FAO/NORWAY GOVERNMENT GCP/INT/648/NOR

COOPERATIVE PROGRAMME Field Report F-13 (En)

# FISHCODE

# MANAGEMENT

## REPORT OF THE WORKSHOP ON THE FISHERIES MANAGEMENT PLAN FOR THE SMALL-PELAGIC FISHERIES OF THE WEST COAST OF PENINSULAR MALAYSIA


FOOD AND AGRICULTURE ORGANIZATION OF THE UNITED NATIONS

ROME, DECEMBER 2000

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**FAO/NORWAY PROGRAMME OF ASSISTANCE TO DEVELOPING COUNTRIES FOR THE IMPLEMENTATION OF THE CODE OF CONDUCT FOR RESPONSIBLE FISHERIES**

**SUB-PROGRAMME F:**
**PROVISION OF SCIENTIFIC ADVICE TO FISHERIES MANAGEMENT**

# REPORT OF THE WORKSHOP ON THE FISHERIES MANAGEMENT PLAN FOR THE SMALL-PELAGIC FISHERIES OF THE WEST COAST OF PENINSULAR MALAYSIA

**Swiss Garden Resort, Damai Laut, Lumut, Perak, 7 – 10 August 2000**

**FOOD AND AGRICULTURE ORGANIZATION OF THE UNITED NATIONS**

**ROME, DECEMBER 2000**

FAO/FISHCODE

Report of the Workshop on the Fisheries Management Plan for the Small-Pelagic Fisheries of the West Coast of Peninsular Malaysia. Swiss Garden Resort, Damai Laut, Lumut, Perak, 7 – 10 August 2000.

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**ABSTRACT**

This document contains a revised Fisheries Management Plan for the fisheries on small pelagic species in the Malacca Straits, off the West Coast of Peninsular Malaysia.

**Distribution:**

Norway (through TCD)
Authors
Institutions concerned
Participants
FAO Fisheries Department
FAO Legal Office
FAO Regional Office for Asia and the Pacific
UNDP Malaysia
Other intersted agencies and donors

## TABLE OF CONTENTS


| Section | Title | Page |
|---|---|---|
| **Main** | Procedings of the workshop | **1** |
| **Appendix A** | List of participants | **3** |
| **Appendix B** | Workshop programme | **5** |
| **Appendix C** | Draft outline of management plan | **7** |
| **Appendix D** | Why bother with fisheries management? by P. Martosubroto | **9** |
| **Appendix E** | What constitutes a fisheries management plan? by M. Elmer | **11** |
| **Appendix F** | Draft Management Plan for the Small-Pelagic Fisheries of the West Coast of Peninsular Malaysia | **15** |

## PROCEDINGS OF THE WORKSHOP

The Workshop on the Fisheries Management Plan for the Small-pelagic Fishery of the West Coast of Peninsular Malaysia was held at Swiss Garden Resort, Damai Laut, Lumut, Perak, from 7 to 10 August 2000. This Workshop was funded by the FAO/FISHCODE Project. Ten Fisheries and Research Officers from the Department of Fisheries Malaysia attended this Workshop together with a staff member from FAO and one FAO consultant. The list of participants is given in Appendix A.

## OBJECTIVE OF THE WORKSHOP

The main objective of this Workshop was to update the Draft Fisheries Management Plan for the Small-pelagic Fisheries of the West Coast of Peninsular Malaysia. This Plan was developed on the basis of the current status of the small-pelagic fishery of the West Coast of Peninsular Malaysia and on an early draft management plan developed during the previous workshop held in Penang in May 1999.

## WORKSHOP PROGRAMME

The full Workshop Programme is given in Appendix B.

### Day 1: 7 August 2000

After a simple opening of the Workshop, two lectures were delivered on the first day:

Why Bother About Fisheries Management? by Purwito Martosubroto (Appendix D).

Fisheries Management Plans by Mark Elmer (Appendix E).

This was followed by an in-depth discussion and agreement on the Objectives of Fisheries Management in the context of the small-pelagic fisheries on the West Coast of Peninsular Malaysia. This section of the draft management plan had to be prepared in advance to provide the proper direction for the preparation of the other sections.

The participants then broke up to draft relevant sections of the Plan following the outline given in Appendix C. The consultants held discussions with all groups.

The major part of the Workshop centred on the preparation and correction of drafts by various Officers working with the consultants.

### Day 2: 8 August 2000

All participants continued drafting their sections of the Plan with discussions and input from the consultants.

A field trip was made to the fishing village of Pulau Pangkor, Perak, through the courtesy of the State Fisheries Director of Perak.

**Day 3: 9 August 2000**

All participants continued drafting their relevant sections.

An in-depth discussion on the Review of the Plan was held, after which this section was drafted.

Upon completion of the section drafts, each section of the draft was presented to the Workshop for discussion, comments and corrections.

**Day 4: 10 August 2000**

Printed copies of the Draft Management Plan for the Small-pelagic Fisheries of the West Coast of Peninsular Malaysia were circulated to all participants for adoption.

Mr. Mark Elmer gave a short talk on the importance of the Process in the development of fisheries management plans and on Performance Indicators.

**Acknowledgements**

The Workshop closed with an expression of thanks and appreciation to FAO/FISHCODE and the Department of Fisheries Malaysia for their support in the organization of this Workshop and also to the consultants, Dr. Purwito Martosubroto and Mr. Mark Elmer, for their guidance and help throughout the Workshop.

**DRAFT MANAGEMENT PLAN FOR THE SMALL-PELAGIC FISHERIES OF THE WEST COAST OF PENINSULAR MALAYSIA**

The final draft (Appendix F) will be submitted to the Department of Fisheries Malaysia for endorsement. Subsequently this draft will be presented for consultation with stakeholders at another workshop to be held in cooperation with FAO/FISHCODE.

**Conclusion**

The Fisheries Management Plan for the Small-pelagic Fisheries of the West Coast of Peninsular Malaysia will be the first fisheries management plan to be prepared for implementation in the country. This Plan will also serve as a guide for the formulation of management plans for other fisheries in Malaysia. It is hoped that this Plan will be implemented in the near future. However it must be stressed that the process of consultation with stakeholders is the key element to ensure the acceptance and successful implementation of the Plan. Fisheries management plans go through “a process of continuous development”. This means that this Plan will improve with time.

**APPENDIX A**

# LIST OF PARTICIPANTS

**Workshop on the fisheries management plan for small-pelagic fisheries of the west coast of Peninsular Malaysia, Swiss Garden Resort, Damai Laut, Lumut, Perak, 7 – 10 August 2000**

| NAME | DESIGNATION | ADDRESS |
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*: Attended Day 1 only.

**APPENDIX B**

# PROGRAMME

**Workshop on the fisheries management plan for small-pelagic fisheries of the west coast of Peninsular Malaysia, Swiss Garden Resort, Damai Laut, Lumut, Perak, 7 – 10 August 2000**

| DATE | TIME | ACTIVITY |
|---|---|---|
| **6 Aug.** | After 1400 | Check-in at Swiss Garden Resort Damai Laut, Perak |
| **7 Aug.** | 0830 | Registration of participants |
| | 0900 | Opening of Workshop |
| | 0930-1030 | Briefing on Proposed Draft Outline of Fisheries Management Plan<br>Discussion on Proposed Draft Outline<br>Discussion on use of reference materials |
| | 1100-12.30 | Break-up for drafting of Sections |
| | 1400-1530 | Drafting of Sections |
| | 1600-1700 | Drafting of Sections |
| | 1700 | Discussion and round-up for the day |
| **8 Aug.** | 0830-1000 | Continuation of Drafting of Sections |
| | 1030-1230 | Continuation of Drafting of Sections |
| | 1400-1530 | Continuation of Drafting of Sections |
| | 1600-1700 | Presentation of Section Drafts and Discussion |
| | 1700 | Round up for the day. |
| **9 Aug.** | 0830-1000 | Presentation of Section Drafts and Discussion |
| | 1030-1230 | Compilation / Preparation of First Draft of Management Plan and Discussion |
| | 1400-1530 | Compilation / Preparation of First Draft of Management Plan and Discussion |
| | 1600-1700 | Presentation of First Draft of Management Plan and Discussion |

| DATE | TIME | ACTIVITY |
|---|---|---|
| **9 Aug.** | 1700 | Round-up for the day |
| | 2000 | Re-drafting of Management Plan |
| **10 Aug.** | 0830-1000 | Presentation of Final Draft Management Plan |
| | 1030-1130 | Adoption of Final Draft Management Plan |
| | 1130 | Closure of Workshop |

**APPENDIX C**

## PROPOSED DRAFT OUTLINE

**Workshop on the fisheries management plan for small-pelagic fisheries of the west coast of Peninsular Malaysia, Swiss Garden Resort, Damai Laut, Lumut, Perak, 7 – 10 August 2000**

| NO. | SECTION | PERSON(S)-IN-CHARGE |
|---|---|---|
| 1. | **DESCRIPTION OF FISHERY (States of Perlis, Kedah, Penang, Perak & Selangor)**<br><br>Species<br>Fishing methods<br>Socio-economic information | Chee |
| 2. | **JURISDICTION**<br><br>Government and agencies with roles in fishery<br>Roles in fisheries management & agreement in fisheries management | Y.M. Raja Noordin and Thalathiah |
| 3. | **OBJECTIVES OF FISHERIES MANAGEMENT**<br><br>Biological<br>Social<br>Economic | Thalathiah |
| 4. | **OPERATIONAL MANAGEMENT**<br><br>Access and licensing<br>Input/output controls<br>Pricing policy/Licence costs | Y.M. Raja Noordin, Sidek and Fadhil |
| 5. | **RESEARCH AND STOCK ASSESSMENT**<br><br>Current research & stock assessment programmes<br>On-going data collection<br>Socio-economic studies<br>Environmental issues<br>Implications for management | Abu Talib, Chee, Dr. Mansor and Tan |
| 6. | **MONITORING, CONTROL & SURVEILLANCE**<br><br>Regulations & rules enforced<br>Description of existing capacity<br>On-going data collection | Fadhil and Sidek |

| NO. | SECTION | PERSON(S)-IN-CHARGE |
|---|---|---|
| 7. | **CONSULTATION WITH STAKEHOLDERS**<br><br>Consultation process<br>Provision of information | Hazizi and Wang |
| 8. | **POST-HARVEST SECTOR**<br><br>Description of post-harvest sector<br>Management implications | Hazizi and Tan |
| 9. | **REVIEW OF PLAN**<br><br>How and when plan will be reviewed?<br>Who has responsibility for plan and review | Thalathiah |

**Consultants**: Dr. Purwito Martosubroto, Mr. Mark Elmer

**Compilation of draft management plan**: Tan, Chee & Consultants

**APPENDIX D**

# WHY BOTHER WITH FISHERIES MANAGEMENT?

**by Purwito Martosubroto**

**REASONS:**

- General declining trend of catch of fisheries in many areas of the world;
- Existence of over-capacity;
- Increased occurrence of fishing conflicts in various areas;
- Global consensus on the need to implement responsible fisheries (Rome Declaration 1995);
- Implementation of CCRF to assure responsible fisheries.

## WHAT IS FISHERIES MANAGEMENT?

The working definition of fisheries management as appeared in FAO. Tech. Guidelines for Responsible Fisheries No. 4 is: *"the integrated process of information gathering, analysis, planning, consultation, decision making, allocation of resources and formulation and implementation, with enforcement as necessary, of regulations or rules which govern fisheries activities in order to ensure the continued productivity of the resources and accomplishment of other fisheries objectives"*.

In simple terms one could define it as *"The management of fisheries to ensure responsible and sustainable fisheries; this requires a good understanding about the dynamics of the fisheries {the resources, the users and their behaviour, the industry (fishing, post-harvest, marketing, etc.)} and the environment"*

## WHY HAVE A FISHERIES MANAGEMENT PLAN?

- To have a bench mark as a basis for measurement;
- To ensure distribution of responsibilities;
- To ensure transparency of the management process.

## WHAT IS REQUIRED IN FISHERIES MANAGEMENT?

- Institution/authority;

- Rules and regulations;
- Data, information and analysis;
- Stakeholders participation;
- Management plan;
- Monitoring, control and surveillance.

***"A FISHERIES MANAGEMENT PLAN BEING DYNAMIC INDICATES PROACTIVE RATHER THAN REACTIVE ACTION"***

**WHAT CONSTITUTES A FISHERIES MANAGEMENT PLAN?**

**It could be**:

- Description of the fishery;
- Area/jurisdiction;
- Objectives of management;
- Operational management;
- Research and stock assessment;
- Monitoring, Control and Surveillance;
- Stakeholders consultation and participation;
- Post-harvest sector;
- Review process.

**APPENDIX E**

# NOTES ON MANAGEMENT PLANS

**by Mark Elmer**

## GENERAL OBSERVATIONS

- Plans are better where **clear government policy and vision** shape management direction.
- **Plans are evolutionary and dynamic**, not static documents to be protected.
- Plans are as strong as their weakest link.
- Plans need to be comprehensive (similar for example to a Strategic Plan).
- Not all events of interest to the plan for a fishery need to be regulated (there are some outcomes that may require no more than a watching brief – outcome may be possible by voluntary code).
- Successful plans are a consequence of commitment and collaboration of all parties (government, industry, etc) – *never to be underestimated.*
- Plans improve with practice and repetition.
- Advances need to be done in bite sized chunks – the idea of *continuous improvement.*
- Plans need to be risk averse and ensure that there are no critical failures or oversights.
- Externalities are often overlooked or dealt with poorly (ecological issues, impacts of gear, discards, bycatch, protection from pollution and disease events, other…).
- Management of the/any transition stages is important in terms of rights, participants, and resources required for implementation, fishery adjustment, and ensuring that policy outcomes match original intentions.
- Need for consistency with other management plans within a jurisdiction and between jurisdictions.
- Costs of management plans must be documented in terms of the plan delivery itself and costs to industry.

### Structure and Content of Plans

- The basic structure of a fisheries management plan is well established although some plans do not use all elements (see examples given below).

- A critical stage in the planning approach is the treatment of performance evaluation and review.

- Plan approaches for single and multi species can differ and the latter are likely to be more complex, also complexity increases where goals differ between stock maintenance and stock rehabilitation for a fishery.

- A decision needs to be taken early as to whether the plan is “high level” and deals with only general principles, or deals in detail with the specifics. (The choice depends on a lot of things but primarily on the needs of fishery participants and stakeholders- see NPF Management Plan for a clear example when contrasted with the other plans provided).

**Goals and Objectives**

- A need exists for *clear* objectives or goals whichever term is preferred. They can be split (as in the SA Rock Lobster Plan for the northern zone).

- A goal is best worded as an *outcome* – that way everybody knows when you/they have got there and what adjustments are necessary on the way.

- Goals are necessary for at least *biological* and *ecological* issues, and *social* and *economic* outcomes sought. Plans benefit from the inclusion of *research* and *compliance* goals. There are a number of others but they can be nested usually under the first four above.

- Do not omit *health* and *safety* considerations from objectives as they are often overlooked in selecting measures to be used.

- Make provision for *recognition of illegal catch events* in the objectives, not only in the area of compliance but also in the stock assessment and other matters that such events have implications for.

**MEASURES TO BE USED IN PLAN**

- *Measures are usually well known by their character. The degree to which constraints (measures) apply is the dynamic variable.*

- The workshop structure reflects a good understanding of measures that form parts of a management plan.

**PERFORMANCE EVALUATION AND REVIEW**

- This is usually the worst done element of Fishery Management Plans. It may be a reflection of the limited knowledge base for many/most fisheries.

- Indicators are necessary for every goal/objective. They need to be described quantitatively and as “target”, “alert” and “action” trigger points.

- There is a clear need for the use of both fishery-dependent and fishery-independent indicators if safe management outcomes are to occur. (Refer to new ESD Framework Structured Approach (Chesson *et al.,* 1998), which addresses outcomes on the basis of effects on environment/effects on humans).

- An Action Plan is also needed which specifies the parties and their tasks, time frames, and reporting on performance.

- The Action Plan should include a Compliance Plan and a Research Plan to prioritise research, monitoring, and assessment and to build on a knowledge base.

**PROCESS AND ALLOCATION ISSUES**

- There may be benefits in using an iterative process such as a draft plan on which comments are sought before adoption of a final version.

- The plan or its accompanying documentation must set out the process for making the plan and for its periodic review.

- It also has to deal with allocation issues as changes in fisheries management measures inevitably involve some change of rights or privileges.

- Structural adjustment needs to be transparent and appeal rights established.

- Adjustment is a complex topic. It is even more divisive when the fishery objectives move from fishery maintenance to fisheries rehabilitation. Such an outcome can be a product of delays in commencing adjustment over time.

- Provision for aboriginal people of a region may need to be specified. Goals might be needed for food supply, social or ceremonial purposes and provision made in measures used.

**RESPONSIBILITIES OF PARTIES**

- A co-management approach for example using a committee comprised of principal stakeholders (industry, government, research, other as necessary) could be formed to ensure the integrity of adherence to the Action Plan, and the Fishery Plan itself.

- Other benefits of a coordinating committee include ensuring consistency with other similar plans for the same or similar species, or different species, or adjacent jurisdictions.

# MANAGEMENT PLANS AVAILABLE FOR PERUSAL BY PARTICIPANTS

***Abalone Management Plan (Draft) 1996. Natural Resources and Environment, Victorian Fisheries Department, Australia***

Northern Prawn Fishery Management Plan 1995. Australian Fisheries Management Authority, Australia

Management Plans for the

- South Australian Abalone Fishery (Draft) 1996
- South Australian Abalone Fishery 1997
- South Australian Gulf St Vincent Prawn Fishery 1997
- South Australian Lobster Fishery Southern Zone 1997
- South Australian Lobster Fishery Northern Zone 1997.

***Primary Industries, South Australia, and the South Australian Research and Development Institute, Australia***

Management Plans for

- Intertidal Clams, Pacific Region, 1998
- Anchovy, 1998

Fisheries and Oceans, Canada

Management Plans for

- Fisheries (Spanner Crab) Management Plan 1999
- Fisheries (Gulf of Carpentaria Inshore Fin Fish) Management Plan 1999
- Fisheries (Freshwater) Management Plan 1999
- Fisheries (Coral Reef Fish) Management Plan (Draft) 1999.

Queensland Fisheries Management Authority (now Queensland Fisheries Service), Australia

**APPENDIX F**

# DRAFT FISHERIES MANAGEMENT PLAN FOR THE SMALL-PELAGIC FISHERIES OF THE WEST COAST OF PENINSULAR MALAYSIA

## I. DESCRIPTION OF THE FISHERY

### 1.1 Introduction

The Malacca Straits is the major fishing ground for fishers on the West Coast of Peninsular Malaysia. Both commercial fishing vessels and vessels using traditional fishing appliances operate in this area. The deepest area reaching 100m is located in the northwestern part of the Straits; other parts of the Straits are generally shallow and average 40-50m only. These waters contain a variety of fisheries resources including small-pelagic fish to which this fisheries plan refers.

### 1.2 Species of Small-pelagic Fish

This management plan covers the small-pelagics that comprise six main groups/genera, that constitute the bulk of the pelagic fish landings on the West Coast. These are the mackerels (*Rastrelliger*), scads *(Atule, Alepes, Selar*), roundscads (*Decapterus*), sardines (*Sardinella, Dussumieria*), hardtail *(Megalaspis cordyla*), small tunas (mainly *Euthynnus affinis, Auxis thazard* and *Thunnus tonggol*).

Fish species comprising the fishery are fished mainly by fish purseseines. Trawls land substantial quantities of *Rastrelliger*. *Rastrelliger* is the dominant group, contributing 65% of the total small-pelagic fish landings at 66,586 tonnes in 1997.

The total wholesale value of small-pelagics on the West Coast of Peninsular Malaysia was estimated at RM330 million in 1997. Of this amount, the group *Rastrelliger* contributed 73% or RM242 million. The highest quantity of small-pelagics was landed in Perak.

### 1.3 Fishing Area

In the Malacca Straits the distribution of small-pelagic fish is mainly confined to the northern half, off the States of Perlis, Kedah, Penang, Perak and Selangor (Fig. 1). The scarcity of small-pelagics in the southern half of the Straits is due to the hydrography of the Straits and the physical barrier of the shallow one-fathom bank off the coast of Selangor. While small-pelagics are available only to fishers in the north, larger pelagic fish like Spanish mackerel and wolfherring, together with semi-demersal threadfins and pomfrets are fished all along the coast.

This management plan covers the fishery for small-pelagics in the area of all national Malaysian waters stretching from the boundary with Thailand in the north to the one-fathom bank off Selangor in the south and extends seawards from the shoreline of the States of Perlis, Kedah, Penang, Perak and Selangor to the limit of the continental shelf as defined in the 1979 Map.


**Fig. 1 The management zone for the small-pelagic fisheries of the West Coast of Peninsular Malaysia. This zone is limited by the boundary with Thailand in the north and the straight line at Latitude 2° 53' N (corresponding to the one-fathom bank) in the south and extends seawards to the continental shelf boundary of Malaysia with Indonesia in the Straits of Malacca**

### 1.4 Fishing Appliances

The main fishing appliance for pelagic fish in terms of quantity of fish landed are the fish purseseine, trawl and driftnet (Fig. 2). The fish purseseine used to be the dominant commercial fishing appliance for pelagic fish until the mid-seventies when the trawl emerged as another commercial gear for catching pelagic fish. Since the mid-eighties, the driftnet became increasingly important. By the mid-nineties all three fishing gears became of equal importance and each contributed to about one-third of the total pelagic fish landings on the West Coast of Peninsular Malaysia.

The numbers of fishing appliances licensed on the West Coast of Peninsular Malaysia are shown in Table 1. The total number of licences increased steadily from 1967 till 1981 after which the number decreased. This was in line with the government's policy to reduce total fishing effort on the west coast of Peninsular Malaysia through the implementation of the Fisheries Licensing Policy in 1981. It is not possible to separate the use of these appliances in the small-pelagic fishery from the other fisheries in the area.

**Table 1 Number of fishing appliances licensed on the West Coast of Peninsular Malaysia**

| Year | Trawl | All seines | Fish purse seine | Driftnet | Other gear | Total |
|---|---|---|---|---|---|---|
| 1967 | 180 | 1478 | | 4163 | 3592 | 9413 |
| 1968 | 264 | 1527 | | 4564 | 3228 | 9583 |
| 1969 | 367 | 1694 | | 5240 | 3303 | 10604 |
| 1970 | 599 | 1754 | | 5551 | 3992 | 11896 |
| 1971 | 2594 | 1412 | | 5216 | 3313 | 12535 |
| 1972 | 2846 | 1473 | | 5319 | 2847 | 12485 |
| 1973 | 2897 | 1650 | | 6533 | 2776 | 13856 |
| 1974 | 2928 | 1814 | | 6236 | 2957 | 13935 |
| 1975 | 2815 | 2123 | | 6702 | 3414 | 15054 |
| 1976 | 3039 | 1354 | | 7475 | 4481 | 16349 |
| 1977 | 3029 | 1877 | | 8932 | 6350 | 20188 |
| 1978 | 3321 | 2004 | 434 | 11012 | 4646 | 20983 |
| 1979 | 3316 | 1909 | 366 | 12363 | 4663 | 22251 |
| 1980 | 3347 | 2028 | 421 | 13260 | 7735 | 26370 |
| 1981 | 3414 | 1755 | 411 | 13394 | 8183 | 26746 |
| 1982 | 3365 | 1726 | 370 | 11647 | 9418 | 26156 |
| 1983 | 3236 | 929 | 384 | 11283 | 6485 | 21933 |
| 1984 | 3487 | 1099 | 390 | 11033 | 4427 | 20046 |
| 1985 | 3281 | 934 | 364 | 10710 | 5911 | 20836 |
| 1986 | 3281 | 766 | 329 | 9940 | 2259 | 16246 |
| 1987 | 3336 | 1090 | 328 | 9371 | 1745 | 15542 |
| 1988 | 3257 | 1251 | 305 | 8965 | 1736 | 15209 |
| 1989 | 3331 | 1308 | 287 | 10713 | 1985 | 17337 |
| 1990 | 3187 | 1219 | 266 | 10728 | 1864 | 16998 |
| 1991 | 3224 | 1196 | 257 | 10465 | 1774 | 16659 |
| 1992 | 3294 | 1160 | 249 | 9723 | 1700 | 15877 |
| 1993 | 3155 | 1116 | 235 | 8518 | 1517 | 14306 |
| 1994 | 3137 | 1048 | 220 | 7818 | 1434 | 13437 |
| 1995 | 3136 | 1022 | 221 | 10826 | 1514 | 16498 |
| 1996 | 3063 | 934 | 217 | 9289 | 1390 | 14676 |

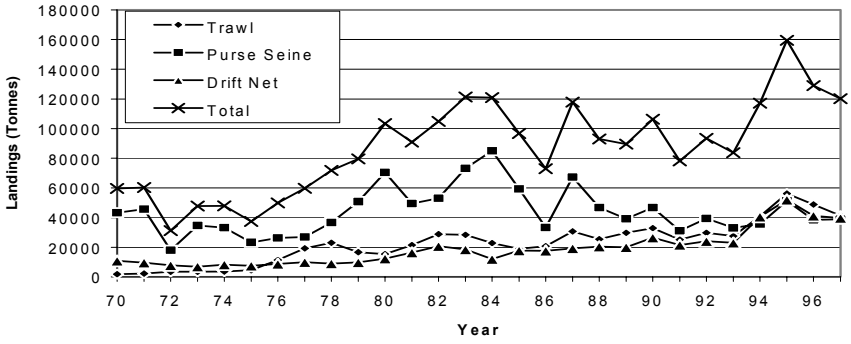


**Fig. 2 Landings of pelagic fish by gear on the West Coast of Peninsular Malaysia**

### *Fish Purseseine*

Fish purseseines are usually operated off the northern States of Perlis, Kedah, Penang, Perak and Selangor, where the bulk of the catch consists of small-pelagic fish and small tunas. These are different appliances from purseseines used for anchovies. Anchovy purseseines have smaller meshes.

Around 200 to 400 units of fish purseseines were licensed annually and the same number were estimated to be operating each year from 1978. Prior to 1978, there was no breakdown of seine nets into fish purseseine, anchovy purseseine and other seines in the Annual Fisheries Statistics. After 1978 the classification of fish purseseines was introduced. Fish purseseine licences decreased by 47%; from 411 units in 1981 to 217 units in 1996 (Table 1).

Fish purseseining is usually conducted in conjunction with Fish Aggregating Devices (FADs). Spotlights mounted on the fishing vessels are the main tools used to aggregate fish. Coconut leaf lures are also used interchangeably with spotlights and fishers either switch from one to the other or use both FADs in one fishing trip. This enables purseseiners to fish more efficiently at night if in the past they mainly fished in the daytime using the coconut leaf lures. If they fished at night in the past years, fish aggregation was through the use of small carbide or gas lamps placed on small floating platforms in the sea to attract fish. These small lamps were also used to displace fish aggregated from the anchored coconut leaf lures to allow the fish purseseine net to be pursed. Certain groups of fishers still scout and catch free-swimming schools of pelagic fish on moonless nights in addition to using spotlights to aggregate fish.

### *Trawl*

The number of trawls licensed increased from 180 units in 1967 to 599 units in 1970. From 1970 to 1971 a four-fold increase was registered. The success of the trawl attracted a large number of entrants into the fishery. The number of trawl licences remained around 3,000 units between 1971 and 1996; the lowest was 2,594 units

while the highest was 3,414 units (Table 1). A decrease of 10% in the number of trawl licences was registered between 1981 and 1996. The number of trawls in operation was generally higher than the number of licences. Many trawlers especially small ones fish without licences. The number of trawls in operation increased from 899 units in 1967 to over 5,000 units for the period from 1979 to 1985, after which the number decreased to remain around 4,000 units until 1996.

Two types of trawls are used locally. They are the shrimp trawls that are operated near the shore and the fish trawls that are operated in deeper waters further away from shore. A shrimp trawl is smaller in size and is operated from a smaller fishing vessel when compared to a fish trawl. While shrimp trawls target shrimps, they land fish as bycatch by virtue of the price difference between shrimps and fish. Pelagic fish are caught mainly by fish trawls.

***Driftnets***

Driftnets and trammel nets are operated all along the West Coast of Peninsular Malaysia and they are the major traditional fishing appliances used. Trammel nets target shrimps and land fish as bycatch, while driftnets catch mainly pelagic fish. Although it is observed that perhaps a larger number of trammel nets is being used in comparison to driftnets for fish, it is difficult to estimate the actual number of each because fishers switch gear during specific fishing seasons or during lean fishing periods.

Driftnet licences, including trammel nets, increased from 4,163 units in 1967 to peak at 13,394 units in 1981. In 1996, there were 9,289 driftnet licences (Table 1). While the number of driftnet licences decreased from 1981 to 1996 by 31%, the estimated number in operation showed an increase of 20% during the same period. The total number of units in operation remain high since the driftnet is not as demanding in capital and operating costs and labour when compared to the fish purseseine or even the trawl.

A fisher licensed for a traditional fishing appliance is also allowed an additional licence to operate a second traditional gear. In certain fishing communities, modifications have also been made to the driftnet in order to target selected species of fish. Net haulers have been installed to handle longer fishing driftnets.

**1.5 Socio-economic Information**

***Fishers***

In 1997, there were 7,908 fishers involved in trawling, 3,741 in purseseining and 8,498 in driftnetting. The number of fishers involved in these fishing activities in the five States has declined as compared to 5 years ago (Table 2).

Purseseining requires a lot of manpower and for some vessels in Perlis, there were more than 30 crewmembers on a vessel. Trawling requires between 3 to 5 crewmembers (including the skipper) to operate, depending on the size of the vessel, while driftnetting only requires about 2 to 3 persons.

In the survey conducted by the Fisheries Development Authority (FDAM) in 1995, it was found that majority of the fishers were aged between 31 to 50 years. About 57%

**Table 2 Number of local fishers by state and gear group 1987, 1992 and 1997**

| 1987 | Trawl | Purse-Seine | Driftnet | Total |
|---|---|---|---|---|
| **Perlis** | 1,034 | 2,091 | 708 | 3,833 |
| **Kedah** | 1,768 | 298 | 1,788 | 3,854 |
| **Penang** | 417 | 628 | 2,858 | 3,903 |
| **Perak** | 3,592 | 1,093 | 2,984 | 7,669 |
| **Selangor** | 1,202 | 270 | 3,555 | 5,027 |
| **Total** | 8,013 | 4,380 | 11,893 | 24,286 |
| **1992** | | | | |
| **Perlis** | 809 | 2,671 | 794 | 4,274 |
| **Kedah** | 1,926 | 312 | 2,780 | 5,018 |
| **Penang** | 363 | 390 | 2,511 | 3,264 |
| **Perak** | 3,742 | 640 | 3,291 | 7,673 |
| **Selangor** | 1,774 | 158 | 3,024 | 4,956 |
| **Total** | 8,614 | 4,171 | 12,400 | 25,185 |
| **1997** | | | | |
| **Perlis** | 670 | 2,683 | 587 | 3,940 |
| **Kedah** | 1,720 | 246 | 1,572 | 3,538 |
| **Penang** | 268 | 225 | 1,581 | 2,074 |
| **Perak** | 3,061 | 425 | 2,244 | 5,730 |
| **Selangor** | 2,189 | 162 | 2,514 | 4,865 |
| **Total** | 7,908 | 3,741 | 8,498 | 20,147 |

of the commercial fishers were in this age group, while for the traditional fishers this age group accounted for almost 53% of the total traditional fishers surveyed. The percentage of fishers above 50 years was higher in the traditional fishery (27%) as compared to the commercial fishery (17%).

***Income of Fishing Household***

The income of a fishing household is defined as the total income of the head of the household from fishing and other sources plus the incomes of other members in the household. The average monthly income of a commercial fishing household was higher at RM1,604 as compared to the traditional fishing household at RM1,210. Towkays' households in both categories had the highest income followed by households of owner-cum-skipper, skipper and crewmember.

Even though the average monthly household income of fishers was above the poverty line of RM405, a high percentage (20.9%) of commercial fishers in Kedah was living below the poverty line. The high poverty rate was mainly due to the large percentage (83%) of crew members' households being surveyed in this State. The State of Kedah also had the highest percentage (11.3%) of traditional fishers living below the poverty line. However, the poverty rates of fishing households in other States were low i.e. below 3% (Table 3).

**Table 3 Percentage of Fishing Household Living Below Poverty Line**

| State | Commercial | Traditional | Overall |
|---|---|---|---|
| **Perlis** | 0 | 6.5 | 1.7 |
| **Kedah** | 20.9 | 11.3 | 16.1 |
| **Penang** | 0 | 0.7 | 0.5 |
| **Perak** | 0.3 | 4.4 | 2.7 |
| **Selangor** | 0.4 | 0.9 | 0.7 |

Source: FDAM's Survey, 1995. Poverty Line Income Level = RM405 per month

### *Earnings*

Purseseiners of size 40-69.9 GRT gave the highest returns among the types of vessels surveyed with an average annual net earning of RM63,562. Trawlers of size 40-69.9 GRT were the second highest with an average annual income of RM43,601. The average annual net earning of driftnetters in the West Coast of Peninsular Malaysia was RM6,636.

## 2. THE STATUS OF THE SMALL-PELAGIC FISH STOCKS

### *Assessments*

Small-pelagics have been supporting the fishery on the West Coast of Peninsular Malaysia. With development, this fishery had expanded from a subsistence fishery to a commercial-scale fishery. Early estimates of potential yield of small-pelagic fish including *Rastrelliger* were based on trends of landings or the surplus production model. Chong (1976) estimated the potential pelagic catch on the West Coast of Peninsular Malaysia as between 81,000 and 91,000 tonnes annually. Of this potential the maximum for *Rastrelliger* was estimated at only 41,000 tonnes. A Workshop in 1976 on the Fishery Resources of the Malacca Straits estimated the annual total pelagic potential at 88,000 tonnes of which only 25,000 tonnes were *Rastrelliger* (Anon., 1976). An assessment made in 1997 estimated the Maximum Sustainable Yield (MSY) of total pelagic fish on the west coast of Peninsular Malaysia at 100,000 tonnes annually, while that for *Rastrelliger* was estimated at between 56,000 tonnes to 70,000 tonnes (FRI, unpublished). This is in agreement with the estimated MSY for

*Rastrelliger* of between 60,000 tonnes to 70,000 tonnes as reported by Mansor (1987).

A hydroacoustic survey on the West Coast of Peninsular Malaysia conducted by the Department of Fisheries in 1998 estimated a potential yield of pelagic fish at 130,000 tonnes. This estimate is higher than the estimates given above but it was based on results from only one cruise and this does not sufficiently cover the seasonal variation of pelagic fish stocks.

***Summary of Status***

Landings of pelagic fish over the last few years were well over 100,000 tonnes. The number of fish purseseines licensed and estimated to be in operation decreased. The catch of pelagic fish and *Rastrelliger* per unit of fish purseseine showed a declining trend. The increases in landings of trash fish by fish purseseines also signal the unhealthy status of the pelagic fishery. The combination in recent years of landings in excess of sustainable yield estimates with declining participation and declining catch per unit of effort indicates that the pelagic fishery on the West Coast of Peninsular Malaysia is over-exploited.

Analysis of catch/effort trends and the surplus production model both provide weak assessments of fish stocks, but are still used because of the availability of historical catch and effort data. Currently attempts at using the yield per recruit model and Virtual Population Analysis to assess the *Rastrelliger* stock on the West Coast are being made. Biological information by species is being collected for use in these models. This should help refine and improve assessments for the management of *Rastrelliger* and the pelagic fishery resources to ensure their sustainability. However, the major problem faced in these assessments is in the estimation of the actual fishing effort in a multi-species and a multi-gear fishery like the fishery for pelagics.

## 3. JURISDICTION

The following government agencies have responsibility for, or a significant interest in, the effective management of the fishery for small-pelagic species off the West Coast of Peninsular Malaysia.

### 3.1 Ministry of Agriculture

- Responsible to Parliament of Malaysia for fisheries matters;
- Oversees the overall activities of the Department of Fisheries Malaysia (DOF) and Fisheries Development Authority of Malaysia (FDAM);
- Approves and endorses the management plan for this and other fisheries;
- Administers the disbursement of Funds for Food through the Agricultural Bank of Malaysia.

### 3.2 Department of Fisheries Malaysia (DOF)

- Manages the fishery resources of Malaysia for their sustainable use in accordance with the Fisheries Act 1985;
- Develops management plans under Section 6 of the Fisheries Act 1985;
- Regulates fishing activities;
- Promotes a dynamic fishing industry to enable increased production of fish;
- Enhances the downstream fishing acitivities;
- Undertakes fisheries research and stock assessment;
- Undertakes monitoring, control and surveillance activities;

There are 4 State Fisheries Offices that are directly involved in this fishery, located at:

- Kedah/Perlis
- Penang
- Perak
- Selangor

Those Offices:

- Assist the DOF headquarters in monitoring, control and surveillance;
- Are responsible for the collection of landing data and information on fishers.

### 3.3 Fisheries Development Authority of Malaysia (FDAM)

FDAM is concerned with the socio-economic status of fishers, in particular to enhance their income and to develop and expand the fishing industry through:

- Developing effective fishery enterprises and investigating and developing industry opportunities;
- Setting up efficient and effective fish marketing enterprises;
- Creating and providing credit facilities to fishers to promote, facilitate and undertake economic activities;
- Registration, control and supervision of Fishers' Associations and Fisheries Co-operatives and coordinating the economic activities of the industry.

### 3.4 Ministry of Finance -The Treasury

- Manages the financial affairs of the government including the activities of the Department of Fisheries and the FDAM.

### 3.5 Economic Planning Unit in the Prime Minister's Department

- Evaluates applications for development funding both for research and management activities;
- Facilitates the project execution, especially where external funding is involved.

### 3.6 Ministry of Science, Technology and the Environment

- Coordinator for research projects bidding for IRPA (Intensification of Research in Priority Areas) funds;
- Evaluates technically all applications pertaining research including fisheries research and development.

### 3.7 Enforcement of the Fisheries Act 1985

Enforcement is undertaken either singly or jointly by:

- The Fisheries Management and Protection Division in the Department of Fisheries Headquarters, as well as the State Fisheries Staff;
- The National Security Council;
- The Royal Malaysian Navy;
- The Marine Police of the Royal Malaysian Police;
- The Maritime Enforcement and Coordinating Centre (MECC) as the coordinating unit.

### 3.8 Search and Rescue (SAR)

SAR operation for fishers in distress or in an emergency is coordinated by the Marine Department under the Ministry of Transport and assisted by:

- The Department of Fisheries at Headquarters and in the States;
- The Royal Malaysian Navy;
- The Marine Police of the Royal Malaysian Police.

## 4. MANAGEMENT OBJECTIVES

The management of the fishery for small-pelagic fish of the west coast of Peninsular Malaysia is concerned with the sustainable use of the stocks and their environment

and with the use of those stocks for supply of food and well-being of the citizens of Malaysia. The objectives of management of that fishery are as follows:

### 4.1 Biological Objectives

- To achieve sustainable use of small-pelagic fish by maintaining the optimal level of exploitation;
- To optimise fishing capacity in terms of number of boats and fishers and in the quantity and type of gears used to match sustainable use of the stock;
- To contribute towards meeting national policy obligations on fish production by maintaining present levels of production.

### 4.2 Ecological Objectives

- To ensure sufficiently selective fishing appliances, methods and practices are followed so as to minimise waste, discards, catch of non-target species, both fish and non-fish species, and impacts on associated or dependent species;
- To ensure that information on new developments on the selectivity of fishing appliances, methods and requirements are made available to all fishers through close cooperation.

### 4.3 Social Objectives

- To protect the interests of fishers and fishworkers engaged in subsistence, small-scale and artisanal fisheries, to achieve a secure and just livelihood, as well as preferential access to traditional fishing grounds and resources;
- Subject to the above, to permit equitable allocation of fisheries resources;
- To increase income of fishers to a level above the poverty level;
- To reduce the number of boats/fishers dependent on the fishery;
- To facilitate the ability for fishers to leave the fishery;
- To ensure continuity of fish supply for food security and fish processing industry and encourage improved product quality;
- To foster fishing/handling/processing practices which comply with health and safety standards in order to optimise the energy usage;
- To increase the integrity of the Plan by reducing the level of illegal fishing;
- To minimise conflict between government and industry, and between industry sectors.

### 4.4 Economic Objectives

- To maximise profits to the community from the use of the fish stock by

  i) Permitting cost effective fishing strategies within biological constraints;

  ii) Adopting cost effective management services.

### 4.5 Education and Training Objectives

- To create a responsible fishing community attitude towards achieving the objectives of this management plan;

- To enhance the level of knowledge, skills and qualifications of fishers through training and extension programmes, to assist in achieving the objectives of the management plan.

### 4.6 Compliance

- To conduct surveillance and enforcement activities which ensure the integrity of this plan.

## 5. OPERATIONAL MANAGEMENT

The Fisheries Act 1985 and associated Regulations provide the Department of Fisheries with the authority to implement measures to ensure that the fishery for small-pelagic fish on the West Coast of Peninsular Malaysia is managed in a sustainable manner.

Management controls adopted within this legal framework are:

1. Issue of licences to fishers;
2. Zone controls on vessels, appliances and vessel ownership;
3. Area controls on fishing adjacent to States;
4. Appliance controls;
5. Controls on vessels;
6. Areas closed to fishing;
7. Foreign fishing;
8. Non legislative management strategies;
9. Licence fees.

These controls are detailed in the following paragraphs:

## 5.1 Registration of Fishers

Every fisher is required to have a Fisherman Registration Card. Only fishers including traditional and commercial fishers with the Fisherman Registration Card can work in the fishery sector. There are restrictions on the issue of Registration Cards for all fisheries.

## 5.2 Zone Controls on Vessels, Appliances and Vessel Ownership

In this fishery, vessels are prohibited from fishing unless in accordance with the controls outlined in the following paragraphs:

**Zone A** – Less than 5 nautical miles from the shore, reserved solely for small-scale fishers using traditional fishing appliances (not trawl or fish purseseine nets) and owner-operated vessels. In this fishery, only traditional fishing vessels less than 40 GRT are allowed to operate.

**Zone B** – Beyond 5 nautical miles from the shore, where owner-operated commercial fishing vessels of less than 40 GRT using trawl nets and purseseiners are allowed to operate.

**Zone C** – Beyond 12 nautical miles from the shore, where commercial fishing vessels which are more than 40 GRT using trawl nets and purseseines are allowed to operate.

**Zone C2** – Beyond 30 nautical miles from the shore where deep-sea fishing vessels of 70 GRT and above are allowed for operation.

## 5.3 Area Controls on Fishing Adjacent to States

Vessels operating in Zones A or B can only fish in waters adjacent to the State of registry.

## 5.4 Appliance Controls

- Pair trawling, electric fishing, fishing using poisons and explosives, push nets and gill nets with mesh sizes of more than 285 mm are prohibited from use.
- All fishing appliances must be licensed and such licences must be renewed annually.
- The minimum net mesh size allowed for use in the cod-end of the trawl is 38 mm.
- Trawl and purseseine nets cannot be used in Zone A.
- Trawl and purseseine nets can only be used in Zone B on owner-operated vessels of less than 40 GRT.
- The use of spotlights with a total power greater than 30 kW is prohibited and spotlights are also prohibited from use in Zones A or B.

### 5.5 Controls on Vessels

- No new additional licences will be issued for vessels to fish in all Zones in this fishery.

- No approval will be given to transfer vessels from ports outside the West Coast of Peninsular Malaysia to this fishery.

- Vessels must be inspected, registered and licensed before commencing operations and are to be inspected annually for the purpose of licence renewal.

- Replacement of vessels by vessels of increased tonnage or engine power is allowed only with the written permission of the Department of Fisheries. Approval will not be granted for such increase in Zones A or B.

- Vessels are required to be identified by recording the Zones in which they are authorised to operate (A, B, C, C2) on the wheelhouses which must be painted in the colour approved for each State. The letters must be large enough for an aircraft or a patrol surveillance vessel to spot.

- Vessels engaged in trawling must paint a diagonal white stripe across the wheelhouse.

- Every vessel must have its registration number engraved on its hull at the bow end of the vessel.

### 5.6 Areas Closed to Fishing

- Fishing is prohibited within two nautical miles from the shore in the Pulau Payar Marine Park.

- Fishing is prohibited within one nautical mile radius from the center of the artificial reef sites are located in Pulau Payar, Pulau Bidan, Pulau Telur, Pulau Kendi, Muka Head, Pulau Sembilan, and Pulau Angsa.

### 5.7 Foreign Fishing

- Foreign persons may be permitted to work only with the approval of the Department of Fisheries and such approval will only be given to persons to work on commercial fishing vessels in Zones C and C2.

- Foreign fishing vessels will not be authorised to operate in the fishery.

### 5.8 Non-Legislative/Voluntary Management Strategies

- Fishers are being encouraged to change their fishing vessels from trawling to purseseining particularly in Zone B.

- There is a voluntary programme to assist fishers who are keen to resettle in other areas or to become involved in downstream industry activities or aquaculture.

### 5.9 Licence Fees

- Licence fees are fixed by the Fisheries Maritime Regulations 1967 and Fisheries (Licensing of Local Fishing Vessels) Regulations 1985. The revenue received is retained by the State.

- There are no price controls on the catch, the price of which is determined by market forces.

### 5.10 Legislation

The controls listed above are contained in the following legislation:

- Fisheries Act 1985;
- Fisheries Maritime Regulations 1967;
- Fisheries (Prohibition of Methods of Fishing) Regulations 1980;
- Fisheries Licensing Policy under the Fisheries Act 1985;
- Fisheries (Licensing of Local Fishing Vessels) Regulations 1985;
- Establishment of Marine Parks & Marine Reserves Order 1994.

## 6. RESEARCH AND STOCK ASSESSMENT

Research and assessment activities are capable of assisting the achievement of the following fishery objectives of the fishery for small-pelagic species.

### 6.1 Fishery Objectives

Objective 1: To achieve sustainable use of small-pelagic fish by maintaining the present level of exploitation.

Objective 2: To optimise fishing capacity in terms of number of boats and fishers and in quantity and type of gears used to match sustainable use of the stock.

Objective 3: To contribute to meeting national policy obligations on fish production by maintaining present levels of production.

Objective 4: To maximise profit to the community from the use of the fish stock by permitting cost effective strategies within biological constraints and adoption of cost effective management services.

Objective 5: To ensure sufficiently selective fishing appliances, methods and practices so as to minimise waste, discards, catch of non-target species, both fish and non-fish species and impacts on associated or dependent species.

Objective 6: To ensure that information on new developments on the selectivity of fishing appliances and methods and requirements is made available to all fishers through close cooperation.

## 6.2 Current Biological and Ecological Research and Stock Assessment Programmes

Research on the biology, ecology and stock assessment of small-pelagic species on the West Coast of Peninsular Malaysia is being carried out to support the management needs of the fishery.

### *Biological research*

Research carried out provides information on growth, recruitment, spawning season, migratory pattern and unit stock determination of small-pelagic fishes.

- The unit stock determination is the basic requirement for management of the fish stock. The determination could be achieved by using conventional or modern molecular methods.

- Provide data for studies on growth, recruitment and migration of the species in particular for using analytical models in stock assessment. This will give more detailed assessments of the status of the small-pelagic fish stocks.

- Research on spawning season provides information for establishment of closed season that allows recovery of exploited small-pelagic fish stocks.

### *Ecological Research*

There are few studies done on the interaction between stocks of small pelagic fish and environmental factors. The study is important to understand the often adverse environmental impact on the production and distribution of the small-pelagic stocks as well as for fish forecasting. Study on mesh size selection to reduce the capture of small-sized fish, study on optimum intensity of light used as Fish Aggregating Devices (FAD) to encourage more selective fishing and the conduct of research on new designs of FADs for selective fishing are appropriate research activities to deal with management needs for this fishery.

### *Stock Assessment*

There are two basic methods used in assessing the stocks of small-pelagic fisheries, holistic and analytical.

#### Holistic Method

Analysis of time series of catch and effort data generates the value of maximum sustainable yield (MSY) and optimum fishing effort for the fisheries on small pelagics.

Hydro-acoustic surveys provide information on fish density and distribution by species as well as total biomass estimation for the small-pelagic fish stocks.

The information on production and biomass is used to calculate current exploitation level, while mortality parameters are derived from biological research.

**Analytical Method**

This method provides stock estimation by size of fish and by species. The information provides basic inputs for more specific management measures.

In general the surplus production model has been commonly used to derive management measures due to less demanding data requirements.

***Comprehensive assessment of dominant species***

Since the pelagic fishery is supported mainly by mackerel of the genus *Rastrelliger*, more research effort will be directed to study those aspects of the biology of this genus on the west coast of Peninsular Malaysia, their recruitment and stock dynamics to strengthen assessments of those stocks. Stock assessment will progress towards the use of analytical models incorporating more information on biological parameters. In addition to this, the changes in species composition of the small-pelagic fish catch should also be monitored to ensure conservation of bio-diversity. Studies to identify certain possible indicator species will also be conducted.

## 6.3 Socio-Economic Research

The latest socio-economic survey of the fishing community was conducted in 1995 by the FDAM.

Information on the socio-economic status is still insufficient and not updated. A detailed study on socio-economics should be conducted to provide a better understanding of the fishing community. The information will improve measures for cost-effective management of this fishery.

## 6.4 Data Supporting Research and Monitoring

A substantial amount of information for the small-pelagic fishery already exists and the information is being updated regularly through on-going monitoring programmes that include the following:

a) **Fisheries Management Information System (FMIS):** There is a comprehensive national programme to collect data on catch and effort that are published in the Annual Fisheries Statistics.

b) **Hydro-Acoustic Surveys:** A number of hydro-acoustic surveys have been conducted in the area providing density distribution and total biomass of the small-pelagic resources.

c) **Monitoring of the landings of small-pelagic resources:** Observations on landings of small-pelagic fishes by gear type have been done at selected major fish landing bases along the west coast of Peninsular Malaysia. Direct observations of

these landings provide information on seasonality of the species and the effect of environmental changes on the fish production.

d) **Biological Studies:** Biological studies on the dominant species of the small-pelagics have been carried out to estimate the growth and recruitment and to identify the spawning areas and seasons.

e) **Oceanographic studies:** A number of oceanographic surveys have been carried out to obtain information on the physical, biological and chemical parameters of the water body through conventional cruises as well as remote sensing application. The information explains the distribution of small-pelagic fish resources in the area.

### 6.5 Research Issues

There is insufficient information on the identity of the small-pelagic fish stocks that are possibly shared among neighbouring countries bordering the Straits of Malacca.

- The Straits of Malacca is a major shipping lane with high risk of accidents resulting in oil spills. Such accidents pose a threat to this fishery.
- Impact of land-based pollution on the fish stocks and fishery.
- Encroachment by foreign fishing vessels will jeopardise the management measures undertaken.
- Illegal transshipment of fish at sea will lead to misreporting of catch data.

### 6.6 Implications for Management

The pelagic fishery resources are over-exploited on the West Coast of Peninsular Malaysia; thus stringent management measures are required for their sustainable use. The management of pelagic fisheries on the West Coast of Peninsular Malaysia is focussed on the interaction of the three fishing appliances namely the fish purseseine, trawl and driftnet since they target the same resource.

Matters of particular concern are the mesh size in the cod end of trawl gear, as well as length and number of driftnets in inshore locations.

## 7. MONITORING, CONTROL AND SURVEILLANCE (MCS)

### 7.1 Regulations and Rules enforced

The Fisheries Act 1985 is administered by the Department of Fisheries Malaysia assisted by other relevant agencies. The enforcement agencies that are empowered to do so are the Department of Fisheries, the Marine Police of the Royal Malaysian Police and the Royal Malaysian Navy. The Department of Fisheries has a Monitoring Control and Surveillance Unit that facilitates these enforcement activities.

Other regulations related to fishing activities and are being enforced by these agencies include the Exclusive Economic Zone Act 1984, Environmental Quality Act

1974, Merchant Shipping (Oil Pollution) Act 1994, Merchant Shipping Ordinance Act 1952, Petroleum Mining Act 1966 and the Continental Shelf Act 1966.

### 7.2 Existing Capacity

The Maritime Enforcement Coordinating Centre (MECC), established by the National Security Council of the Prime Minister's Department, and under the supervision of the Royal Malaysian Navy, is responsible for coordinating the functions of the three agencies. It is located in Lumut on the West Coast of Peninsular Malaysia. It also functions as the focal point for all emergency work such as implementing oil spill contingency plans, rescue at sea and assists mariners in distress.

In the area of the fishery on west coast of Peninsular Malaysia, the Department of Fisheries is equipped with patrol vessels of different series, namely, four 75 ft vessels (PX series), five 45 ft vessels (PA series) and 28 speedboats with outboard twin engines ranging from 150-240 hp.

Forty authorised departmental officers are engaged in monitoring, control and surveillance activities in this fishery and are supported by 200 personnel who are mainly boat crews. The staff is distributed throughout the area where the patrol vessels are based, located in Langkawi, Kuala Kedah, Lumut, and Port Kelang. These bases have continuous contact with the Operations Control Center at Departmental Headquarters in Kuala Lumpur.

### 7.3 Operational Approach

The mode of MCS operation includes the following:

**Routine patrols:** Periodic sea-patrols are carried out in areas identified as problematic but having possibility of recovery due to timely enforcement activity.

**Immediate patrols:** Sea-patrols are conducted based on information provided by the public.

**Joint patrols or operations:** These are sea-patrols carried out with one or more other departments in areas identified as problematic and require immediate solution. In most cases, arrests in Zone C2 of the EEZ waters are made by the Royal Malaysian Navy and all prosecution actions are conducted by staff of the relevant State Fisheries Office and advised by the Legal Unit of the Department of Fisheries.

**Air-surveillance:** Suitable airplanes are chartered that cover wider determined areas. This operation is aimed to detect the presence of foreign fishing vessels in the EEZ waters and other illegal fishing activities.

**Intelligence networking:** Networking that has been established comprised of personnel who have been trained in procuring reliable information.

The latest surveillance technique adopted is the **Vessel Tracking and Management System (VTMS)** which was tried in 1998. All chartered vessels are now required to have installed this system. Plans are made to extend the system in the area soon for all C2 vessels (estimated to be about 100) for the waters adjacent to the five States.

At present two vessels located in Perlis and operating in C2 are already equipped with VTMS.

### 7.4 On-going Data Collection

The types of data collected for this fishery include statistical and research data pertaining to the biological, economic, social aspects of the fisheries.

Data collected include details of the fishing fleet, fishing appliances, number of fishers, literacy rate among the fishers, size of fisher households, dependency ratio of fisher households, occupational status of head of household, income of fishers from fishing, involvement of fishers in other economic activities, returns from other economic activities, income of fishers from other sources and income of fishing household. Economics of fishing operations can be deduced from the following data collection such as fishing operations, landings, capital cost, operational cost and earnings.

Data obtained in surveillance operations such as the number violations or breaches are used to assess the status of compliance by fishers towards the regulations.

Catch-effort data are used to monitor the monthly yields, catch composition and to check the effects of fishing on the fish stocks. The data are published annually in the Annual Fisheries Statistics.

## 8. CONSULTATION WITH STAKEHOLDERS

Opportunities for consultation with the fishers on issues related to the management of this fishery are not well developed within the five States. The potential exists for improved compliance with and commitment to management measures for the fishery through better consultative processes.

### 8.1 CONSULTATION PROCESS

***Organisations***

The plan provides for the inclusion of fishers and other stakeholders in its development and ongoing administration, using where possible existing consultative structures.

Fishers are represented either by the Area Fishers' Associations, Area Fishers' Cooperatives or other registered Fishers' Associations.

These associations are engaged in consultation on this fishery by the DOF. Some are administered and assisted by the FDAM. Other registered fishers' organisations and other associations related to the fishing industry are also consulted. Representatives of these associations and organisations are also invited to participate in the process.

Membership of Area Fishers' Associations consist mainly of traditional fishers whereas Area Fishers' Cooperatives/other registered Fishers' Association members are commercial fishers.

***Process***

The DOF will undertake the following consultative processes as part of this Plan.

1. DOF to conduct dialogues/discussion with fishers and the interested parties at a local level about the Small-pelagic Fisheries Management Plan twice yearly.

2. Exchanges of preliminary information between DOF/FDAM/Area Fishers' Associations/Area Fishers' Cooperatives will occur on a repetitive basis to minimize differences of views about management needed.

3. Outcomes documented.

4. Recommended views submitted to a Coordinating Committee responsible for implementation and monitoring of the Plan (See Section 10 for further details).

5. Recommendations about the Plan of the Committee are forwarded to the Director General of DOF/Minister of Agriculture for consideration and approval.

6. A decision is taken and feedback provided to fishers and other interested parties.

## 8.2 Provision of Information to Stakeholders

The consultative process includes provision for involvement of and feedback to fishers and other parties who have an interest in any changes or advances in the management of the fishery for small-pelagic species. Fishers are to be provided with information directly via local media, presentations by DOF staff, through information processes of the Fisheries Development Authority, through the stakeholder Associations, amongst other approaches. The DOF will also engage in regular visits and presentations to interested parties about the provisions of the Plan and why those provisions apply.

DOF will also make available Information Papers about aspects of the fishery as reference materials for stakeholder use.

## 8.3 Improving Public Awareness

The plan acknowledges the importance of public support for and commitment to the objectives contained in that plan and the benefits that such support and commitment offer for the effective management of the stock and the people that depend on it for their food and their livelihood.

The DOF will engage in information exchange and extension about the contents of the Plan and its performance, with a view to inform, persuade and remind the wider community about the value of an effective management plan for the conservation and wise use of these stocks.

## 9. POST-HARVEST SECTOR

The post harvest sector consists of the handling of fish on board of fishing vessels and its distribution to the consumers and the fish processors.

### 9.1 Fish Handling

Presently, commercial fishing vessels in the small-pelagic fishery have a reasonably good fish preservation method. They are using a Refrigerated Seawater System (RSW). The catch is kept in the large plastic bins according to species and stored in the insulated fish hold. The fish hold is filled with seawater that is cooled by the RSW system. Temperature of fish is kept at around 0 $^0$C. At this temperature, the rate of quality loss of the fish is reduced. Since the fishing trip normally does not exceed more than a week, the catch is still in very good condition.

The fishing trip of the traditional fishers is normally on a daily basis. Nowadays, they are beginning to carry ice blocks on board their fishing vessels. They are also using insulated fish boxes. With such practices, the loss in fish quality is also reduced. However, in isolated places there is no regular supply of ice blocks and fishers have to go fishing without ice. This affects the quality of the fish landed.

Some commercial fishers are also fish traders. They send their fish directly to the wholesale market in bigger towns. The fish are stacked in between crushed ice in insulated fish boxes and are transported by lorries. Normally it takes about 12 hours to reach the wholesale market. Retailers obtain their fish supply from the wholesale market early in the morning and sell the fish to consumers during the day.

Traditional fishers sell their catch locally or to the fish traders who collect the fish and send the fish consignment to the wholesale market.

A continuing extension programme is undertaken to educate the fishers on better fish handling methods to further improve their catch. Training on this subject is regularly conducted at the various fishing villages. Commercial fishers are encouraged to freeze their catch at sea because there exist good cold-chain facilities to cater for the needs of the consumers in urban areas. The catch can be kept for longer durations if maintained at –18$^0$C from the time of harvest. For the traditional fishers, the use of flaked ice and crushed ice is more economical and is able to cool down the fish at a faster rate.

### 9.2 Fish Processing

Fishers started to process fish whenever there was extra catch exceeding the need of the day. The fish was salted, dried or fermented. Even though it was carried out in a very traditional way following each family's secret recipe, it not only helped them to provide protein during lean periods when they could not fish, but it also enabled them to sell their produce to other people in the locality. Fish processing has since evolved with time and the invention of new technologies. There are now more varieties of fish products with longer shelf life. Fish processors today are mostly located within the vicinity of the fish landing base. Normally, the fish processors are family members of the fishers.

At present, the bulk of the small-pelagics caught are consumed fresh. All of the fish are packed in ice for both the local and foreign markets such as Singapore, and Thailand. Small quantities are frozen as stockpile in Kuala Perlis and for export to Brunei, China and Thailand.

Dried, salted small-pelagics like *Megalaspis* are widely produced in Kuala Kedah and consumed due to their simplicity of processing, low investment and acceptable taste. However, small-pelagics like *Sardinella* have very high fat contents and have shorter shelf life because of the oxidation of the fats. Special packaging has been used successfully to extend the shelf life.

Some fish are boiled or steamed and then sold. This process is usually done using the *Rastrelliger.* This is done on a very small scale in places like Pulau Pangkor. Due to the high price of fresh fish, the product is very expensive. There is very little demand for this type of processed fish especially from the younger generation.

Over the last decade, there has been increased utilization of previously low-priced fish species for the production of value-added fish and fish-based products like surimi, fish cakes, fish fingers and fish balls and fish crackers. Certain small-pelagic fish species are preferred for the production of selected products. Fish cakes, fish fingers and fish balls are made from round herring (*Dussumieria*) and sardines (*Sardinella*) to yield a springy texture. *Sardinella* is also used to produce a cheaper fish cracker. However, pelagic species are reputed to be not suitable for surimi processing on the account of their fat content, rapidly deteriorating meat and dark colour. The higher pH contributes to lower gel strength consequently alternative leaching methods is used. Nevertheless such surimi can be used in manufacturing traditional products such as fish crackers, otak-otak and satar.

Fish noodles is another product that can be made from small-pelagic fish. Minced fish meat is mixed uniformly with flour, salt and water before passing through the roller and cutter. The thin noodles are cooked in a steamer and are then ready for the market. The noodles can also be dried and packed in plastic packages for later consumption.

The fish processing industry for the small-pelagics is on a subsistence level and is scattered throughout the States concerned and is not the driving force for fishers to target small-pelagics in their fishing activities. The landings of the small-pelagics have been at a consistent level for a sustained period and have not created excess capacity in its industry processing sector.

### 9.3 Management Implications

Improved fish handling practices will help to increase the income of the fishers as good quality fish will fetch higher prices and fish is easily marketable in a wider area. Frozen fish can be released to be marketed in times of fish shortage. This will ensure better returns to the fishers and continuity in fish supply. Good handling practices can guarantee safe fish for the consumers because it will help to reduce contaminations and health hazards.

While the production of value-added products from low-valued species reduce wastage in fish resources, much debate has arisen over the use of the fish as feed

for aquaculture operations. With a high demand for fish culture in ponds and floating cages, much of the by-catch landed by fishing vessels including small-sized pelagic species notably, *Decapterus,* has been caught and sold as feed for these culture operations. Even *Rastrelliger* has been used as feed during periods of glut when the ex-vessel price of fish drops. Previously much of the fish was reduced to fishmeal but this practice continues to decline.

## 10. REVIEW OF PLAN

The Plan provides that it be formally reviewed and amended if necessary after no more than five years duration. Further, the Plan provides that progress towards its objectives is monitored at least annually and corrective action taken where needed. Such monitoring is undertaken using specified indicators (to be developed in wider consultation with stakeholders). A Coordinating Committee headed by the Director of Resource Management and Protection Division will carry out the review process. The committee members shall comprise of:

- An officer from the Corporate Planning Division with knowledge of socio-economic aspects of the fishery.
- An officer from the Extension and Training Division.
- A relevant researcher from the Research Division.
- One Fisheries State Director on behalf of the 4 Directors covered by the fishery.
- An officer from the FDAM.
- Stakeholders – representatives of the fishers and the processors in this fishery (up to five persons).

The chairperson may invite an advisor(s) to sit in the Committee.

The Coordinating Committee will evaluate and gauge the achievements of the management objectives (the committee may not have the resources and the expertise to complete the task).

The Coordinating Committee will meet at least once yearly to review progress towards achieving the objectives of the Plan.