CMFRI Data Collection System for Marine Fish Landings Estimation

CMFRI

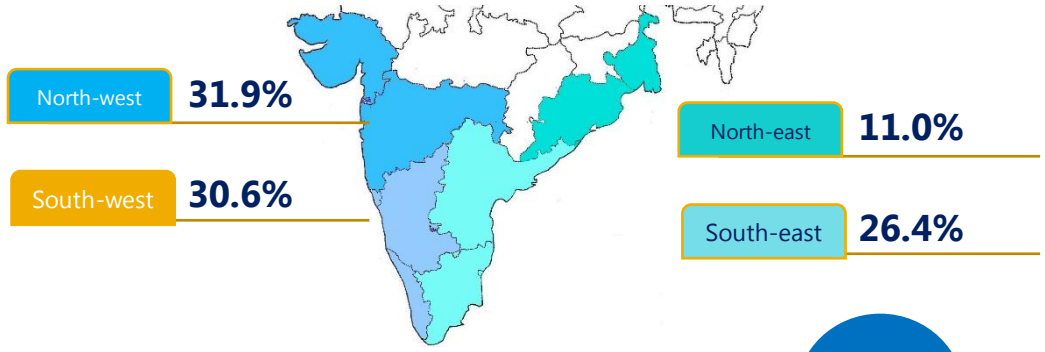
भाकृअनुप
ICAR

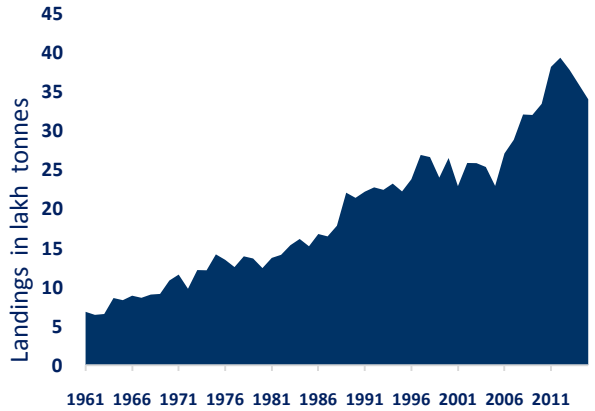
सी एम एफ आर आइ
CMFRI

Dr. T.V. Sathianandan
Principal Scientist & Head
Fishery Resources Assessment Division
ICAR-Central Marine Fisheries Research Institute
Kochi - 682018

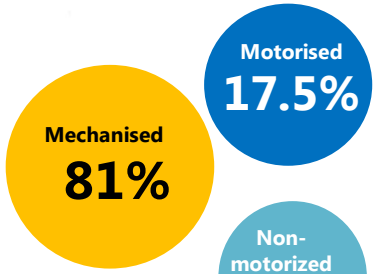
Marine Capture Fisheries - Fishery Resource Monitoring

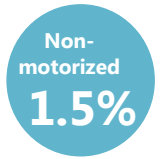
Marine Fish Landings | **6068 km** Coastline | **9** Maritime states **2** Union Territories





3.63 million tonnes in 2016





51.3% pelagic
29.9% demersal
12.2% crustacean
6.6% mollusc

MAJOR RESOURCES 2016
(lakh tonnes)

Oil sardine	2.45
Indian mackerel	2.41
Cephalopods	2.31
Penaeid prawns	2.04
Ribbon fishes	2.00
Lesser sardines	1.87
Threadfin breams	1.66
Croakers	1.66
Other perches	1.62
Non-penaeid prawns	1.58

Why monitoring of resources ?

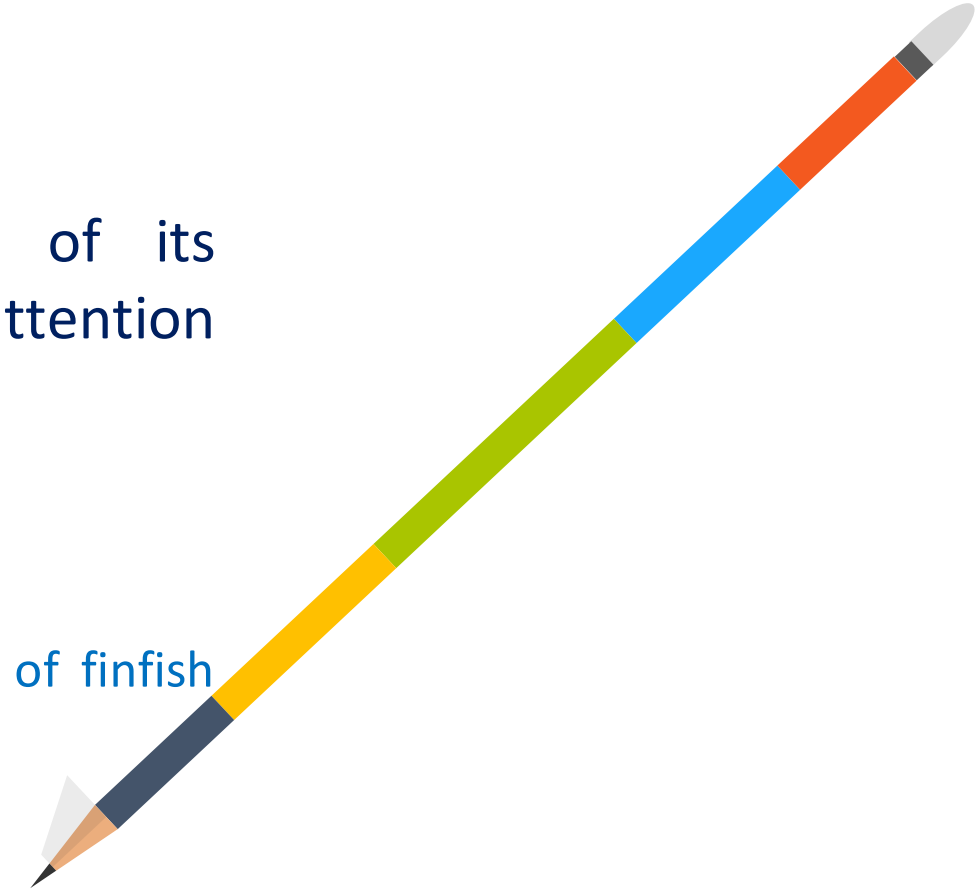
Marine fisheries resources are invisible, frequently migrating and easily affected by the changes in the sea. These characteristics make it unique and complex and hence difficult to monitor, manage and intervene.

- **Productivity of the seas**
- **The availability of fish at given point of time**
- **The fishing effort expended**
- **Accessibility and vulnerability of the resources**
- **A number of natural factors**

Monitoring and assessment of marine fisheries resources - Role of CMFRI

During the first half of the seven decades of its existence, the CMFRI devoted its research attention towards

- the estimation of marine fisheries landings and effort,
- taxonomy of marine organisms and the
- bio-economic characteristics of the exploited stocks of finfish and shellfish.



Monitoring and Assessment of Marine Fishery Resources

Information on

- catch
- effort
- biological aspects
- socio-economic aspects

Essential requirements for assessing the exploited stock

Marine Fisheries Data Collection

India is one among few countries where a system based on sampling theory is used to collect marine fish catch statistics.

1947

Initiated the process of collection of data on marine fish catch, effort, biological parameters etc.

1957

Pilot surveys along the Malabar coast by IASRI based on a three stage stratified sampling

1959

Initiated marine fish landings data collection along the west coast through stratified multistage sampling design

1961

The stratified multistage random sampling design for the entire coast became operational

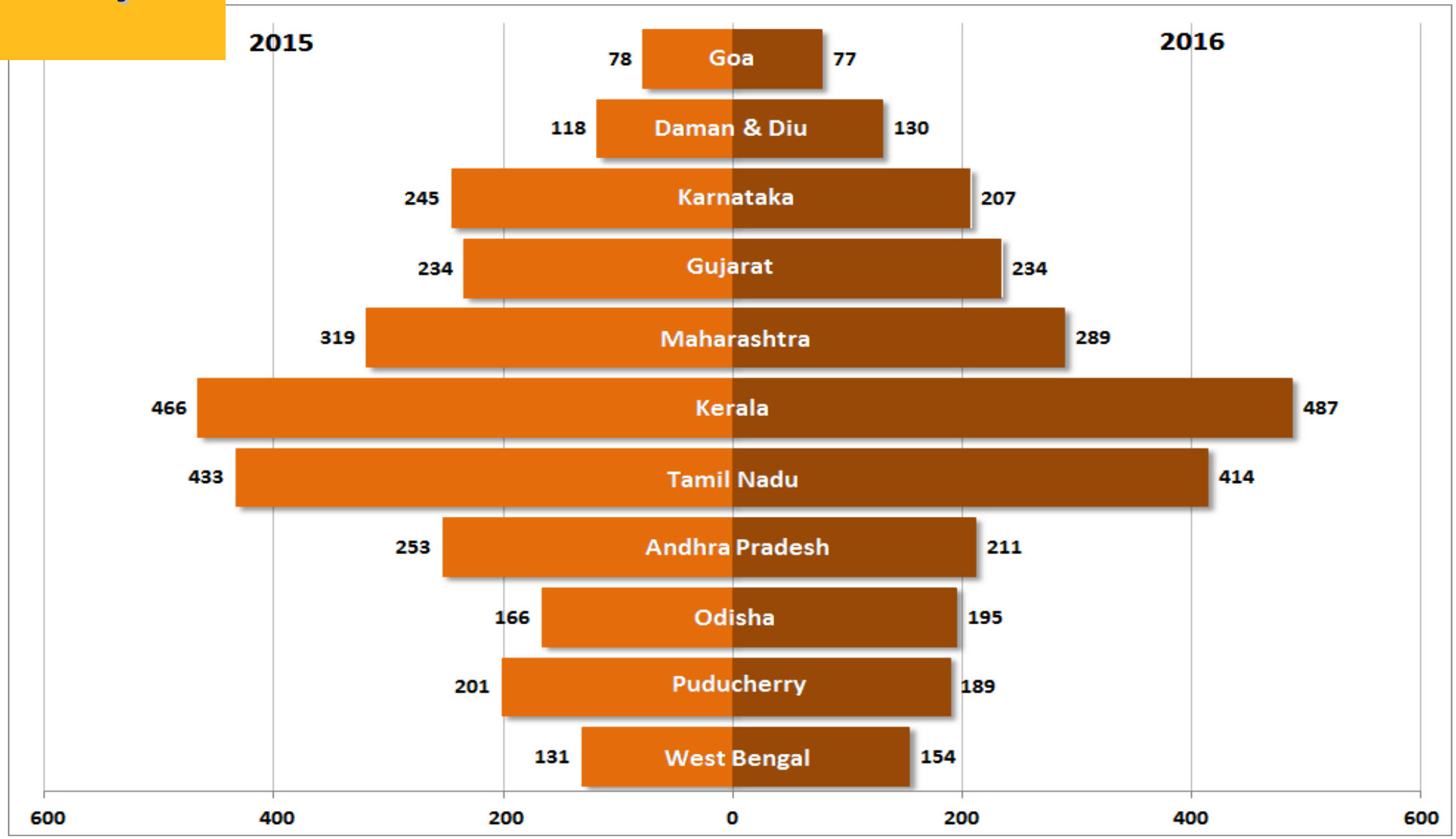
1972

Sampling scheme evaluated by independent statistical experts (NIO)

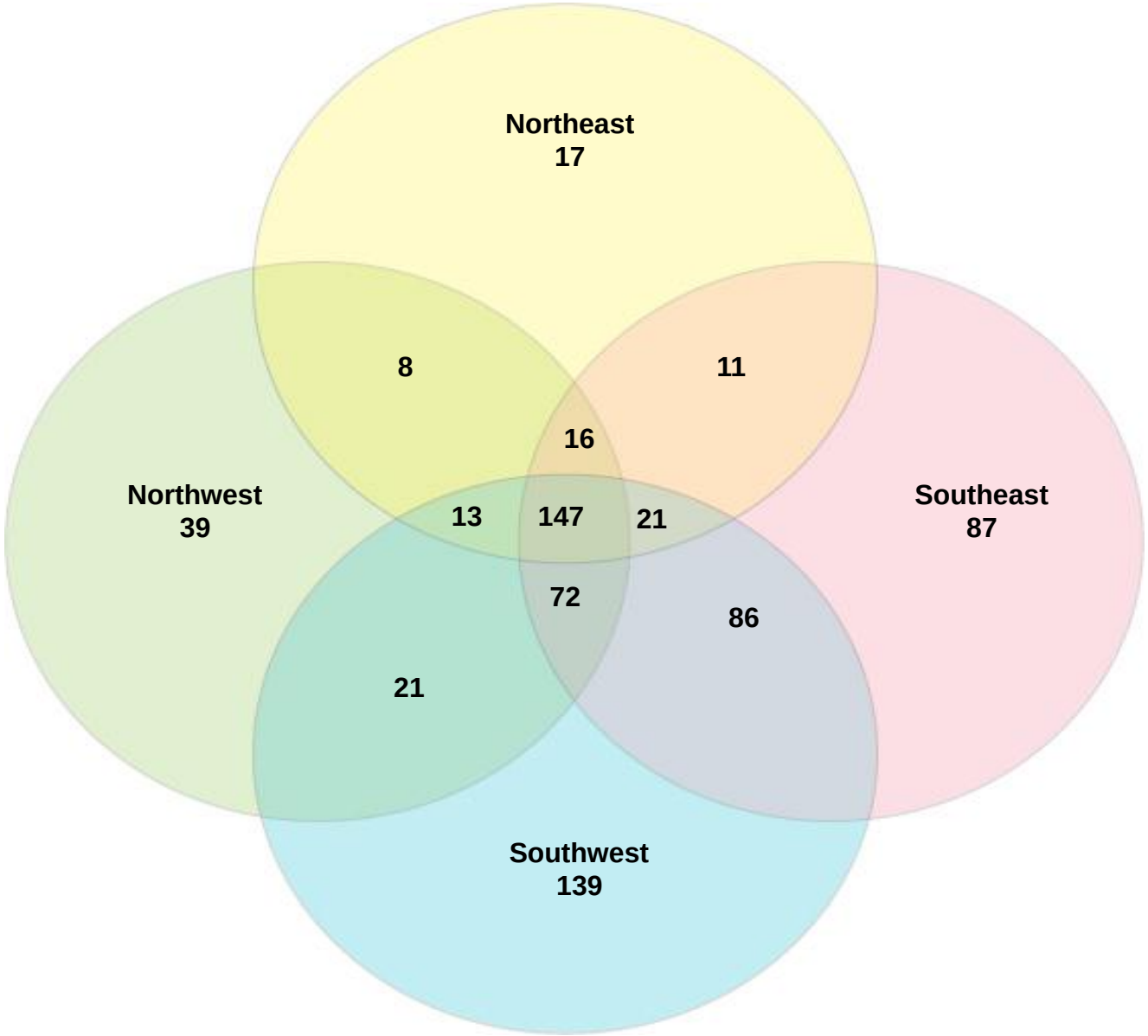
Why Sampling ?

- Fish landings take place all along the coast line in 1341 landing centres including fisheries harbours during day and night through out the year
- In 2016, there were 72,93,000 boat trips in the landing centres to be enumerated for arriving at exact landings figure.
- We require 4,86,000 man days/year for complete enumeration
- A scientifically valid sampling scheme is the only feasible way for estimating fish landings and fishing effort

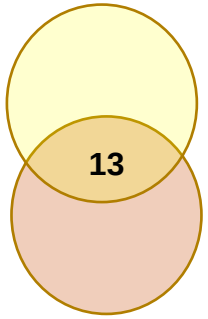
Species diversity

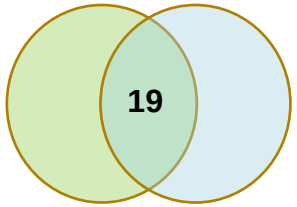


Regionwise distribution of species (count)



2016





Total: 709

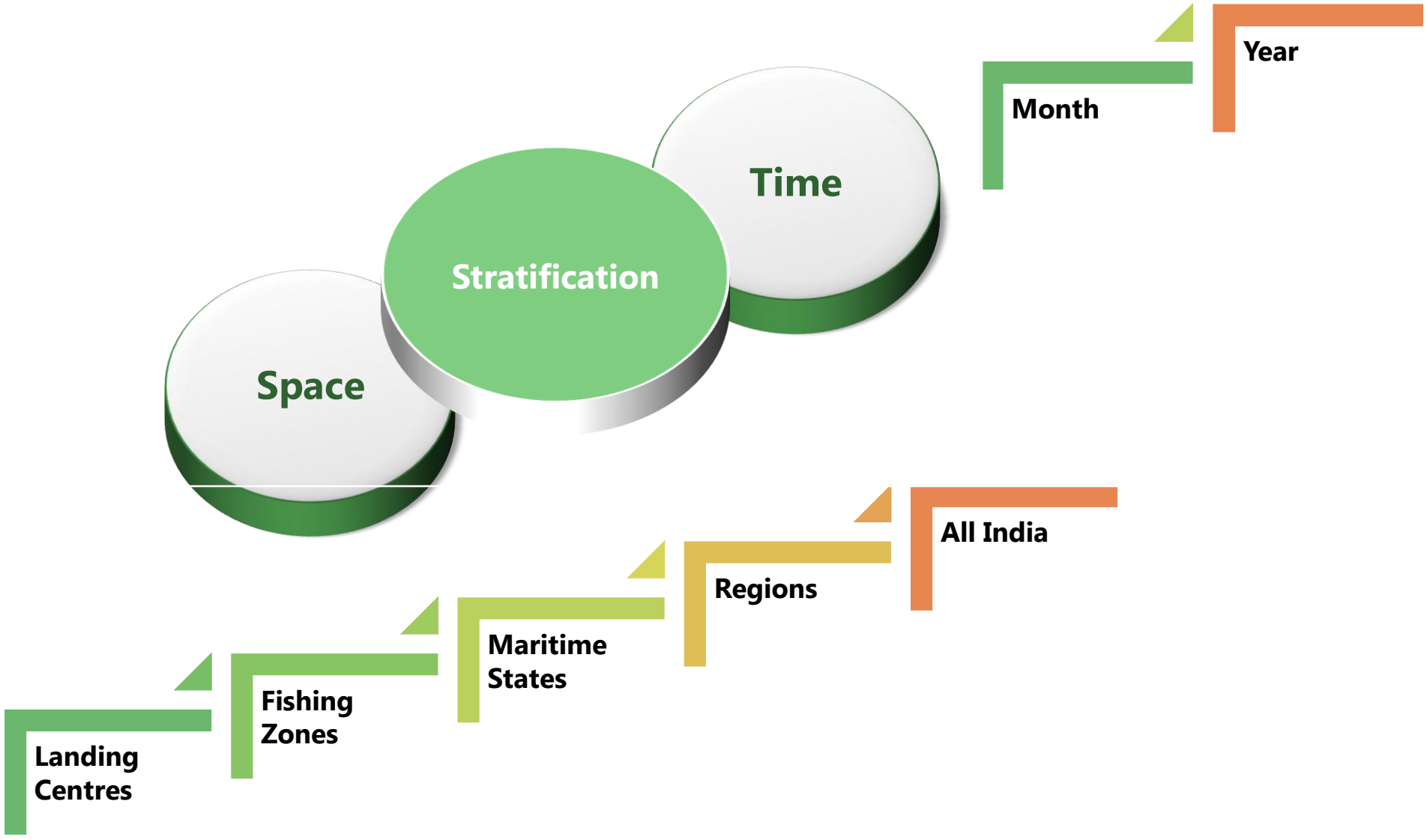
Effective utilization of CMFRI data

- Input for assessing the status of exploited marine fishery resources of Indian EEZ through the in-house research projects of the Institute
- Estimation of Potential Yield and Optimum Fleet Size for each maritime state as part of revalidation of Potential Yield for the committee constituted by Ministry of Agriculture
- Preparation of trawl ban policy for the committee constituted by Ministry of Agriculture
- Formulate replies for starred questions raised in Parliament and State Legislative Assembly.
- Inputs for research activities of Students and Researchers of other Institutes and Universities.
- Data dissemination to different organizations on demand for planning and developmental activities along the coastal region.
- Access of daily catch and price information to public through FishWatch available in *www.cmfri.org.in*

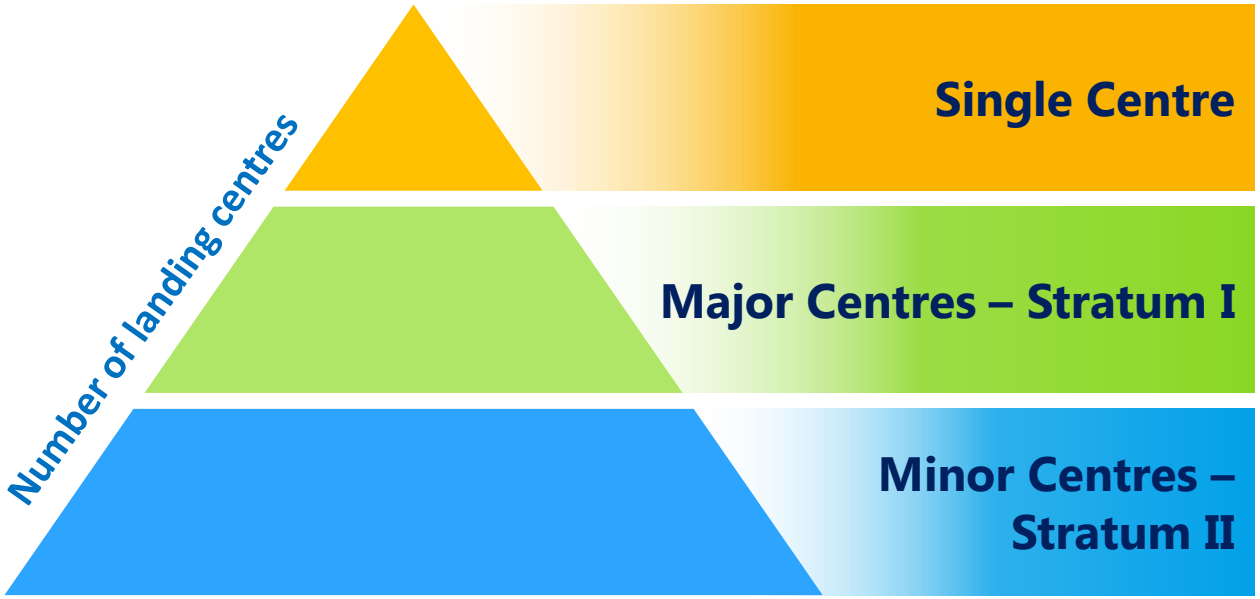
Advantages of the data collection system

- Strong statistical footing
- Carried out by an unbiased research agency ensuring uniformity and consistency
- Full fledged methodological review mechanism with major relooks as and when required
- Enumeration is carried out by trained dedicated staff with expertise in species identification
- Information collected at individual species level and stored in database for fast and easy retrieval
- As multi-species and multi-gear fishery prevailing in India, Log sheet system of data collection followed in temperate regions are not feasible.

Stratified Multistage Random Sampling Design



Fishing zone



- Sampling is performed within geographical areas referred as fishing zones
- Varying number of fish landing centres fall under fishing zones
- Single centre zones - Landing centres with relatively high intensity of fishing activity

Criteria for stratification within fishing zones

- variation in fishing intensity
- type of fishing craft and fishing method
- Number of fishing crafts

Recording of Fish Landings

01 Species wise catch

02 Fishing Effort

03 Type of Crafts

04 Gears operated

05 Fishing Ground

06 Other details

Species identification

Work programme schedules for data collection are send every month from HQ to field staff.
Data received is centrally processed at HQ.

WORK
Programme

from headquarters

Headquarters, Kochi

Data quality check through periodic field inspections

11 Regional Research Centres

17 Field Centres

Marine Fish Landings

12%

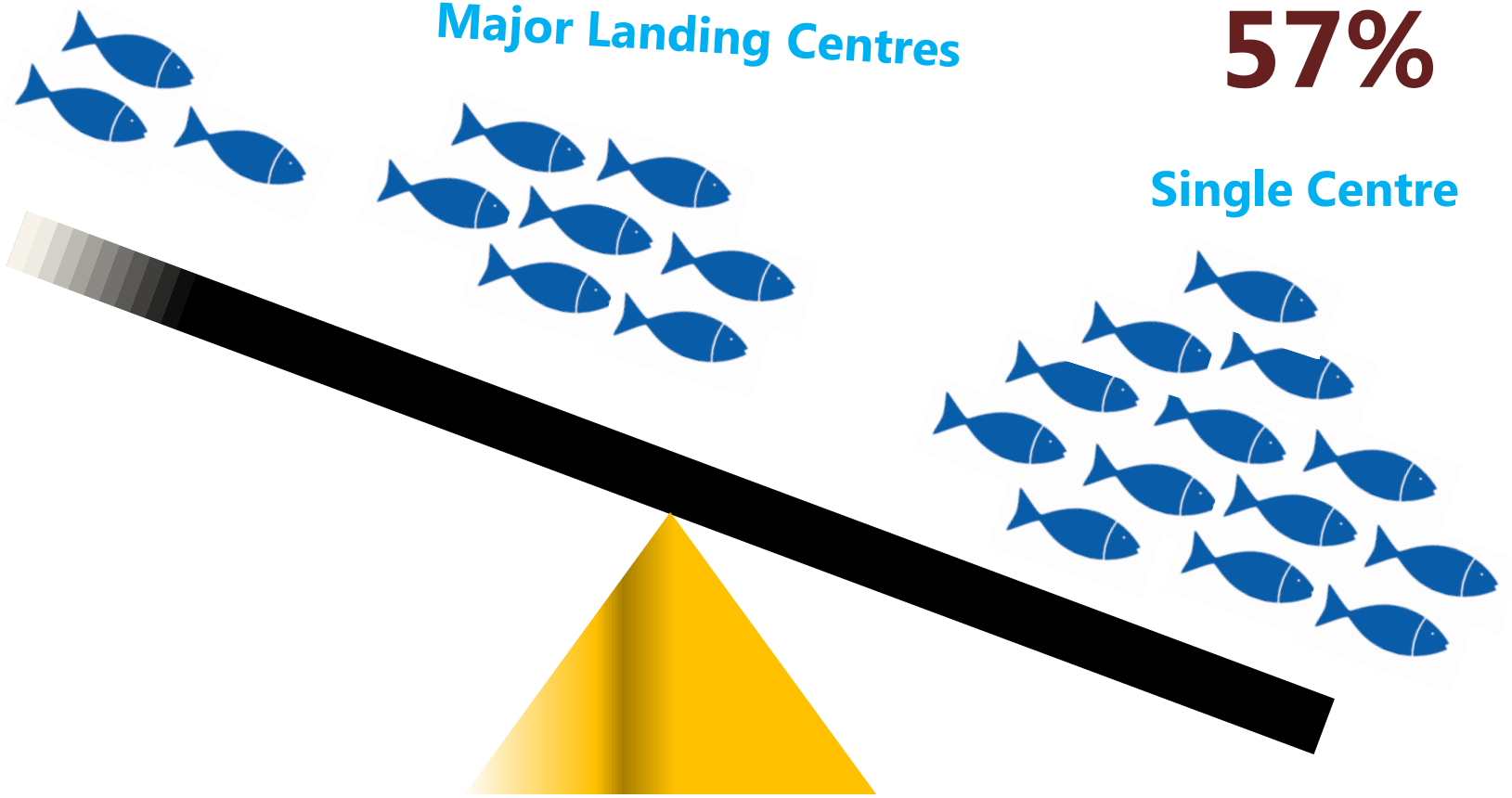
Minor Landing Centres

31%

Major Landing Centres

57%

Single Centre



Sampling coverage & Sampling Error

State/UT	Coastal Length	No. of fishing zones	No. of landing centres	Sampling coverage (%)		
				Single centre zones	Major centres	Minor centres
West Bengal	158	3	57		2.68	1.77
Odisha	480	5	58	1.49	1.79	3.03
Andhra Pradesh	974	14	233	7.03	2.32	2.16
Tamil Nadu	1076	18	398	2.88	1.37	0.97
Puducherry	45	1	25			
Kerala	590	10	189	8.69		3.51
Karnataka	300	7	92	7.57	2.04	
Goa	104	2	34		3.11	
Maharashtra	720	8	158	6.78	1.30	0.96
Gujarat	1600	6	92	2.69	5.15	1.08
Damen & Diu	21	1	5		1.4	
Total	6068	75	1341	5.30	2.35	1.77
Error %				5 - 8	15 - 20	12 - 18

National Marine Fisheries Data Centre

- Individual species level estimates on landings
- Fishing gear/craft wise landings & fishing effort
- Fishing zone, district, state, region, national resolutions
- Monthly estimates for every year
- Historic information from 1950 onwards

NMFDC

- Mechanised
- Motorised
- Non-motorised

Species → Genus → Family → Order → Class → Phylum

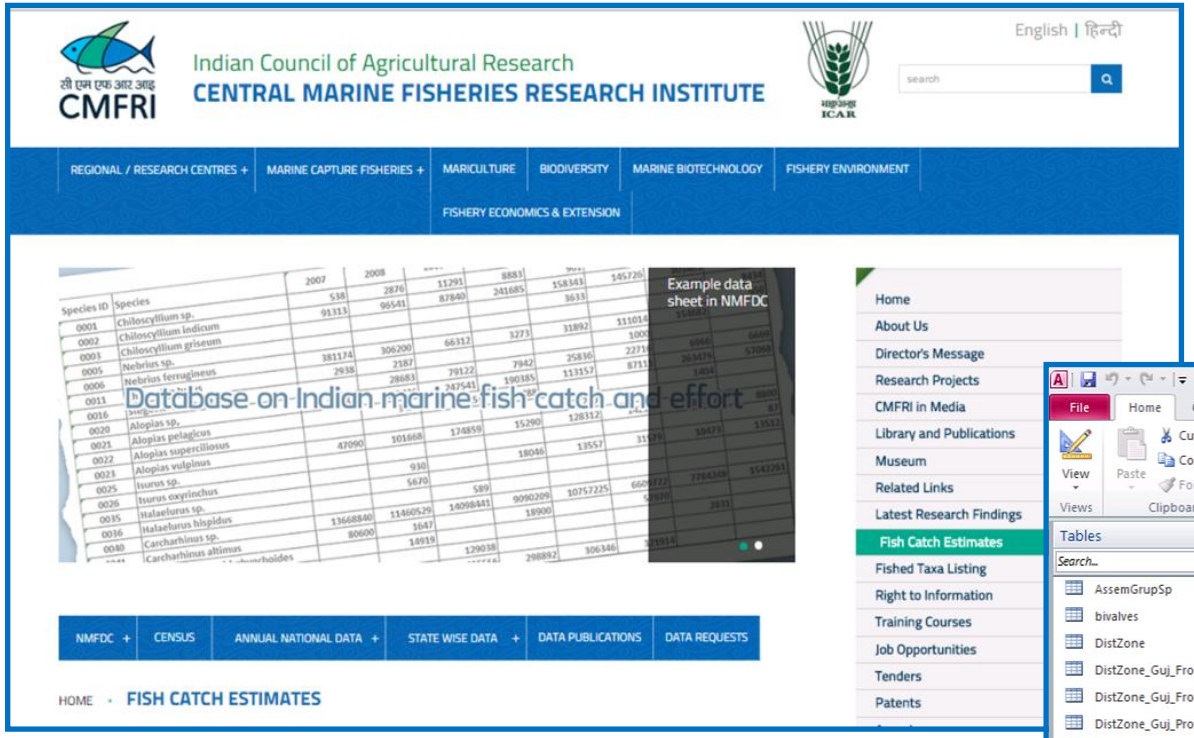
01
Fishing zones
75

02
Districts
33

03
States+ UTs
9 + 2

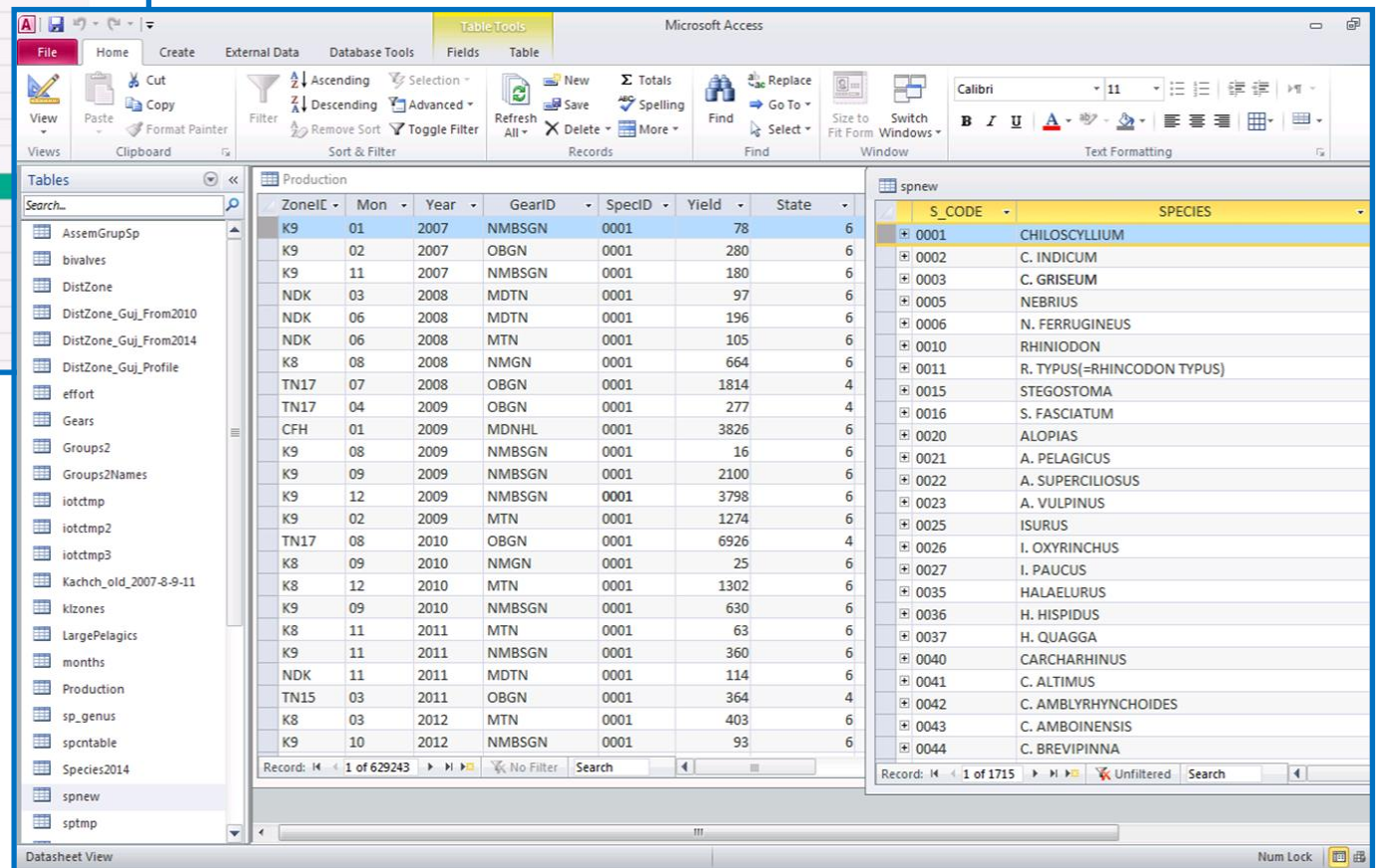
04
Regions
4

Database - Estimated Marine Fish Landings and Fishing Effort



Webpage

Database

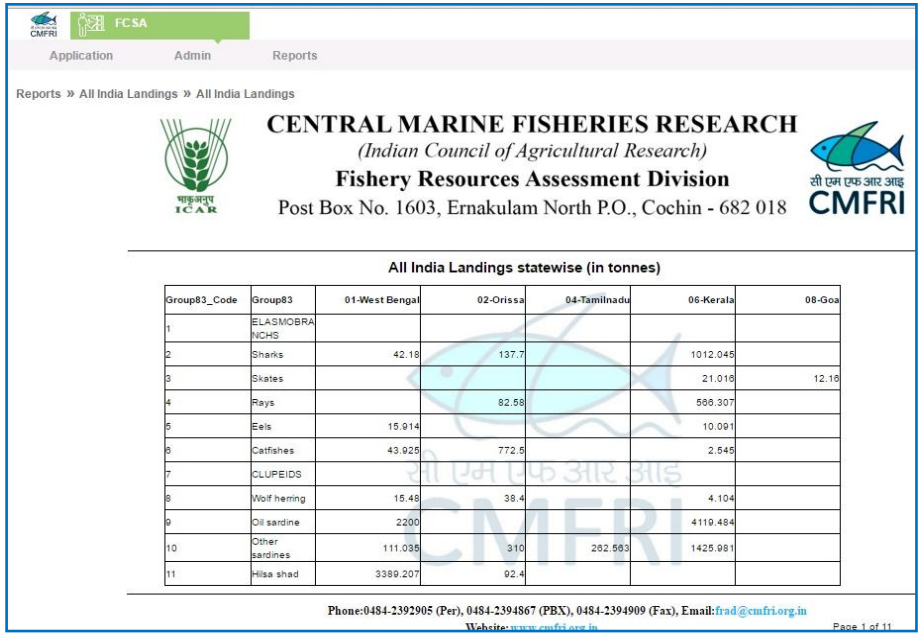


Web based application software

for

online data collection and estimation of landings

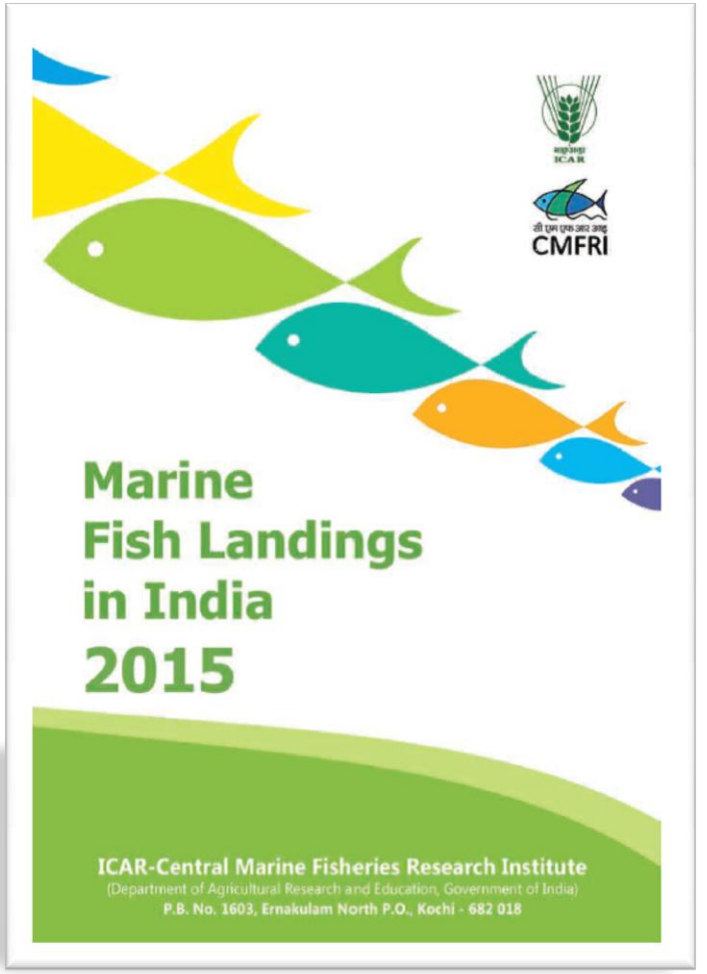
- **Developed web application for online data entry from landings centers using electronic tablets and centralized processing and retrieval of marine fish landings data at headquarters through the database server.**



Group83_Code	Group83	01-West Bengal	02-Orissa	04-Tamilnadu	06-Kerala	08-Goa
1	ELASMOBRANCHS					
2	Sharks	42.18	137.7		1012.045	
3	Skates				21.016	12.16
4	Rays		82.58		566.307	
5	Eels	15.914			10.091	
6	Catfishes	43.925	772.5		2.545	
7	CLUPEIDS					
8	Wolf herring	15.48	38.4		4.104	
9	Oil sardine	2200			4119.484	
10	Other sardines	111.035	310	262.563	1425.981	
11	Hilsa shad	3389.207	92.4			


Marine Fish Landings in India 2013
Central Marine Fisheries Research Institute
Indian Council of Agricultural Research
Ernakulam North P.O., P.B. No. 1603, Cochin – 682 018
Kerala, India


Marine Fish Landings in India
2014
Fishery Resources Assessment Division
ICAR - Central Marine Fisheries Research Institute
Kochi | Kerala | India


CMFRI
Marine Fish Landings in India 2015
ICAR-Central Marine Fisheries Research Institute
(Department of Agricultural Research and Education, Government of India)
P.B. No. 1603, Ernakulam North P.O., Kochi - 682 018


CMFRI Booklet No : 6/2017
CMFRI
Marine Fish Landings in INDIA
2016
ICAR-Central Marine Fisheries Research Institute
(Department of Agricultural Research and Education, Government of India)
P.B. No. 1603, Ernakulam North P.O., Kochi - 682 018

Issue of multiple estimates of marine fish landings in India

Zeller *et al.* (2015)

Appendix II: India mainland catch reconstruction

RECONSTRUCTION OF INDIA'S MARINE FISH CATCH FROM 1950-2010[8]

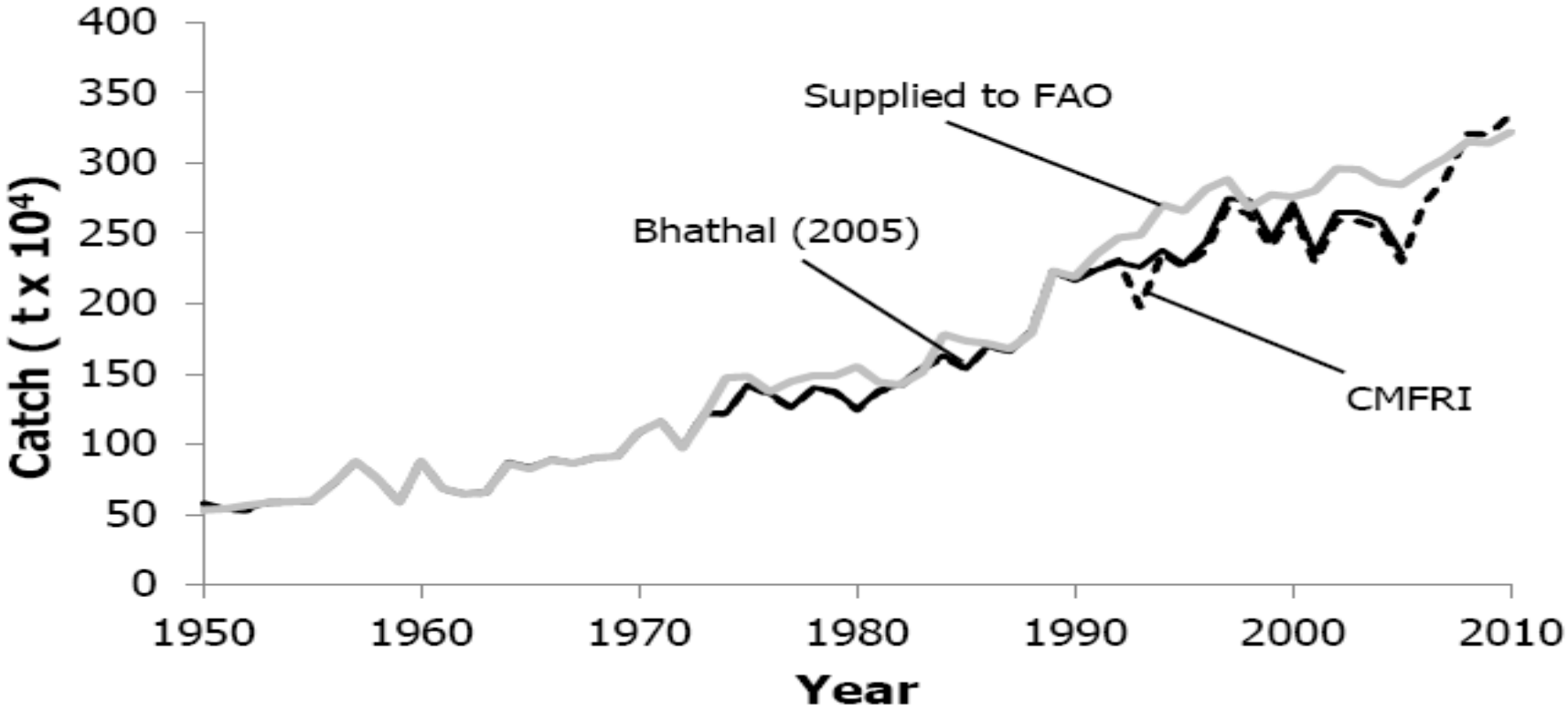
Claire Hornby, Brajgeet Bhathal, Daniel Pauly and Dirk Zeller

Sea Around Us, University of British Columbia,
2202 Main Mall, Vancouver, BC, V6T 1Z4, Canada

c.hornby@fisheries.ubc.ca, b.bhathal@fisheries.ubc.ca, d.pauly@fisheries.ubc.ca, d.zeller@fisheries.ubc.ca

"Discrepancies have been observed between the reported FAO catch statistics and national data presented by the CMFRI"

Comparison of India's official ("Supplied to FAO") and national catch statistics (CMFRI; dashed line) from 1950-2010, with previously estimated marine catch (dark solid line labelled "Bhathal (2005)") from 1950-2005 (Bhathal 2005b).



Suggested Options

1. The marine fish landings estimates made by CMFRI maybe recognized as the national statistics and the current data collection from the maritime states is dispensed off
   - CMFRI will provide all necessary data to DOFs for their use and dissemination to DADF
   - The State's data collection mechanism be devoted for inland fisheries and aquaculture which is currently inadequate
2. The CMFRI plans and supervises the data collection of the DOFs leading to a single data collection system and estimate with higher taxonomic resolution – several logistic problems are foreseeable

THANK YOU

Selection of Primary Stage Units

- 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,
- Then, the next 5 consecutive days are automatically selected.

Time strata	Days in a month									
1	1	2	3	4	5	6	7	8	9	10
2	11	12	13	14	15	16	17	18	19	20
3	21	22	23	24	25	26	27	28	29	30

Selection of Primary Stage Units

- From this, three clusters of two consecutive days are formed.
- In the remaining ten day groups, the clusters are systematically selected with an interval of 10 days.

Time strata	Days in a month									
1	1	2	3	4	5	6	7	8	9	10
2	11	12	13	14	15	16	17	18	19	20
3	21	22	23	24	25	26	27	28	29	30

Period of Observation

Period	Duration
Period 1	1200 to 1800 hours on 1st day
Period 2	0600 to 1200 hours on 2nd day
Period 3	1800 hours to next morning 0600 hours

Primary Stage Unit

Landing centre day

Second Stage Unit

Fishing boats

Selection of Second Stage Units

- **Not practical to record the catches of all fishing units (boats) landed**
- **Sampling of the units becomes essential**

Fishing unit - Secondary stage unit

Number of boats landed	Fraction to be observed
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 and so on**

NMFDC

- Mechanised
- Motorised
- Non-motorised

Genus → Family → Order → Class → Phylum

01
Fishing zones
75

02
Districts
33

03
States+ UTs
9 + 2

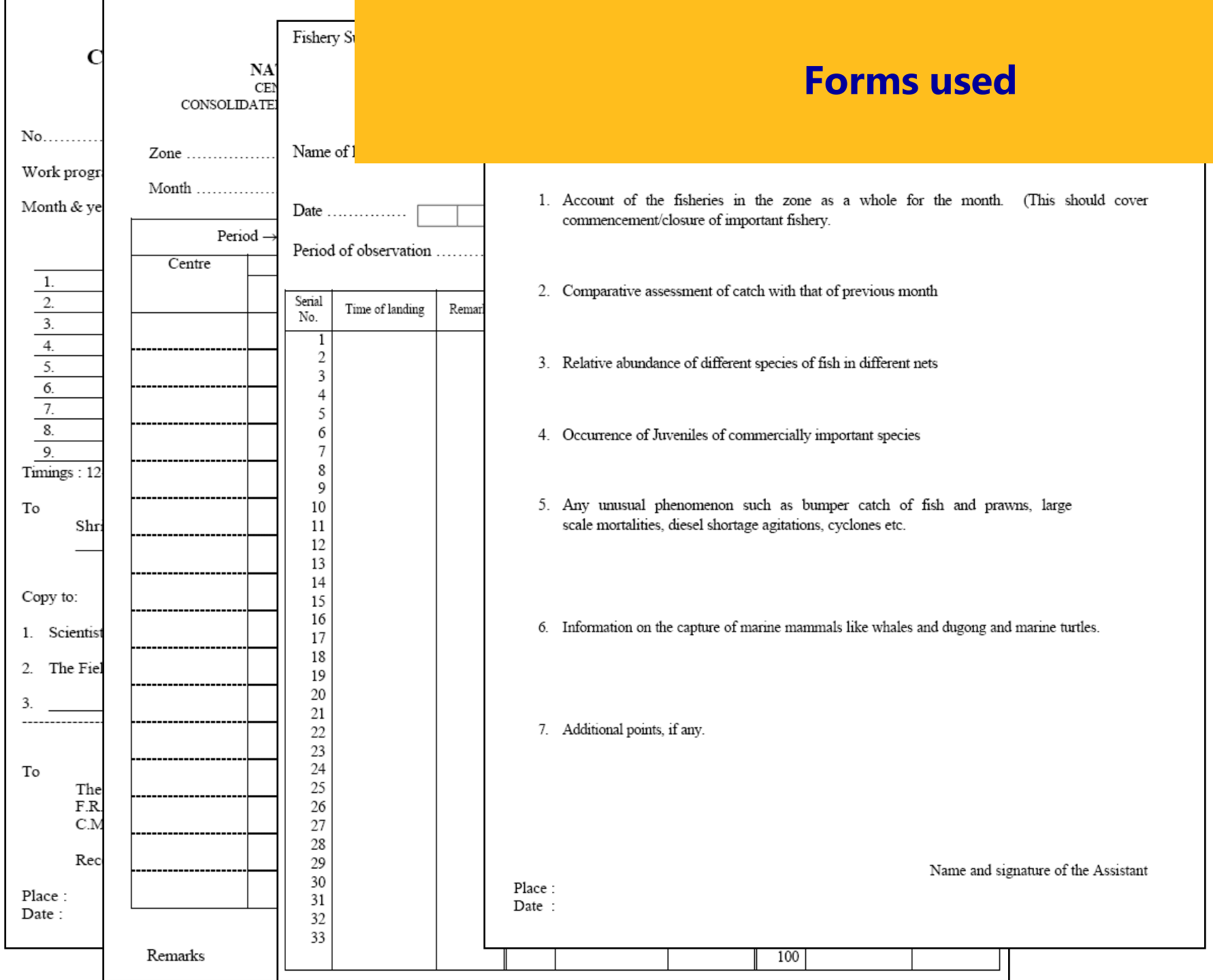
04
Regions
4

Distribution of the landing centres over the coastline of maritime states

Replace table – with state-wise info

District	Length of Coastline (in km)	Number of landing centres
Thiruvananthapuram	78	52
Kollam	37	19
Alappuzha	82	14
Ernakulam	46	19
Thrissur	54	23
Malappuram	70	12
Kozhikode	71	21
Kannur	82	12
Kasaragod	70	16
Total	590	188

Forms used



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 :

Zone .....

Month .....

Period →

Centre

Date .....

Period of observation .....

Serial No.	Time of landing	Remar
1		
2		
3		
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32		
33		
		100

Remarks

Fishery Survey Form 2
Trawler (A) /Gillnetter (B) /Longliner (C) /Dolnetter (D)/Country craft with O.B.(E).

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 ..... one ..... atre .....

Date Period..... ber of units landed ..... No. of units selected .....

State of sea ..... tate of sky ..... ection of wind ....

Serial number	Allotted No. of selection of units examined	Nam e 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									Total
			Name	Code	Name	Code			Dep. Time & Date	Arr. Time	Duration of absence (hrs)	Distance (km) from shore	Direction from L.C.	Depth (m)															
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

Name and signature

Fishery Survey Form 1

NATIONAL MARINE LIVING RESOURCES DATA CENTRE
CENTRAL MARINE FISHERIES RESEARCH INSTITUTE (ICAR), COCHIN– 18
DAILY RECORD OF CATCH AND EFFORT OF NON-MECHANIZED FISHING CRAFT – SHORE SEINES/OTHERS

State ..... District ..... one ..... tre .....

Date Period..... per of shore seines/other units landed ..... No. of units selected .....

State of sea ..... tate of sky ..... rection of wind ....

Serial number	Allotted No. of selection of units examined	Type of craft		Type of gear		Length of craft	Absence from shore			Fishing ground			No. of hauls	Duration of actual fishing (hrs. & mts)	Man power employed	Name, code and weight (kg) of fish landed										Total
		Name	Code	Name	Code		Dep. Time & Date	Arr. Time	Duration of absence (hrs)	Distance (km) from shore	Direction from L.C.	Depth (m)														
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

Special attention : Report incidental catch/stranding of cetaceans and turtles with details

Prince in Rs per Kg

Remarks

Name and signature of observer

Fishery Survey Form II
Trawler (A)

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

State ..... District ..... me ..... itre .....

Date Period..... ber of units landed ..... No. of units selected .....

State of sea ..... tate of sky ..... ection 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)															
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

Fishery Survey Form II
Trawler (A)

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

Serial number	Serial number of the unit selected	Name, code and weight (Kg) of fish landed																				
1	2	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52
Price in Rs. Per Kg																							

SAMPLING

Coverage (%)