

fish with high marketability along the coasts, causing progressive diminution of resources, while in offshore areas at depths between contour lines at 100 and 200 meters it is estimated that there are abundant biomass of usable fish which will be effectively exploited, and these comments also apply to certain coastal pelagic fish. Accordingly, it is necessary to improve imbalanced utilization of fish resources and to modernize artisanal fisheries.

① Improving Management of Fisheries based on Good Understanding of Resource Trends

A. Improvement of Fishing Mainly of Coastal Demersal Fish Resources and Partial Diversion to Exploitation of Pelagic Fish Resources

At the moment, there is a concentration in exploitation of bottom fish resources to only catching coastal species with good marketability.

Artisanal fishermen tend to select Serranidae (groupers) and Lutjanidae (snappers), while shrimp trawlers concentrate on shallow-water shrimp. These fish resources exploited by artisanal fleet show slow decline in the abundance, while shrimp resources are seemed to be diminishing rapidly.

Management of resources and fishing operations for shrimp trawlers must be strengthened to respond to changes in the fish populations (reduction of fleet, closed seasons, and no-fishing zones). Shift to pelagic fishing based on resource surveys will allow a diversification of the fleet,

and changes in trawling for different species of fish, described below, should also be considered.

It would also be effective to divert artisanal fishing boats (pangas, botes, and lanchas) to expand the scale of operations. In some seasons it is better to bring them to favour fishing of pelagic species using payaos and other equipment capable of pelagic fish. After such steps are taken, it would be a good idea to develop fishing in groups or cooperative organizations.

B. Development of Unused Demersal Fish Resources

There are considerable resources of bottom fish between contour lines of 100 to 200 meters that are still completely unused. These include *Peprilus* sp. (butterfish), *Lolligopsis diomedea* (squid), and *Bothidae* (flatfish), which look very attractive in the future. Thus, along with expanding markets and increasing consumption, it is also necessary to devise effective methods for utilizing existing resources. At the moment there are not always best techniques for catching these fish, but it ought to be possible to overcome the situation by converting some shrimp trawlers to fish trolling, or to make bigger lanchas to introduce small-scale bottom trawl fishing.

② Enlargement of Fishing Vessels and Modernization of Fishing Gear and Techniques in Order to Exploit Unused Resources

The current outboard motor type pangas and boats should

be enlarged to inboard motor type lanchas and equipment (fish finders and navigational instruments, etc.) as well as fishing gear and techniques have to be modernized and improved. The results of this survey suggest that introducing bottom gill netting and improving the fishing techniques using this here should increase productivity. In any case, these measures can help to increase productivity and drastically improve utilization of resources. However, there is the danger that they will increase the pressure on resources. Thus, it is vital to consider not only increasing the catch, reducing costs, and improving the quality of the catches, reducing post-harvest losses but also resources management when implementing these measures.

③ Recommendations on Primary Surveys for Development of Propagation and Aquaculture

Taking a long-term view of the situation, the vital importance of resources propagation and aquaculture is undeniable. Thus, selection of species for propagation and of suitable sites for aquaculture and basic surveys and studies for seedlings production and farming technology and other research in this area must be promoted and pursued in terms of a long-term perspective. Ways must be found to train technical specialists by reinforcement of study and training at home and in the advanced industrial countries.

④ Expansion and Reinforcement of Fisheries Administration and Research Institutes

A. Strengthening experimental research institutes

Fisheries administration depends heavily upon the work of collecting and accumulating results of experiments and research. Research and experiments in fisheries biology of marine living resource, fishing technology, oceanic environments, food processing, and socio-economic factors and other diverse areas can contribute to development of practical technology. To do this, there have to be more technicians and researchers in the experimental research institutes with better equipment and measuring instruments, and organization for cooperation with the fisheries administration must be strengthened drastically.

At the same time research work at sea is indispensable in the actual locations where the fish live for on-site oceanographic studies. Thus, experimental and research institutes should conduct studies based on appropriate management and operations of a research vessel of about 50 to 100 GRT with modern equipment to enable it to undertake oceanic observation, and fishing operation and biological studies.

B Strengthening technical training for fishermen

There has been remarkable progress recently in fishing technology and especially in fishing boat equipment. Thus, introducing more new technology while maintaining careful consideration of resources and consumption trends can make a great contribution to increasing productivity. It is also suggested that fishermen be trained in courses on techniques

at existing training facilities and/or in systematizing fishermen's cooperatives.

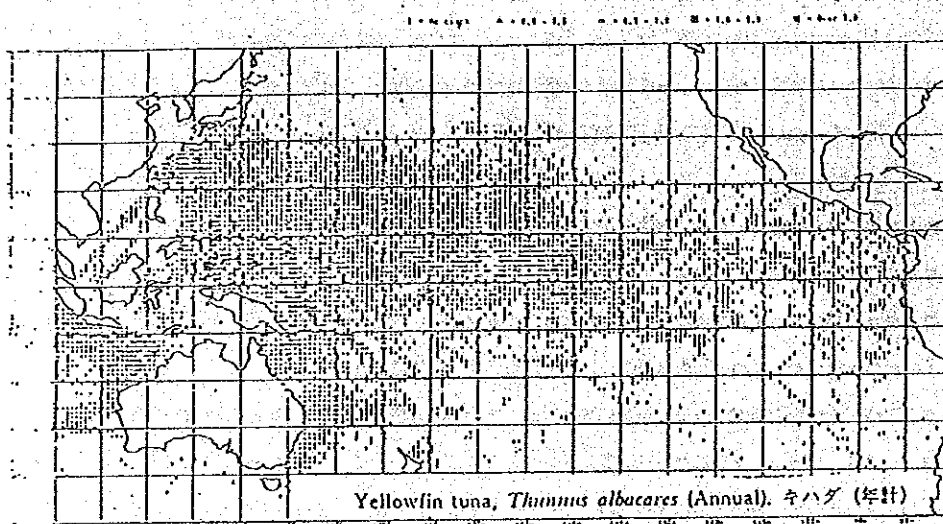
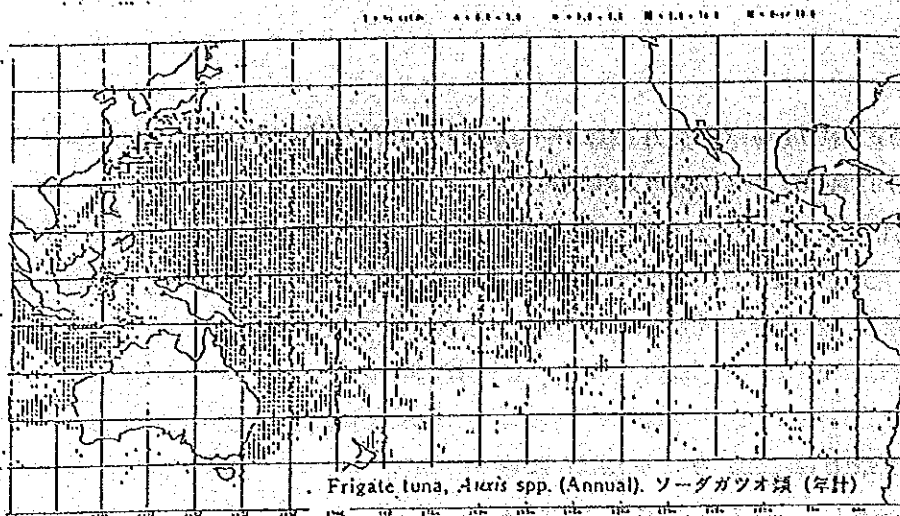


Fig. 19 Distribution of Skipjack and Yellowfin Tuna Larvae (1956 - 1981)
 (after Far Sea Fish Res. Lab., 1985)

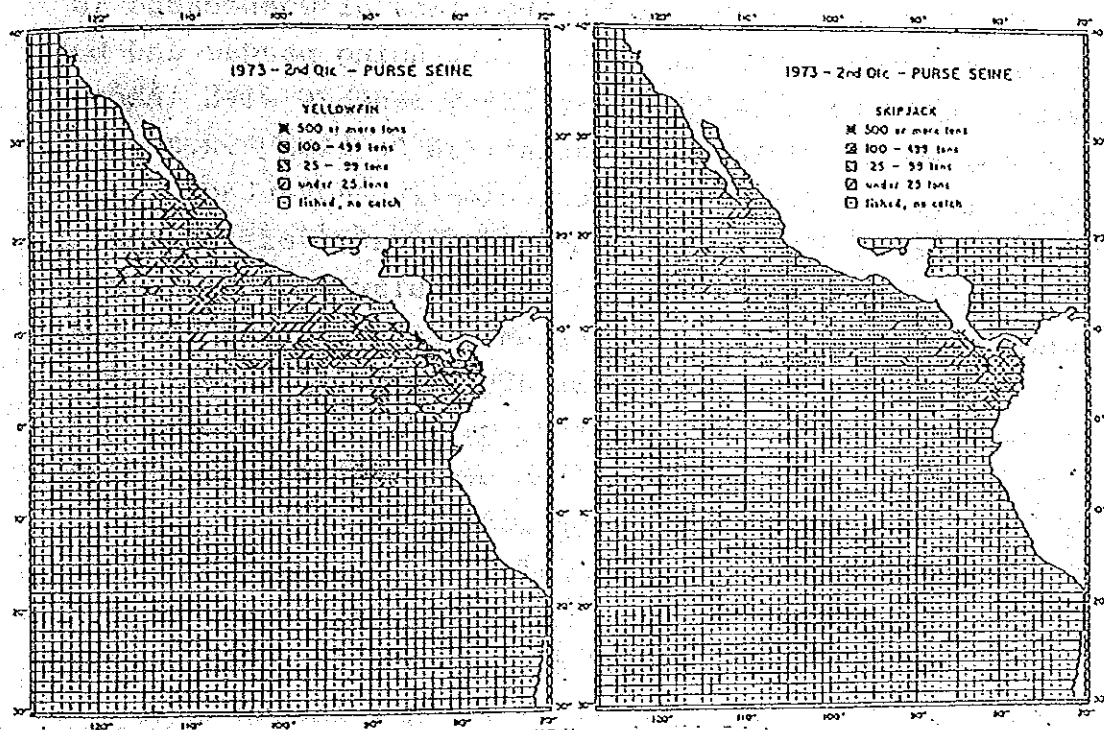


Fig. 20 Catch Distribution of Yellowfin and Skipjack in the Second Through the Fourth Quarters of 1973 (after Thomas P. Calkins, 1975)

4-2 Problems and Suggested Countermeasure Arising from the Survey on Fisheries Development Program

(1) Fishing Industry Management

① Current Situation

The fishing industry in the Province of Guanacaste is roughly divided into two types, that using pangas and botes with outboard motors, and that using lanchas with inboard motors, and as explained in detail in Section 3.2.3, both of these types of fishing are economically (advantageous) pretty much in the black, and the dominance of the inboard motor boat fishing business is particularly clear. In both cases, very many of the fishermen want to expand the scale of their operations, but there are serious problems with procuring funds (interest rates, periods, collateral, etc.), but at the moment sufficient improvements in boat equipment and fishing gear have not been made.

Sales of the catch are limited to specific dealers, and funds and materials are also often procured from specific dealers, and consequently many fishing villages cannot expect to sell their catches at prices anything like the market values.

② Remarks

A. Fisheries Industries Production

- i. Small-scale fishermen do not have a good understanding of management techniques.
- ii. Fishing boat equipment (fishing equipment, safety measures, etc.) are insufficient.
- iii. Fishing tackle and techniques are extremely tradition bound and restricted by habits.
- iv. They fish to a great extent only for bottom fish.
- v. Utilization of resources is insufficiently effective, especially in the case of discarded catch.

B. Fish Sales

- i. Sales are mainly done to specific dealers.
- ii. The fishermen do not get prices appropriate to the actual market price.
- iii. Fish added values (maintenance of freshness, effective utilization, processing, etc.) are not sufficient.
- iv. There is a need for adequate cold storage facilities.

C. Provision of Funds and Materials

- i Most fishermen depend on the private funds of dealers.
- ii Provision and repair of fishing gear and materials is inadequate.

③ Countermeasures

Training and other measures have to be implemented to increase awareness of management techniques, and fishing technology must be improved to develop independent manager fishermen, and the following measures should be taken to promote these goals.

A. Fishing Industry Production

- i To realize efficient fishing industry management and safe operations, it is vital that fishing technology and equipment and navigational equipment also be sufficient, and that the boats be well-equipped.
- ii While continuing with traditional fishing tackle and techniques, improvements and new techniques must be introduced aggressively, and utilization of fishing grounds must be improved.
- iii The fishermen's outlays can be reduced. For example, the main part of their outlays are labor costs (46%), fuel costs (22%), and fishing boat costs (11%). Track engines can be replaced by marine engines to reduce

fuel costs, and they can purchase fishing tackle and nets that are tax deductible through the fishermen's cooperatives. In these ways their costs can be significantly reduced.

iv Utilization of the catch (including discarded fish) must be improved, and utilization of as yet unused resources (for instance, meal production) must be promoted, and these measures can help to increase fishing industry income.

v This suggestion is related to i. above, but in the cooperative management systems developed in some of the fishing villages found in this survey there were really excellent systems in existence especially when compared with the individual management of the many artisanal fishermen. Bringing together the fishermen in organized groups can strengthen and expand the scale of management, and save a lot of labor while increasing productivity, and so it is very important to study ways to promote increasing cooperation because it can have excellent effects on fishing industry resources.

B. Fish Sales

i As mentioned elsewhere, organizing the fishermen, for instance, into fishing industry cooperatives, should be done and sales should be promoted through the cooperatives.

ii Cooperative sales of fish to large consumers (hotels,

restaurants, etc.) in direct sales should be developed and firmly established depending upon the conditions of the individual fishing villages.

- iii Public institutions should provide periodically information on markets and prices (by fish species, by standards, etc.) both domestically and abroad, to help increase awareness and understanding of fish sales prices among the fishermen themselves.

C. Provision of Funds and Materials

- i As discussed elsewhere, the fishermen's cooperatives should be more involved with credit operations to contribute to increasing their knowledge and competence in credit dealings.
- ii As discussed elsewhere, the fishermen's cooperatives under a new regime should provide the main funds and materials (fuel, ice, pure water, fishing nets and gear, fixtures, spares, etc.) as an important measure to support the development of the requisite infrastructure in the fishing village, and this should make it easier to get discounted prices for association members on materials and provide smooth supply and repair.

(2) Fishing Industries Production Base and Facilities

① Current Situation

Apart from a very small number of fishing villages, there are no good facilities related to fishing industries production activities in the country (fishing harbor, facilities for supply of oil and water, ice factories, freezers, refrigerators, processing plants, boat building and repair facilities, etc.). Even in the villages which do have facilities, at the moment the main facilities are not used.

Consequently, there are many cases where materials necessary for fishing industry production are delivered from far away inland by middlemen (mostly dealers), and in all of the fishing villages these kind of obstacles to smooth production activities can be seen. The general environment in the fishing villages in the Province of Guanacaste is that facilities for transportation, communications and telecommunications, insurance and medical provision, sanitation, and education and just about all other aspects, the villages are far, far behind the cities. Many people in the fishermen's questionnaire survey express the opinion that they hope to see improvements in the facilities for the foundations of production in the fishing industry.

② Remarks

- A. Since facilities are not in place in the fishing villages, it is hard to work for revitalization of the

villages. The standard of living of people in the fishing villages is low.

- B. Since facilities for the fishing industry are not in place, efficient fishing industry management cannot be expected.
- C. Since there are no fishing terminals that could be used as bases for fishing industry production activities, and consequently, quality control and sanitary control of the catch is slovenly.

③ Countermeasures

A. Promoting Institution of Fishing Industries Production Infrastructure

It is desirable that infrastructure for the fishing industry be put in place in all of the fishing villages in order to stimulate the industry, but this is almost impossible given the problems involved in provision of funds. Thus, it is suggested that the following infrastructure criteria be established, and that villages in which this is to be put in place should be selected on the basis of careful planning.

B. Infrastructure Criteria

- i Villages selected should be those where a lot of the fishermen strongly desire infrastructure.

- ii Fishing villages should be selected which can make great contributions to the national regional planning policies, which have priority in this, and which can expect to receive support and leadership from the central government.
- iii Villages should be selected which have more than 100 fishermen and more than 50 fishing boats.
- iv The life of the fishermen should be very active, and many of them should desire to expand the scale of fishing industry.
- v A majority of the fishermen should want to see the establishment of fishermen's cooperatives
- vi Villages should be selected which have the prospect of seeing local consumption increasing of marine products in their vicinity.
- vii Villages should be selected which have good transportation and communications connections with the main consumption centers.
- viii Villages should be selected which are recognized to have good natural and social environments.

For the villages which receive the first installations, they should be positioned as fishing industry terminals as appropriate models for the whole country, they should be nucleus fishing villages with comprehensive functions, and

the results of this should be used carefully as needed to sequentially proceed with installation of infrastructure in other fishing villages.

C. Selection of Model Fishing Villages

The results of the "fishing village general conditions survey" conducted in the Province of Guanacaste are given in the following table. It shows that Playas del Coco almost completely fulfills the conditions of the criteria given above. Thus, it seems appropriate to give priority to instituting infrastructure in Playas del Coco in this selection. Selection of model villages other than Playas del Coco should proceed on the basis of careful sequential planning one by one.

CONDITIONS IN FISHING COMMUNITIES

Parameters	Puerto Soley	El Jobo	Cuajiniquil	Playas del Coco	Brasilito	Tamaringo	La-garto	San Juanillo	No-sara	Garza	Sa-mararillo	Car-rillo
Total Population	36	520	1,607	3,000	362	74	400	100	804	210	2,005	175
Number of People Employed in Fishing Industry	12	100	278	360	70	62	49	46	28	32	165	27
Number of Pangas and Boats	7	32	49	35	11	12	16	14	12	7	42	11
Number of Lanchas	-	-	15	50	1	-	1	-	-	-	1	-
Number of Fishing Community Households in Opion Survey (Number of Households Wanting Expansion)	3 (2)	10 (3)	28 (8)	62 (52)	4 (4)	4 (4)	4 (4)	4 (4)	7 (7)	5 (5)	20 (12)	4 (3)
Distance to San Jose (km)	281	288	268	252	286	306	305	328	347	347	331	339
Distance to Libera (km)	64	71	51	35	69	89	88	111	132	132	116	124
Road Connections to Main Roads	x	x	*	*	#	#	x	x	x	x	x	x

(*: Paved; #partially paved; x: Gravel)

Note: The data in this table is taken from the "Fishing Communities Survey"

D. Details of Equipment for Model Fishing Village

The equipment and facilities required for the infrastructure in the model fishing village Playas del Coco are as follows.

- i Landing wharf
- ii Facilities for sale and disposal of the catch
- iii Oil and water supply facilities
- iv Ice-making plant and ice storage
- v Storage facilities for fishing gear and materials
- vi Refrigerators and other storage facilities
- vii Processing plant
- viii Rigging and repair facilities on the boats
- ix Training facilities
- x Other facilities required for production and distribution

It is desirable that all of these facilities be put in place in Playas del Coco as soon as possible, and for other fishing villages under consideration, facilities other than

i to vi should be kept to a minimum while considering the landing quantity of the village, its number of fishing boats, and investment effects.

E. Facilities Management

It would be ideal if management was undertaken principally by the locally established fishermen's cooperative. To effect this, an infrastructure management committee should be established built around the fishermen's cooperative with representatives of other related institutions (Ministry of Transportation, INA, etc.) which should establish practical and effective measures for utilization and support management and control, and for securing funds. However, INA should take the lead in managing training facilities and schedules. Use of facilities should of course not be confined to members of the cooperatives, but should also of course be open to neighboring and other local fishermen, and in general open to all the fishermen of the country, and it is necessary to manage the facilities so that the advantages (sales of catch according to actual market prices, application of a tax of claimable (tax deductible) purchase for members of imported fishing nets, fishing tackle, and materials, procurement of materials at discount prices by bulk buying, increasing the speed of repair, etc.) should be reflected in the operations and activities of the fishermen.

(3) Fishermen's Organizations

① Current Situation

Of the main 12 fishing villages in the Province of Guana-
caste, fishermen's cooperatives (including fishermen's
unions) are established only in five of them.

Of these, the four villages other than Playas del Coco
have fishermen's cooperatives established according to the
stipulations of the Cooperative Associations Law (Law No.
6756), but operations intended for coverage by the concept
of "cooperative" stipulated in that law (credit, sales,
purchase, utilization, advice and guidance, etc.) are not
being performed, and, in fact, the main agent for such
operations remains, in almost all cases, the fisheries
industry production companies. All of these five
cooperatives lack people with the experience and ability to
operate effective management, and if the current situation
continues there is not much prospect over the long term for
the development of such personnel.

The average number of members for existing cooperatives
(fishermen only) is 21.6 persons. Almost half of these have
less than five years' fishing experience, they pay very low
rates to the cooperative, and around 95% of the operating
costs of the cooperatives come from national government
financial institutions, and international aid agencies
providing finance and non-repayable contributions.

The cooperatives associations promotion council

(INFOCOOP), the cooperatives associations league (UNACOOOP), and the chorotega local fishermen's cooperatives associations league (ORCOOPES) and other local fishermen's cooperatives associations supervise certain institutions, but efforts to expand operations of fishermen's cooperatives associations are confined to these organizations, and this combined with the lack of fishing industry specialists means that sufficient results are not being achieved.

Note: The Costa Rican law on cooperatives and cooperative associations (Ley de Asociaciones Cooperativas) was enacted on 22nd August 1968, and is law number 4779. Since then it has been reformed three times, and in its current form it is called the "Cooperatives and Cooperatives Association Promotion Council Establishment Law (Ley de Asociacion Cooperativas y Creacion del Instituto Nacional de Fomento Cooperativo)", which was enacted on the 30th April 1982 and is law number 6756.

② Remarks

A. None of the cooperatives includes more than a part of the fishermen in their villages, and they are not well established in the local villages.

B. It is extremely difficult to find people who have a mature understanding of management of fishermen's cooperatives.

C. Operations are limited, and they do not sufficiently

contribute to improving the socio-economic positions of their members.

D. Operations which the cooperatives should be performing, such as purchasing and sales operations, are not being done.

E. All of the cooperatives have serious difficulties in securing funds, they have a lot of difficulties with management, and in some cases, they end up dissolving the organization.

③ Countermeasures

A. Promoting Strengthening of Organizations

To improve the socio-economic position of fishermen, to promote development of the fishing industries and local fishing villages, it is necessary to establish fishermen's cooperatives in fishing villages above a certain scale for the main fishing villages (e.g., with more than 50 fishermen). New fishermen's cooperatives should be different from existing fishermen's cooperatives in that they should operate comprehensive support for the main economy by developing democratic management among the local fishermen.

The results of the survey of opinions of fishermen's households showed that a very high proportion of 83% supported the idea of establishing fishermen's cooperative. Although many people said that there was no particular

advantage in joining a cooperative and gave that as the reason why they had not joined.

Based on these facts, it is necessary that the fishermen be sufficiently impressed about the great advantages from organizing and indeed the necessity of organizing to set up cooperatives, and the leadership and support from INFOCOOP, are indispensable.

B. Structure of Fishermen's Cooperatives

It is desirable that the fishermen's cooperative in any given village include all of the fishermen living in the village as its members, and qualifications for membership should be established by taking into consideration the opinions and the aspirations of all the fishermen and the conditions of each particular village.

C. Fishermen's Cooperative Funding

Setting up fishermen's cooperative will initially cost a lot of money. For this reason it is suggested that until the fishermen's cooperative really gets going, public funds should be distributed on a priority basis with their cooperation and support and other financing measures should be worked out. At the moment, the funds normally considered necessary are listed below.

i Investment capital

ii Membership dues

- iii Profits (profits from various operations)
- iv Costs (costs for various facilities, etc.)
- v Fees (fees involved in participation in various operations)
- vi Loans
- vii Aid, other

D. Fishermen's Cooperative Operations

The operations of the fishermen's cooperatives should be aimed at increasing the trust and mutual support among the members, producing more economic profits, and to foster and develop a sense of community and solidarity among the membership, as well as working for more safety in the lives of their members. This means that they should get out of the existing types of fishermen's cooperatives and move on to the following types of comprehensive operations.

- i Credit operations (members savings, borrowing, etc.)
- ii Sales operations (fish sales, direct sales, combined sales, etc.)
- iii Purchasing operations (cooperative purchasing of fishing materials, and household needs, etc.)

- iv Production operations (fishing industry production, etc.)
 - v Leadership (informing and educating fishermen, guidance and support)
 - vi Facilities management (in discussions and collaboration with related governmental and public organizations management of infrastructure, etc., efficient development of management and operating systems)
 - vii Other operations advantageous to the fishermen's cooperatives
- E. Training Personnel for the Fishermen's Cooperatives Association

It is desirable that the government of Costa Rica apply to the governments of the advanced countries with well-developed fishing industries and to its national organizations to have them send specialists on cooperative management to the league for a long period of time to promote improvements in running and management of the cooperative under the umbrella of the association by the training information support of these specialists and specifically to train and educate people who can take over efficient management and operation after these specialists leave.

- F. Participation in the Fishermen's Cooperatives Association

All of the local fishermen's cooperative associations should join the fishermen's cooperatives association and

should work to strengthen the foundations of their local fishermen's cooperatives under the leadership of the league, thereby strengthening the solidarity of the fishermen, and developing efficient and effective organizations.

G. Establishing Fishermen's Cooperatives in the Model Fishing Villages

When choosing candidates for model fishing villages, top priority should be given to the potential for establishing an effective fishermen's cooperative and on this basis propagation and development throughout the village of the organization should be promoted.

H. Support for Establishment and Management of Fishermen's Cooperatives

The proposal for establishing fishermen's cooperatives described above is something very different from the establishment of the existing fishermen's cooperatives. Since it is quite clear that there is not sufficient experience and sufficient knowledge from actually working in this area in the country of Costa Rica, which means that it would be extremely difficult to realize this proposal without very strong wide-ranging and substantial information, explanation, and leadership and material support from INFOCOOP, and other relevant organizations on establishment and management. To this end, a project team of specialists for promoting organizing in the villages should be established, and this should be used to impress on the fishermen the vital necessity of organizing and to

ensure long-term support in appropriate ways for management of the cooperative after establishment. Organizing the fishermen must be seen as the vital key determining the success or failure of efforts to develop the coastal fishing industry in Costa Rica.

(4) Fishermen's Education

① Current Situation

The main organization providing substantial technical training for the fishermen in Costa Rica is INA, and they have achieved considerable results, although it is undeniable that there is a serious lack of instructors and training materials and that it is mainly classroom instruction.

According to the results of the surveys, quite a lot of fishermen have received training and instruction from INA and other foreign organizations, a majority of the fishermen desire training, and it was also found that the current organization for training and practice does not satisfy their aspirations.

What the fishermen want in their training is navigation of fishing boats, production and repair of fishing gear, and other issues in technical matters, and besides this they want to know about management of fishermen's cooperatives, and also about accounting and other business matters. This shows that their interests are really wide ranging and the results of the survey certainly lead to the judgment that the fishermen have a very strong desire to improve their operations generally.

② Remarks

A. Fishermen's desires for training are not sufficiently

being satisfied.

- B. Training is basically classroom instruction and it is not really catching the interest of those receiving the instruction.
- C. Inadequate and insufficient instructors and educational materials means that sufficient results of the training are not being achieved.

③ Countermeasures

Promoting the fisheries industry and simultaneously improving the social position of the fishermen requires as its most fundamental and vitally important factor the education of excellent fishermen. In particular, in the Province of Guanacaste, artisanal fishermen are rather isolated, do not have many opportunities for study in a rather deprived environment in the fishing villages, have great difficulties in obtaining useful information, and are astonishingly far behind in modernization of their fisheries industries.

Consequently, it is necessary to establish firmly and to strengthen the training systems by developing careful plans for the establishment of fishermen's training centers. As the results of the questionnaire survey to well-informed people in this field showed, the content of the training should include practical business operations and general education and training, and in addition to this, it is vitally necessary to promote the education and development

of all round excellent fishermen while promoting improvement of their social position.

A. Training Center Management

It is most desirable that the management and operation of training centers and facilities be undertaken principally by INA. It is also necessary that the cooperation of MAG and other related organizations be obtained to ensure smooth-running of these facilities.

B. Training Courses

There should be two training courses, one for beginners and one advanced course. The beginners course being a traveling course that would move around through all the fishing villages, while the advanced course should be concentrated and operated in the training centers. The subjects taught in the training courses have been established as follows, taking into account those taught in the past.

i General education

ii Fishing boat navigation and fishing operations

iii Fishing tackle production and repair

iv Operation and maintenance of marine engines

v Operation and maintenance of nautical instruments

- vi Maintenance and repair of fishing boats
- vii Storage and processing of the catch
- viii Management and accounting for the fishermen's cooperatives
- ix Practical exercise and practice techniques
- x Other necessary subjects

C. Training Materials

In order to develop more effective training, audio-visual materials should be used (e.g., slides, videos, simulation equipment, and various models, etc.), and in addition practical exercises with fishing gear and fishing techniques should be included. A training vehicle should also be provided for the traveling training system.

D. Instructors

INA instructors should form the core of the teaching staff, and where necessary the specialists of organizations like MAG, CIMAR, and other related organizations should be used as well as private individuals who are specialists in the field, and this should include specialists from the advanced countries with well developed fishing industries.

E. Qualifications for Trainees and Monetary Allowances

Monetary support should be given to trainees who have reached a certain standard and have the qualifications (e.g., those who have received respective technical training etc.), and this should be done to increase the interest of the fishermen in training.

(5) Distribution

① Current Conditions

The condition of maintenance of freshness of fish at the facilities where local dealers take in the catch and at the marine products retail stores in the capitol metropolitan area is bad, and there are unsanitary locations around the existing facilities.

The quantity of marine products handled by the CNP chain stores is extremely low.

The dealers make supplies to the fishermen at their own convenience and oblige the fishermen to sell the catch to them, and in many cases, they obtain the fish at prices much lower than the price obtained by fishermen who do not get the convenience contributions from the dealers.

The main system is for distribution of fresh fish and seafood and supply to the markets varies greatly with oversupply, no fish at all, or extreme seasonal variations.

② Remarks

- A. Many of the dealers and retail stores are small scale, and for the artisanal fishermen it is extremely difficult to reduce distribution costs.
- B. The price the fishermen sell their fish at is determined by the dealers, and it does not reflect

market prices.

- C. The fish loaded from the boats is fresh and of good quality, but it goes through many transactions and many dealers until a certain volume is reached, then it is stored near the local harbor, and eventually sent to the capitol metropolitan area, and all of this of course invites deterioration in quality. Quality control in the distribution process is poor, there are serious sanitary problems, and this seems to be one important reason why domestic consumption is not growing.
- D. CNP lacks any commitment to expanding sales of fish and seafood, and most of the fish and seafood processing factories and refrigeration plants are idle.
- E. It is necessary to establish an effective cold chain, to reduce variation in fish prices due to oversupply, undersupply, and seasonal variations, and to improve quality.
- F. Export of fish and seafood, apart from shrimp, is concentrated on one region of the United States, since there are no other sales routes that might make possible large amount of exports. This situation is one of the reasons for low export fish prices.

③ Countermeasures

A. Improvement in Storage Locations and Transportation Vehicles

To improve the maintenance of quality of marine products and expand consumption, it is necessary to create much bigger storage locations in the local fishing communities, and to establish simple refrigerators with high preservation functions in the main fishing communities. It is also important to use better transporter trucks, which should be medium-sized trucks with good freezing preservation equipment, and to encourage widespread use of these in an effective low-temperature distribution system. This will require a government credit system under the facilities for introducing refrigerators and trucks, and their widespread use must be promoted.

B. Distribution Services Should Be Larger Scale

To reduce distribution costs, for example in fishing communities where several dealers purchase the catch and then combine to a given volume in a single fishing community, or where dealers travel around neighboring fishing communities to collect the required volume, distribution costs can be reduced by increasing the scale of operations handling this with a transportation specialist sector for overseeing transportation operations exclusively.

C. Transportation Mechanism Improvement

The existing sales and distribution system based on the dealer system has been formed by the historical details of Costa Rica and the trade and business customs of the country and other factors, and it has a variety of defects, but it seems extremely difficult to improve these any time soon, consequently, we are investigating as described elsewhere in this document ways to build fishermen's cooperatives for organization the fishermen for cooperative sales and for introducing partial direct sales to promote bit by bit improvements.

D. Price Formation

As described elsewhere in this document, it is necessary to introduce transactions based on realistic prices by improving communication and propagation of information on actual market conditions and on production locations and consumption locations (exporting).

(6) Consumption

① Current Conditions

As the survey results show, there are many consumer households in the large cities stating that they would like to increase the quantity of their consumption of marine products, but in general people think the price of fish is higher than that of meat.

Consumer tastes center on fresh snappers, croakers, sea bass, dorado, and other fresh fish and shrimp, lobsters and other shellfish, as well as squid, octopus and other mollusks, and they exhibit a strong taste for high-ranked fish and seafood, while dark meat fish and small fish are not much liked.

Newspapers and magazines are often describing methods of cooking for beauty aimed at women, but they center mostly on beef and chicken, and few articles cover cooking of fish and seafood. There is almost no national work being done on promotion of eating fish.

② Remarks

- A. There is plenty of room for expanding consumption of marine products, and it is also possible to reduce distribution costs.
- B. There is insufficient promotional work being done on fish as health food and food for beauty (high protein, low calories, etc.).
- C. Recent increases in population in Costa Rica over the last ten years have averaged 2.62% annually, and if this continues, the population of the country should exceed 3,000,000 by 1992, and this will bring with it enormous expansion in the demand for animal protein.

③ Countermeasures

- A. The government should use its influence through public information institutions to inform the general consumers mainly in the cities of the excellent values of fish for health and beauty (high protein, low calorie, etc.), and should also work more aggressively to promote and propagate cooking methods for fish and seafood, and do both of these tasks together.
- B. As one of its leadership operations the fishermen's cooperatives could work more on promoting the eating of fish by establishing tasting courses and by providing leadership on and promoting cooking methods aimed mainly at consumers in or near the fishing communities and restaurant cooks, etc.
- C. To expand consumption of fish resources not yet being used, it is necessary to advance development of fish processing and cooked products. For example, this kind of research should be done by the Food Products Technology Research Center of Costa Rica University and other such institutions.

(7) Fisheries Financing

① Current Conditions

There is no nationally organized special financing system for artisanal fishermen in Costa Rica, so that if the fishermen do not have sufficient funds of their own to purchase fishing boats and equipment, they have to rely on banks. The banks are more interested in financing fishing boats, engines, and nautical instruments, so this is not appropriate for the financing of fishing boats for unorganized artisanal fishermen.

When fishermen receive financing from city banks, they have to provide real estate collateral to the value of five times the amount they borrowed. The following shows the normal rates of interest at the Costa Rican banks.

Period	Annual Interest Rate on Savings (%)	Annual Interest Rate on Loans (%)
One month	8.60	13.0
Three months	8.87	15.0
Six months	8.87	18.0
One year	9.22	23.0
Two years	9.85	30.0
Three years	10.22	32.5
Five years	12.80	35.0

In the agricultural sector, the government has introduced long-term, low-interest loans from international institutions, and in particular, for agricultural sectors that make great contributions to export, the government's own financial institutions are being used to open up ways of financing based on the US dollar with credit at an annual rate of interest of 15% and with loans to be paid back over five year periods.

② Remarks

A. Artisanal fishermen have a lot of demands for funds, and they all wish to see the introduction of long-term, low-interest financing.

B. In the north Pacific coast region of Costa Rica, a lot of high-ranked fish are caught among the catches of fish and seafood by artisanal fishermen for export. Thus, this area of the industry, artisanal fishermen should also be supported with financing from the government as the sector that can contribute to exports. However, looked at from the standpoint of the financial institutions, there are very high, very serious dangers indeed in dispersing their base to the regions for providing financing to artisanal fishermen who do not have sufficient real estate collateral that the financial institutions could take in.

③ Countermeasures

A. It is necessary to institute firmly a financing system

for artisanal fishermen who form the backbone of the fishermen's cooperatives.

- B. The government should establish public financial institutions and while harmonizing loan conditions, should introduce long-term, low-interest loans from international financial institutions or from the advanced countries, and all of this should be done in the struggle to promote and develop the fisheries industry.
- C. The government should provide leadership for a system for provision of reserve funds to the fishermen's cooperatives (for fuel oil costs, a fixed rate reserve fund for specific landing quantities?, and fees for cases of government lending, etc.), and a financing system should be introduced using this as the financial resource.

(8) Fisheries Administration

① Current Conditions

Comprehensive administration of the fisheries industry is being provided and centers around the Marine Products Bureau and benefits from the support and cooperation of related government departments (Ministry of Economic Planning, Transport Ministry, etc.), CIMAR, various private organizations interested in marine products, and financial institutions. While it cannot be said that proposals for fisheries industry development plans, writing laws on the fisheries industry, and the various surveys needed in this area, as well as statistical data and materials are not sufficient, it certainly is the case that provision of these things and activities in these areas are undertaken as necessary.

② Remarks

Results of data collection on the ground lead to the following suggestions.

- A. Comprehensive adjustment functions between the related institutions are not working sufficiently.
- B. There is a lack of both personnel and funds for effective operation of administration.
- C. Work on collecting survey and statistical materials tends to be delayed. Also, once the summarizing and

editing work has been done, the results are not sufficiently used by the administration or not sufficiently communicated to them.

③ Countermeasure Orientation

A. Preparation of Comprehensive Fisheries Industry Development Plans

Medium and long term plans are necessary which clarify future goals for revitalizing the fishing communities and the work of the fishermen. Communication and mutual negotiations between the related institutions is vital for promoting basic fisheries industry policy. For example, it is necessary to propose plans that are flexible and that cover areas like supply and demand of food stuffs (marine products), trade, labor, fishermen's incomes, commodity prices, financing, and for negotiating on fishing grounds with other countries. Further, it is necessary to establish a system which clarifies in quantitative terms the progress that has been made in each year on these plans.

B. Review of Laws Relating to the Fisheries Industry

In order to promote concrete measures for establishing the administration necessary to implement the fishing industry policies described above, various laws in this area must be reformed and new laws proposed based on scientific and objective understanding of changes that have taken place in actual conditions and the desire to reflect the new conditions in the changes to existing laws or new laws. For

example, this refers to specifications of licensing conditions, number of boats licensed, fishing regulations (fishing grounds, seasons, techniques, etc.), and these laws must impose legal obligations on the fishermen to respect them. It is also necessary to protect the fishermen using tax and financial regulations. In this connection it is of the utmost importance that the material generated by the statistical data system described below be used to support these moves.

C. Statistical Data Collection System

Drawing up policies and procedures for administration should be based on scientific and objective indices. This requires effective establishment of the following kind of system.

i Statistical data system

a. Structural statistics

Number of fishermen (by socio-economic class, etc.), number of fishing boats (by bote, lancha, etc.) and other important parameters to fisheries production should be generated at three to five year intervals. An efficient way of gathering data on the number of fishermen would be to do it in the census.

b. Production statistics

Fisheries production varies greatly with the conditions of the fishing grounds, and these statistics should be produced every year. Surveys to gather this information can use the purchase chits currently being collected by the four local offices of the Marine Products Bureau, and these should be organized by region, by type of fishing, productivity by type of technology (outboard motor, inboard motor), productivity by species of fish (biological classifications), and these statistics should be the basic data, and they should all be produced by month. Statistics given by type of fisheries business should also be given in terms of number of days spent on fishing voyages. The most important thing to remember to make statistics really usable is clarification of definitions of classification groups (types of fisheries business, species, technology, etc.) for each type of statistics.

c. Distribution statistics

The purchase chits mentioned above can also be used to generate statistics on sales volumes, number of items sold, and prices by species of fish in production areas (per kilogram). These statistics should also include information on sales destinations (by region, and classified as to retailers, processing, large consumers, etc.), and it is desirable that the statistics be generated which clarify the distribution of marine products. Price statistics in consumption locations can be done in the Marine Products Bureau's own surveys of purchase and sales

prices in retailers and other outlets, to produce statistics on the transition from production locations to consumption locations.

d. Economic statistics

The regional offices of the Marine Products Bureau supervise annual (where possible, monthly) surveys on fisheries expenditures and incomes and household expenditures. Where serious obstacles to conducting these surveys annually exist, such as lack of survey personnel and funds, they can be done at three year intervals, and the statistics can be maintained by sliding the commodity price index for the years in which the surveys are not conducted.

D. Reinforcing System of Procedures for Conducting Administration

To promote smooth operations of administration for the fishermen, it is vital to provide knowledgeable and competent specialists in each of the areas of technology, law, management and economics, cooperatives, education, and general management and negotiations. As many as possible of these specialists should have received training in other countries, and it is very important to foster better specialist knowledge by bringing in experts from abroad.

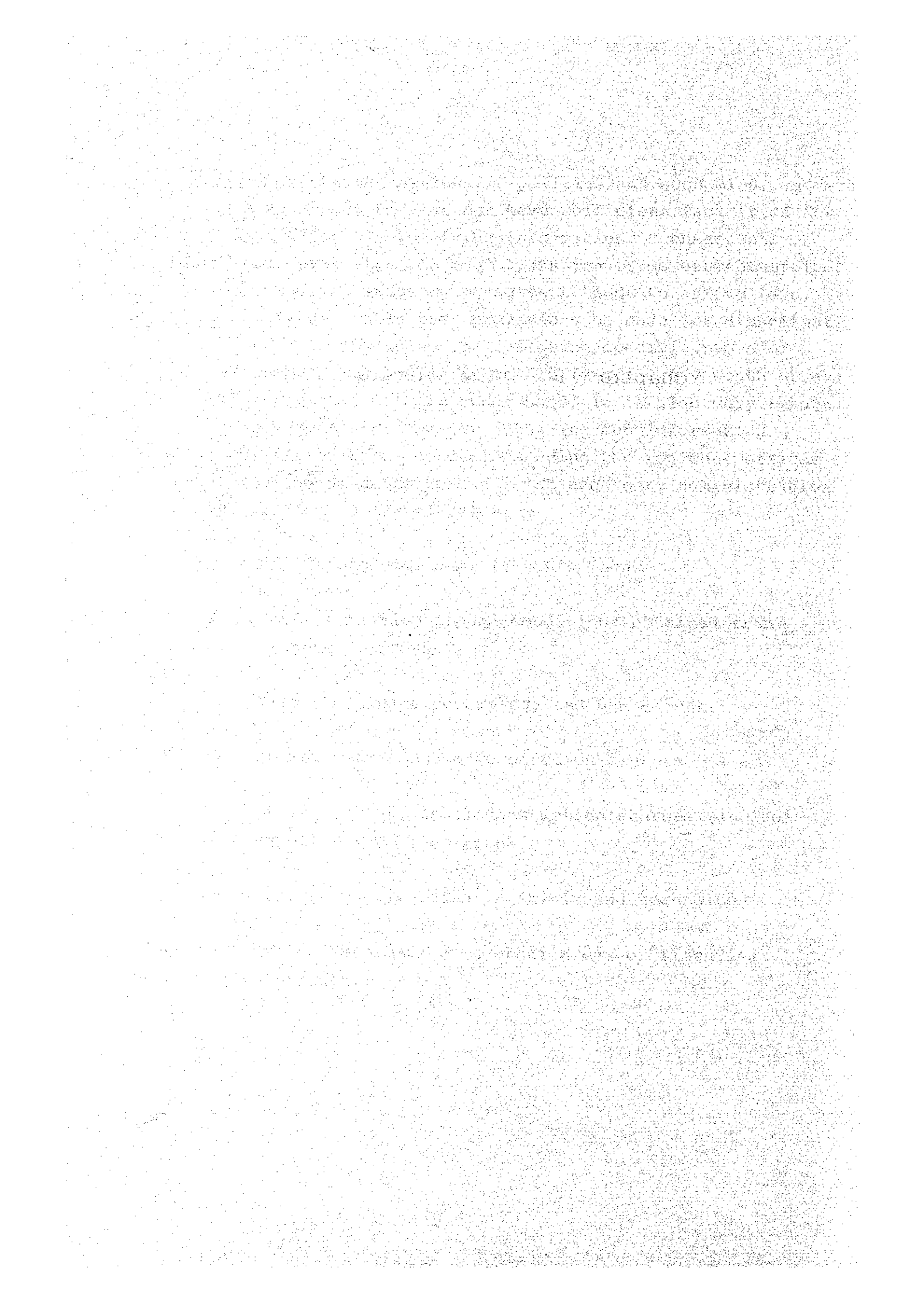
E. Activities on Promoting Dissemination of Administration Information

The fishing communities are comparatively distant from

the governmental centers of politics and economics, and many fishing communities do not have sufficient facilities for transmitting and receiving information. Consequently, useful information on administration of government offices and fisheries industry management tends to arrive late, and so it is desirable that provisions be made for disseminating information including the following specific types of information at regular intervals (e.g., every month or every three months). On the other hand, it is also very important to construct a system for gathering the information regularly on local conditions using the regional offices of the Marine Products Bureau. The necessary administration information is listed below.

- i Marine products administration news
- ii Data on fishing ground conditions obtained from resource surveys
- iii Data on fishing technology and management
- iv Market conditions at production centers
- v Market conditions at consumption centers (including export market conditions)
- vi Reports on fisheries materials and technology
- vii Useful information on other areas of fisheries management

Chapter 5 The Master Plan



Chapter 5 The Master Plan

5-1 Concept of the master plan

(1) Survey scope

According to the S/W, the scope of the "Pacific Coast Fisheries Resources Survey" for Costa Rica integrates the following aspects:

- Work I: To estimate the biomass (MSY not calculated) and the distribution of potential demersal fish resources in the area which includes Costa Rica's northwest continental shelves, slopes, and neighboring banks.
- Work II: To formulate a fisheries development program (under the master plan) for efficient exploitation of potential demersal fish resources, for reinforcing the distribution system, and for developing fishing ports and the infrastructure.

In some cases, however, the survey surpassed its scope in order to formulate medium- and long-term programs. Therefore, the survey will be explained as "Work I," "Work II," and "Miscellaneous."

(2) Master plan formulation policy

The master plan is a proposal for implementing various programs according to a certain time period. These programs for promoting Costa Rica's fisheries will be devised according to the countermeasures devised for the existing problems revealed by the survey results.

In order for the master plan to go forward, it will be essential to keep in mind that "the formulation and implementation of concrete programs will be realized through Costa Rica's own efforts and self-reliance." The information obtained from this survey is no more than a sample at the time it was taken. Therefore, integrated fisheries development programs must be implemented while taking into consideration the fisheries' historical circumstances and future outlook and the domestic socioeconomic conditions. Bilateral cooperation and the support of international organizations will be sought to expedite the attainment of program goals.

The master plan will classify programs as short-term, medium-term, and long-term.

Since short-term programs are to be commenced within 5 years, the master plan will be outlined in concrete detail to some degree. The medium-term programs will be completed within 6 to 10 years, and the long-term programs will last over 10 years. This report outlines the concepts of these master plan programs.

The master plan is basically limited to the region and scope covered by the survey. However, medium- and long-term programs call for concerted actions on a national scale. This chapter therefore includes recommendations that go beyond the intended region and scope.

For this Pacific Coast Fishery Resources Survey, we received many opinions and requests from fishermen and fisheries authorities regarding the management of fisheries. Measures addressing these requests are presented in detail in Chapter 4, 4-1-(2) and 4-2-(8).

(3) Work I (Fishery resources survey)

The fishery resources survey was conducted in two phases. The first phase was during the dry season (Nov. 1987 - Feb. 1988) and the second phase was during the rainy season (Jun. - Oct. 1988). The estimated tonnage of fishery resources differed widely between the dry and rainy seasons. The biomass of fishery resources estimated during the first phase was 21,000, whereas the tonnage estimated during the second phase was 60,000. As explained below, this large difference may be due mainly to the seasonal changes in the abundance of fishery species.

① Survey by trawling

A. First phase (Dry season: Nov.'87 - Feb.'88)

During this period, northerly and northeasterly trade winds blew continuously over the mountains. In Costa Rica's northern Pacific region, the winds were warm and dry due to the Föhn phenomenon, and there was no rainfall. The ocean temperature was also generally warm. However, due to these strong northeasterly winds, the surface water was carried off shore. To compensate, upwelling was generated, reducing the water temperature to 24°C - 25°C. In the south, on the other hand, where the northeasterly winds were weak, there were high water temperatures of 28°C to 29°C. This surface layer warming was probably associated with the El Niño.

The two surveys conducted during the first phase estimated the total biomass to be 21,000. Common resources were

mainly langostino (8,000 t), *Argentina aliciae* (3,000 t), *Peprilus* (1,200 t), *Cabrilla* (3,300 t), *Merlusa* (600 t), and *Pontinus sierra* (500 t).

B. Second phase (Rainy season: Jun. - Oct.'88)

During the rainy season, moisture-filled southerly and southwesterly winds hit Costa Rica's mountain range and released large amounts of rain that ends up in the ocean. An important effect of runoff is the cooling of the surface waters, which during the rainy season reach maximum temperatures, 1°C to 2°C lower than those recorded during the dry season. Also, the offshore front running along the coast nurtures plankton growth. It can be surmised that small fish such as *Peprilus* and *Argentina aliciae* concentrate in this area for feeding.

After examining the stomach contents and gonads of the fish caught, it was concluded that the *Peprilus* spp. and *Argentina aliciae* were in feeding migration, whereas the squid, *Loligo diomedea* was in spawning migration. Also, associated to these small fish, large fish such as tuna and *Sarda* were observed.

The fish stock for this period was estimated at 60,000 tons. This comprised mainly langostino (12,000 t), *Peprilus* (20,000 t), *Argentina aliciae* (5,000 t), sea robin (3,500 t), scorpion fish (500 t), and *Loligo diomedea* (400 t). Species which had increased substantially over the dry season included *Peprilus*, *Argentina aliciae*, *Loligo diomedea*, and other fish which migrate seasonally. Large

catches were made at depths of 100 m to 150 m. It is probable that these fish were concentrated at these depths due to the presence of zooplankton such as small mysid.

② Survey by other fishing methods

During the second phase of this survey, the abundance of fish stock in the shallows was surveyed twice by using bottom long lines, bottom vertical lines and shrimp pots. The distribution of commercially-potential fishes such as *Epinephelus* spp., *Lutjanus* spp., *Caulolatilus affinis*, tuna, and *Sarda*, was determined. In the shallows of Region 2, where local fishing vessels do not operate, large *Epinephelus* spp. and *Caulolatilus affinis* were abundant. Whereas in Region 3, in the shallows close to shore, tuna that had approached shore was caught.

③ Master plan based on the fishery resources survey results

From the above survey results, it can be concluded that *Peprilus* sp., *Argentina aliciae*, *Loligo diomedea*, *Bothidae* sp., and flatfish have potential commercial value (trawling is not currently used to fish these stocks). Also, the results of surveys done with other fishing methods confirm that the commercial fishing of large reef fish included tuna species is possible in the shallows.

To promote the development of Costa Rica's fisheries, it will be necessary to take advantage of these unexploited fishery resources. To this end, the following programs have

(4) Work II (Fisheries development program survey)

① Major survey results

The fisheries development survey encompassed interviews with fishermen on Costa Rica's northwestern Pacific coast, questionnaires from fisheries authorities, and a fact-finding survey by the survey team. The survey results and recommendations are presented in detail in Chapters 3 and 4, and summarized as follows:

A. Results of fishermen's interviews (by topic)

i Expansion of operations

The desire to expand operations was expressed by 83.9% of the fishermen surveyed in Playas del Coco, and by only 46.2%, on the average, of the fishermen in other fishing villages.

ii The willingness or desire to join a fishery cooperative

From among the 165 fishing households surveyed, only 7.9% belonged to a fishery cooperative. It was estimated that about 58% of the fishing households that did not belong to a fishery cooperative wanted to join one. Regarding the ideal role of the fishery cooperative, many mentioned their desire for one that would "expand cooperative and independent operations," "implement selling, credit, and counseling," and "provide facilities and infrastructure."

iii Finance

In a multiple answer survey on financial matters, 68.2% desired an increase in public financing and subsidies, 80.0% wanted interest subsidies, and 80.9% wanted longer repayment terms for loans. Thus, there was a strong desire for reforming financial arrangements.

iv Sales

There was a strong desire for reforming the current sales route. The most common proposals were: public management of fish markets at production locations (70.0%), the creation of a cooperative shipping system for fishermen (68.2%), and promotion for increasing marine products consumption (80.9%). (Multiple answer survey.)

v Facilities and infrastructure

In a multiple answer survey, most fishermen wanted storage facilities, such as cold storage (69.1%), and adequate infrastructure (81%).

vi Education and training

Many fishermen have received fisheries-related education and training. They also have a strong desire (78.2%) to further their education and training. (Multiple answer survey.)

B. Results of the questionnaires from fisheries authorities

The results of the multiple answer questionnaire were as follows: the education of fishermen is necessary (67.7%), improving of the distribution system are needed (58.1%), infrastructure is needed (45.2%), and the administrative management must be reinforced and reformed (38.7%). These were followed by the need for reform and reinforcement of the fisheries financing and the need for organizing the fishermen.

C. Results of this survey

Based on the results of the survey carried out in the fishing villages of Guanacaste Province, the problems concerning fishermen can be surmised as follows:

- i Lack of business sense among the fishermen.
- ii Limited or non-existent fishermen's organization.
- iii Non-existent or very poor infrastructure.
- iv Outdated fishing equipment and methods.
- v Underdeveloped distribution system and facilities.
- vi Insufficient education and training for fishermen.
- vii Low level of nationwide consumption of fish.