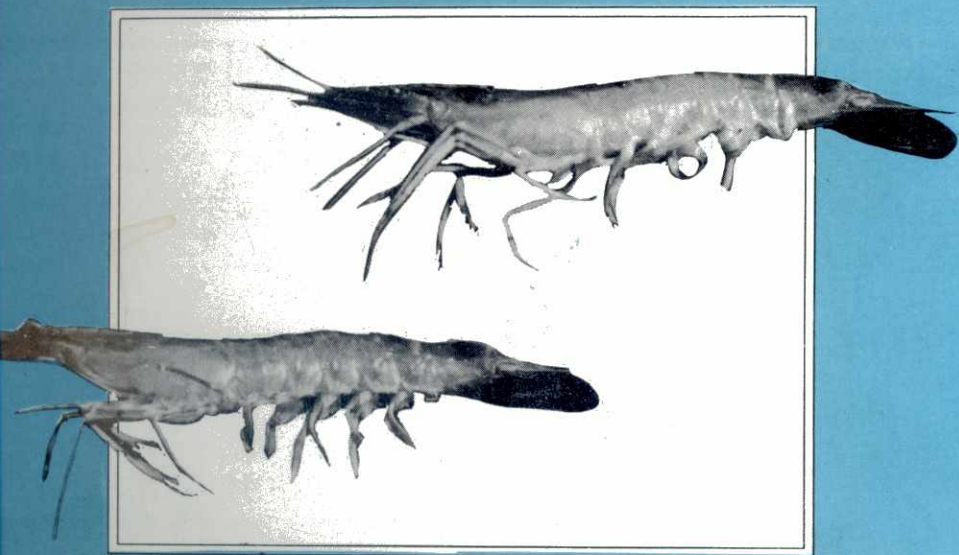


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Trawl Fishery of Leyte Gulf

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ABSTRACT

A preliminary analysis of catch, effort and CPUE of the Leyte Gulf trawl fishery is presented, based on a five-year observation period, from 1984 - 1988. A decreasing trend of trawl landings is noted from 1987 to 1988. Families Carangidae and Scombridae dominated the catch, with *Decapterus macrosoma* and *Rastrelliger brachysoma* as the most dominant species. The Leyte Gulf trawl fishery is highly seasonal with major peak months in March-May and July-August and a minor peak in December-January.

Keywords: trawl fishery, Leyte Gulf, catch effort, CPUE

INTRODUCTION

Recognizing the need to access and manage our fishery resources, the Bureau of Fisheries and Aquatic Resources developed the Regional Resources Assessment Program with the assistance of the Philippine Council for Agriculture Resources Research and Development (PCARRD now PCAMRD) sometime in 1982. The program was implemented in cooperation with the 12 BFAR Regional offices. From 1983 to 1988, the program accumulated voluminous data on catch and effort and catch composition. For Region VIII, Leyte Gulf was the study area and the data collected was on the trawl gear.

Leyte Gulf is located on the central eastern side of the Philippine Islands facing the Pacific Ocean (Fig.1). It has an exposed easterly coast, which makes

fishing activities favorable only for six months of the year (May to October) during the southeast monsoon season (Philippine Coast Pilot, Part I, 4th ed., 1953). In the inset bay (San Pedro Bay), coastal fishing goes on all-year round except during typhoons and other unfavorable weather conditions.

Leyte Gulf covers an area of approximately 1,110 square miles including San Pedro Bay, with an average depth of 38 fathoms in the central gulf and 8 fathoms in the bay. Commercial trawlers are the main gear used in the Gulf, operated at a depth range of 34 to 38 fathoms. The bottom is generally muddy with indications of coral growth on the 15-fathom contour along the northwest coast (Warfel and Manacop, 1949). Surveys undertaken around Leyte Gulf in 1949 identified the species of fish in the area and the places where trawlers could be operated.

The gulf has an average production of 45,384 mt, of which 97% comes from municipal fisheries (1983-1987 BFAR Statistics). The commercial production is contributed by the trawl gear.

The registered trawlers in Tacloban City during the study period consisted of 36 fishing vessels ranging from 6 to 58 gross tons ($x = 17.4$ G.T.). Out of these 36, only 5-10 were regularly fishing around Leyte Gulf. Others were fishing in Masbate and Mindoro and their catches were landed in these areas. These boats were using diesel engines ranging from 56 to 500 hp ($x = 245$ hp) with an average crew of 10. These vessels spend an average of two days per fishing operation with an average of 10 fishing hours at fishing depths ranging from 34-38 fathoms ($x = 35.7$).

METHODOLOGY

Trawl landings at the Tacloban City fish landing center were monitored for at least 10 times a month. The total weight of the landed catch was recorded by counting the number of boxes of fish multiplied by a constant factor of 40 to account for the total catch in kilograms. This constant factor was determined by weighing several boxes to get the average weight of one box. The species composition of the landed catch was recorded by getting several samples of boxes to account for the numerical weight and percentage composition. In the case of sampled boxes with mixed species, subsamples were taken, sorted and weighed in order to get the percentage composition from where the total weight composition by kind of the mixed species may be calculated.

Interviews with the crew of the boats were done to get information on the location of fishing operation, number of hours spent in fishing, number of hauls made and number of days at sea.

After recording of the catch composition was made and the interviews conducted, length and weight measurements of major species were done. At least 25 samples of each of the major species were taken at random and were measured for total length and weight.

Observed daily catches were raised to estimate the total boat landings and the monthly total catches were calculated by raising the sampled catchweight.

Total catch for the day was raised using the formula:

$$\text{TOTAL CATCH} = \frac{\text{catch of sampled boats} \times \text{R.F.}}{\text{sampled boats}} \quad \text{--- Equation (1)}$$

where R.F. = total landed boats
(raising factor)

Monthly total catch landed by trawlers was calculated by:

$$\text{T.C. for the Month} = \frac{\text{catch of sampling day} \times \text{R.F.}}{\text{sampling days}} \quad \text{--- Equation (2)}$$

where R.F. = total days in a month

The estimated annual catch was calculated using:

$$\text{T.C. for the Year} = \frac{\text{catch of all sampled months} \times \text{R.F.}}{\text{sampled months}} \quad \text{--- Equation (3)}$$

where R.F. = total months in a year

Catch, effort and species composition by family were summarized in a monthly and yearly basis (Appendices A-E)

RESULTS AND DISCUSSION

Catch, effort and CPUE

Based on the five-year observation from 1984 to 1988 records showed that trawlers around Leyte Gulf that landed in the Tacloban City fish landing center were about 2-3 units per day or about 50-80 mean monthly landings (see Appendix G).

The total landed catch of commercial trawlers operating around Leyte Gulf during 1984-1988 fluctuated from 1,651 mt in 1984 to 1,454 mt in 1985 (Fig. 2). This markedly increased to 2,558 mt in 1986 but gradually decreased to 1,950 mt in 1987 and 1,224 mt in 1988. The total estimated effort in 1984 of 817 trawl unit landings dropped to 249 in 1985, then increased to 701 in 1986; 674 in 1987; and 450 in 1988.

The trend of catch, effort and catch per unit effort from 1984 to 1988 showed that with an increased number of trawl boat landings in 1984, the corresponding catch per unit effort was 2 mt, which became higher with lesser effort (Fig. 3). The fluctuating trend also showed that irrespective of effort, more or less the same amount of catch was made, an indication of a fully exploited status. The reference (commercial) production of 1,428 mt in 1975 was just about the same after 10 years.

Yield curve

Fitting the above catch and effort data to a yield model (Schaefer), MSY was attained in 1987 with about 2,100 mt at an optimum effort of 670 trawl unit landings (Fig. 4). With a record of 817 trawl landings in 1984, this means that fishing has been more efficient in the previous years.

Catch composition

Throughout the five-year period, pelagic fishes ($x = 84\%$) were abundant compared to the demersal species ($x = 16\%$). This fact may be due to the improved design of trawl, i.e., with high opening, which catches the roundscads and mackerels in greater quantities (Caces-Borja, 1972). This result is similar to the Manila Bay fisheries where pelagic fishes such as anchovy, sardines, mackerel and roundscad made up the major catch of the trawl (Munoz, 1988), not only because of the modified design but also due to the overfished state of the resources in Manila Bay. Overfished areas showed the same results, i.e., more pelagic fishes are caught by the demersal gear.

Others believe that pelagic species are caught by the trawl gear possibly because larger roundscads change from a pelagic to a demersal habitat (Jabat and Dalzell, 1988). Tiews (1962), noted that roundscads caught by trawlers were feeding on zoobenthos, indicating that they had been at the bottom for sometime.

In general, the catch was composed of 99% fishes and 1% invertebrates (App. A-F). About fifteen (15) families and forty-one (41) species of fish comprised the catch of Leyte Gulf trawlers from 1984-1988 (Fig. 5). Families Carangidae (30 - 53%) and Scombridae (21 - 30%) dominated the whole catch throughout the five-year period.

The carangids, with a catch percentage of 48% in 1984 and 53% in 1985 showed a decreasing catch trend in 1986 - 1988. The scombrids showed an increasing trend during these years. The Clupeoids showed a decreasing catch trend from 12% in 1984 to less than 1% in 1988 (Fig. 6a).

Decapterus macrosoma ($x = 29.57\%$) topped the list of the most dominant species, followed by *Rastrelliger brachysoma* ($x = 15.77\%$) and *Rastrelliger kanagurta* ($x = 6.98\%$) (Fig. 6b).

The decreasing catch trend of *D. macrosoma* from 1986 to 1988 was replaced by the appearance of other Carangid species, *Atule mate* and *Selar crumenophthalmus*; while the appearance of several Scombrid species, namely, *Rastrelliger kanagurta* and *Rastrelliger faughni* has a corresponding decreasing catch trend of *Rastrelliger brachysoma*. Species replacement in the tropics is a common observation in a fully exploited fishing ground, even when the overall catch would not appear to be so declined yet.

SEASONALITY

The monthly mean catch per unit effort (CPUE in kg/boat and in kg/hr) for the five-year observation period (1984-88) shows the highly seasonal nature of the trawl fisheries in Leyte Gulf as well as the major resources (Fig. 7).

Two major fishing seasons are shown, one occurring during the months of March-May and the other in July-August, and a lower peak in December-January.

The seasonality of the different species caught in Leyte Gulf are shown in Figures 8a-8k.

D. macrosoma, which tops the list of the most dominant species (Table 1) in Leyte Gulf during the five-year observation, shows high production peaks in most months except in November, when the CPUE is at its lowest.

R. brachysoma shows an irregular pattern of seasonality with higher CPUE in July and the smaller peaks appearing in September, February and April. The other species of mackerel *R. kanagurta* shows two peaks, one in September to October and a secondary peak appearing in January. It can be noted that the two species have different months of abundance.

Another species of mackerel, *R. faughni* has a comparatively lower CPUE throughout the year except in December when they occur more.

For the carangids, *S. crumenophthalmus* shows higher CPUE in January and April with a steady decline of CPUE beginning May.

Atule mate shows peak production from April to May and September and December, and lowest in January.

The sardines, represented by *S. fimbriata*, show more in January, May and October, and lowest in February and August.

As to demersal species, the catch rate of *N. japonicus* is high from August to September and from December to March, with lowest CPUE in November and June; *Leiognathus fasciatus* is abundant in May and *Upeneus sulphureus* in April and July.

The annual variation of the CPUE for the Leyte Gulf trawl fishery and that of the major fish catch shows a general declining trend, although there was an up and down fluctuation from year to year (Table 1). This pattern is consistent with the findings of Dalzell and Ganaden (1987) that the Philippine small pelagic fish landings were declining and assumed to be heavily exploited.

In general, the Leyte Gulf trawl fishery is highly seasonal with the major catch showing different peak seasons.

CONCLUSION AND RECOMMENDATIONS

As shown in the yield curve for 1984 - 1988 (Fig. 4), the optimum effort for Leyte Gulf is 670 unit landings and this was attained in 1987. More efforts were made in 1984 and 1985 but they gave a lower catch. This decline of catch after a maximum has been reached is a normal occurrence and forms the basis of the inference that Leyte Gulf is fully exploited. It, thus, needs a policy of moratorium on additional exploitation, as to reduce exploitation to the optimum level would be unacceptable and impossible once the units have been acquired and in operation.

Studies in the past in fully/overexploited areas have recommended a reduction of exploitation but never has it been seriously considered; hence,

strategy disallowing new fishing boats in the Gulf may be more logical and implementable.

The dominance of the pelagic fishes over the demersal group proved the effectiveness of the trawl gear with high opening. It could also be that the demersals were already heavily exploited at the time of the study.

Leyte Gulf trawl fishery is highly seasonal in nature, with peak months occurring in March-April and July-August. Trawl operations should, therefore, be concentrated during these months to obtain higher catch per effort.

The roundscad (*D. macrosoma*) and mackerel (*R. brachysoma*), which composed the main bulk of the Leyte Gulf trawl catches, showed signs of heavy exploitation with the steady decline of catch rates in 1987 and 1988. These results agree with the conclusion of Dalzell and Ganaden (1987) that the Philippine small pelagics are already overfished.

In summary, the preliminary results of this assessment in Leyte Gulf answers the problem of the lack of information on the state of exploitation in a particular area. The decreasing yield shown by the trawl fishery of Leyte Gulf is an indication of a fully exploited state of the resources in which reducing effort is the only remedy to maintain a sustainable yield, or else retaining the present level of effort should be enforced if reduction of effort cannot be implemented.

Since it is a fact that less priority is given by the regional offices of Department of Agriculture to fish stock assessment activities, it is highly recommended that projects similar to this be given proper attention by the respective regions involved. They should organize a research unit and provide full-time personnel to conduct similar research projects. At present, many resource enhancement projects are being launched in all regions through the fishery sector program, which needs a data collection system in order to determine their effects on the resources. A continuous observation would be needed for the management of governmental programs such as the artificial reef program and the declaration of fish sanctuaries. As the fishing pattern changes, catch rates and size composition changes are expected. These can only be determined if the resource assessment activity is on-going.

Sampling/observation should not be limited to the trawl fishery but should also include data on municipal gears to obtain a more representative set of data for better analysis.

Together with resource assessment activity, it is also recommended that a socio-economic survey be conducted to assess economic earnings of the fishermen and the extent to which the resource benefits are shared among different operators and beneficiaries.

REFERENCES

- Caces, Borja, P. 1972. On the ability of otter trawls to catch pelagic fish in Manila Bay. Phil. Jour. Fish. Vol. 10 Nos. 1 & 2 pp. 39-56.
- Dalzell, P. and R. Ganaden. 1987. The overfishing of small pelagic fish stocks in the Philippines. Phil. Jour. Fish. Vol. 17 pp. 66-73.
- Jabat, M. and P. Dalzell. 1988. Preliminary stock assessment of the Danao ring net fishery in the Camotes Sea, Central Visayas, Philippines. BFAR Tech. Paper Ser. 11 (1) 34 pp.
- Munoz, J.C. 1990. Manila Bay: Status of its Fisheries and Management. EMECS '90, August 3-5 1990. Kobe, Japan.
- Tiews, K. 1962. Report to the Government of the Philippines on marine fishery resources. Phil. Jour. Fish. Vol. 6 No.2 pp. 107-208.

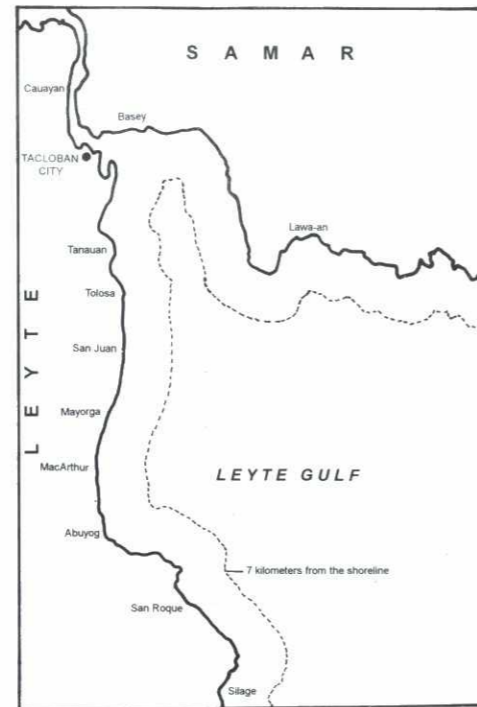


Figure 1. Map of Leyte Gulf

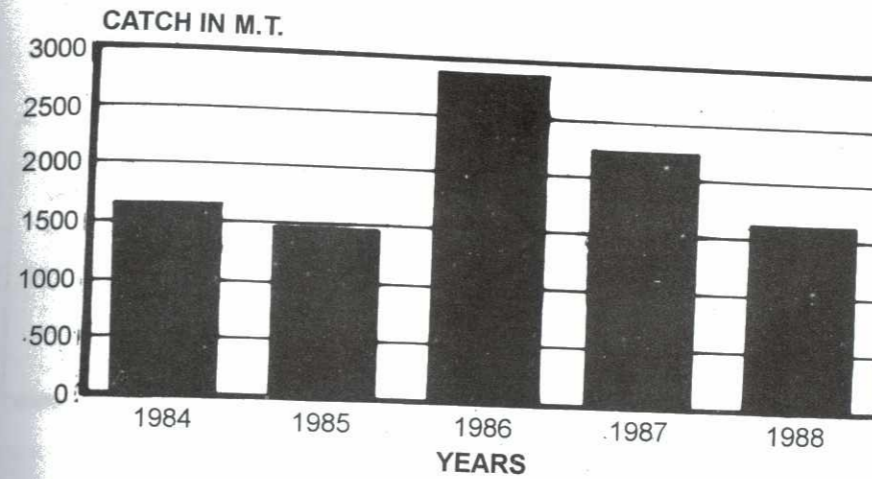


Figure 2. The annual landings of trawls from Leyte Gulf.

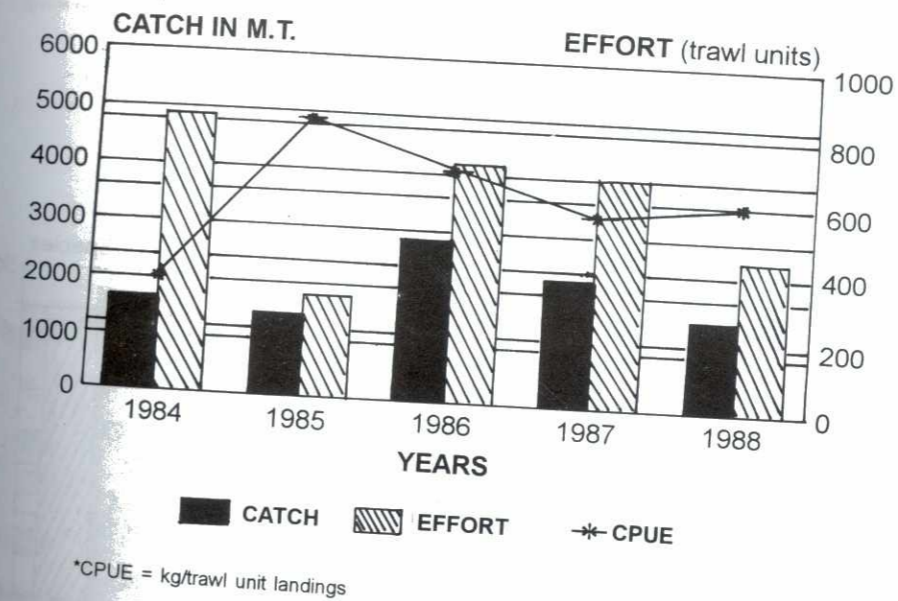


Figure 3. The annual fluctuations of catch, effort & CPUE in Leyte Gulf

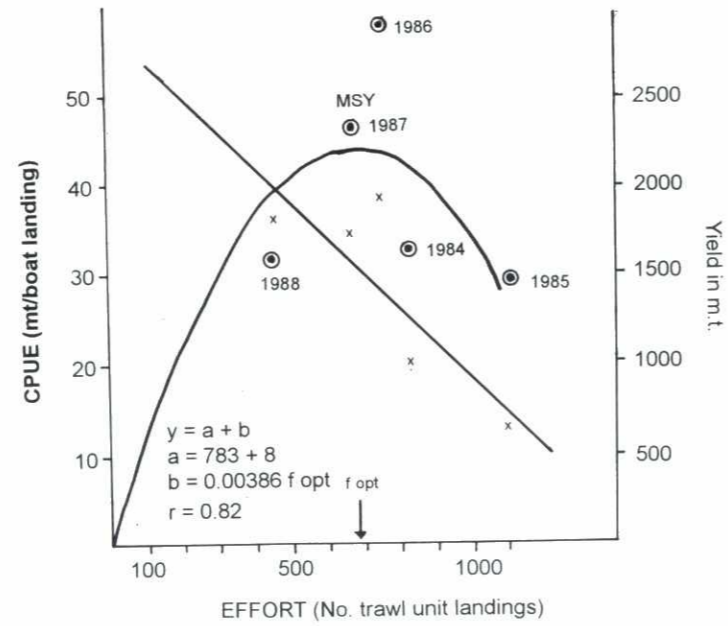


Figure 4. Yield curve of Leyte Gulf trawl fishery.

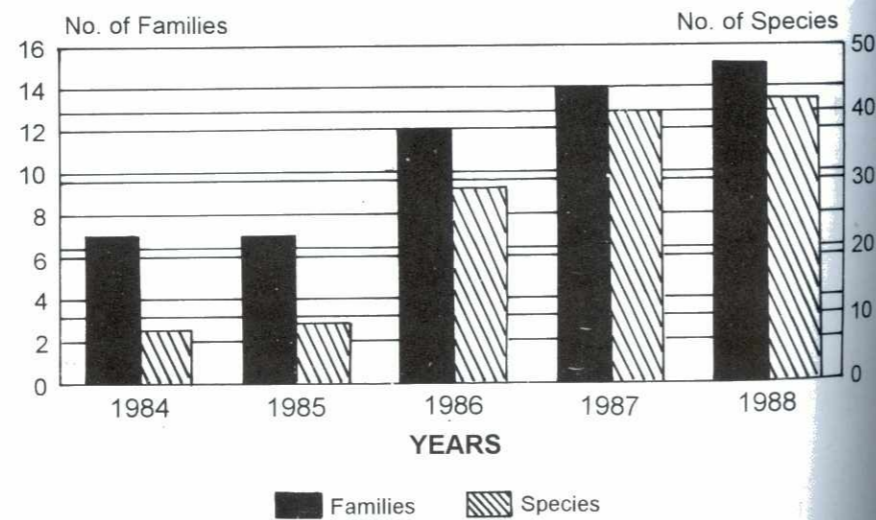


Figure 5. The number of fish families and species identified in Leyte Gulf, 1984-1988

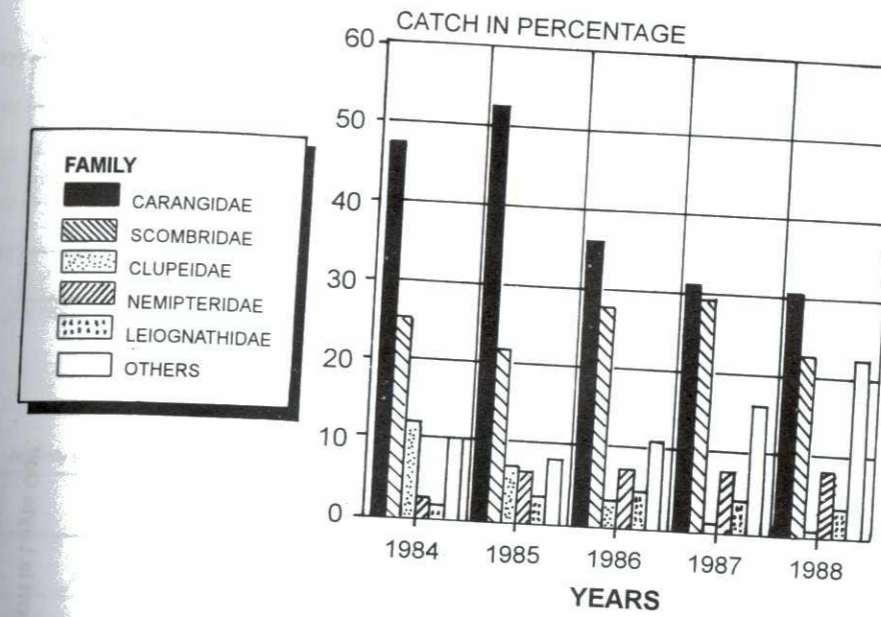


Figure 6a. Catch composition by Family of trawl fishery in Leyte Gulf (1984-1988)

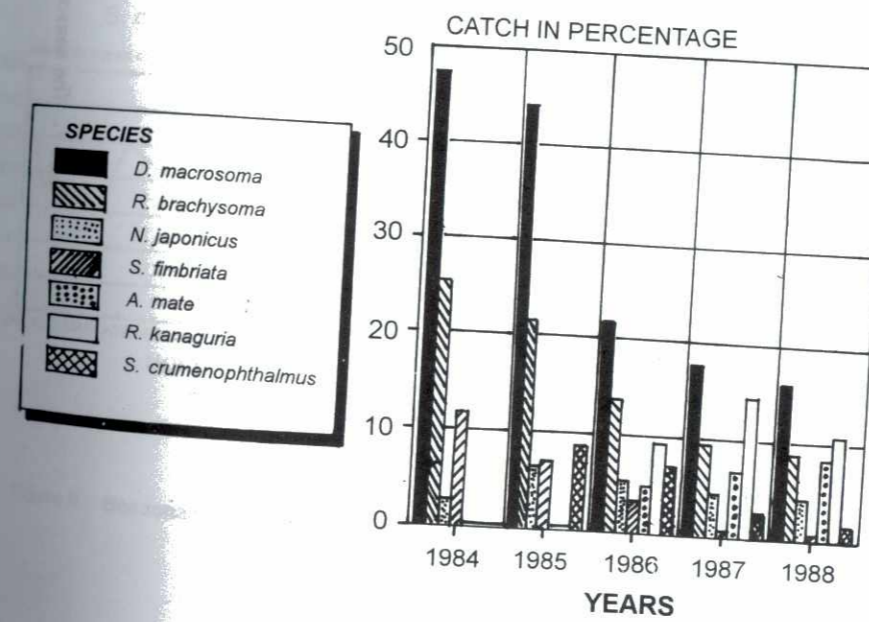


Figure 6b. Most dominant species caught by trawl in Leyte.

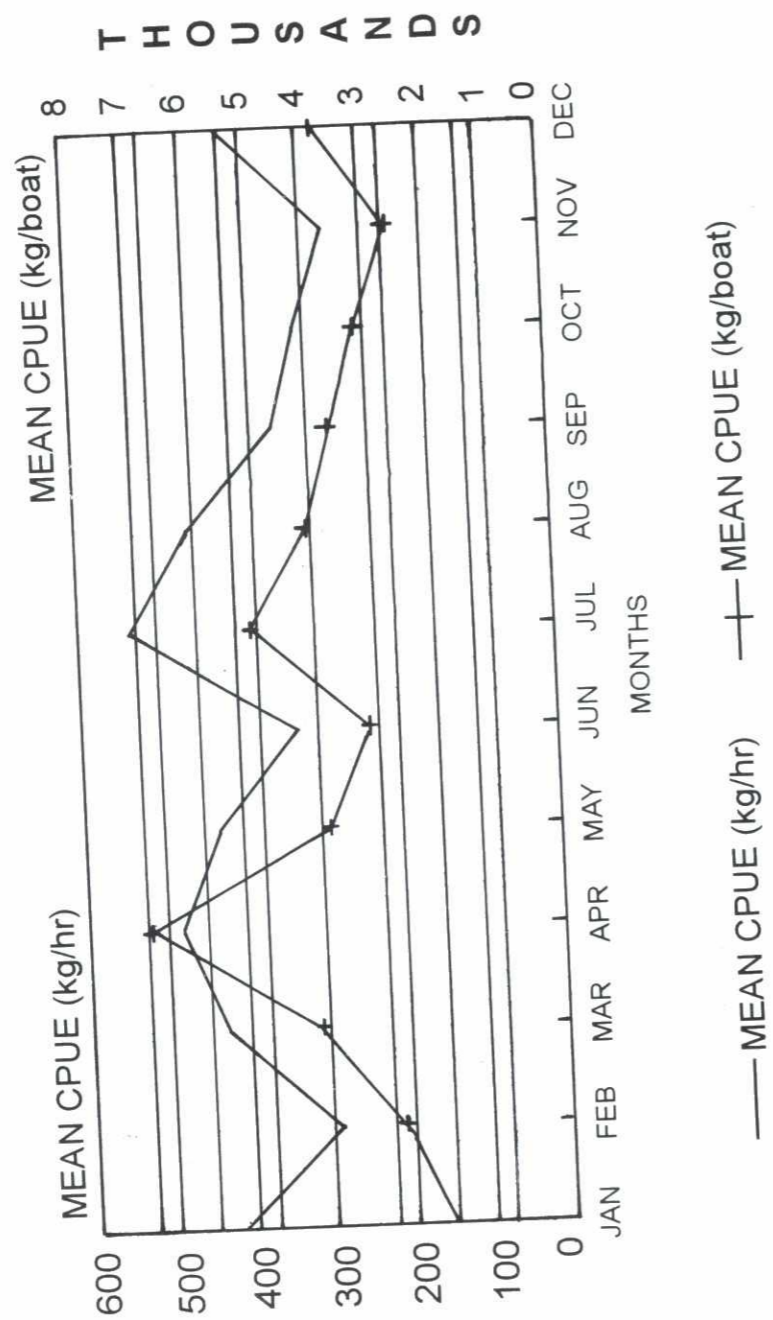


Figure 7. The seasonality of CPUE of trawl in Leyte Gulf.

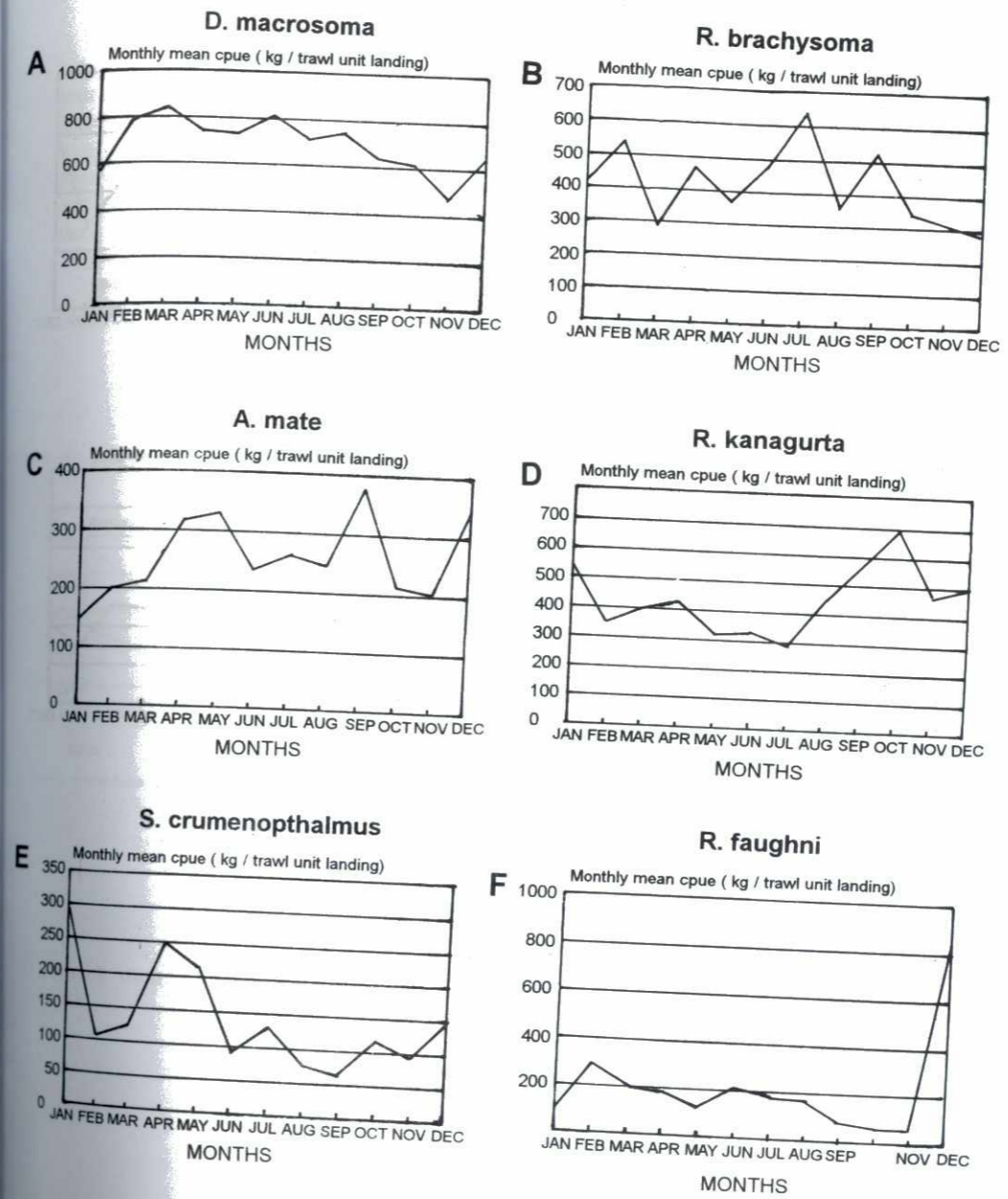


Figure 8. Seasonality of some important fish species in Leyte Gulf (1984-1988)

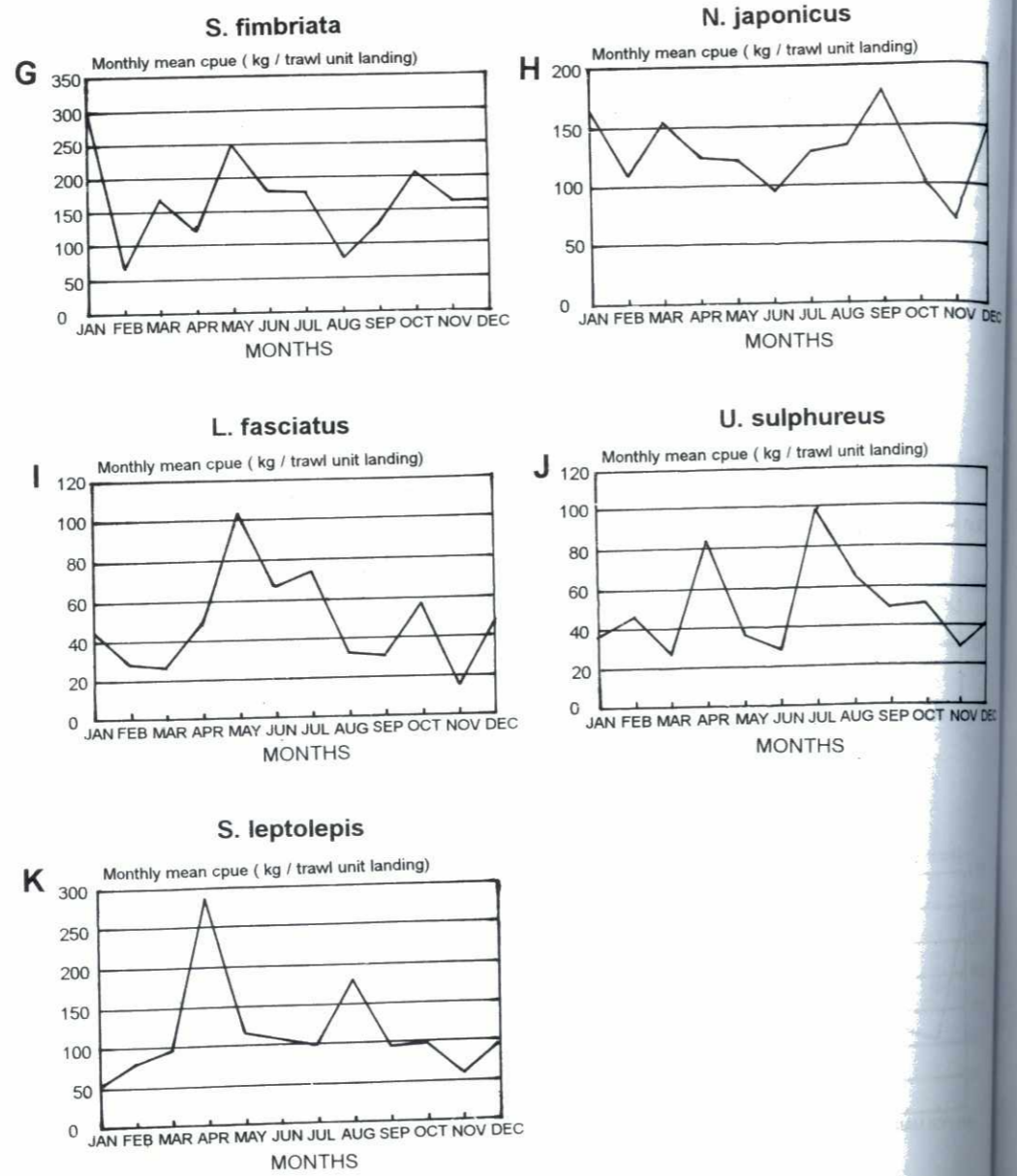


Figure 8 (continued...). Seasonality of some important fish species in Leyte Gulf (1984-1988)

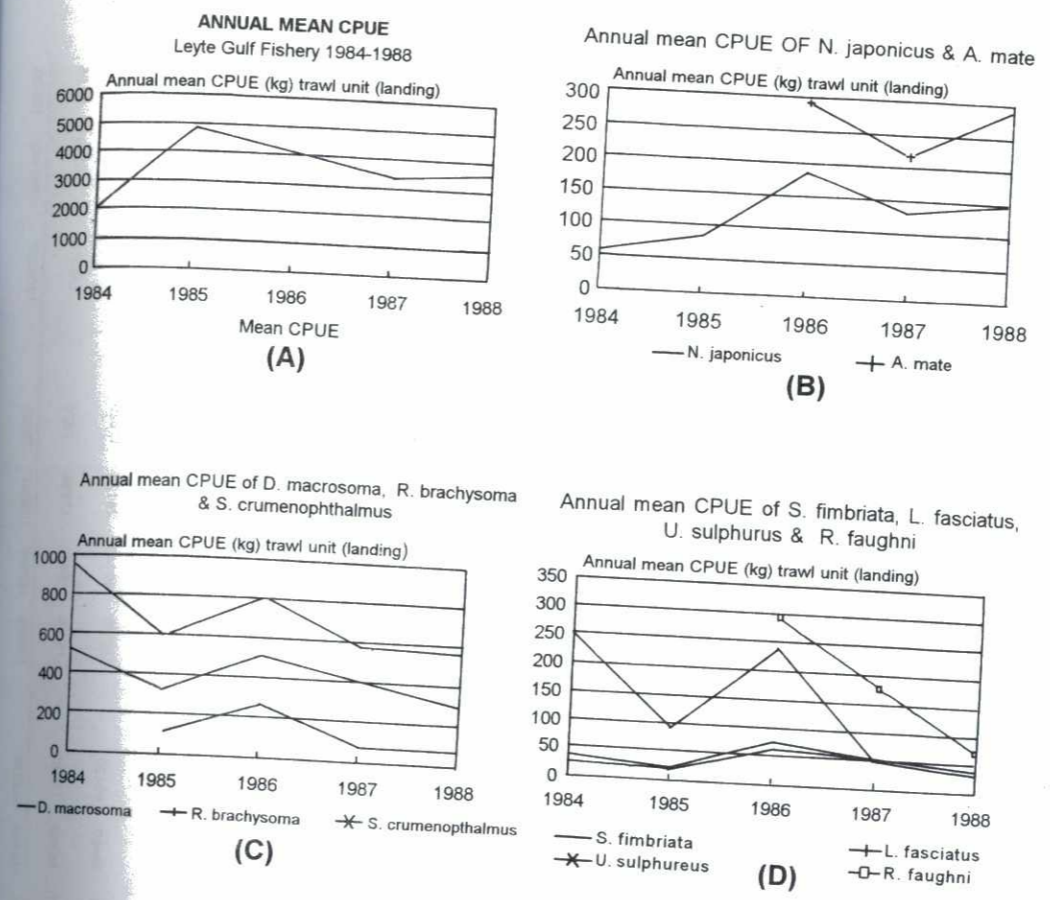


Figure 9. Annual variation in mean CPUE of Leyte Gulf trawl fishery and of the major fish catch

APPENDIX A.
 REGION : VIII
 YEAR : 1984
 LANDING CENTER : Tacloban City
 FISHING GROUND : Leyte Gulf
 FISHING GEAR : Trawl

| | JAN | FEB | MAR | APR | MAY | JUN | JUL | AUG | SEP | OCT | NOV | DEC | TOTAL | TRC % COMP | |
|----------------------------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-----|-----|--------|------------|-------|
| MONTH | | | | | | | | | | | | | | | |
| Number of boats landed | 102 | 78 | 90 | 60 | 66 | 60 | 54 | 63 | 63 | 60 | 48 | 48 | 681 | 817 | |
| Number of boats sampled | 102 | 78 | 90 | 60 | 66 | 60 | 54 | 63 | 63 | 60 | 48 | 48 | 681 | 817 | |
| Number of net sets | 180 | 174 | 150 | 144 | 144 | 153 | 153 | 144 | 144 | 135 | 81 | 81 | 1458 | 1750 | |
| Number of fishing days | 62 | 58 | 51 | 42 | 48 | 51 | 51 | 48 | 48 | 45 | 27 | 27 | 483 | 580 | |
| FAMILY/SPECIES COMPOSITION | | | | | | | | | | | | | | | |
| CARANGIDAE | 81592 | 78706 | 83638 | 44100 | 60884 | 79260 | 57660 | 65940 | 67270 | 34860 | | | 653910 | 784692 | 47.52 |
| Decapterus macrostoma | | | | | | | | | | | | | | | |
| CLUPEIDAE | 3472 | 15196 | 20088 | 11340 | 28892 | 19320 | 11532 | 23580 | 17112 | 12060 | | | 162592 | 195110 | 11.81 |
| Sardinella fimbriata | | | | | | | | | | | | | | | |
| ENGRAULIDAE | 496 | 580 | 1302 | 1020 | 5580 | 3180 | | 2100 | | 360 | | | 14618 | 17542 | 1.06 |
| Stolephorus spp | | | | | | | | | | | | | | | |
| LEIOGNATHIDAE | 2976 | 1392 | 806 | 1320 | | 3480 | 2418 | 1920 | 2604 | 1020 | | | 14418 | 17302 | 1.05 |
| Leiognathus fasciatus | | | | | | | | | | | | | | | |
| Leiognathus insidiator | | | | | | | | | | | | | | | |
| NEMIPTERIDAE | | 2204 | 5456 | 1740 | 3968 | 3360 | 1798 | 8820 | 4030 | 2400 | | | 33776 | 40531 | 2.45 |
| Nemipterus japonicus | | | | | | | | | | | | | | | |
| MULLIDAE | 982 | | | | | 1680 | | 1860 | | 1560 | | | 6092 | 7310 | 0.44 |
| Upeneoides sulphureus | | | | | | | | | | | | | | | |
| SCOMBRIDAE | 31992 | 57710 | 23460 | 29100 | 36460 | 60420 | 25740 | 40140 | 24120 | 17820 | | | 348962 | 418754 | 25.36 |
| Rastrelliger brachysoma | | | | | | | | | | | | | | | |
| OTHERS/MIXED | 13702 | 13340 | 12152 | 7920 | 16678 | 17520 | 19716 | 15480 | 13888 | 7920 | | | 138316 | 165979 | 10.05 |

APPENDIX B
 REGION : VIII
 YEAR : 1985
 LANDING CENTER : Tacloban City
 FISHING GROUND : Leyte Gulf
 FISHING GEAR : Trawl

| | JAN | FEB | MAR | APR | MAY | JUN | JUL | AUG | SEP | OCT | NOV | DEC | TOTAL | TRC % COMP | |
|----------------------------|--------|--------|-------|-------|--------|--------|--------|--------|-------|--------|---------|---------|--------|------------|-------|
| MONTH | | | | | | | | | | | | | | | |
| Number of boats landed | 27 | 24 | 24 | 24 | 24 | 27 | 24 | 21 | 24 | 24 | 24 | 30 | 249 | 299 | |
| Number of boats sampled | 27 | 24 | 24 | 24 | 24 | 27 | 24 | 21 | 24 | 24 | 24 | 30 | 249 | 299 | |
| Number of net sets | 153 | 135 | 135 | 144 | 144 | 153 | 126 | 126 | 126 | 135 | 135 | 162 | 1395 | 1674 | |
| Number of fishing days | 57 | 48 | 48 | 48 | 48 | 51 | 42 | 42 | 42 | 45 | 45 | 54 | 474 | 569 | |
| FAMILY/SPECIES COMPOSITION | | | | | | | | | | | | | | | |
| CARANGIDAE | 9744 | 12276 | 10664 | 7320 | 19778 | 5766 | 6240 | 16430 | 6900 | 5890 | | | 101008 | 121210 | 8.34 |
| Selar crumenophthalmus | | | | | | | | | | | | | | | |
| Decapterus macrostoma | 60146 | 77624 | 40052 | 47520 | 74896 | 50592 | 58920 | 54188 | 32340 | 39742 | | | 536020 | 643224 | 44.25 |
| CLUPEIDAE | 7656 | 19096 | 2418 | 6480 | 18600 | 6634 | 4140 | 2852 | 4980 | 7750 | | | 80606 | 96727 | 6.65 |
| Sardinella fimbriata | | | | | | | | | | | | | | | |
| ENGRAULIDAE | 1740 | 744 | 2728 | | | 3038 | 1440 | | 1080 | | | | 10770 | 12924 | 0.89 |
| Stolephorus spp | | | | | | | | | | | | | | | |
| LEIOGNATHIDAE | 2030 | 1984 | 3300 | 7316 | 1364 | 5160 | 1798 | 1200 | 5146 | 29298 | | | 35158 | 2.42 | |
| Leiognathus equulus | | | | | | | | | | | | | | | |
| Leiognathus fasciatus | 638 | 1364 | 3900 | 720 | 620 | 7242 | 8690 | 0.60 | | | | | | | |
| MULLIDAE | 2320 | 992 | 620 | 540 | | 3900 | | | 4030 | 14882 | | | 14882 | 1.02 | |
| Upeneoides sulphureus | | | | | | | | | | | | | | | |
| NEMIPTERIDAE | 11252 | 7440 | 6820 | 2540 | 10230 | 5642 | 10440 | 6634 | 7500 | 7068 | | | 75666 | 90799 | 6.25 |
| Nemipterus japonicus | | | | | | | | | | | | | | | |
| SCOMBRIDAE | 38936 | | 21514 | 20460 | 39246 | 21266 | 36780 | 34100 | 26280 | 23188 | | | 261770 | 314124 | 21.61 |
| Rastrelliger brachysoma | | | | | | | | | | | | | | | |
| OTHERS/MIXED | 12934 | 9300 | 7378 | 7800 | 13826 | 10354 | 10980 | 9424 | 6960 | 7688 | | | 96844 | 115973 | 7.98 |
| TOTAL LANDED CATCH | 108460 | 169756 | 92194 | 96060 | 183892 | 104656 | 141900 | 125426 | 87960 | 101122 | 1211426 | 1453711 | 100.00 | | |

APPENDIX C.
 REGION : VIII
 YEAR : 1986
 LANDING CENTER : Tacloban City
 FISHING GROUND : Leyte Gulf
 FISHING GEAR : Trawl

| | MONTH | | | | | | | | | | | | TOTAL % COMP | |
|----------------------------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------------|--------|
| | JAN | FEB | MAR | APR | MAY | JUN | JUL | AUG | SEP | OCT | NOV | DEC | | |
| Number of boats landed | 112 | 56 | 53 | 21 | 58 | 66 | 59 | 56 | 63 | 53 | 48 | 56 | 589 | |
| Number of boats sampled | 25 | 20 | 22 | 7 | 23 | 24 | 19 | 22 | 24 | 19 | 18 | 22 | 220 | |
| Number of net sets | 74 | 134 | 130 | 42 | 140 | 130 | 130 | 144 | 102 | 108 | 108 | 43 | 930 | |
| Number of fishing days | 50 | 39 | 43 | 14 | 47 | 48 | 31 | 43 | 48 | 34 | 36 | 43 | 426 | |
| FAMILY/SPECIES COMPOSITION | | | | | | | | | | | | | | |
| CARANGIDAE | | | | | | | | | | | | | | |
| Caranx mate | | 13144 | 32234 | 15830 | | | | 9362 | 13680 | 11532 | 12840 | 24552 | 133174 | 4.65 |
| Decapterus macrostoma | 114328 | 51296 | 28396 | 53280 | 31861 | 55920 | 77252 | 46314 | 36600 | 29884 | 33480 | 61628 | 620039 | 21.63 |
| Megalaspis cordyla | | 1736 | 5195 | 1862 | | | | 1200 | | | | 2976 | 12969 | 0.45 |
| Selar crumenothalmus | 52624 | 7168 | 10416 | 31968 | 30885 | 9120 | 6510 | 4588 | | 8680 | 7650 | 26784 | 196623 | 6.86 |
| Selar boops | | | | | | | | 4960 | | | | | 4960 | 0.17 |
| Selaroides leptolepis | | | 7316 | 13187 | 4966 | | | | 9720 | 9920 | 5040 | 10912 | 61061 | 2.13 |
| CLUPEIDAE | | | | | | | | | | | | | | |
| Sardinella fimbriata | 33976 | 4816 | 9424 | | 30264 | | 6324 | | | | | | 84804 | 2.96 |
| ENGRAULIDAE | | | | | | | | | | | | | | |
| Stolephorus spp | 7192 | 3696 | 10292 | 5195 | 5587 | 8620 | 1968 | 4340 | 5400 | 3348 | | | 55838 | 1.95 |
| GERRIDAE | | | | | | | | | | | | | | |
| Gerrus filamentosus | | | | 19714 | 4811 | | | | | | | | 3844 | 0.99 |
| LEIOGNATHIDAE | | | | | | | | | | | | | | |
| Leiognathus equulus | 14942 | 1568 | | 20379 | | 6300 | 8820 | | 3600 | 4960 | | 1736 | 60305 | 2.10 |
| Leiognathus fasciatus | 3720 | 1232 | | 3197 | 9312 | 6660 | 4650 | 2046 | 1080 | 3782 | | 3720 | 39399 | 1.37 |
| Leiognathus insidiator | | 2128 | | 4262 | | 5520 | | | | 1674 | | 1488 | 13584 | 0.47 |
| Gazza minuta | | | | | 7760 | | | | | | | | 9248 | 0.32 |
| LUTJANIDAE | | | | | | | | | | | | | | |
| Lutjanus gibbus | | | | 1996 | | | | | 720 | | | | 448 | 0.02 |
| Lutjanus malabaricus | | | | | | | | | 1080 | | | | 2718 | 0.09 |
| Lutjanus vitta | | | | | | | | | | | | | 2568 | 0.09 |
| Lutjanus spp | | | | | | | 744 | | | | | | 744 | 0.03 |
| MULLIDAE | | | | | | | | | | | | | | |
| Upeneus sulphureus | 2976 | 5096 | 2480 | 9857 | 3725 | 3300 | 11346 | 3720 | 1980 | 2976 | 1920 | | 49376 | 1.72 |
| NEMIPTERIDAE | | | | | | | | | | | | | | |
| Nemipterus japonicus | 19654 | 4592 | 12400 | 14322 | 9157 | 18180 | 9548 | 13702 | 22380 | 8556 | 2400 | 10168 | 142059 | 4.96 |
| Nemipterus hexodon | | | 11160 | 17716 | 9312 | | | 9300 | 960 | | | | 48448 | 1.69 |
| Nemipterus tolu | | | | 9590 | | | | | | | | 982 | 10582 | 0.37 |
| Nemipterus taeniopterus | | 1680 | | | | | | | | | | | 1680 | 0.06 |
| PRIACANTHIDAE | | | | | | | | | | | | | | |
| Priacanthus layenus | | | 8680 | 12254 | 8381 | | | 9960 | 2520 | 5332 | 1440 | 3968 | 52535 | 1.83 |
| SCOMBRIDAE | | | | | | | | | | | | | | |
| Rastrelliger brachysoma | 74834 | 37184 | 17360 | 28238 | 25918 | 35160 | 61318 | 24552 | 22560 | 17856 | 21360 | 25792 | 392132 | 13.68 |
| Rastrelliger faughni | | | 11656 | 17582 | 9312 | 20700 | 16492 | 10540 | | | 3360 | 48360 | 138002 | 4.82 |
| Rastrelliger kanagurta | 8064 | 25296 | 35165 | 21728 | 12000 | 12000 | 9238 | 21948 | 26340 | 28768 | 27720 | 48856 | 265123 | 9.25 |
| SPHYRAENIDAE | | | | | | | | | | | | | | |
| Sphyræna oblusata | | | 4092 | 4795 | 29798 | | | | | | | | | |
| Sphyræna jello | | | | | | | | 9486 | 3960 | | 2400 | 7440 | 46125 | 1.61 |
| TRICHIURIDAE | | | | | | | | | | | | | | |
| Trichiurus lepturus | | 3360 | 5952 | 17449 | 9312 | | | 3162 | 2160 | | 1440 | 2232 | 45067 | 1.57 |
| OTHERS/MIXED | | | | | | | | | | | | | | |
| | 29016 | | 28520 | 32766 | 67046 | | | 26160 | 1200 | 24180 | 45000 | 53816 | 307704 | 10.74 |
| INVERTEBRATES | | | | | | | | | | | | | | |
| Loigo spp. | | | | | | | | | | | | | | |
| Penaeus spp. | 1288 | 4960 | 2797 | 2340 | | | | 1488 | 5100 | 1488 | 720 | 496 | 20677 | 0.72 |
| Penaeus monodon | 224 | | 1488 | 1998 | | | | | | | | | 3486 | 0.12 |
| | | | | | | | | | | | | | 224 | 0.01 |
| TOTAL LANDED CATCH | | | | | | | | | | | | | | |
| | 353462 | 133840 | 214768 | 392138 | 338967 | 181680 | 212210 | 205628 | 162240 | 162936 | 166800 | 341248 | 2865917 | 100.00 |

APPENDIX D.
 REGION : VIII
 YEAR : 1987
 LANDING CENTER : Tacloban City
 FISHING GROUND : Leyte Gulf
 FISHING GEAR : Trawl

| | JAN | FEB | MAR | APR | MAY | JUN | JUL | AUG | SEP | OCT | NOV | DEC | TOTAL % COMP |
|----------------------------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|-------|--------|----------------|
| MONTH | | | | | | | | | | | | | |
| Number of boats landed | 62 | 78 | 76 | 57 | 71 | 51 | 71 | 28 | 63 | 37 | 27 | 53 | 674 |
| Number of boats sampled | 25 | 22 | 25 | 23 | 25 | 24 | 25 | 15 | 27 | 28 | 21 | 53 | 313 |
| Number of fishing days | 53 | 78 | 80 | 73 | 90 | 87 | 78 | 34 | 78 | 87 | 57 | 53 | 848 |
| Number of net sets | | | | | | | | | | | | | |
| FAMILY/SPECIES COMPOSITION | | | | | | | | | | | | | |
| CARANGIDAE | | | | | | | | | | | | | |
| Caranx kalla | | | | | | | 1488 | | | | 240 | | 1728 0.08 |
| Caranx sexfasciatus | 1008 | 1008 | 799 | 1116 | 1080 | 744 | | | | | 360 | 248 | 5355 0.24 |
| Atule mate | 10664 | 16464 | 5456 | 9857 | 25792 | 14880 | 18848 | 5456 | 22800 | 5302 | 3240 | 12848 | 151407 6.73 |
| Caranx malabaricus | 2400 | 58464 | 50344 | 41692 | 69936 | 37440 | 22816 | 21452 | 28560 | 23011 | 7320 | 30876 | 394311 17.52 |
| Decapterus macrostoma | | | | | | | | | | 113 | | | 113 0.01 |
| Hynnios momsa | 6944 | 7056 | 3844 | 10922 | 7440 | 2880 | 3720 | 2232 | 6240 | 677 | | 1984 | 53939 2.40 |
| Selar crumenophthalmus | 4960 | 3136 | | 1736 | 4800 | 7688 | 1860 | 960 | 1128 | 1920 | | 1364 | 29552 1.31 |
| Megalaspis cordyla | 2976 | | | | | | | | | | | | 2976 0.13 |
| Selar boops | 4960 | 6832 | 4836 | 3197 | 9548 | | 6076 | 5704 | 2400 | 2030 | 960 | 1860 | 48403 2.15 |
| Selaroides leptolepis | | | | | | | | | | | | | |
| CLUPEIDAE | | | | | | | | | | | | | |
| Sardinella fimbriata | | | | | | 1920 | 3968 | | | | | | 5888 0.26 |
| Sardinella longiceps | | | | 3996 | | | | | | | | 6448 | 10444 0.46 |
| ENGRALIIDAE | | | | | | | | | | | | | |
| Stolephorus commersonii | 3224 | 3024 | 4464 | 2131 | 6572 | 3480 | 4464 | | 1920 | | | | 29279 1.30 |
| GERRIDAE | | | | | | | | | | | | | |
| Gerres filamentosus | 8928 | 9632 | | 2930 | 2232 | 4680 | 5952 | 3472 | 12120 | 2369 | 2520 | 5828 | 60663 2.70 |
| LEIognathidae | | | | | | | | | | | | | |
| Leiognathus fasciatus | 6448 | 4368 | 1860 | | | 1920 | 4836 | 744 | 1560 | | 480 | 3720 | 25936 1.15 |
| Leiognathus equulus | 9424 | 4592 | 3720 | 1066 | | 4320 | 8804 | | 2400 | 1128 | 1800 | 1984 | 38172 1.70 |
| Leiognathus xanthurus | | | | | | 1200 | | 620 | 1320 | 1692 | 1200 | 1736 | 8834 0.39 |
| Leiognathus xanthurus | | | | | | | | | | 451 | | | 451 0.02 |
| Ludjanus vittatus | | | | | | | | | | | 677 | 960 | 10123 0.45 |
| Ludjanus vittatus | | | | | | | | | | | | 120 | 120 0.09 |
| Ludjanus gibbus | | | | | | | | 496 | | 720 | 338 | | 2118 0.99 |
| MULLIDAE | | | | | | | | | | | | | |
| Upeneus sulphureus | 3472 | | | | | | | | | 720 | | | 1554 0.07 |
| MENIDAE | | | | | | | | | | | | | |
| Mene maculata | | | | | 3197 | 1440 | 5952 | | 4320 | 1692 | | 2232 | 22305 0.99 |
| NEMIPTERIDAE | | | | | | | | | | | | | |
| Nemipterus japonicus | 10416 | 14672 | 13764 | 4795 | 9796 | 1200 | 10912 | 2356 | 5280 | 4738 | 3120 | 12524 | 93573 4.16 |
| Nemipterus hexodon | 2728 | 7068 | 2797 | 7316 | 7440 | | 8680 | | 7200 | 2369 | 1560 | 6820 | 46538 2.07 |
| Nemipterus marginatus | | | | | | | | | | | | | 7440 0.33 |
| Nemipterus taenioplerus | | | | | | | | | | | | | 2232 0.23 |
| Nemipterus tolu | | | | | | | | | | | | | 1240 0.42 |
| Scolopsis taenioplerus | | | | | | | | | | | | | 1488 0.07 |
| PRIACANTHIDAE | | | | | | | | | | | | | |
| Priacanthus tayenus | 2976 | 2688 | | | 5084 | 1440 | | | 992 | 2143 | 1440 | 1488 | 18251 0.81 |
| SCOMBRIDAE | | | | | | | | | | | | | |
| Rastrelliger brachysoma | 21080 | 24528 | 17112 | 21046 | 27776 | 13680 | 38688 | 3472 | 17160 | 18048 | 6840 | 4640 | 214070 9.51 |
| Rastrelliger kanagurta | 40548 | 47824 | 25172 | 24375 | 31992 | 30480 | 20336 | 17608 | 23280 | 40157 | 14400 | 11040 | 327212 14.54 |
| Rastrelliger faughni | 8556 | 22848 | 15996 | 15185 | 14260 | 11520 | 14756 | 6944 | 4200 | 2369 | 840 | | 117474 5.22 |
| Scomberomorus commerson | | | | | 496 | | | | 240 | 338 | 360 | 992 | 2426 0.11 |
| SPHYRAENIDAE | | | | | | | | | | | | | |
| Sphyraena jello | 8680 | | 4464 | 3197 | | 3240 | | | 2400 | 1128 | 1680 | 3224 | 19333 0.86 |
| Sphyraena obtusata | | 1240 | 2930 | 3720 | 2400 | 5332 | 1488 | | 960 | 3497 | | 4960 | 35207 1.56 |
| STROMATEIDAE | | | | | | | | | | | | | |
| Stromateus niger | | | | | | | | | | | | | |
| TRICHIURIDAE | | | | | | | | | | | | | |
| Trichiurus lepturus | 1488 | 1344 | 2232 | 2930 | 2604 | 960 | 2232 | 1984 | 1800 | 338 | 480 | 496 | 18888 0.84 |
| OTHERS/MIXED | | | | | | | | | | | | | |
| INVERTEBRATES | 26536 | 23520 | 53568 | 59674 | 51460 | 54360 | 33480 | 38556 | 13680 | 1354 | 2760 | 2976 | 362924 16.12 |
| Loligo spp. | 1488 | 4592 | 2976 | 3463 | 744 | 2880 | 1488 | | | | | | 18082 0.80 |
| Panaeus spp. | 1240 | 2800 | 1488 | 799 | 4836 | 744 | | | | 451 | | | 11907 0.53 |
| TOTAL LANDED CATCH. | | | | | | | | | | | | | |
| | 191996 | 262752 | 231880 | 225374 | 294996 | 203400 | 242792 | 115940 | 173040 | 118779 | 56400 | 133408 | 2250757 100.00 |

LIST OF FAMILIES AND SPECIES COMPOSITION OF LEYTE GULF TRAWL FISHERY 1984-1988
CATCH IN KILOGRAMS

| FAMILY/SPECIES COMPOSITION | 1984 | % | 1985 | % | 1986 | % | 1987 | % | 1988 | % | MEAN % |
|----------------------------|--------|-------|--------|-------|---------|-------|--------|-------|--------|-------|--------|
| CARANGIDAE | | | | | | | | | | | |
| Decapterus macrostoma | 784692 | 47.52 | 764434 | 52.59 | 1028826 | 35.90 | 695992 | 30.92 | 490695 | 30.42 | 39.47 |
| Selar crumenophthalmus | 784692 | 47.52 | 643224 | 44.25 | 620039 | 21.63 | 394311 | 17.52 | 257776 | 15.98 | |
| Atule mate | | | 121210 | 8.34 | 196623 | 6.86 | 53939 | 2.40 | 17647 | 1.09 | |
| Caranx sexfasciatus | | | | | 133174 | 4.65 | 151407 | 6.73 | 133568 | 8.28 | |
| Caranx kalla | | | | | | | 5355 | 0.24 | 1932 | 0.12 | |
| Caranx malabaricus | | | | | | | 1728 | 0.08 | 2120 | 0.13 | |
| Megalopsis cordyla | | | | | | | 8208 | 0.36 | 9363 | 0.58 | |
| Selar boops | | | | | | | 29552 | 1.31 | 25407 | 1.58 | |
| Selaroides leptolepis | | | | | 12969 | 0.45 | 2976 | 0.13 | 40316 | 2.50 | |
| Decapterus russelli | | | | | 4960 | 0.17 | 48403 | 2.15 | 1353 | 0.08 | |
| Eliagatis bipinnulatus | | | | | 61061 | 2.13 | | | 496 | 0.03 | |
| Scomberoides lysan | | | | | | | 113 | 0.01 | 113 | 0.01 | |
| Hymis morsa | | | | | | | | | 604 | 0.04 | |
| CLUPEIDAE | | | | | | | | | | | |
| Sardinella fimbriata | 195110 | 11.81 | 96727 | 6.65 | 84804 | 2.96 | 16332 | 0.73 | 5169 | 0.32 | 4.49 |
| Sardinella longiceps | 195110 | 11.81 | 96727 | 6.65 | 84804 | 2.96 | 16332 | 0.73 | 5169 | 0.32 | 4.49 |
| ENGRAULIDAE | | | | | | | | | | | |
| Stolephorus spp. | 17542 | 1.06 | 12924 | 0.89 | 55838 | 1.95 | 29279 | 1.30 | 16167 | 1.00 | 1.24 |
| Stolephorus commersonii | 17542 | 1.06 | 12924 | 0.89 | 55838 | 1.95 | 29279 | 1.30 | 16167 | 1.00 | 1.24 |
| Stolephorus indicus | 21524 | 1.30 | 43848 | 3.02 | 122536 | 4.28 | 84553 | 3.76 | 50822 | 3.15 | 3.10 |
| LEIOGNATHIDAE | | | | | | | | | | | |
| Leiognathus fasciatus | 17302 | 1.05 | 8690 | 0.60 | 39399 | 1.37 | 25936 | 1.15 | 7895 | 0.49 | |
| Leiognathus insidiator | 4222 | 0.26 | 35158 | 2.42 | 60305 | 2.10 | 38172 | 1.70 | 14959 | 0.93 | |
| Leiognathus equulus | | | | | | | 451 | 0.02 | 14963 | 0.93 | |
| Leiognathus splendens | | | | | | | | | | | |
| Leiognathus deatus | | | | | | | | | | | |
| MULLIDAE | | | | | | | | | | | |
| Upeneus sulphureus | 7310 | 0.44 | 14882 | 1.02 | 49376 | 1.72 | 22305 | 0.99 | 10308 | 0.64 | 0.96 |
| NEMIPTERIDAE | | | | | | | | | | | |
| Nemipterus japonicus | 40531 | 2.45 | 90799 | 6.25 | 202769 | 7.08 | 163628 | 7.27 | 125988 | 7.81 | 6.17 |
| Nemipterus hexodon | 40531 | 2.45 | 90799 | 6.25 | 202769 | 7.08 | 163628 | 7.27 | 125988 | 7.81 | 6.17 |
| Nemipterus tolu | | | | | 142059 | 4.96 | 93573 | 4.16 | 67331 | 4.17 | |
| Nemipterus malabaricus | | | | | 48448 | 1.69 | 46538 | 2.07 | 33346 | 2.07 | |
| Nemipterus marginatus | | | | | 10582 | 0.37 | 9393 | 0.42 | 4575 | 0.28 | |
| Nemipterus taenipterus | | | | | | | 7440 | 0.33 | 16044 | 0.99 | |
| Scolopsis taenipterus | | | | | | | 5196 | 0.23 | 4692 | 0.29 | |
| SCOMBRIDAE | | | | | | | | | | | |
| Rastrelliger brachysoma | 418754 | 25.36 | 314124 | 21.61 | 795257 | 27.75 | 661182 | 29.38 | 365749 | 22.68 | 25.35 |
| Rastrelliger kanagurta | 418754 | 25.36 | 314124 | 21.61 | 795257 | 27.75 | 661182 | 29.38 | 365749 | 22.68 | 25.35 |
| Rastrelliger faughni | | | | | 392132 | 13.68 | 214070 | 9.51 | 140571 | 8.72 | |
| Scomberomorus commerson | | | | | 265123 | 9.25 | 327212 | 14.54 | 172138 | 10.67 | |
| GERRIDAE | | | | | | | | | | | |
| Gerres filamentosus | | | | | 138002 | 4.82 | 117474 | 5.22 | 25697 | 1.59 | |
| LUTIANIDAE | | | | | | | | | | | |
| Lutjanus gibbus | | | | | 28369 | 0.99 | 60663 | 2.70 | 21482 | 1.33 | 1.00 |
| Lutjanus malabaricus | | | | | 28369 | 0.99 | 60663 | 2.70 | 21482 | 1.33 | 1.00 |
| Lutjanus vitta | | | | | 6478 | 0.23 | 14763 | 0.66 | 11217 | 0.70 | 0.32 |
| Lutjanus johnii | | | | | 448 | 0.02 | 968 | 0.04 | 2804 | 0.17 | |
| Lutjanus spp. | | | | | 2718 | 0.09 | 10123 | 0.45 | 2302 | 0.14 | |
| | | | | | 2568 | 0.09 | 2118 | 0.09 | 2693 | 0.17 | |
| | | | | | 744 | 0.03 | 1554 | 0.07 | 3418 | 0.21 | |
| PRIACANTHIDAE | | | | | | | | | | | |
| Priacanthus tuyenus | | | | | 52535 | 1.83 | 18251 | 0.81 | 11039 | 0.68 | 0.67 |
| | | | | | 52535 | 1.83 | 18251 | 0.81 | 11039 | 0.68 | 0.68 |

| | 61971 | 2.16 | 54540 | 2.42 | 34898 | 2.16 | 1.35 |
|-----------------------|---------|--------|---------|--------|---------|--------|--------|
| SPHYRAENIDAE | | | | | | | |
| Sphyraena jello | 15846 | 0.55 | 19333 | 0.86 | 20063 | 1.24 | |
| Sphyraena oblusata | 46125 | 1.61 | 35207 | 1.56 | 14835 | 0.92 | |
| SYNODONTIDAE | | | | | | | |
| Saurida tumbil | | | 5064 | 0.22 | 5392 | 0.33 | 0.11 |
| STROMATEIDAE | | | | | | | |
| Stromateus niger | | | 5064 | 0.22 | 5392 | 0.33 | |
| MENIDAE | | | | | | | |
| Mene maculata | 45067 | 1.57 | 18888 | 0.84 | 17053 | 1.06 | 0.69 |
| TRICHIURIDAE | | | | | | | |
| Trichiurus lepturus | 45067 | 1.57 | 18888 | 0.84 | 17053 | 1.06 | |
| INVERTEBRATES | | | | | | | |
| Loligo spp. | 24387 | 0.85 | 29989 | 1.33 | 10054 | 0.62 | 0.56 |
| Penaeus spp. | 20677 | 0.72 | 18082 | 0.80 | 10054 | 0.62 | |
| Penaeus monodon | 3486 | 0.12 | 11907 | 0.53 | | | |
| | 224 | 0.01 | | | | | |
| TRASHFISHMIXED/OTHERS | 165979 | 10.05 | 115973 | 7.98 | 307704 | 10.74 | 13.46 |
| TOTAL LANDED CATCH | 1651442 | 100.00 | 1453711 | 100.00 | 2250757 | 100.00 | 100.00 |

APPENDIX G
Monthly Estimated Landed Catch, Effort and Catch per unit effort (CPUE) of Trawlers in Leyte Gulf (1984-1988)

| MONTH | 1984 | | | 1985 | | | 1986 | | | 1987 | | | 1988 | | |
|-------|-------------|--------------|--------------|-------------|--------------|--------------|-------------|--------------|--------------|-------------|--------------|--------------|-------------|--------------|--------------|
| | CATCH (kgs) | EFFORT (hrs) | CPUE (kg/hr) | CATCH (kgs) | EFFORT (hrs) | CPUE (kg/hr) | CATCH (kgs) | EFFORT (hrs) | CPUE (kg/hr) | CATCH (kgs) | EFFORT (hrs) | CPUE (kg/hr) | CATCH (kgs) | EFFORT (hrs) | CPUE (kg/hr) |
| Jan | 135222 | 102 | 1326 | 353462 | 112 | 3156 | 191966 | 62 | 3097 | 110980 | 43 | 2581 | 158332 | 64 | 2032 |
| Feb | 169128 | 78 | 2168 | 133840 | 56 | 2390 | 262752 | 78 | 3369 | 72964 | 38 | 1920 | 149429 | 55 | 2773 |
| Mar | 146902 | 90 | 1632 | 214768 | 53 | 4052 | 231880 | 76 | 3051 | 243011 | 51 | 4765 | 201263 | 59 | 4115 |
| Apr | 96540 | 60 | 1609 | 392138 | 21 | 18673 | 225374 | 57 | 3954 | 162553 | 45 | 3612 | 175321 | 37 | 8962 |
| May | 154462 | 66 | 2340 | 338967 | 58 | 5844 | 294996 | 71 | 4155 | 146451 | 48 | 3051 | 205414 | 53 | 3846 |
| Jun | 188220 | 60 | 3137 | 183892 | 27 | 3558 | 181680 | 66 | 2753 | 203400 | 51 | 3988 | 40592 | 18 | 2255 |
| Jul | | | | 212210 | 59 | 3597 | 242792 | 71 | 3420 | 245064 | 43 | 5699 | 176792 | 44 | 3138 |
| Aug | 118864 | 54 | 2201 | 104656 | 24 | 7662 | 115940 | 28 | 4141 | 216240 | 40 | 5406 | 152266 | 39 | 5094 |
| Sep | 159840 | 63 | 2537 | 141900 | 24 | 4984 | 205628 | 56 | 3672 | 115940 | 28 | 4141 | 216240 | 40 | 4081 |
| Oct | 129024 | 60 | 2150 | 162240 | 63 | 2575 | 173040 | 63 | 2747 | 160320 | 36 | 4453 | 159468 | 50 | 3645 |
| Nov | 78000 | 48 | 1625 | 125426 | 24 | 5226 | 162936 | 53 | 3074 | 118779 | 37 | 3210 | 52097 | 25 | 2084 |
| Dec | | | | 166800 | 48 | 3475 | 56400 | 27 | 2089 | 46200 | 24 | 1925 | 87072 | 34 | 2556 |
| | | | | 101122 | 30 | 3371 | 341248 | 56 | 6094 | 133408 | 53 | 2517 | 116410 | 39 | 2985 |
| TOTAL | 1376202 | 681 | 2021 | 1211426 | 249 | 4865 | 2865917 | 701 | 4088 | 2250757 | 674 | 3339 | 1612882 | 450 | 3584 |
| TRC | 1651442 | 817 | 2021 | 1453711 | 299 | 4865 | | | | | | | | | |

Monthly Estimated Fishing Hours of Trawlers in Leyte Gulf (1986-1988)

| MONTH | 1986 | | | 1987 | | | 1988 | | |
|-------|-------------|--------------|--------------|-------------|--------------|--------------|-------------|--------------|--------------|
| | CATCH (kgs) | EFFORT (hrs) | CPUE (kg/hr) | CATCH (kgs) | EFFORT (hrs) | CPUE (kg/hr) | CATCH (kgs) | EFFORT (hrs) | CPUE (kg/hr) |
| Jan | 353462 | 551 | 641 | 191966 | 577 | 333 | 110980 | 409 | 271 |
| Feb | 133840 | 543 | 246 | 262752 | 658 | 399 | 72964 | 342 | 213 |
| Mar | 214768 | 527 | 408 | 231880 | 688 | 337 | 243011 | 451 | 539 |
| Apr | 392138 | 702 | 559 | 225374 | 474 | 475 | 162553 | 402 | 404 |
| May | 338967 | 639 | 530 | 294996 | 682 | 433 | 146451 | 451 | 325 |
| Jun | 181680 | 606 | 300 | 203400 | 468 | 435 | 40592 | 168 | 242 |
| Jul | 212210 | 415 | 511 | 242792 | 694 | 350 | 245064 | 334 | 734 |
| Aug | 205628 | 533 | 386 | 115940 | 279 | 416 | 216240 | 378 | 572 |
| Sep | 162240 | 642 | 253 | 173040 | 624 | 277 | 160320 | 318 | 504 |
| Oct | 162936 | 465 | 350 | 118779 | 333 | 357 | 52097 | 231 | 226 |
| Nov | 166800 | 462 | 361 | 56400 | 252 | 224 | 46200 | 198 | 233 |
| Dec | 341248 | 558 | 612 | 133408 | 468 | 285 | 116410 | 367 | 317 |

APPENDIX H.
Monthly catch per unit effort (kg/rawl unit landing) of *D. macrostoma* in Leyte Gulf.

| MONTH | 1984 | 1985 | 1986 | 1987 | 1988 | MEAN CPUE | MONTH | 1984 | 1985 | 1986 | 1987 | 1988 | MEAN CPUE |
|-----------|------|------|------|------|------|-----------|-----------|------|------|------|------|------|-----------|
| January | 800 | | 1021 | 39 | 389 | 562 | January | 28 | 114 | 175 | 168 | 150 | 164 |
| February | 1009 | 608 | 916 | 750 | 657 | 788 | February | 59 | 86 | 82 | 188 | 131 | 109 |
| March | 899 | 892 | 536 | 662 | 1180 | 834 | March | 29 | 234 | 234 | 181 | 201 | 152 |
| April | 735 | | 772 | 731 | 733 | 743 | April | 58 | 78 | 158 | 138 | 167 | 120 |
| May | 895 | 460 | 546 | 985 | 794 | 736 | May | 56 | 28 | 275 | 24 | 93 | 95 |
| June | 1321 | 511 | 847 | 734 | 613 | 805 | June | 32 | 118 | 162 | 154 | 75 | 127 |
| July | | 861 | 1309 | 321 | 369 | 715 | July | 140 | 67 | 245 | 84 | 236 | 133 |
| August | 1030 | 602 | 827 | 766 | 499 | 745 | August | 65 | 50 | 50 | 116 | 55 | 68 |
| September | 1047 | 755 | 581 | 453 | 377 | 643 | September | 50 | 69 | 182 | 236 | 110 | 149 |
| October | 1085 | 547 | 564 | 622 | 225 | 609 | October | 57 | 83 | 187 | 132 | 146 | |
| November | 726 | 308 | 698 | 271 | 375 | 476 | November | 50 | 69 | 57 | 57 | 57 | |
| December | | 390 | 1101 | 583 | 541 | 654 | December | 50 | 69 | 57 | 57 | 57 | |
| Mean | 955 | 593 | 810 | 576 | 563 | | Mean | 57 | 83 | 187 | 132 | 146 | |

Monthly catch per unit effort (kg/rawl unit landing) of *R. brachysoma* in Leyte Gulf.

| MONTH | 1984 | 1985 | 1986 | 1987 | 1988 | MEAN CPUE | MONTH | 1984 | 1985 | 1986 | 1987 | 1988 | MEAN CPUE |
|-----------|------|------|------|------|------|-----------|-----------|------|------|------|------|------|-----------|
| January | 314 | | 668 | 441 | 213 | 409 | January | 98 | 472 | 112 | 292 | 105 | |
| February | 740 | | 664 | 573 | 146 | 531 | February | 141 | 128 | 90 | 111 | 125 | |
| March | 252 | 448 | 328 | 131 | 278 | 287 | March | 123 | 463 | 192 | 96 | 250 | |
| April | 485 | | 409 | 421 | 544 | 465 | April | 79 | 533 | 105 | 92 | 213 | |
| May | 566 | 247 | 447 | 413 | 169 | 368 | May | 227 | 138 | 56 | 56 | 130 | |
| June | 1007 | 220 | 533 | 507 | 100 | 473 | June | 69 | 110 | 52 | 77 | 77 | |
| July | | 451 | 1039 | 678 | 319 | 356 | July | 80 | 82 | 80 | 23 | 67 | |
| August | 460 | 253 | 438 | 319 | 310 | 356 | August | 166 | 164 | 18 | 116 | 116 | |
| September | 637 | 472 | 358 | 435 | 673 | 515 | September | 66 | 160 | 60 | 60 | 95 | |
| October | 389 | 344 | 337 | 390 | 257 | 343 | October | 58 | 478 | 37 | 26 | 150 | |
| November | 371 | 250 | 445 | 330 | 160 | 311 | November | 111 | 266 | 81 | 68 | | |
| December | | 227 | 460 | 88 | 367 | 286 | December | 57 | 83 | 187 | 132 | 146 | |
| Mean | 522 | 324 | 511 | 394 | 299 | | Mean | 111 | 266 | 81 | 68 | | |

Monthly catch per unit effort (kg/rawl unit landing) of *S. crumenophthalmus* in Leyte Gulf.

| MONTH | 1984 | 1985 | 1986 | 1987 | 1988 | MEAN CPUE | MONTH | 1984 | 1985 | 1986 | 1987 | 1988 | MEAN CPUE |
|-----------|------|------|------|------|------|-----------|-----------|------|------|------|------|------|-----------|
| January | 172 | 121 | 147 | | | | January | 29 | 33 | 33 | 104 | 12 | 45 |
| February | 211 | 186 | 199 | | | | February | 6 | 22 | 22 | 56 | 28 | 28 |
| March | 248 | 72 | 305 | 208 | | | March | 16 | 46 | 46 | 24 | 42 | 27 |
| April | 467 | 173 | 309 | 316 | | | April | 161 | 161 | 161 | 38 | 66 | 66 |
| May | 273 | 363 | 348 | 328 | | | May | 101 | 79 | 79 | 68 | 74 | 74 |
| June | | 292 | 180 | 236 | | | June | 37 | 37 | 37 | 27 | 19 | 32 |
| July | | 265 | 257 | 261 | | | July | 50 | 50 | 50 | 25 | 31 | 31 |
| August | 167 | 195 | 369 | 244 | | | August | 42 | 71 | 71 | 18 | 15 | 15 |
| September | 217 | 362 | 553 | 377 | | | September | 7 | 6 | 66 | 70 | 47 | 47 |
| October | 218 | 143 | 275 | 212 | | | October | 37 | 17 | 63 | 48 | 34 | 34 |
| November | 268 | 120 | 215 | 201 | | | November | 21 | 7 | 17 | 48 | 34 | 34 |
| December | 472 | 239 | 347 | 353 | | | December | 6 | 6 | 66 | 70 | 47 | 47 |
| Mean | 291 | 217 | 289 | | | | Mean | 37 | 17 | 63 | 48 | 34 | 34 |

Monthly catch per unit effort (kg/rawl unit landing) of *A. macle* in Leyte Gulf.

| MONTH | 1986 | 1987 | 1988 | MEAN CPUE | MONTH | 1984 | 1985 | 1986 | 1987 | 1988 | MEAN CPUE |
|-----------|------|------|------|-----------|-----------|------|------|------|------|------|-----------|
| January | 172 | 121 | 147 | | January | 29 | 33 | 33 | 104 | 12 | 45 |
| February | 211 | 186 | 199 | | February | 6 | 22 | 22 | 56 | 28 | 28 |
| March | 248 | 72 | 305 | 208 | March | 16 | 46 | 46 | 24 | 42 | 27 |
| April | 467 | 173 | 309 | 316 | April | 161 | 161 | 161 | 38 | 66 | 66 |
| May | 273 | 363 | 348 | 328 | May | 101 | 79 | 79 | 68 | 74 | 74 |
| June | | 292 | 180 | 236 | June | 37 | 37 | 37 | 27 | 19 | 32 |
| July | | 265 | 257 | 261 | July | 50 | 50 | 50 | 25 | 31 | 31 |
| August | 167 | 195 | 369 | 244 | August | 42 | 71 | 71 | 18 | 15 | 15 |
| September | 217 | 362 | 553 | 377 | September | 7 | 6 | 66 | 70 | 47 | 47 |
| October | 218 | 143 | 275 | 212 | October | 37 | 17 | 63 | 48 | 34 | 34 |
| November | 268 | 120 | 215 | 201 | November | 21 | 7 | 17 | 48 | 34 | 34 |
| December | 472 | 239 | 347 | 353 | December | 6 | 6 | 66 | 70 | 47 | 47 |
| Mean | 291 | 217 | 289 | | Mean | 37 | 17 | 63 | 48 | 34 | 34 |

Monthly catch per unit effort (kg/rawl unit landing) of *L. fasciatus* in Leyte Gulf.

| MONTH | 1984 | 1985 | 1986 | 1987 | 1988 | MEAN CPUE | MONTH | 1984 | 1985 | 1986 | 1987 | 1988 | MEAN CPUE |
|-----------|------|------|------|------|------|-----------|-----------|------|------|------|------|------|-----------|
| January | 34 | 77 | 86 | | | | January | 138 | 63 | 63 | 101 | 101 | |
| February | 195 | 219 | 178 | | | | February | 293 | 293 | 293 | 293 | 293 | |
| March | 216 | 189 | 28 | 522 | | | March | 220 | 188 | 188 | 206 | 206 | |
| April | 189 | 28 | 70 | 38 | | | April | 255 | 266 | 27 | 183 | 183 | |
| May | 425 | 70 | 107 | 56 | | | May | 161 | 201 | 23 | 128 | 128 | |
| June | 322 | 214 | 79 | 79 | | | June | 314 | 226 | 67 | 202 | 202 | |
| July | | 206 | 53 | 130 | | | July | 280 | 208 | 43 | 177 | 177 | |
| August | | 374 | 29 | 202 | | | August | 188 | 67 | 100 | 84 | 84 | |
| September | 206 | 276 | 47 | 162 | | | September | 70 | 31 | 85 | 62 | 62 | |
| October | 374 | 276 | 47 | 162 | | | October | 64 | 64 | 64 | 64 | 64 | |
| November | 251 | 76 | | 164 | | | November | 31 | 85 | 85 | 85 | 85 | |
| December | | 249 | 89 | 239 | 47 | 47 | December | 864 | 864 | 864 | 864 | 864 | |
| Mean | 249 | 89 | 239 | 47 | 47 | | Mean | 294 | 177 | 73 | 73 | 73 | |

Monthly catch per unit effort (kg/rawl unit landing) of *S. fimbriata* in Leyte Gulf.

| MONTH | 1984 | 1985 | 1986 | 1987 | 1988 | MEAN CPUE | MONTH | 1984 | 1985 | 1986 | 1987 | 1988 | MEAN CPUE |
|-----------|------|------|------|------|------|-----------|-----------|------|------|------|------|------|-----------|
| January | 34 | 77 | 86 | | | | January | 138 | 63 | 63 | 101 | 101 | |
| February | 195 | 219 | 178 | | | | February | 293 | 293 | 293 | 293 | 293 | |
| March | 216 | 189 | 28 | 522 | | | March | 220 | 188 | 188 | 206 | 206 | |
| April | 189 | 28 | 70 | 38 | | | April | 255 | 266 | 27 | 183 | 183 | |
| May | 425 | 70 | 107 | 56 | | | May | 161 | 201 | 23 | 128 | 128 | |
| June | 322 | 214 | 79 | 79 | | | June | 314 | 226 | 67 | 202 | 202 | |
| July | | 206 | 53 | 130 | | | July | 280 | 208 | 43 | 177 | 177 | |
| August | | 374 | 29 | 202 | | | August | 188 | 67 | 100 | 84 | 84 | |
| September | 206 | 276 | 47 | 162 | | | September | 70 | 31 | 85 | 62 | 62 | |
| October | 374 | 276 | 47 | 162 | | | October | 64 | 64 | 64 | 64 | 64 | |
| November | 251 | 76 | | 164 | | | November | 31 | 85 | 85 | 85 | 85 | |
| December | | 249 | 89 | 239 | 47 | 47 | December | 864 | 864 | 864 | 864 | 864 | |
| Mean | 249 | 89 | 239 | 47 | 47 | | Mean | 294 | 177 | 73 | 73 | 73 | |

Monthly catch per unit effort (kg/rawl unit landing) of *R. faughni* in Leyte Gulf.

| MONTH | 1984 | 1985 | 1986 | 1987 | 1988 | MEAN CPUE | MONTH | 1984 | 1985 | 1986 | 1987 | 1988 | MEAN CPUE |
|-----------|------|------|------|------|------|-----------|-----------|------|------|------|------|------|-----------|
| January | 34 | 77 | 86 | | | | January | 138 | 63 | 63 | 101 | 101 | |
| February | 195 | 219 | 178 | | | | February | 293 | 293 | 293 | 293 | 293 | |
| March | 216 | 189 | 28 | 522 | | | March | 220 | 188 | 188 | 206 | 206 | |
| April | 189 | 28 | 70 | 38 | | | April | 255 | 266 | 27 | 183 | 183 | |
| May | 425 | 70 | 107 | 56 | | | May | 161 | 201 | 23 | 128 | 128 | |
| June | 322 | 214 | 79 | 79 | | | June | 314 | 226 | 67 | 202 | 202 | |
| July | | 206 | 53 | 130 | | | July | 280 | 208 | 43 | 177 | 177 | |
| August | | 374 | 29 | 202 | | | August | 188 | 67 | 100 | 84 | 84 | |
| September | 206 | 276 | 47 | 162 | | | September | 70 | 31 | 85 | 62 | 62 | |
| October | 374 | 276 | 47 | 162 | | | October | 64 | 64 | 64 | 64 | 64 | |
| November | 251 | 76 | | 164 | | | November | 31 | 85 | 85 | 85 | 85 | |
| December | | 249 | 89 | 239 | 47 | 47 | December | 864 | 864 | 864 | 864 | 864 | |
| Mean | 249 | 89 | 239 | 47 | 47 | | Mean | 294 | 177 | 73 | 73 | 73 | |

cont. of APPENDIX H

| Monthly catch per unit effort (kg/rawl unit landing) of U. sulphureus in Leyte Gulf | | | | | | Monthly catch per unit effort (kg/rawl unit landing) of R. kanagurta in Leyte Gulf | | | | | |
|---|------|------|------|------|------|--|-----------|------|------|------|-----------|
| MONTH | 1984 | 1985 | 1986 | 1987 | 1988 | MEAN CPUE | MONTH | 1986 | 1987 | 1988 | MEAN CPUE |
| January | 10 | | 27 | 56 | 55 | 37 | January | 144 | 654 | 427 | 541 |
| February | | 23 | 91 | | 24 | 46 | February | 477 | 613 | 283 | 350 |
| March | | 11 | 47 | 56 | 24 | 27 | March | 510 | 331 | 396 | 401 |
| April | | | 143 | | 51 | 83 | April | 375 | 428 | 331 | 423 |
| May | | 7 | 64 | | | 36 | May | 182 | 451 | 136 | 321 |
| June | | 6 | 50 | 28 | | 28 | June | 157 | 598 | 200 | 327 |
| July | 28 | | 192 | 84 | 17 | 66 | July | 392 | 286 | 415 | 286 |
| August | | | 66 | | | 49 | August | 418 | 629 | 304 | 442 |
| September | 30 | 50 | 31 | 69 | 67 | 51 | September | 543 | 370 | 900 | 563 |
| October | | | 56 | 46 | | 29 | October | 578 | 1085 | 460 | 696 |
| November | 33 | 40 | 40 | 42 | 15 | 41 | November | 872 | 533 | 295 | 469 |
| December | | | | | | | December | | 208 | 422 | 501 |
| Mean | 25 | 23 | 73 | 54 | 36 | | Mean | 423 | 516 | 382 | |