

SURVEY OF BANGUS AND SUGPO FRY GROUNDS AND OTHER MARINE RESOURCES OF QUEZON AND BICOL PROVINCES

By

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INTRODUCTION

This survey was conducted from April 28 to May 27, 1969 to assess existing resources, both of bangus and sugpo fry in Quezon and the Bicol provinces. Areas covered were Sorsogon, Albay, Catanduanes, Camarines Sur, and Quezon.

Bicol region is located between longitudes 124°E and 122°E and latitudes 12°N and 14°N while Quezon lies in longitudes 122°E and 121°E and latitudes 13°N and 16°N . The Bicol peninsula has limited mountain ranges unlike Quezon province which has vast mountain ranges. Although Bicol has small mountain ranges and isolated volcanoes, there are level plains and fertile valleys which provide sufficient nutrients to fertilize the bays, gulfs, and coves during the rainy months.

The climate of Quezon and Bicol has no well-pronounced dry season, but both receive great amounts of rainfall during the northeast monsoon. The prevalent wind throughout the year are the northeast and southwest winds which influence the intensity of the fishing activity along the coastal areas.

The primary objective of this survey is to evaluate existing or established bangus and sugpo fry grounds, explore the potential fry grounds and simultaneously assess local fishery resources. While in the area, the authors helped extended technical advice especially on the kinds of fishing boats, equipment and various types of fishing gears. They also helped resolve some local fishery problems similar to the "alamang fishery" and "trawler" problems of the Bicol region. The authors also disseminated information on the potentials of commercial shrimps and their fry as an important source of local income for the population of the contiguous areas.

Development of the local fry industry can generate income for the gatherers, dealers, and ultimately, on the national level, to the economy as a dollar-earning industry. Taiwan and Hongkong are prospective buyers of Philippine bangus fry. Sugpo fry are presently being cultured in fishponds in commercial quantities. Sugpo when harvested cost more per kilo than bangus and are considered as luxury. Local and foreign demands show unlimited market.

METHODS

Actual observations and ocular surveys were carried out in the area covered. Interviews with the fry concessionaires and barrio captains, mayors, fishermen, fishing boat operators, employees of the regional office and other government personnel were performed, and a government vehicle (RPT-8714) was utilized in covering all the areas and places scheduled in this 30-day survey of the Quezon and Bicol provinces.

Vital information were gathered from people engaged in the fry industry specially the field personnel of the Bureau of Fisheries and Aquatic Resources. Data on the daily catch, exact places, number of gatherers, buyers and distribution methods and gears locally utilized, peak or slack periods in each fry ground were the vital information which were obtained from the fry dealers and concessionaires.

Places covered by this survey were: Matnog, Bulan, Juban, Donsol, Gubat, Sorsogon, and Cabid-an in Sorsogon province; Tiwi and Tabaco in Albay, Capalonga, Paracale, Mercedes and Daet in Camarines Norte; Infanta, Real, Dalahican, Sariaya, Catanauan, Aloneros, Macalelon, Tagkawayan and Calauag in Quezon Province. In Catanduanes, only the towns of Calolhon and Cabugao were covered due to the limited means of land transportation.

Where permissible, actual catching of shrimp fry with the use of sinamay scoop net was made to determine the resource available in each fry area.

RESULTS AND OBSERVATIONS

A. INFRASTRUCTURES:

National, as well as provincial roads are classified as first and second class roads. Transporting of fishery products and other commodities to various places in the region is easy. The existing

ice plants in the different provinces cannot provide adequate ice to the fishing industry, as well as to domestic consumers especially during the hottest part of the year. To augment this shortage in ice, the Bureau of Fisheries has constructed three ice plants in Sorsogon, Camarines Norte, and in Pio Duran, Albay.

B. PLACES SURVEYED:

1. Camarines Norte (Mercedes and Daet)

Fisheries personnel in Mercedes informed us that they were able to buy juvenile and marketable sugpo from the gatherers from April to August. The maximum quantity bought by each local fishpond operator was 5,000 (post-fry) sugpo in one season and at prices ranging from ₱1.00 to ₱3.50 per hundred.

Gatherers interviewed in Mercedes and Daet earned their living by catching marketable-sized sugpo in the swampland creeks by using multiple-pronged (salapang) spear and torches at night. In their operation, they noticed numerous juvenile sugpo and they used scoop nets to collect these fry.

During our survey, a river and several creeks were explored to gather sugpo fry, but unfortunately no sample of the fry was obtained in all places surveyed. The possible reason for this was that the tide was already receding when we reached Sabang, Daet.

2. Tiwi, Albay (established bangus fry ground)

During the survey a total of 714 pots filled with at least 2,000 fry of bangus per pot were stocked in the nipa shed. According to the concessionaire, the estimated fry collected in three to five days ranged about 1,428,000 to 2,000,000 gathered by 400 collectors. The fry ground is leased by the municipality of Tiwi for ₱15,000 for one year. Most of the buyers were fishpond operators from the Bicol provinces and Samar. The bangus fry stocked at the BFAR Cabid-an fishery station came from this area.

The prevailing market prices of bangus fry on March 5, 1969 was ₱12 per pot of 2,000 at Tiwi and ₱7 per pot of 2,000 bangus fry in Malabon, Rizal. Tiwi and the neigh-

boring towns of Naga, Mayong, and Malinao are known sources of bangus fry.

3. Sorsogon province:

The potential sugpo fry grounds are Matnog, Bulan, Juban, and Cabid-an, while Donsol, Castellana, and Pilar are already known and established sources of bangus and sugpo fry.

Matnog river is also the source of juvenile and marketable-sized sugpo. However, the town Mayor informed us that most local residents were not familiar with the appearance of sugpo fry.

The geographical location and layout of Bulan, Juban, Cabid-an, and Matnog river serve as sheltering areas for both bangus and sugpo fry. They are directly connected with the open sea at high tide. With favorable wave and wind direction, planktonic organisms are brought along the sheltered coast, rivers, tributaries, creeks, and swampland.

During the survey, trial collection of shrimp fry along the banks of the Matnog river yielded only *Mysis sp.* The areas covered was very limited, no bangus fry was found either. The tide was already receding hence no sugpo fry were collected.

Donsol, Pilar, and Castellana are neighboring towns and have almost common coastal areas. In the past years, sugpo fry were gathered here and brought to Malabon, Rizal, according to the informant. From 1966-69 they were shipping from 25,000 to 50,000 sugpo fry weekly by PAL plane from Legaspi to Malabon. There were around 300 gatherers from May to August each year. The venture did not prosper because of some misunderstanding between partners. Municipal officials would not cooperate in stopping the rampant dynamiting in the coastal areas. Other information on the yearly concession, local price, and other data could not be furnished by the informant who became evasive.

4. Quezon province:

a. Aloneros, Guinayangan:

The rivers, creeks, and tributaries are sources of sugpo fry in commercial quantities. The permittee was

able to sell 140,000 sugpo fry for the months of April to May, 1969.

His general observation about the place was that the supply of sugpo has consistently decreased compared to the sugpo fry available 10 to 15 years ago. Our interviewee believes that the cause of the decrease in sugpo fry supply was the continuous operation of trawlers which have come closer to the possible breeding places of the sugpo. The volume of fry catch has decreased during the past years. Sugpo fry, however, are still available throughout the year. The peak periods vary according to the available high tides, favorable weather conditions and prevailing easterly winds.

The concessionaire had only 35 regular gatherers and sold his fry to fishpond operators of Ragay Gulf and Quezon province. However, his problems was that there were not enough buyers to keep his gatherers working regularly. Gatherers only work when there are orders to fill. About 50,000 sugpo fry could be collected in three days.

b. Calauag:

The price of sugpo fry both in Aloneros and Calauag was about the same, ranging from ₱27 to ₱30 per 1,000 sugpo fry. There were 45 regular gatherers in this area and each could gather as much as 1,300 sugpo fry in one day during the peak season lasting from February to April with the prevailing easterly winds. Buyers were mostly fishpond operators of Quezon and Ragay Gulf.

We were informed that from October to April of each year sugpo fry collected were in the fry stages and from May to September, the predominant catch were in the post-fry states. The total catch from September 1968 to May 1969 reached 409,678 sugpo fry.

c. Potential fry grounds in Quezon:

Macalelon, General Luna, and Unisan are potential sources of both bangus and sugpo fry in this province. However, people in these areas are not aware of the commercial value of the resource. It is also possible that the volume of the fry available is small and this maybe

the limiting factor why the industry has not been explored. According to some informants dynamiting has been rampant in the area because municipal officials were indifferent to the problem.

Fishpond operators in Macalelon still buy their bangus fry for stocking from Malabon, Rizal. Occasionally during the peak fry season from February to April, bangus fry enter the ponds through the main gates.

1. *Catanauan:*

During the survey catching of bangus fry was suspended by the concessionaire because of the low prevailing price in Malabon, Rizal. The concessionaire was not available for interview. Instead other informants provided the above data. While we were in the area, 30 pots were delivered but the price offered was too cheap and allowed only a very small profit margin, almost making the venture a losing proposition.

2. *Dalahican:*

Bangus fry gatherers here were in a pitiful state. During the survey the catch ranged only from 50 to 100 bangus fry per gatherer each day. Ten to 15 gatherers collected a total of 1,000 bangus fry the result of several hauls each day. The gatherers also pointed out the gradual decrease in the volume of fry collected each passing year in their area. Sometime in 1957, each gatherer could easily catch about 1,000,000 fry in one season. Ten years after, from 1967-68, they could hardly get 1,000 bangus fry a day with 10 to 15 gatherers working. As a result, the local fishpond operators bought their bangus fry supply from Malabon, Rizal, believing that fry won't be available if they depended on the Dalahican fry gatherers. They began to catch fry only during the first week of May, 1969.

3. *Infanta:*

We interviewed the Mayor because of the absence of the local concessionaire and inavailability of the other data needed. Municipal permit was ₱200 a year for catching bangus fry at the boundary of Dalahican and Sta. Monica.

4. *Gisgis, Sariaya:*

At the time of the survey, pots filled with bangus fry were stocked (estimated at 54,000) under the house of the fry dealer.

C. MARINE FISHERIES OF QUEZON AND BICOL PROVINCES:

The marine fishes supplied to the local market and even Manila markets came from Lamon Bay, San Miguel, Lagunoy Gulf, Ticao Pass, Burias Pass, Ragay Gulf, Cabugao, Maqueda Channel, Sorsogon, and Albay Gulf. These bodies of water are rich in fishery resources which, when properly exploited, will not only supply the fish requirements of the nearby hinterland provinces, but also partly meet the fish demand of the entire country.

1. *Fishing Methods:*

Blast fishing and the use of obnoxious substances to capture fish is still rampant in several municipalities of Quezon.

The commercial fishing methods found in the area are *basnig*, with a capital requirement of ₱20,000 to ₱30,000; *kabyaw* (round haul seine) ₱20,000; *kalansisi* (encircling net) ₱10,000 and trawls.

On the sustenance level, fishing gears used are hand-line (*kawil*), troll line (*sibid-sibid*), crab lift net (*bintol*) fish pot, (*bobo, sa-sir*), fish corral (*bonoan, baklad, sagid*) sinamay drag seine or beach seine (*sarap*), encircling net (*kalansisi*), stop seine (*kubkub*) fish shelter and skimming net (*sapiaw sabuya*), drive-in net (*sapyaw*), filter net (*bayakus*), baby beam trawl (*bangkwer-na*) and baby trawl.

The number of sustenance fishing gears used by fishermen in the Bicol provinces is shown next page.

2. *Fishing Season:*

The whole coastal and inland region of Quezon and Bicol provinces is governed by two major monsoons: the Northeast (*amihan*) and Southeast (*habagat*) winds. Other wind directions occur during the shifting of the

Number of sustenance fishing gears used in the Bicol provinces.

Classification of fisheries	Province	No. of fishing towns		No. of fishing men		No. of fishing families		No. of boats		Total number of boats
		fishing towns	fishing men	fishing families	with motor	boats	w/out motor			
Sustenance	Catanduanes	10	5,186	5,119	2,222	781	3,003			
Sustenance	Sorsogon	15	12,720	5,953	2,054	320	2,374			
Sustenance	Camarines N	8	12,500	-----	-----	-----	-----			2,490
Sustenance	Camarines S	8	5,860	-----	-----	-----	-----			80

Sources: Fisheries Statistics of the Bureau of Fisheries and Aquatic Resources

monsoon. Due to these prevailing monsoons, fishing is carried out the whole year round. At the onset of *amihan*, fishing is done at the Western side and at the time of *habagat*, fishing activity is very heavy at the Pacific side or the leeward side.

The monsoon causes vital changes in the marine environment due to the turbulence created by wind action and current and to the rains that bring with it nutrients which generate plankton bloom which in turn attract the *Decapterus*, *Rastrelliger*, and directly or indirectly tuna and tuna-like fishes. Fishing season varies in different places by species of fish caught. The following tables show the fishing seasons in the fishing grounds of Quezon and Bicol Provinces, the fishing gears used, and the different species caught:

3. Marketing and Distribution:

The fish that are landed by fishermen are brought to the markets by passenger buses, jeepneys and trains. The fish reach the consumers through the retailers or middlemen. Surplus fresh fish are also brought to Manila markets. Ice is used to preserve freshness of the fish if they are to be brought to the interior or to Manila. The producers dispose their catch by auction sale — that is, the highest bidder gets the bulk of the catch.

During the height of the fishing season when the supply is greater than the local demand, surplus fish are processed into finished products such as smoked fish, salted and dried fish, and *patis*. There are more fish processors in Camarines Norte than in any of the provinces surveyed.

4. Interview with the "alamang" and trawl operators in Paracale and Naga City:

a. Season:

The season for *alamang* starts from November to April, with the peak season in January to February. The fishing ground for this species can be found from the shoreline of Paracale and vicinities up to midway of Calaguas Island with an estimated sounding of up to 20 fathoms deep. Information

Fishing seasons in Quezon and the Bicol provinces, fishing gears used, and the different species caught.

Fishing Ground	Kind of Fishery	Fishing Season	Fishing Gear Used
Lamon Bay	Decapterus, mackerels, squids, anchovy, tuna and tuna-like fishes	Mar-Oct.	Basnig, fish corral, hand-line, troll lines, gill net
San Miguel Bay	Anchovy, Decapterus, croakers, goatfishes, shrimps, slipmouths	June-Oct. Jan-Dec. Oct-Feb. June-Dec.	Otter trawl, basnig, gill net, fish corral, hand-lines, troll lines
Lagonoy Gulf	Anchovy, siganid fry, Decapterus, mackerel, sardines, and herrings, spiny lobster, tuna and tuna-like fishes	Mar-Apr. Feb-Oct. May-Oct.	Beach seine, handline, basnig, spear gun, gill net
Ticao Pass and Burias Pass	Serum-serum, anchovy, hairtails, bonitos, mackerels, roundscads	Jan-Mar. Jan-June Nov-May	Basnig, hand-line round hall seine, gill net, dip net and troll lines

(Continuation)

Sorsogon Bay and Bulan Bay	Mackerels, sardines, and herrings, squids, slipmouths, shrimps, crabs, anchovies and mulletts	May-Oct. Sept-May June-May Dec-May	Drive-in-net, round haul seine, gill net, baby trawl, beach seine, fish corral crab lift net
Ragay Gulf	Anchovy, Croakers, lizardfish, shrimps, sapsap, Mackerel, tuna and tuna-like species	Dec-May Jan-Dec. Jan-May	Trawl, basnig, handline, fish corral, beach seine
Albay Gulf	Anchovy, Decapterus, Goatfish, mackerels, spiny lobsters, and siganid fry	Feb-Oct. Mar-Apr. May-Oct.	Gill net, baby trawl, spear gun, basnig, fish corral, hook and lines, beach seines, and kukkub
Cabugao Bay and Maqueda Channel	Garfish, slipmouths, flying fish, dorado, Nemipterid and Siganid fry	Feb-Oct. Mar-Oct. July-Oct. May	beach seine, basnig, gill net, troll lines, handline, and fish corral

gathered from the fishermen, especially from old folks in the area shows that when the shoreline water is a little bit turbid after a downpour, the "alamang" begins to appear near the coastal areas and the season for this species (alamang) begins.

b. Fishing gear and methods:

Before the introduction of the motorized bancas, sailboats were used by fishermen to catch *alamang*. Now, that gasoline and diesel engines are being used, fishermen are able to reach farther grounds and expand their fishing area. Fishermen now are able to spend more time in fishing and could reach the markets in a shorter time. The fishing methods employed is locally known as "*bangkwerna*" (baby beam trawl). This is a conical-shaped bag net made of *sinamay* dragged at or near the bottom of the sea using an opening device of wood which is cylindrical in shape. This wooden beam is about two fathoms in length. The riggings of the gear is composed of a towing line, 85 to 120 fathoms long, a wooden brail, 48 inches long attached to the tip wing with a six-kilogram weight at the bottom end. The net proper is four fathoms on the headrope and from mouth to the end is five fathoms long.

The net proper is being dragged at or near the sea bottom at intervals of 30 minutes for every hauling period. The major catch is *alamang* but occasionally, shrimps compose the catch. According to local fishermen, the average catch of *alamang* per *bangkwerna* in 1964 was 12 cans (5 gallons/can). However, as of April, 1969, average catch had gone down to only six cans. Fishermen also pointed out that since 1964 up to 1969, the catch per *bangkwerna* has dropped year after year, allegedly because of the presence of big otter trawlers which have destroyed the *alamang* fishery. It was observed that the abundance of *alamang* in 1964 coincided with the great amount of rainfall in that part of Bicol (see rainfall chart of Daet, Camarines Norte).

The market price per can in 1964 was P5.00. In 1969, a 5-gallon can of *alamang* could be sold at P12 per can. The fresh *alamang* not consumed in the local markets are salted and fermented as *bagoong* and shipped to Manila, Northern

Luzon, and other parts of the country. Some of the *alamang* are also prepared into paste. A can of fresh *alamang* can produce four kilos of *alamang* paste.

c. Capitalization of a complete set of *bangkwerna*

A complete set of *bangkwerna* with a Clinton or Briggs engine costs ₱1,200 while that with a Peter diesel engine requires ₱3,150 as capital. An ordinary net for *alamang* costs ₱50 and lasts up to one and one-half months if used continuously. Approximately five nets can be utilized by an ordinary *bangkwerna* outfit for the duration of the *alamang* season.

d. Views of the *alamang* fishermen on trawlers

Alamang fishermen believe that the big trawls are responsible for the scarcity of *alamang* in Paracale and vicinities based on the following reasons:

- 1) the plowing action of the trawl destroys the eggs and habitat of the *alamang* at the sea bottom;
- 2) the trawlers' nets while towed at the bottom kill the swimming *alamang*; and
- 3) trawlers operate their gears in places where *alamang* nets were being operated annoying *alamang* fishermen when the trawl nets get engaged with the *alamang* nets.

e. Views of the trawl operators

Trawler operators however denied that their operation was detrimental to the *alamang* catching-trade for the following reasons:

- 1) that trawls have not been in operation in that area for the past 16 years since 1963, and if this gear were really responsible for the scarcity of *alamang*, considering the length of time the trawls were supposed to be in operation, by this time there would be no more *alamang*.
- 2) that there were only six trawlers operating in the area.

- 3) that the mesh size of their nets ranged from 1½ inches in the bag and four inches in the wing portion of the gear hence *alamang* could easily escape from the net.
- 4) that the weights used by trawlers consisted of ⅛ chains and the remaining ⅔ were stones of assorted sizes.
- 5) that the trawlers were catching demersal fishes like galonggong (*Decapterus*), hasa-hasa (*Rastrilleger*) and other species near the sea bottom which feed on *alamang*.

D. OTHER ACTIVITIES UNDERTAKEN DURING THE SURVEY:

1. Technical assistance in reactivation of fishpond project:

The Mayor of Calauag requested us for assistance in the re-establishment of the SEA-Fisheries Development Project. He was advised to verify first whether there were previous applicants for the same area. When the status of the proposed project became clear as a pending national project, we assured him that its reactivation could be worked out.

2. Technical assistance in fish capture:

Technical advice on the rigging of trawl was extended to the Mayor of Capalonga who was venturing for the first time in this type of fishing. Gill net and basnig operators in the different places surveyed especially those using synthetic or man-made fibers were advised, that as much as possible, their nets should not be dried in direct sunlight. The synthetic fibers should not be treated with tan barks because tanning affects the strength of the twine.

SUMMARY AND RECOMMENDATIONS

A. BICOL AREA:

The consensus of our survey showed potential sugpo fry grounds are not being developed because of the lack of information on the significance and importance of the sugpo fry industry to the lives of the residents

and the economy of the area. In many areas, juvenile forms and marketable sizes of shrimps are being caught in rivers, creeks and tributaries of the swamp areas, and along the coast together with the other commercial shrimps and sold in the markets.

Where the sugpo fry are available as in the case of Donsol and its neighboring towns, its further development is hampered by the indifference of local municipal officials in controlling, if not totally minimizing, the use of explosives and other means of illegal fishing. This lack of interest in developing the sugpo and bangus fry industry accounts for the supply shortage of bangus and sugpo fry.

Highly effective fishing gear like the trawls has also contributed to the scarcity of the sugpo fry in both the already established as well as in the potential fry grounds.

B. QUEZON PROVINCE:

Well-established sources of sugpo fry in this area are Aloneros and Calauag. Supply is continuous throughout the year in limited quantities. During the peak season the quantity being collected and sold is determined by the number being ordered by the buyers. Gathering is only intensified when there are contracts to meet.

Other factors which may have induced buyers from shying away from these places are the transportation problems, risks involved in maintaining survival of the stock, number contained in each bag, and the range of prices prevailing in the locality. It takes about five to seven hours to negotiate the distance to Manila. Transporting sugpo fry requires experience and skill in caring for the stock. A minimum quantity must be gathered, collected and purchased to justify the prohibitive transportation cost and leave a margin of profit.

Fluctuation of supply and demand is also one major reason why the sugpo fry industry has not prospered

or has remained unexploited and the potential areas has also remained untapped.

Limited accessible feeder road facilities is also one of the limiting factors retarding the growth of the sugpo fry industry. Aloneros is accessible only through trains which stop at the local station twice a day. It has no road connection to the next town. Motorboat trips are also irregular between Quinayangan and Aloneros.

"Push net" made of synthetic screen fiber is used in collecting sugpo fry in Aloneros and Calauag.

C. ESTABLISHED BANGUS FRY GROUNDS:

1. Bicol provinces:

Tiwi, Naga, Matnog and Malinao towns along the coast are well-established sources of bangus fry. Records gathered from the area in May, 1969, showed two billion bangus fry caught.

2. Quezon:

Recorded bangus fry gathered during the survey is shown below:

May 21, 1969	—	Catanauan	—	30 pots
May 27, 1969	—	Dalahican	—	5 pots
May 27, 1969	—	Sariaya	—	27 pots

3. Infanta:

No record available.

4. Real:

No record available.

D. SUGPO FRY INDUSTRY:

1. An intensive information campaign on the potentials of sugpo fry as an industry in Bicol and Quezon provinces is needed. Local residents near the fry grounds must be informed about the species, volume, and income-generating potentials of the resources, to augment their livelihood.

2. Fisheries personnel should be well acquainted with the fry of sugpo and conversant with the various collection methods so they can provide intelligent information on the resource when people come to inquire. Some specimens should be preserved for identification and evaluation of the species of shrimps available in their areas.
3. Fisheries personnel should establish communication lines with the local fry dealers to help fishpond operators and fry buyers locate available supply easily.
4. Studies on the various aspects of the storage and transporting of sugpo fry should be conducted to evaluate an ideal media by which minimum mortality can be attained.

The following aspect should be considered and given priority:

- a. Delivery — to reduce fry mortality to a minimum,
 - (1) temperature
 - (2) salinity
 - (3) allowable fouling or pollution level
 - (4) Ideal size of fry for stocking and quantity
 - (5) Strength of container and its size.
 - (6) Amount of water
 - (7) Oxygen pressure
 - (8) Frequency of water freshening needed.
 - (9) Length of storage and transporting time.
5. Actual collection in each of the potential fry grounds should be conducted to coincide with the fry season, high tides and favorable weather conditions, and gather information on the local grounds.
6. Collection of shrimp breeders should be started and a composite study on the biology and culture of the commercially potential shrimps should be initiated.

E. COMMON FISHING GEAR USED BY SUSTENANCE FISHERMEN:

The most popular fishing method all over Quezon and the Bicol provinces is the hook and line fishing.

Hook and line is of course the most practical method for catching bait-biting fishes because of the negligible capital needed. There are only a few seine nets used for commercial-scale fishing and this indicate that local fishermen are financially handicapped and cannot afford to invest in bigger fishing ventures and effective seine nets.

The presence of tuna-like fishes and other big species of fish, especially in Lamon Bay, and adjacent waters, indicates a large population of these fishes. To exploit this resource to the maximum, more effective fishing gear such as long lines or gill nets should be used because handlining alone is not sufficient to catch all the tuna.

The rampant use of explosives and other illegal methods of catching fish in many parts of Quezon and Bicol provinces have seriously affected the fish stocks and the availability of bangus fry.

F. FISHING GEAR:

1. As a pilot project, it is strongly recommended that one unit of gill net (100 m x 100 m deep, 6 inches mesh stretched) be sent to Mercedes, Camarines Norte, to be used in gill netting experiments to catch tuna and other big species of fish. Paracale is a priority area where this gill net can be tried first. This gill net should be reconstructed into 15 to 20 smaller units so that smaller bancas can be used for their operation.
2. Information should be provided to the fishermen by this Office on the proper care and maintenance of synthetic fiber nets.
 - a. Kuralon nets (man-made fiber) should not be treated with any tanning material because the tensile strength is greatly affected.
 - b. Synthetic fibers must never be dried in direct sunlight. It is preferable to dry the nets in the shade.
3. This Office should run experiments on the feasibility of undertaking tuna longline fishing operations in Lamon Bay on a commercial scale.

4. It is also recommended that a motorized trawl for catching bangus fry similar to the Iloilo-Panay fry bulldozer be tried to cover a wider area of collection.

G. ALAMANG FISHERY OF PARACALE:

Based on our findings there is no biological basis for the allegation of the *bangkwerna* operators that the other trawlers are destroying the *alamang* fishery of Paracale. It is therefore recommended that a thorough biological study be undertaken on the biology of *alamang* in Paracale. It is also suggested that *alamang* operators should always bring with them any of its secondary fishing gears like multiple troll lines, gill nets, small-scale long line, etc, so that when the *alamang* is no longer in season, they can still continue fishing as long as the weather permits.

As of January 13, 1970, Lope de Mesa, Fishery Agent assigned in Paracale reported that the biggest problem of the *bangkwerna* operators is where to sell their big volume of *alamang* production now. He confirmed to us that after a series of downpours in that area, *alamang*, suddenly appeared in big quantities.

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