloidichthys; Parupeneus; Upeneus</i>
11	31	THREADFINS	<i>Eleutheronema; Polynemus, Polydactylus</i>
12	32	CROAKERS	<i>Dendrophysa; Johnieops; Johnius (=Sciaena); Kathala; Nibea; Otolithes; Pennahia; Protonibea diacanthus; Otolithoides biauritus</i>
13	33	RIBBONFISHES (HAIRTAILS)	<i>Eupleurogrammus, Lepturacanthus; Trichiurus</i>
14	34	CARANGIDS	
	35	a. Horse Mackerel	<i>Megalaspis cordyla</i>
	36	b. Scads	<i>Decapterus</i>
	37	c. Leather-Jackets (Queenfishes)	<i>Scomberoides (=Chorinemus)</i>
	38	d. Other Carangids	<i>Alectis; Alepes; Atropus; Atule; Carangoides; Caranx; Coryphaena; Elagatis; Gnathanodon; Mene; Naucrates; Platax; Rachycentron; Selar; Selaroides; Seriola; Trachinotus</i>
15	39	SILVERBELLIES (PONYFISHES)	<i>Gazza; Leiognathus; Secutor</i>
16	40	BIG JAWED JUMPER (FALSE TREVALLY)	<i>Lactarius lactarius</i>
17	41	POMFRETS	
	42	a. Black Pomfret	<i>Formio niger (=Parastromateus niger)</i>
	43	b. Silver Pomfret	<i>Pampus argenteus (=Stromateus argenteus)</i>
	44	c. Chinese Pomfret	<i>Pampus chinensis (=Stromateus sinensis)</i>
18	45	MACKERELS	
	46	a. Indian Mackerel	<i>Rastrelliger kanagurta</i>
	47	b. Other mackerels	Other <i>Rastrelliger</i> spp.
19	48	SEERFISHES	
	49	a. Narrow-Barred Spanish Mackerel	<i>Scomberomorus commerson (=Cybium commerson)</i>
	50	b. Indo-Pacific Spanish Mackerel	<i>Scomberomorus guttatus</i>
	51	c. Streaked Spanish Mackerel	<i>Scomberomorus lineolatus</i>
	52	d. Wahoo	<i>Acanthocybium solandri</i>
20	53	TUNNIES	
	54	a. Little Tuna	<i>Euthynnus affinis</i>
	55	b. Frigate and Bullet Tuna	<i>Auxis</i> spp.

	56	c. Skipjack Tuna	<i>Katsuwonus pelamis</i>
	57	e. i. Longtail Tuna ii. Yellowfin Tuna	<i>Thunnus tonggol</i> <i>T. albacares</i>
	58	f. Other Tunnies	Other <i>Thunnus</i> spp.; <i>Sarda</i>
21	59	BILLFISHES	<i>Istiophorus</i> ; <i>Makaira</i> ; <i>Tetrapterus</i> ; <i>Xiphias</i>
22	60	BARRACUDAS	<i>Sphyraena</i> spp.
23	61	MULLETS	<i>Liza</i> ; <i>Mugil</i> ; <i>Valamugil</i>
24	62	UNICORN COD	<i>Bregmaceros</i>
25	63	FLATFISHES	
	64	a. Halibut	<i>Psettodes erumei</i>
	65	b. Flounders	<i>Bothus</i> ; <i>Chascanopsetta</i> ; <i>Poecilopsetta</i> ; <i>Pseudorhombus</i>
	66	c. Soles	<i>Cynoglossus</i> ; <i>Euryglossa</i> ; <i>Heteromycteris</i> ; <i>Solea</i> ; <i>Synaptura</i> ; <i>Zebrias</i>
26	67	CRUSTACEANS	
	68	a. Penaeid Prawns	
		(i) Littoral species	<i>Aristaeomorpha</i> ; <i>Atypopenaeus</i> ; <i>Hymenopenaeus</i> ; <i>Metapenaeus</i> ; <i>Penaeus</i> ; <i>Parapenaeopsis</i> ; <i>Parapenaeus</i> ; <i>Solenocera</i> ; <i>Trachypenaeus</i>
		(ii) Deepsea species	<i>Aristeus</i> ; <i>Metapenaeopsis</i> ; <i>Penaeopsis</i>
	69	b. Non-Penaeid Prawns	
		(i) Littoral species	<i>Acetes</i> ; <i>Exhippolysmata</i> ; <i>Nematopalaemon</i>
		(i) Deepsea species	<i>Heterocarpus</i> ; <i>Plesionika</i> ; <i>Parapandalus</i>
	70	a. Lobsters	
		(i) Littoral species	<i>Panulirus</i> ; <i>Thenus</i>
		(ii) Deepsea species	<i>Puerulus</i>
	71	d. Crabs	<i>Charybdis</i> ; <i>Portunus</i> ; <i>Scylla</i>
	72	e. Stomatopods	<i>Oratosquilla</i>
27	73	MOLLUSCS	
	74	a. Bivalves	<i>Crassostrea</i> ; <i>Donax</i> ; <i>Katelysia</i> ; <i>Meretrix</i> ; <i>Paphia</i> ; <i>Perna viridis</i> ; <i>P. indica</i> ; <i>Pinctada</i> ; <i>Villorita</i>
	75	b. Gastropods	<i>Conus</i> ; <i>Cypraea</i> ; <i>Murex</i> ; <i>Nautilus</i> ; <i>Strombus</i> ; <i>Trochus</i> ; <i>Turbo</i> ; <i>Xancus</i>
	76	c. Cephalopods	<i>Loligo</i> ; <i>Octopus</i> ; <i>Sepia</i> ; <i>Sepiella</i> ; <i>Sepioteuthis</i> ; <i>Symplectoteuthis</i>
28	77	MARINE TURTLES	<i>Chelonia</i> ; <i>Lepidochelys</i> <i>Eretmochelys</i> ; <i>Dermochelys</i> ; <i>Caretta</i>
29	78	MARINE MAMMALS	
	79	a. Dolphins and Porpoise	<i>Delphinus</i> ; <i>Grampus</i> ; <i>Sousa</i> ; <i>Stenella</i> ; <i>Tursiops</i> ; <i>Neophocaena</i>
	80	b. Seacow	<i>Dugong</i>
	81	b. Whale	
		i. Baleen whale	<i>Balaenoptera</i> ; <i>Globicephala</i> ; <i>Megaptera</i> ; <i>Pseudorca</i>
		ii. Toothed whale	<i>Kogia</i> ; <i>Physeter</i> ; <i>Ziphius</i>
30	82	SEAWEEDS	<i>Gelidiella</i> ; <i>Gracilaria</i> ; <i>Sargassum</i>
31	83	MISCELLANEOUS	<i>Amphiprion</i> ; <i>Anacanthus</i> ; <i>Antennarius</i> ; <i>Atherina</i> ; <i>Batrachus</i> ; <i>Blennius</i> ; <i>Diodon</i> ; <i>Echeneis</i> ; <i>Fistularia</i> ; <i>Odonus</i> ; <i>Ostracion</i> ; <i>Pomacanthus</i> ; <i>Pomacentrus</i> ; <i>Pterois</i> ; <i>Sufflamen</i> ; <i>Triacanthus</i> ; <i>Trypauchen</i> and other genera not listed

CHECK LIST FOR ANALYSIS

Checking and coding of data

The steps followed for checking and coding of data are :

1. Mark leave taken by the field staff in the Work Programme.
2. Compare Form C with the work programme and see whether the field staff has collected data according to the Work Programme issued to him.
3. Check whether the number of units recorded in Form C tallies with that in the Fishery Survey form for each day.
4. Check whether the name of state, district, zone, centre, date, period of observation, number of units landed, number of units selected, state of sea etc. are furnished properly.
5. Check the name of craft and gear and the corresponding code number.
6. Horse power should be checked in the case of mechanised and motorised units.
7. Departure time, date and arrival time should be checked and find whether the duration of absence (in hrs) is correct. IF THE DURATION OF ABSENCE IS MORE THAN 24 HOURS IT SHOULD BE TREATED AS MULTIDAY FISHING.
8. Duration of Actual fishing (in hours and minutes) should also be noted.
9. Check whether the name of species and the corresponding four digit code furnished by the field staff are correct. If not, correct the same. THEN PREFIX THE TWO DIGIT RESOURCE CODE FOR EACH SPECIES.
10. For each gear a raising factor for each day of observation has to be given. If only one type of gear is operated give the raising factor as total number of units landed divided by number of units observed. In case of more than one gear, give a proportionate number (raising factor) unless the field staff has given the number of different units landed separately. Coding should be done like this for the whole data.



- 11 Then check for stratification if the data are not of a single centre.
- 12 Raising factors for each stratum should be given for obtaining monthly estimate and indicated prominently on the data sheet.

For example :- TN1DECO4.SCZ, 31,1, TN1, St I – 8/ 5, St II-- 7/3

- 13 Ensure both raw data and the analyzed data are backed up on suitable storage media.

INDFISH – THE SOFTWARE FOR ANALYSIS

Computer Programs

To facilitate creation of a computer based database of marine fish landings, a suite of programs were developed for estimation and preparation of required reports. A complete list of such programs is given in Srinath (1998). Here, only the essential programs are described. All the programs are developed using C++ and are executed via a command line (in DOS mode) with necessary arguments. The Graphical User Interface (GUI) based version of the software will be released shortly. The list of programs for analysis is given below.

Programs	Developed by
1 chkbdf	T.V. Sathianandan
2 fishold	M. Srinath
3 cull	M. Karthikeyan & M. Srinath
4 tabold	M. Srinath
5 merold	M. Srinath
6 mermany	T.V. Sathianandan
7 fishtab1	M. Srinath
8 Procmany	T.V. Sathianandan

The input for estimation is given in the form of a file (unformatted, free field text file) that contains the species/resource-wise and gear-wise catch data for a given zone, including the single center zone. The output from the estimation program is stored in a file with an extension SCZ.

Note:

❖	Raw data file has no extension
❖	File names should not be more than 8 letters excluding extension
❖	All commands and the required arguments should be given with space delimited
❖	Place all the programs in a separate directory and include them in the PATH by adding the path name

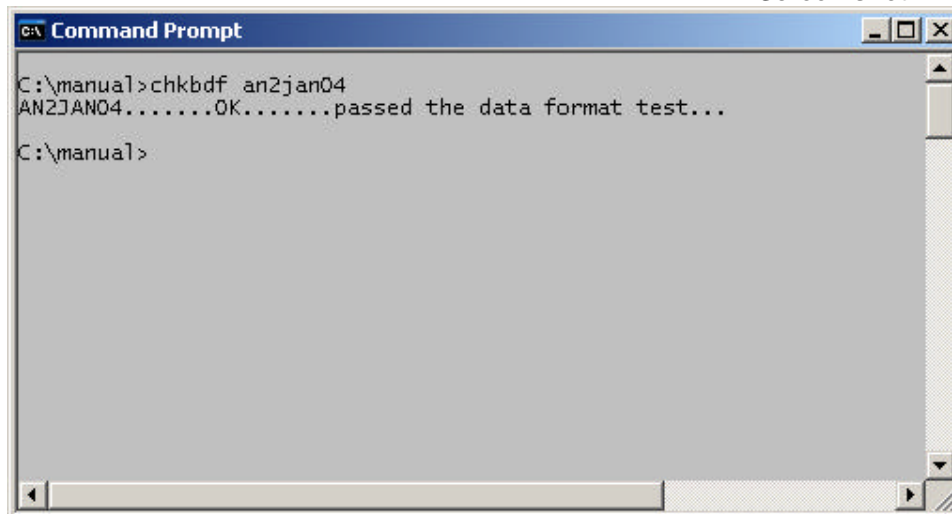
For the output of some of the programs, a text file containing names of the 83 resource groups (as given in Section 9) should be created in the directory from where the programs are executed. Name the file as **specs** (without any extension). The resource names should be entered line by line. The listing of the **specs** file is given at the end of the section.

Description of computer programs

Command : *chkbdf*
Description : To check for errors in the raw data file
Syntax : *chkbdf* <input filename>
Eg: *chkbdf* AN2JAN04.

Following screen shot is for the case when there are no errors in the raw data file.

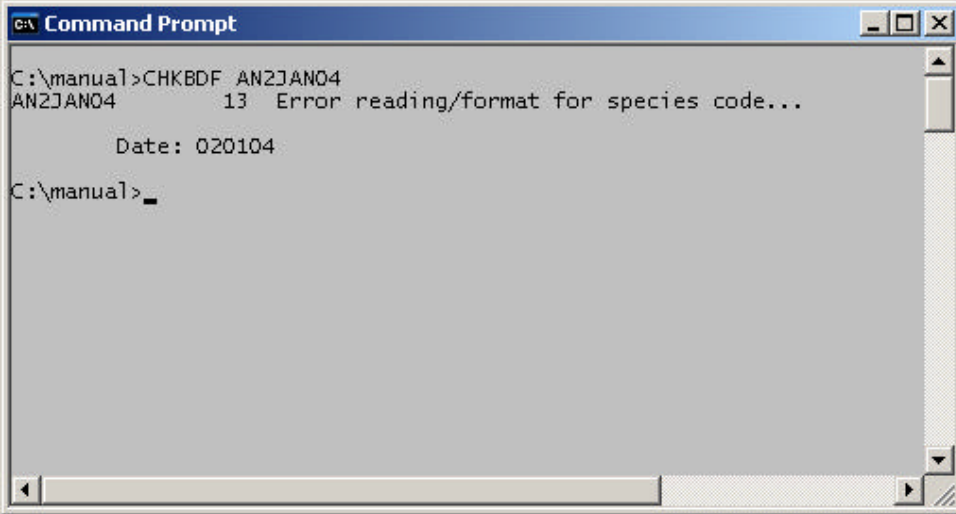
Screen shot 1



```
C:\> Command Prompt
C:\manual>chkbdf an2jan04
AN2JAN04.....OK.....passed the data format test...
C:\manual>
```

When there are errors in the data file, the screen will appear as shown in screen shot 2. Edit the file for correction and rerun the program to check for any other error. Ensure there are no errors in the data file and proceed with the analysis of the data for obtaining the estimates of landings.

Screen shot 2



```

C:\manual>CHKBDF AN2JAN04
AN2JAN04      13 Error reading/format for species code...

      Date: 020104

C:\manual>

```

Command : *fishold*

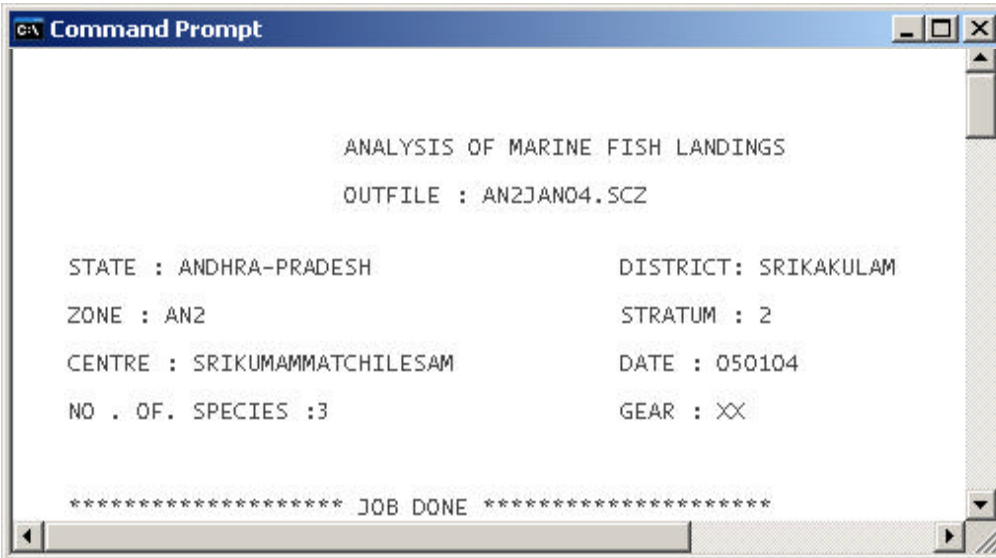
Description : To analyse and estimate species-wise and gear-wise landings using the data provided in the raw data file.

Syntax : fishold <rawdata file>

Eg: fishold AN2JAN04

Following is the screenshot for a successful run.

Screen shot 3



```

                                ANALYSIS OF MARINE FISH LANDINGS
                                OUTFILE : AN2JAN04.SCZ

STATE : ANDHRA-PRADESH           DISTRICT: SRIKAKULAM
ZONE : AN2                       STRATUM : 2
CENTRE : SRIKUMAMMATCHILESAM    DATE : 050104
NO . OF. SPECIES :3             GEAR : XX

***** JOB DONE *****

```

If there is any error in the raw data, the program will terminate as follows

Screen shot 4

```

C:\ Command Prompt

ANALYSIS OF MARINE FISH LANDINGS
OUTFILE : AN2JAN04.SCZ

STATE : ANDHRA-PRADESH           DISTRICT: SRIKAKULAM
ZONE : AN2                       STRATUM : 1
CENTRE : BALARAMAPURAM          DATE : 020104
NO . OF. SPECIES :6              GEAR : 1
Floating point error: Divide by 0.
Abnormal program termination

```

Command : *cull*

Description : To display gear wise estimates of landings for selected resource groups indicated by the resource code.

Syntax : *cull* <SCZ file name> code 1 code2

Eg : *cull an2jan04.scz 09 46*

The output will be the gearwise catches of the selected resources as in screen shot 5.

Screen shot 5

```

C:\ manual Command Prompt
C:\manual>cull an2jan04.scz 09 46
ESTIMATED MARINE FISH LANDINGS (in tonnes) IN an2jan04
-----
Name of fish           NMBSGN   NMGN    NMSS    TOTAL
-----
Oil sardine            0        0       24      24
Indian mackerel       1        6       87      94
Others                 12       116     11      139
-----
TOTAL                 13       122     122     257
-----
Effort (Units)        2387    2604    155
Effort (A.F.H)       9719   11842    388
C:\manual>_

```

Cull without species code

cull <SCZ file name>

Eg. : cull an1jan04.scz

In this case, the total landings for a particular zone with gearwise break-up will be obtained as seen in screen shot 6.

Screen shot 6

```

C:\manual>CULL AN1JAN04.SCZ
ESTIMATED MARINE FISH LANDINGS (in tonnes) IN AN1JAN04
-----
Name of fish          NMGN    TOTAL
-----
Others                1801    1801
-----
TOTAL                 1801    1801
-----
Effort (Units)        54653
Effort (A.F.H)       109306
C:\manual>
  
```

The output can be directed to a printer as follows:

Cull < SCZ file ><Code 1><Code2> >Lpt1:

Or

The output can be directed to a file as follows:

Cull <SCZ file> Code1 Code2 > <outputfile>

Without code

Cull <SCZ file> > <output file>

Output from multiple input files (SCZ files) can be annexed to a single output file in as follows:

by repetitive command line.

cull <SCZ file> Code1 Code2 >> <Output file>

cull <SCZ file> Code1 Code 2 >> <Output file>

cull <SCZ file> Code1 Code 2 >> <Output file>

Alternatively you can do this by creating batch file (file with BAT extension)

Command : *tabold*

Description : To make gear wise x species-wise two way table of the estimated landings

Syntax : *tabold*

Type '*tabold*' and press Enter key. Name of the input file will be prompted and follow the screen dialogue as given in screen shot 7

Screen shot 7

```

C:\manual>tabold
Name of the input file: an2jan04.scz
an2jan04.scz
Type the title to the table: MarineFish Landings in AN2 during Januar
Type the name of output file:an2jan04.out
C:\manual>

```

The output file can be edited with a suitable editor (Dos editor Edit), as seen in screen shot 8.

Edit <outputfile> as given in *tabold*

Screen shot 8

```

File Edit Search View Options Help
C:\manual\AN2FEB04.OUT
Estimated marine fish landings in an2 during february 2004(fig in tonnes)

Name of fish          NMGN  NMSS  NMHL  IBGN  IBHL  TOTAL
Catfishes             -     -     31   -     34    65
Oil sardine           -     48   -     -     -     48
Other sardines        366    2   -     -     -    368
Thryssa               15    -   -     -     -     15
Other clupeids        59    -   -     -     -     59
LIZARD FISHES         9     -   -     -     -     9
SILVERBELLIES        41    10  -     -     -     51
BIG-JAWED JUMPER     1     -   -     -     -     1
S. commersoni        -     -   -     -     6     6
Miscellaneous         12    -   -     3     -     15
TOTAL                 503   60   35    3     40    641
Effort(Units)        26512 310  851  1808  425
Effort(A.F.H.)      103643 776 3828 6214  1808
F1=Help
Line:17 Col:71

```

Command : *merold*

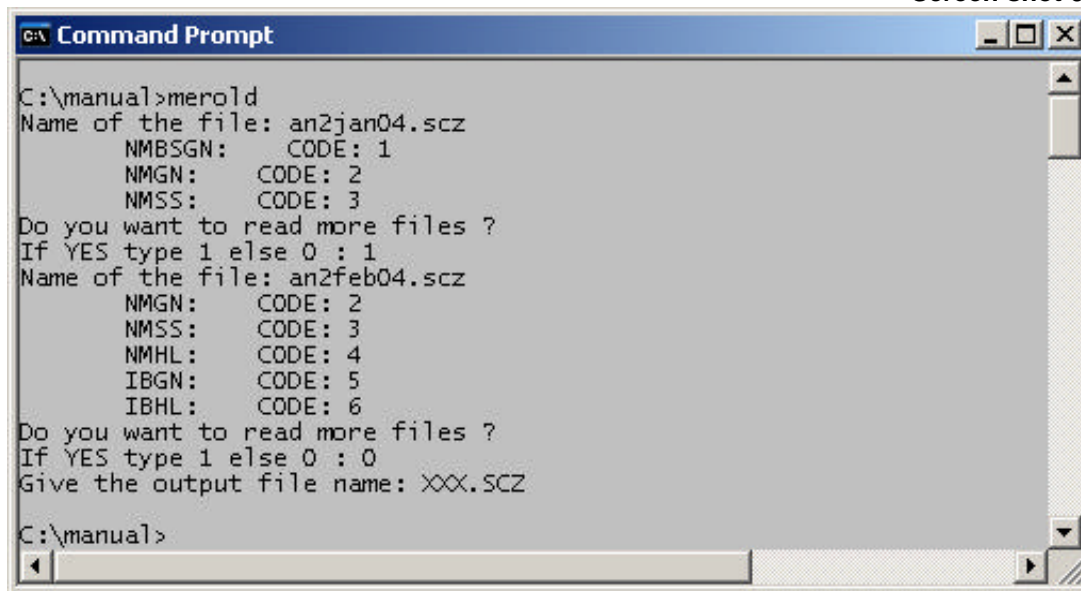
Description : To merge different SCZ files

Syntax : merold

Type '*merold*' and press the Enter key. Name of the file will be prompted. Program will prompt for as many files to be merged. Give same code number for same gear or sector (mechanized, motorized and non-mechanised). '*Merold*' can also be used to obtain monthly, quarterly, half yearly and annual estimates by pooling the appropriate output file (analyzed data) by suitably merging the gears. You can get total landings of a species pooled on all gears by giving gear code 1 to all the gears.

In the following screen shot data from two files for the month of January and February are pooled for the zone AN2.

Screen shot 9



```

C:\manual>merold
Name of the file: an2jan04.scz
  NMBSGN:   CODE: 1
  NMGN:     CODE: 2
  NMSS:     CODE: 3
Do you want to read more files ?
If YES type 1 else 0 : 1
Name of the file: an2feb04.scz
  NMGN:     CODE: 2
  NMSS:     CODE: 3
  NMHL:     CODE: 4
  IBGN:     CODE: 5
  IBHL:     CODE: 6
Do you want to read more files ?
If YES type 1 else 0 : 0
Give the output file name: XXX.SCZ

C:\manual>

```

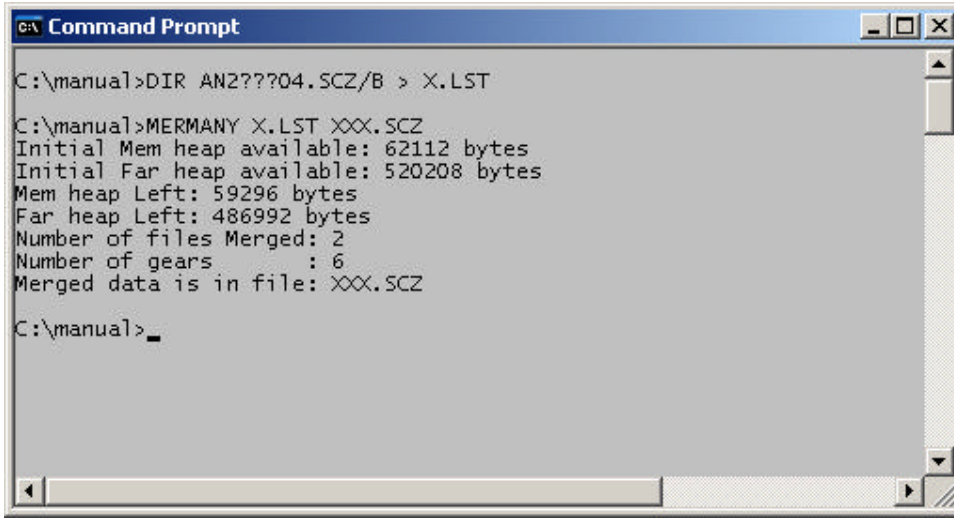
Command : *mermany*

Description : To merge multiple SCZ files by a single command.

Syntax : mermany <master file> <output file name>.

Master file is created by placing all the SCZ files to the required region/month as shown, for example, in screen shot 10 (in this X.LST is the master file).

Screen shot 10



```

C:\manual>DIR AN2???04.SCZ/B > X.LST

C:\manual>MERMANY X.LST XXX.SCZ
Initial Mem heap available: 62112 bytes
Initial Far heap available: 520208 bytes
Mem heap Left: 59296 bytes
Far heap Left: 486992 bytes
Number of files Merged: 2
Number of gears      : 6
Merged data is in file: XXX.SCZ

C:\manual>_

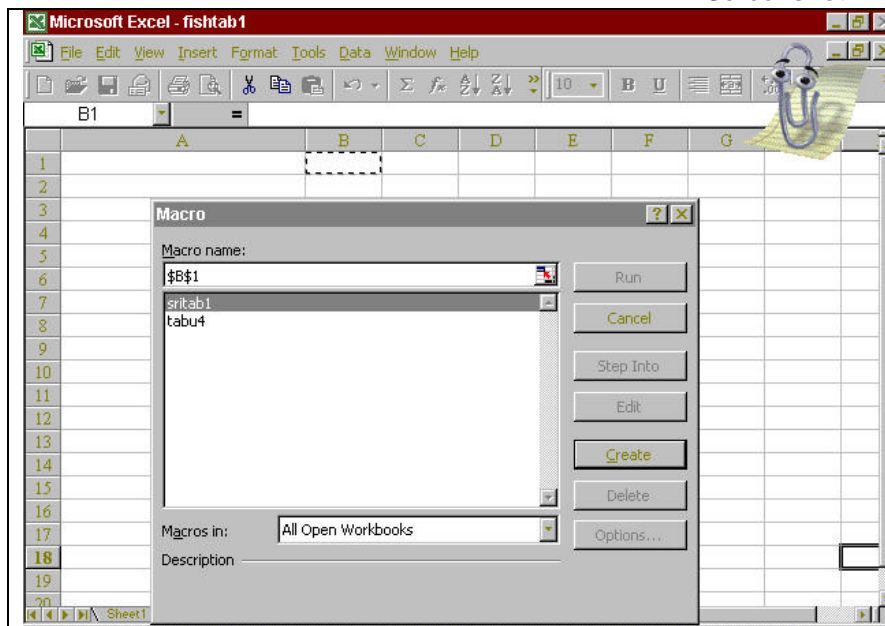
```

Command : *fishtab1*

Description : To create a table in Excel format for existing SCZ file.

Open *fishtab1* in Excel. Ensure that the worksheet is blank. From Tools select Macros and from the Macro name select Sritab1. Data path and file name will be prompted (screenshot 11).

Screenshot 11



Screen shot 12

UserForm2

Preparation of table

Data path c:\manual

File name: an2jan04.scz

OK

Output will be shown as in screenshot 13. Edit for necessary changes if any.

Screenshot 13

	A	B	C	D	E	F	G
1	an2jan04.scz						
2							
3							
4	Name of fish	NMGN	NMSS	Total			
5	ELASMOBRANCHS	0	0	0			
6	Sharks	0	0	0			
7	Skates	0	0	0			
8	Rays	0	0	0			
9	Eels	0	0	0			
10	Catfishes	0	0	0			
11	CLUPEIDS	0	0	0			
12	Wolf herring	0	0	0			
13	Oil sardine	0	122	122			
14	Other sardines	59	12	71			
15	Hilsa shad	0	0	0			
16	Other shads	0	0	0			
17	Anchovies	0	0	0			
18	Coilia	0	0	0			
19	Setipinna	0	0	0			
20	Stolephorus	0	0	0			

Command : *procmany*

Description : For multi-processing (checking, estimating and culling data) of multiple files (raw data or analyzed data) using a single command.

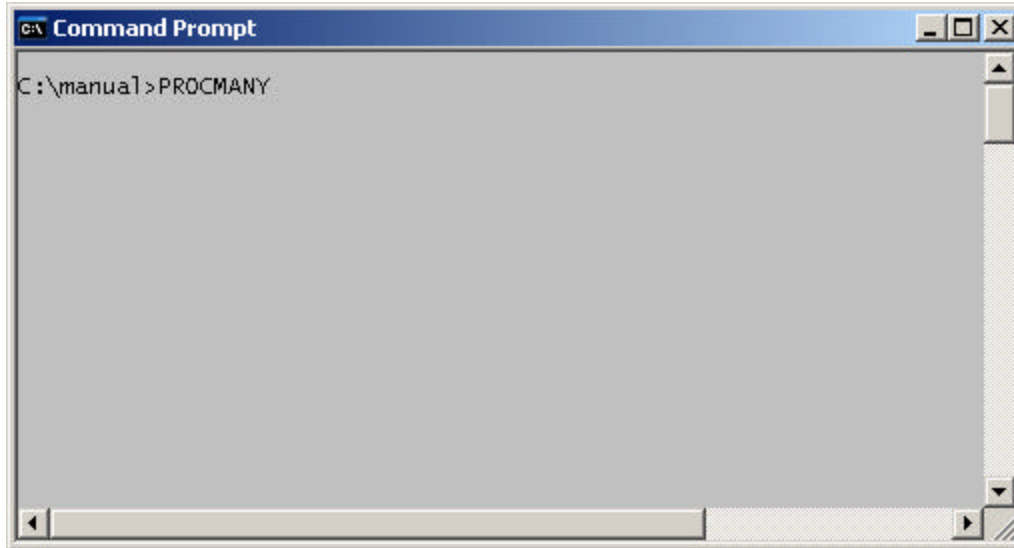
Syntax : *procmany*

Type '*procmany*' as seen in the screenshot 14 and press Enter key. Give name of the command as in screenshot 15 and Master file name when prompted for. The contents of the master file will be a list of raw data files, if the program is used to check data validity and to estimate the

resource-wise/gear-wise landing. In case of culling of estimates for selected resource groups the master file will have a list of analysed data files (with SCZ extension).

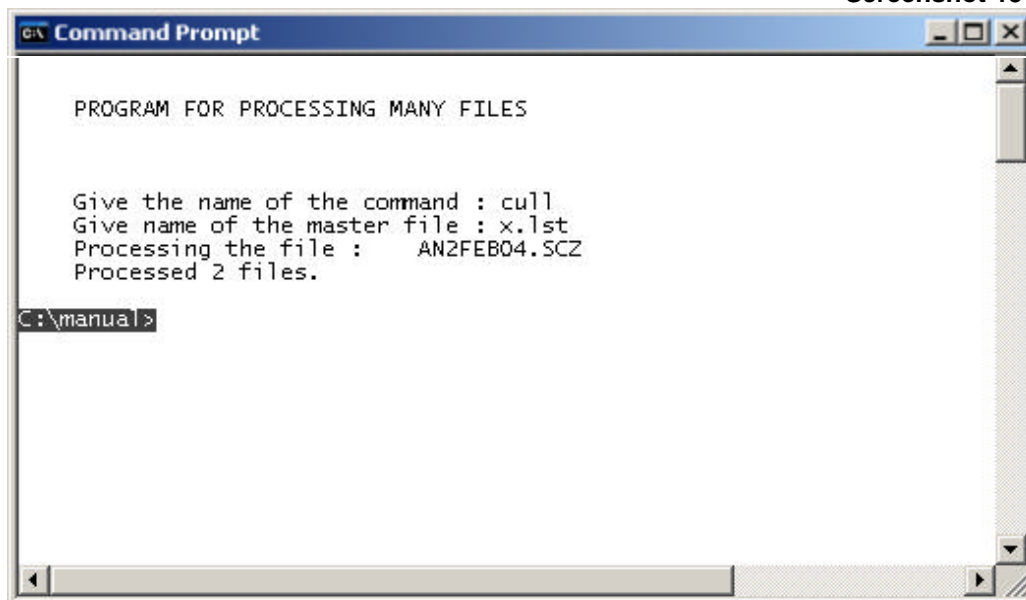
(Master file will be created by the command “dir <filenames>/b> <filename>”

Screenshot 14



```
C:\manual>PROC MANY
```

Screenshot 15



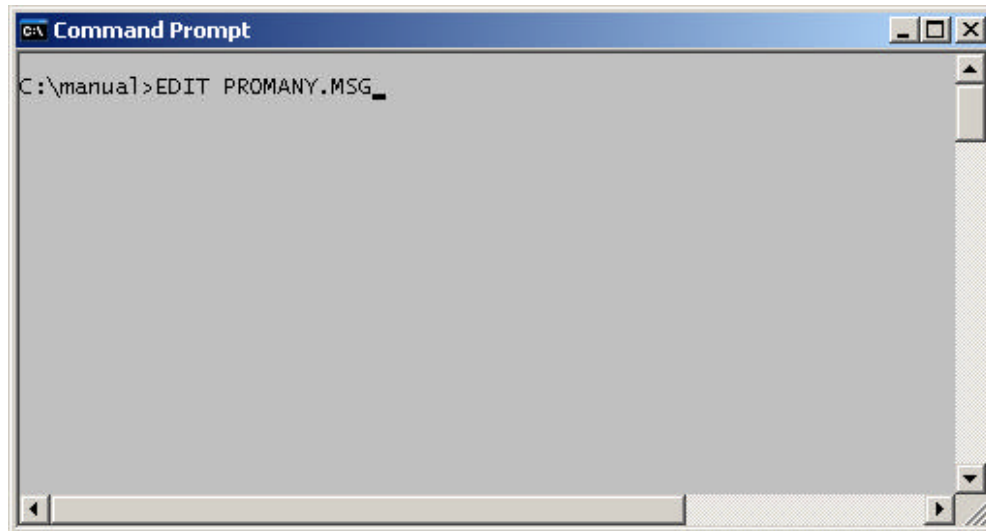
```
PROGRAM FOR PROCESSING MANY FILES

Give the name of the command : cull
Give name of the master file : x.lst
Processing the file : AN2FEB04.SCZ
Processed 2 files.

C:\manual >
```

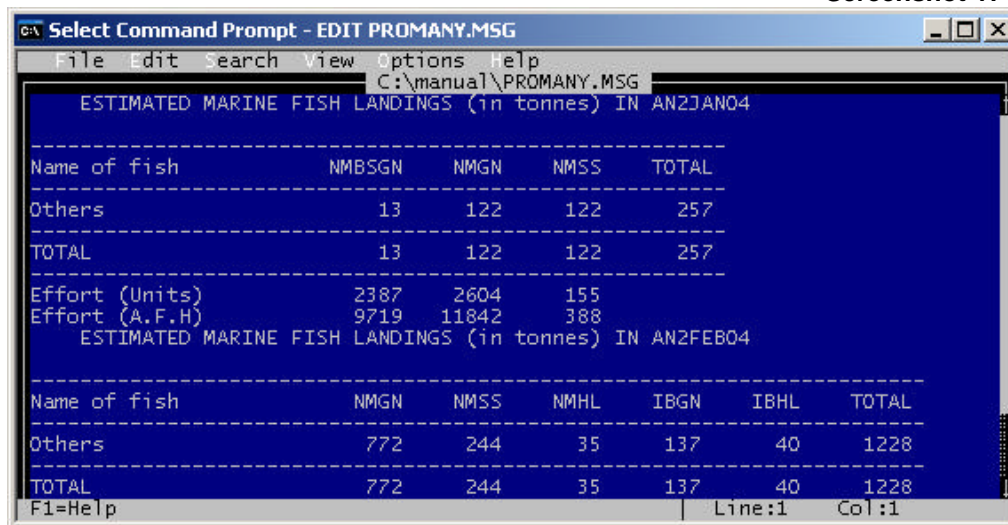
To display and edit the results edit the PROMANY.MSG file as shown in screenshot 16 and result is displayed as in screen shot 17.

Screenshot 16



```
C:\manual>EDIT PROMANY.MSG
```

Screenshot 17



```
ESTIMATED MARINE FISH LANDINGS (in tonnes) IN AN2JAN04
-----
Name of fish      NMBSGN    NMGN     NMSS     TOTAL
-----
Others            13        122     122      257
TOTAL            13        122     122      257
-----
Effort (Units)    2387     2604     155
Effort (A.F.H)   9719    11842     388
ESTIMATED MARINE FISH LANDINGS (in tonnes) IN AN2FEB04
-----
Name of fish      NMGN     NMSS     NMHL     IBGN     IBHL     TOTAL
-----
Others            772      244      35       137      40      1228
TOTAL            772      244      35       137      40      1228
F1=Help | Line:1 Col:1
```

The same syntax can be used for fishhold and chkbuf commands for analyzing and checking a group of files.

Contents of specs file

ELASMOBRANCHS

Sharks

Skates

Rays

Eels

Catfishes

CLUPEIDS

Wolf herring

Oil sardine

Other sardines

Hilsa shad

Other shads

Anchovies

Coilia

Setipinna

Stolephorus

Thrissina

Thryssa

Other clupeids

BOMBAYDUCK

LIZARD FISHES

HALF BEAKS&FULL BEAKS

FLYING FISHES

PERCHES

Rock cods

Snappers

Pig-face breams

Threadfin breams

Other perches

GOATFISHES

THREADFINS

CROAKERS

RIBBON FISHES

CARANGIDS

Horse Mackerel

Scads

Leather-jackets

Other carangids

SILVERBELLIES

BIG-JAWED JUMPER

POMFRETS

Black pomfret

Silver pomfret

Chinese pomfret



Contents of specs file contd.

MACKERELS

Indian mackerel

Other mackerels

SEER FISHES

S. commersoni

S. guttatus

S. lineolatus

Acanthocybium spp.

TUNNIES

E. affinis

Auxis. spp

K. pelamis

T. tonggol

Other tunnies

BILL FISHES

BARRACUDAS

MULLETS

UNICORN COD

FLAT FISHES

Halibut

Flounders

Soles

CRUSTACEANS

Penaeid prawns

Non-penaeid prawns

Lobsters

Crabs

Stomatopods

MOLLUSCS

Bivalves

Gastropods

Cephalopods

MARINE TURTLES

MARINE MAMMALS

Dolphin & Porpoise

Seacow

Whale

SEAWEEEDS

MISCELLANEOUS



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APPENDIX

Forms Used For Data Collection

REGISTERED

Central Marine Fisheries Research Institute, Cochin – 18

FISHERIES RESOURCES ASSESSMENT DIVISION

No.....

Date:

Work programme of Shri _____

Month & year _____ Zone _____ District _____ State _____

Place	Date
1.	
2.	
3.	
4.	
5.	
6.	
7.	
8.	
9.	

Timings : 12-00 hrs. to 18-00 hrs. on the first day and 0600 hrs. to 12-00 hrs on the second day

To

Shri _____

Head of Division

Copy to:

- 1. Scientist-in-Charge _____ Regional/Research Centre of CMFRI _____
- 2. The Field Officer, FRAD, CMFRI, Cochin. 3. Concerned Technical staff at Headquarters
- 3. _____

ACKNOWLEDGEMENT

(To be detached and returned)

To

The Head
F.R.A.Division
C.M.F.R.I., Cochin-18

Received work programme for the month of _____ for the zone _____

Place :

Date :

(Signature)

Fishery Survey Form T

NATIONAL MARINE LIVING RESOURCES DATA CENTRE

CENTRAL MARINE FISHERIES RESEARCH INSTITUTE (ICAR), COCHIN – 18

RECORD OF TIME OF LANDINGS

Name of landing centre Type of unit – Mechanized/Non-mechanized
(Shoreseine/others)

Date Number of fishing units landed during the
Previous night

Period of observation

Serial No.	Time of landing	Remarks	Serial No.	Time of landing	Remarks	Serial No.	Time of landing	Remarks
1			34			67		
2			35			68		
3			36			69		
4			37			70		
5			38			71		
6			39			72		
7			40			73		
8			41			74		
9			42			75		
10			43			76		
11			44			77		
12			45			78		
13			46			79		
14			47			80		
15			48			81		
16			49			82		
17			50			83		
18			51			84		
19			52			85		
20			53			86		
21			54			87		
22			55			88		
23			56			89		
24			57			90		
25			58			91		
26			59			92		
27			60			93		
28			61			94		
29			62			95		
30			63			96		
31			64			97		
32			65			98		
33			66			99		
						100		

CENTRAL MARINE FISHERIES RESEARCH INSTITUTE, COCHIN
FISHERY RESOURCES ASSESSMENT DIVISION

Trend of fisheries for the month of

State **District** **Zone**

1. Account of the fisheries in the zone as a whole for the month. (This should cover commencement/closure of important fishery.

2. Comparative assessment of catch with that of previous month

3. Relative abundance of different species of fish in different nets

4. Occurrence of Juveniles of commercially important species

5. Any unusual phenomenon such as bumper catch of fish and prawns, large scale mortalities, diesel shortage agitations, cyclones etc.

6. Information on the capture of marine mammals like whales and dugong and marine turtles.

7. Additional points, if any.

Name and signature of the Assistant

Place :

Date :

NATIONAL MARINE LIVING RESOURCES DATA CENTRE
CENTRAL MARINE FISHERIES RESEARCH INSTITUTE (ICAR), COCHIN- 18
DAILY RECORD OF CATCH AND EFFORT OF SMALL MECHANIZED FISHING CRAFT

State District Tne tre
Date Period..... ber of units landed No. of units selected
State of sea State of sky Direction of wind

Serial number	Allotted No. of selection of units examined	Name and/or craft number	Type of craft		Type of gear		Length of craft	Horse power	Absence from shore			Fishing ground			No. of hauls	Duration of actual fishing (hrs. & mts)	Man power employed	Av. Trawling speed in case of trawler (km/hr)	Name, code and weight (kg) of fish landed													
			Name	Code	Name	Code			Dep. Time & Date	Arr. Time	Duration of absence (hrs)	Distance (km) from shore	Direction from L.C.	Depth (m)					20	21	22	23	24	25	26	27	28	29	30			
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30			
Special attention : Report incidental catch/stranding of cetaceans and turtles with details															Price in Rs per Kg																	

Remarks

