



Fisheries Administration



Mekong River Commission

Annual Report

**Fish Abundance and Diversity Monitoring along Mekong River and its Tributaries
in Cambodia**

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Phnom Penh, December 2020

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Abbreviation and Acronyms

MRC	Mekong River Commission
FP	Fisheries Programme
LMB	Lower Mekong Basin
IFReDI	Inland Fisheries Research and Development Institutes
FiA	Fisheries Administration

Acknowledgements

The authors are grateful to the Mekong River Commission's (MRC) Fisheries Programme (FP) for providing financial support to the Inland Fisheries Research and Development Institute (IFReDI) of the Fisheries Administration (FiA) of the Royal Government of Cambodia to conduct this research.

We would like to thank first the members of the fieldwork teams, whose hard work and dedication to collect the data and made this report possible. Many thanks are also go to all local authorities who made the fieldwork possible, including all data recorders in six villages, namely Banfang, Day Lo, O Svay, Preah Bang, Koh Knhe, and Sang Vor, who spent a lot of time and provided all information for this research.

Sincere thanks are also given to Mrs. Kaing Khim, Deputy Director General of FiA, and MRC FP National Technical Manager, Mr. Bun Thang, Acting Director of Inland Fisheries Research and Development Institute (IFReDI), Mr. Sok Khom, MRC FP National Programme Coordinator, Dr. So Nam, Coordinator MRC-FP, and Mr. Vanna Noun, MRC FP Capture Fisheries Specialist who always provided guidance to us regarding this and other research activities; therefore, we have to express our great gratitude to them.

Executive Summary

The study is conducted at six sites on five Rivers of Cambodia: two sites on the Mekong River and one site each in Tonle Sap, Sekong, Sesan, and Srepok Rivers. Findings of this study are from the fishers' catch monitoring over a one-year period from January to December 2020. The results are based on the catch data recorded by 18 trained fishers whose main occupations are fishing. They recorded their daily fish catch in logbooks, noting the weight and size range of each fish species as well as other basic ecological information.

The fishers used 14 kinds of fishing gears. Gill nets (Stationary gill net, and drifting gill net) were the most common and effective gear catching 86% of all fish species, fallow by big horizontal cylinder trap 6%. Catch per fisher vary between 1.53kg/day and 6.39 kg/day. The Sekong River fishers catch the least fish and the fishers from the Tonle Sap catch the most. Catches include 248 fish species belonging to 48 families, with white fish comprising 97% of total fish weight. Key species are *Puntioplites proctozysron*, *Labeo chrysophekadion*, *Paralauca typus*, *Hypsibarbus malcolmi*, *Pangasius macronema*, *Cosmochilus harmandi*, *Puntioplites falcifer*, *Cyclocheilichthys enoplos*, *Hemibagrus wyckioides*, and *Pangasius larnaudi*. Catch comprises 3% of black fish species (mainly from *Channa striata* and *Osphronemus goramy*), 14 estuarine species (0.01 % catches all sites of the study area), 6 marine species (0.001%) and unknown species comprised 0.01 %.

1. Introduction

Fisheries monitoring is a core activity of the MRC. MRC Fisheries Programme had been supporting field fisheries monitoring on fish abundance and diversity monitoring since 2003. These monitoring activities will involve in the recording of fisher daily catches, fish catch composition, length frequencies and fishing gear dimensions used by target fishers along the Mekong River and its tributaries in the four member countries: Cambodia, Lao PDR, Thailand and Viet Nam.

This study is a part of a routine capture fisheries monitoring in the Lower Mekong Basin. It is implemented in close cooperation with fisheries line agencies in the four member countries. It intends to monitor fisheries yield indicators in the LMB contributing to the interpretation of the status and trends of basin-wide capture fisheries as well as providing a more effective means of monitoring and assessing the effects of water management and basin development activities. Particularly, it also aims to answer some basic questions, regarding such issues as the health of fisheries, effects of overfishing and the status of giant or endangered species.

The Mekong Basin has a wide variety of different habitats, including Mekong mainstream, tributaries, canals, floodplain, rice field, which play an important role for both the national economy and food security for the people of the Lower Mekong countries especially with regards to fish and fisheries in the basin.

Most of the people who live in the Mekong Basin are involved in fishing and other fishery related activities. Any change in the fish daily catch may affect their livelihoods. So the need of the information on the status and trend of fish abundance and diversity is necessary and useful for them in order to inform decision makers for sustainable fisheries management interventions.

Recently result of fisheries monitoring activities in the Lower Mekong basin reflected the positive trend in providing information on the fisheries resources status and trends, but these can be satisfied in some certain levels only, compared to the need of information to support basin-wide fisheries management decisions.

The study purpose is monitor fisheries yield indicators in the Lower Mekong Basin (LMB) contributing to the interpretation of the status and trends of basin-wide capture fisheries as well as providing a more effective means of monitoring and assessing the effects of water management and basin development activities.

To achieve this overall objective, the specific objectives are set as follows:

- To determine status and trends of fish abundance and diversity in the LMB through temporal and spatial variation.

- To provide information on likely fish catches by individual professional fishers using specific types of fishing gear in the Lower Mekong mainstream and its major tributaries;
- To populate and update the monitoring database on fish abundance and diversity in the LMB.

2. Methods

2.1 Studies sites

The fish monitoring fish abundance and diversity is fundamental for monitoring the status and trends of fisheries resources and for evaluating the outcome of management and basin development activities. Six monitoring sites were chosen to provide good geographic and habitat coverage of the Mekong Delta. The study was carried out in the Mekong River and its main tributaries. Four main tributaries situated in six studied sites from five rivers (Figure 1) of Cambodia were selected:

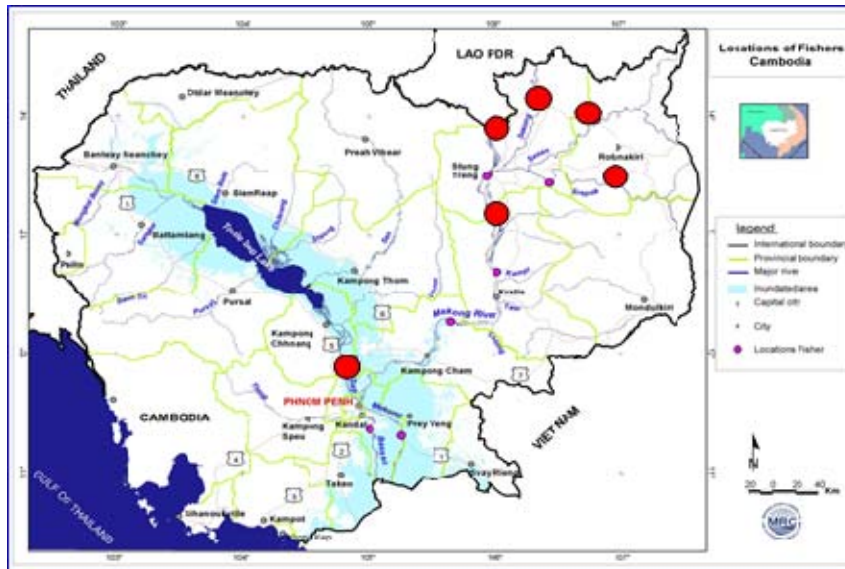


Figure 1: Cambodia map showing the studies sites

No	Province	District	Commune	Village	Habitat	GPS	
1	Ratanakiri	Lum Phat	Chey Udom	Day Lo	Srepork river	N 13°28.429'	E 106°59.299'
2	Ratanakiri	Veounsai	Banpong	Fang	Sesan river	N 13°57.523'	E 106°48.338'
3	Stung Treng	Siem Pang	Tmar Keo	Pres Bang	Sekong river	N 14°07.520'	E 106°23.944'
4	Stung Treng	Talarborivat	Ou Svay	Ou Run	Mekong river	N 13°52.287'	E 106°00.551'
5	Kra Tie	Sambo	Ou Krieng	Koh Khne	Mekong river	N 13°08.570'	E 106°04.280'
6	Kandal	Ponhea Leu	Kampong Luong	Sang Var	Tonlesap river	N 11°50.847'	E 104°48.142'

Table 1: List of monitoring sites

2.1.1 The Mekong River

As the Mekong passes into Cambodia, it flows over Khone Falls, experiencing an elevation drop of 21 meters. Within Cambodia, the Mekong has a variety of characteristic forms (Rainboth 1996). The Mekong River in Cambodia, from Lao PDR to upper Kratie, is characterized by rapids, deep pools, big rock formations, and flooded forest. This study was carried out in two stations in the Cambodian Mekong River mainstream: one was in Tala Barivat district, Stung Treng province, and other station in Sambour district, Kratie province.

2.1.2 The tributaries of the Mekong River

- The Tonle Sap River connecting the Mekong River with Great Lake reverses its flow with the rising of the Mekong during the wet season. Tonle Sap-Great Lake floodplain is filled two-thirds by the Mekong River and about one-third by the tributaries flowing into Tonle Sap Great Lake (Poulsen, A. F. and J. Valbo-Jørgensen (eds.) 2000). For the present study the monitoring station was located at the Tonle Sap River in Sang Vor village, Ponhea Leu district, Kandal province.
- The Srepok River originates in the central highlands of Viet Nam entering into Cambodia in Mondulkiri province flowing through Ratanakiri province and finally joining the Sesan River in Stung Treng province. The study was carried out in Dey Lo village, Lumphat district, Ratanakiri province.
- The Sesan River also originates in the central highlands of Viet Nam. In Cambodia it flows through Ratanakiri and Stung Treng provinces joining the Sekong River close to Stung Treng town. The study was carried out in Voeun Sai district, Ratanakiri province.
- The Sekong River originates in the South Eastern highlands of Lao PDR. In Cambodia it flows through Stung Treng province where it joins the Mekong River. The study was carried out in Siem Pang district, Stung Treng province.

2.2 Fisher selection

Fishers were selected on the basis of following criteria:

- Full-time fish
- Willingness
- Capacity to participate

There are 3 fishers selected at each monitoring site. Firstly, selected fishers were trained on recording of fishing information into a given “Fisher Catch Monitoring Form” (Annex 1). Each of the selected fishers was equipped with one 20-kg scale, one 1-kg scale, one fish measuring board, one calculator, one notebook, writing pens and twelve logbooks. All scales were calibrated before being distributed. A photo flipchart, containing more than two hundred fish species was provided to all fishers at the training.

2.3 Sampling techniques

Individual fishers will land quantities of fish. The total catch (landed) weight of all species combined for each gear type should be sorted, recording details of the weight, number and maximum length in separate rows for each species in a given “Fisher Catch Monitoring Form”. When landings are large quantity, fishers need first remove all large fish out, and for the small fish fishers need take 1kg from total weight to count number of heads, and multiplies with total catch to find out the heads number of all small fish, then plus with the number of large fish, and record in to the row number of fish for each species.

2.4 Sample sizes

On the basis of the relationship between the minimum detectable differences in estimates of mean gillnet CPUE in August - the month corresponding to peak gillnets catches, it was concluded that a minimum of three fishers should monitor their landings and effort at each sampling location. This decision represented a compromise between the need for precision and survey costs. Assuming each fisher fishes at less for 20 days per month, this would generate 60 samples of CPUE per month sufficient to detect a significant difference in mean CPUE (fish abundance) of approximately 15% at $(1-\beta) = 0.9$ and $\alpha=0.05$. S is reviewed annually to determine whether they are adequate in each habitat.



Figure 2: Activity of a fisher recording fish catch into the logbook

2.5 Data collection

The fishers were provided to training to developed and conducted. Each fisher was supplied one 20-kg (with calibrate 50 g) scale, one 1-kg scale (with calibrate 5 g), one measuring board, one notebook, and one ball point pen and twelve log books. A photo flipchart, containing more than two hundred fish species has been given to all fishers at the training. This chart is an upgraded version from the one used by the Assessment of the Mekong Fisheries Component in four countries: Cambodia, Lao PDR, Thailand and. The research team regularly went to monitor fishers and collect their logbooks every three months. All data recorded in the logbooks by fishers were verified and errors were corrected accordingly on site closely together with the fishers so as to improve data recording.

2.6 Data analysis

A database was designed to store all fishing information in Microsoft Access. After each field-visit, data was collected and entered into the database regularly. Moreover, some queries were

developed for data checking and cleaning. In addition, a series of queries was also made by former Fisheries Programme experts and agreed by all riparian countries for data processing and analysis.

2.7 Reporting

Guidelines and contents for annual reporting on Fish Abundance and Diversity Monitoring were developed and agreed by all riparian countries. It is therefore the report follow the same format and content with other countries.

2.8 Survey materials

Some materials and equipment's also were given to each fisher such as weighing scales, measuring board, notebook, pen guidelines for completing the “Fisher Catch Monitoring Form” in local language. Weighing scales are maintained and calibrated regularly.

3. Results

3.1 Fisher profiles

The age of fisher's ranges from 25 to 74. Majority of fishers are 51 – 74 years old, accounting for 44.44% (Figure3).

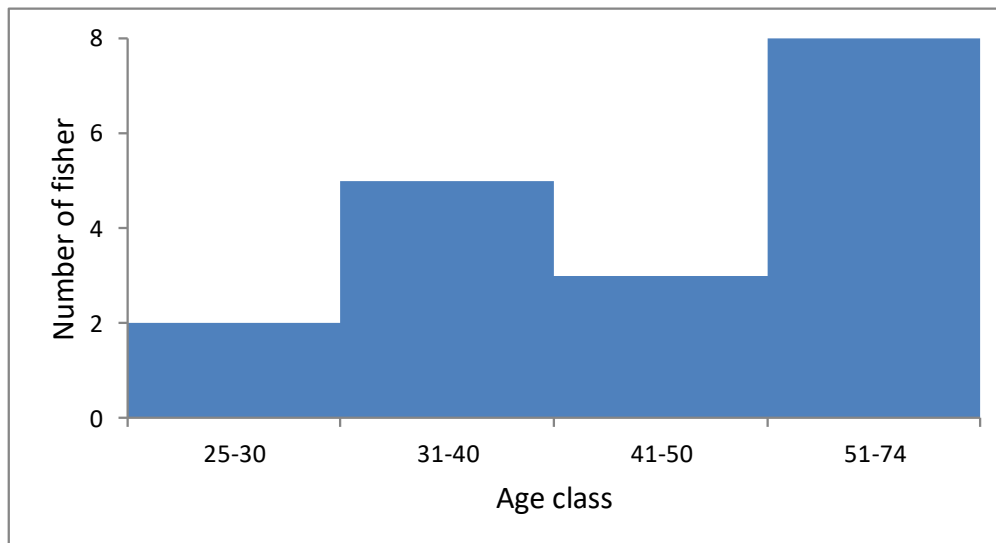


Figure 3: Age of fishers

All fishers have education, but have only two levels and almost of fishers are primary school (66.67%), and secondary school (33.33%) (Figure 4).

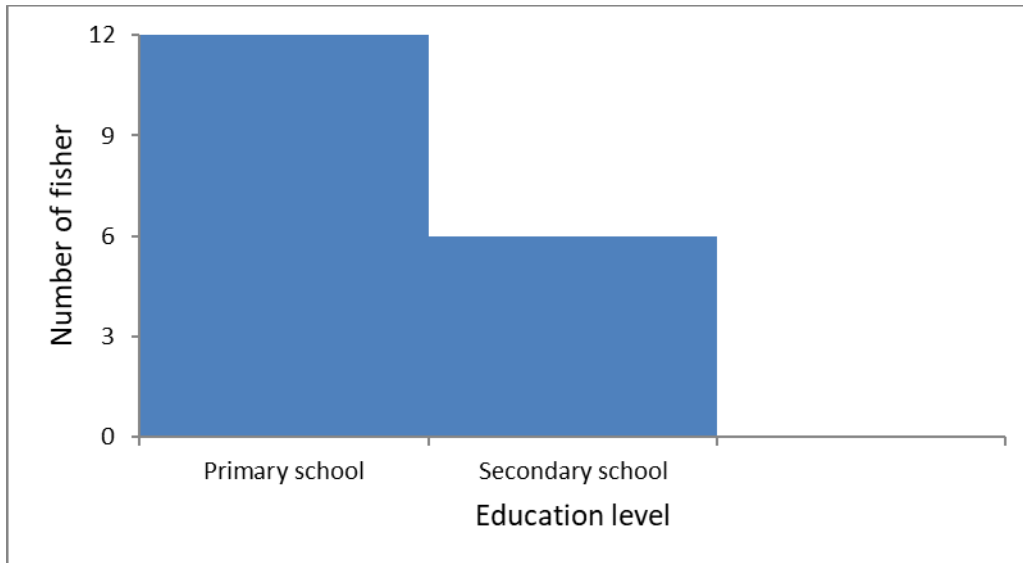


Figure 4: Education level of fishers

The fisher’s fishing experience ranges from 14 to 46 years. Many of fishers have experience ranges from 14 – 30 years in fishing (61.11%) (Figure 5).

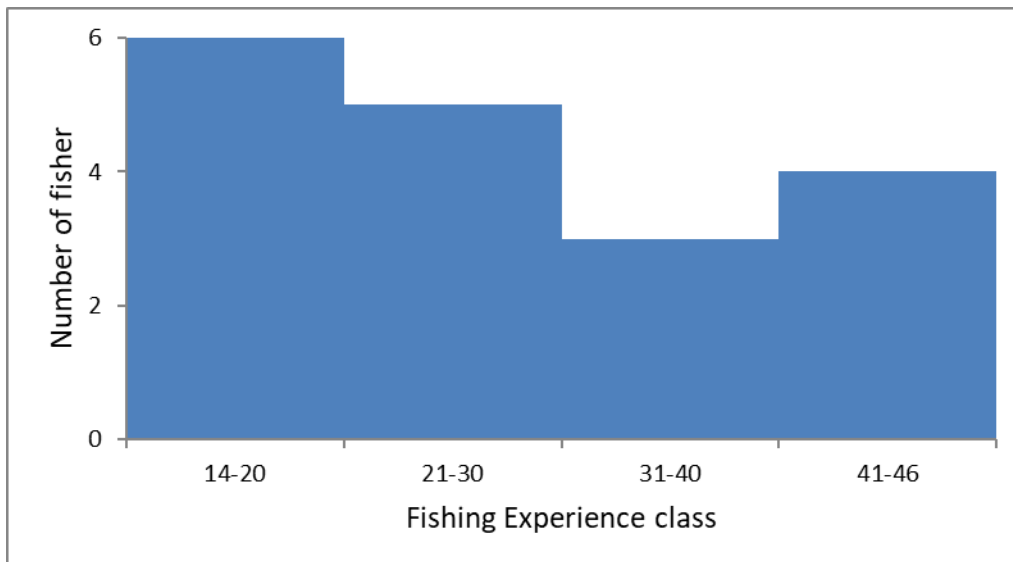


Figure 5: Fishing experience of fishers

3.2 Fishing habitats

There are 7 habitats: Mekong River, Mekong tributaries, Stream, Floodplain, Pond, Lake, and Rice field were found during one year study period from January to December 2020 of Fish Abundance and Diversity Monitoring along Mekong River and its tributaries in Cambodia. Through the graphic Tributary caught a lot every month follow by Mekong River and Steam, for other habitats caught leas (Figure 6).

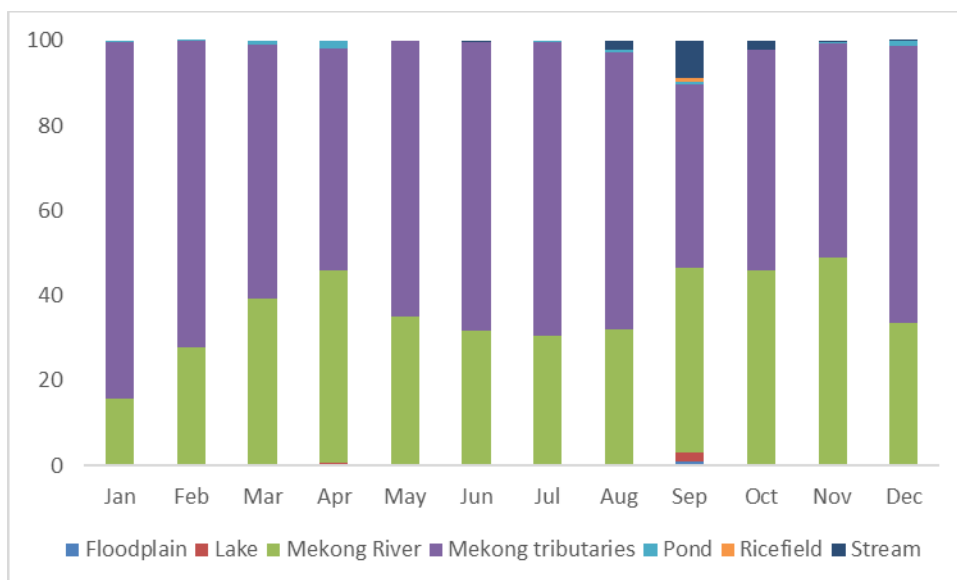


Figure 6: Percentage catches by habitats and by month

3.3. Fishing gear monitored (fishing effort)

3.3.1. Explaining the number of fishing gear used by sites

There are fourteen gears types used to fishing in this monitoring. Gill net stationary is using at all sites (6 sites), follow by Drifting gill net, and Hook and line (using 5 sites), 100 instead trap, Snakehead, Wedge-shaped scoop basket, and Vertical Vase trap is using only one site.

No	Gear name	Site					
		Day Lo	Fang	Koh khne	Ou Run	Pres Bang	Sang Var
1	100 treads trap			5			
2	Big bamboo cylinder vertical entrance trap		16	32		60	
3	Big horizontal cylinder trap		71	69		79	
4	Cast net		30	11		53	23
5	Drifting gill net	40	389	26		33	149
6	Giant wedge cone trap	3	1	3	1		
7	Hook and line	4	38	55		36	57
8	Hook long line		52	31		118	71
9	Horizontal cylinder trap for rice fields		2			1	
10	Snakehead wedge trap			26			
11	Stationary gill net	1208	470	846	1065	689	858
12	Trap or Reak					121	31
13	Vertical Vase trap		11				
14	Wedge-shaped scoop basket			6			

Table 2: Composition of fishing gear used

3.3.2. Fishing of Gill net stationary, Drifting gill net and Hook and line in all sites

The total of time used by Stationary gill net, drifting gill net, and Hook and line in each site is show in the graph bellow:



Figure 7: Fishing time of Stationary gill net, Drifting gill net, and Hook and line

3.3.3. Seasonally fishing gear use by sampling location

Seasonally fishing gear use by sampling location of Stationary gill net, Drifting gill net, and Hook and line

- Dry season

The graphic show for dry season in Day Lo, Sang Var, and Ou Run has most used Stationary gill net, for Drifting gill net, and Hook and line saw used in Fang, Sang Var, and Pres Bang.

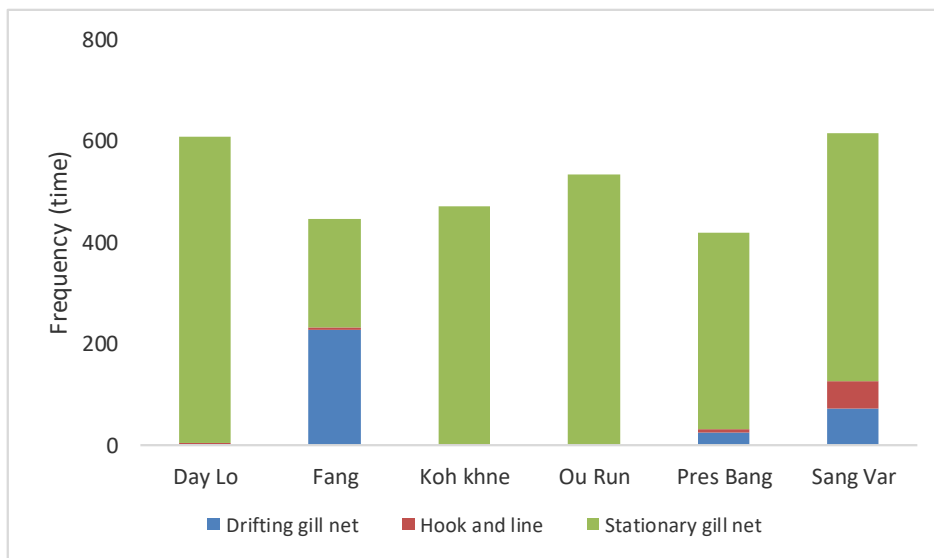


Figure 8: Dry season fishing by time of Stationary gill net, Drifting gill net, and Hook and line

- Wet season

In wet season Day Lo, and Ou Run has most used Stationary gill net, follow by Drifting gill net has used in Pres Bang, Fang, Day Lo, and Sang Var, and Hook and line has used few times in other sites but not more than 50 times.

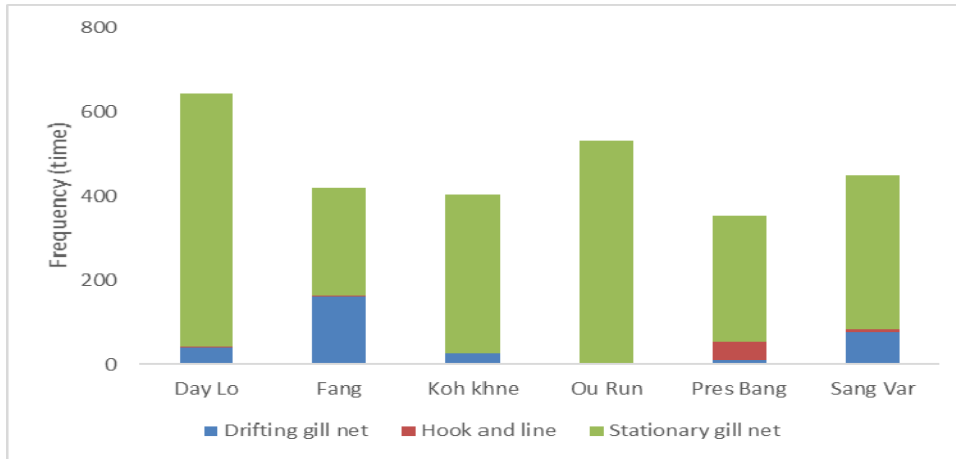


Figure 9: Wet season fishing by time of Stationary gill net, Drifting gill net, and Hook and line

3.3.4 Monthly variation of Stationary gill net mesh sizes by site

The stationary gill net mesh sizes were used all study areas were group to 5 groups range from ≤ 4 cm to > 13 cm. The main gillnet mesh sizes range from ≥ 4 cm to 7 cm, and 12-13cm were used all studies sites. For mesh sizes range from 8-11 cm only used in Koh Khne and Day Lo sites. (Figures10).

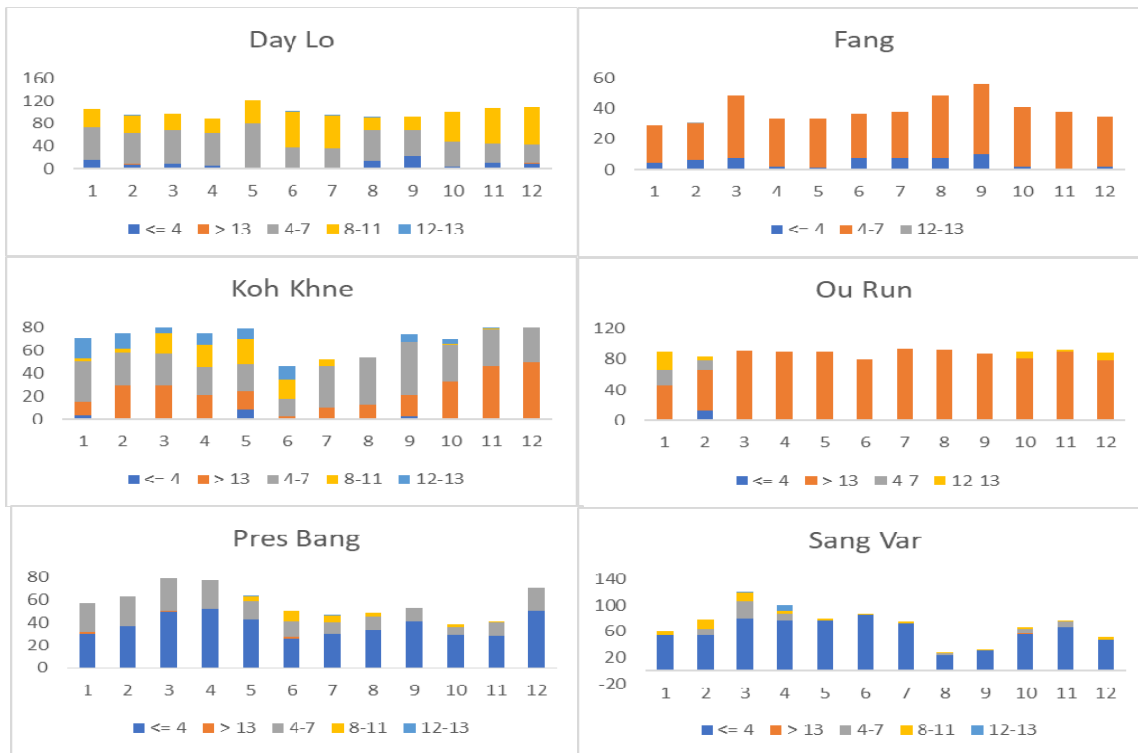


Figure 10: Monthly variation of Gill net mesh sizes by sit

3.3.5 Monthly variation of Hook sizes by site

The Hook and line mesh sizes were used in five study areas and were grouped into 4 groups ranging from ≤ 4 cm to >13 cm. The main Hook mesh sizes ranging from 9-13 and >13 were used most at the study sites. For the mesh sizes ≤ 4 , 4-7 were only used in Pres Bang, and Day Lo sites. (Figure 11).

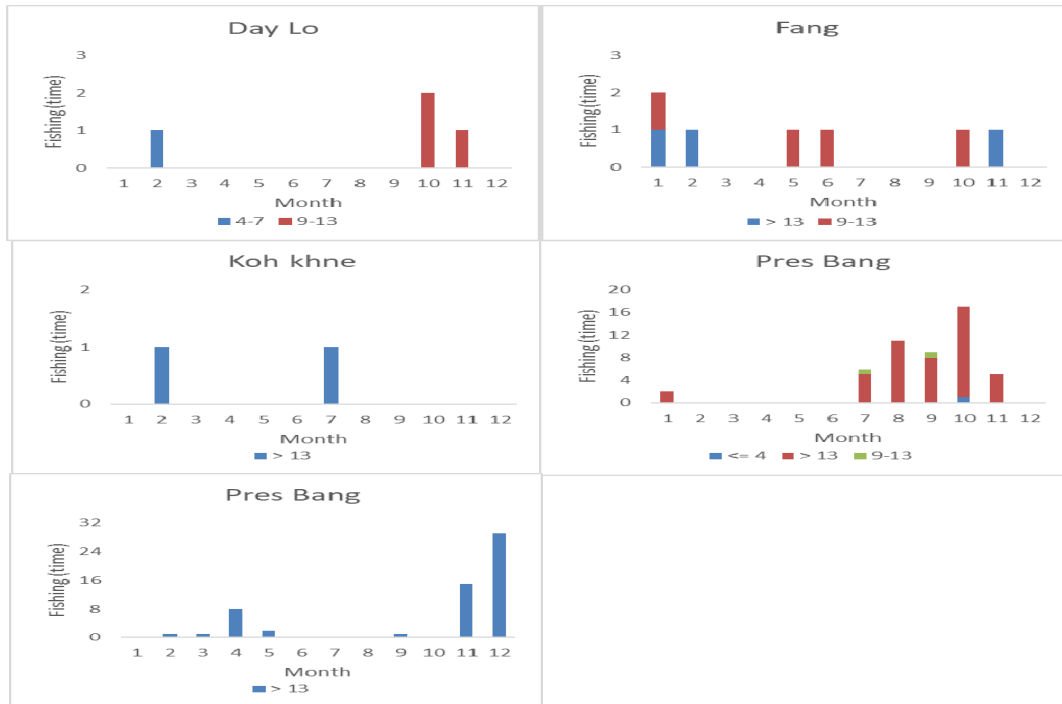


Figure 11: Monthly variation of Hook long line mesh sizes by site

3.3.6 Mean of fishing

Means of fishing has divided to: no engine used (paddle boat, and on foot), and engine used by horsepower. Through one-year study period we found 8 kinds of Means of fishing were used in studies areas (Figure 12). The engine used by horsepower Hp 6.5 and Hp6 used most times. The means fishing boat equipped with engine Hp 8, and Hp18 used least time in a year.

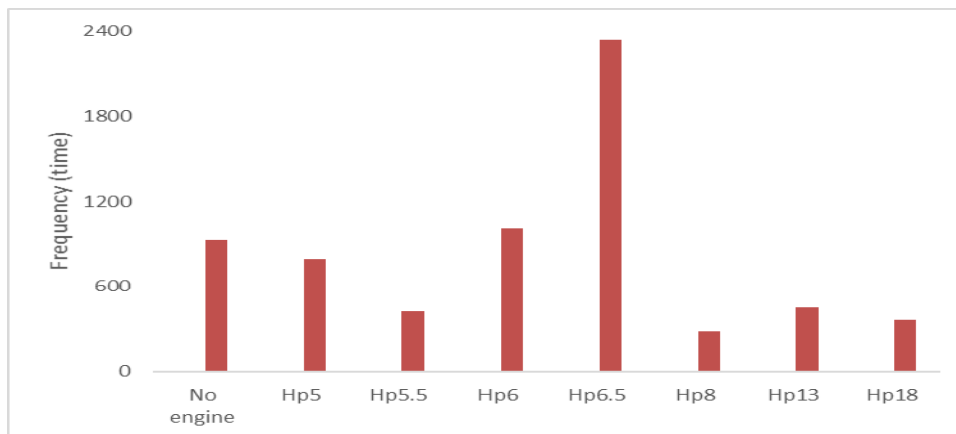


Figure 12: Mean of fishing was used all sites

3.3.7 Variation of means of fishing by month and by sites

Variation of Means of fishing by fishing boat equipped with engine 6.5 Hp is highest, and used every month, and follow by Means of fishing No engine (paddle boat, and on foot) (Figure 13).

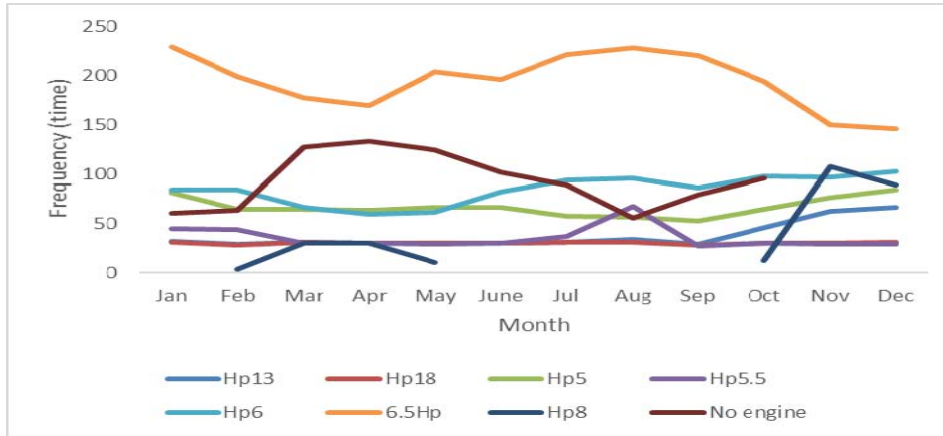


Figure 13: Variation of means of fishing by month

The means of fishing by no engine has been used most times in Sang Var, and follow by boat with engine horse power engine Hp 5 used in Pres Bang, and horse power Hp 6.5 used in 4 sites (Figure 14).

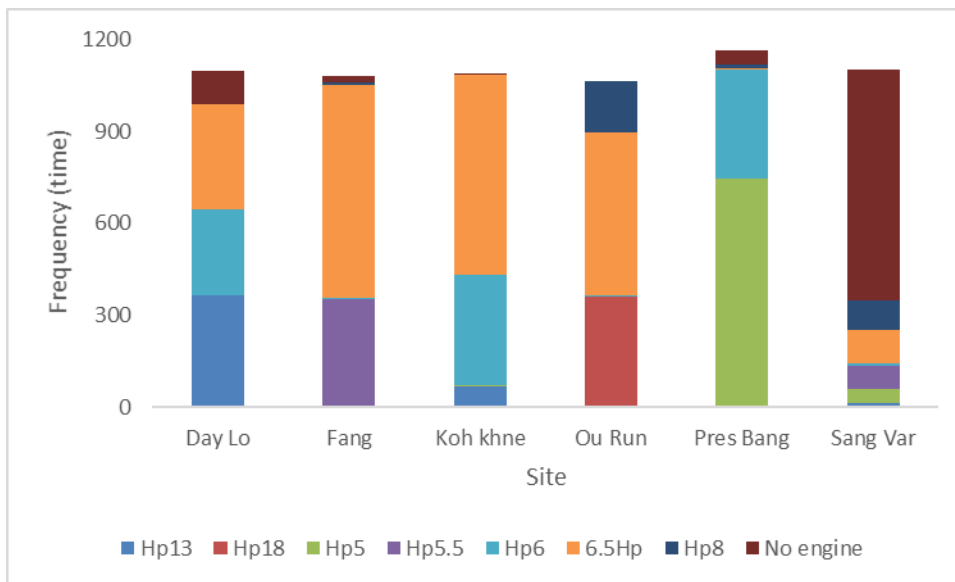


Figure 14: Means of fishing by sites

3.3.8 Actual fishing hours per fishers per fishing trip by month by sites

Generally fishers all sites used gill net stationary for every months of the year, fishers soak their net in water more than 10 hour per fishing time Soaking time in Koh Khne, and Ou Run are longer than other sites (13 to 14 hours per soaking time), and in Fang site is the less, the soaking time in this site from 7 to 11 hours (Figure 15).

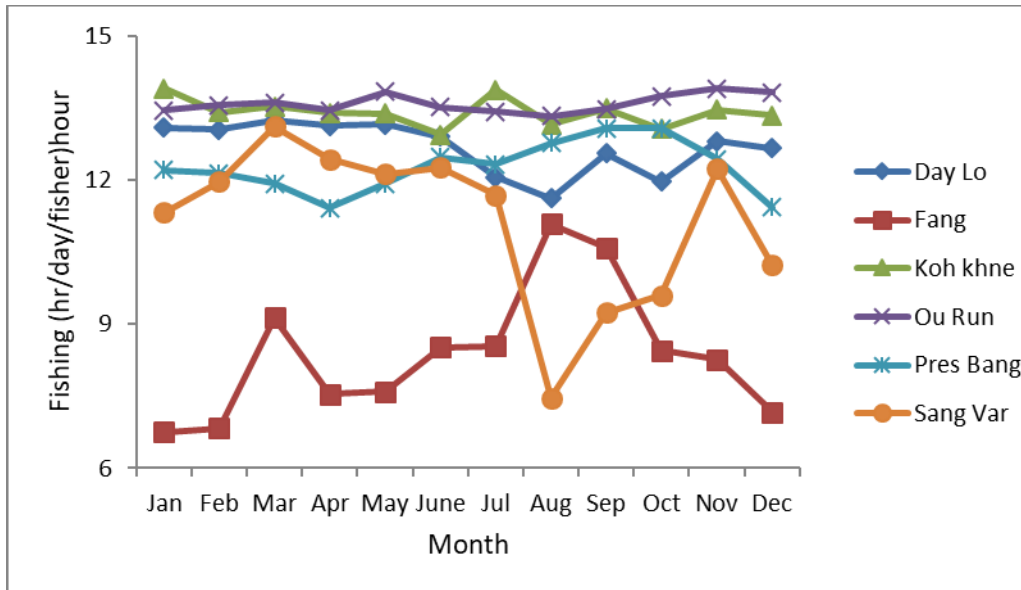


Figure 15: Average of fishing hours (soaking time)

3.4 Fish Catch

3.4.1 Annual total catch by target monitoring sites

Total annual catch all sites is 20,493 kg. Sang Var site is highest with the catches 6,123 kg, and took (34%) of total catches all sites, Pres Bang site catches less only 1,230 kg, and took only (6%) (Figure16).

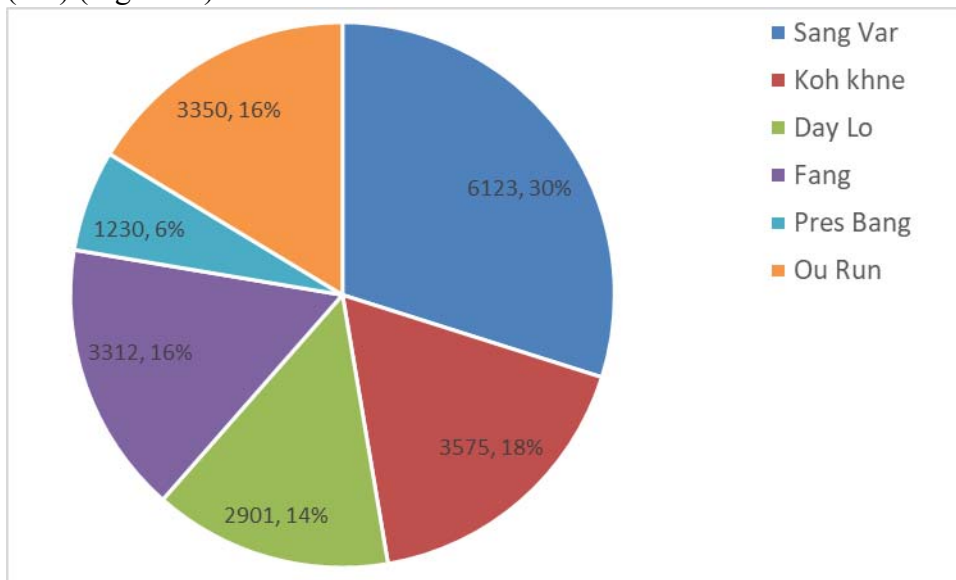


Figure 16: Annual total catch by target monitoring sites

3.4.2 Monthly total catch by target monitoring sites

The monthly total catches in Sang Var site highest in January 2,479 kg, during the peach fish migration from Tonle Sap to Mekong River. For Day Lo site, the total catch high in May, and

August (fish migrated down to the pool, and main stream), and in Pres Bang site have the lowest catch compared to other sites (Figure 17).

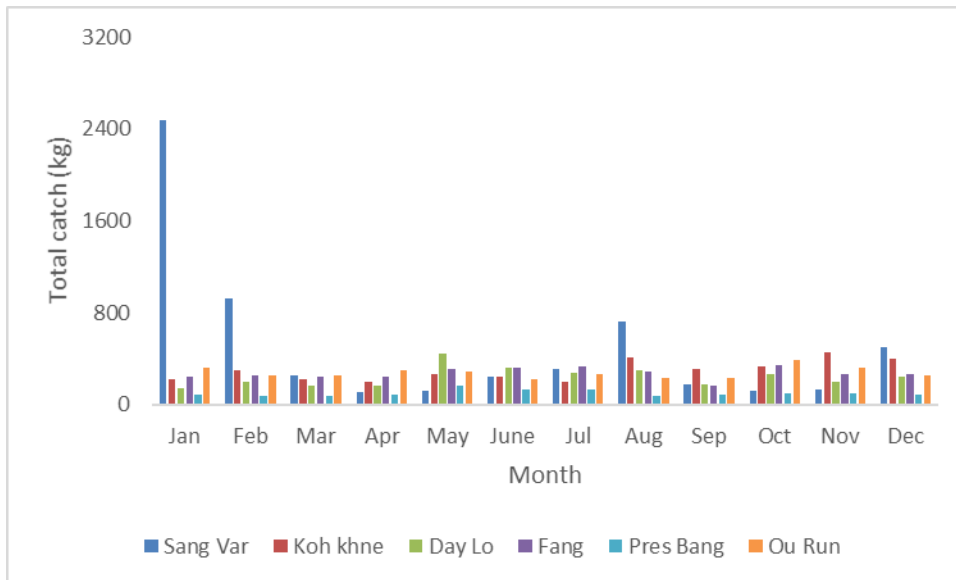


Figure 17: Monthly total catch by target monitoring sites

3.4.3 Annual fish catch by gear types

One-year study period, 14 types of fishing gears were used all sites, stationary gill nets were the most common and effective gears with total catching 13,029 kg, and follow by drifting gill net 5,131 kg, of total fish catches. Giant wedge cone trap catches less only 10 kg, and 11 kg (Figure 18).

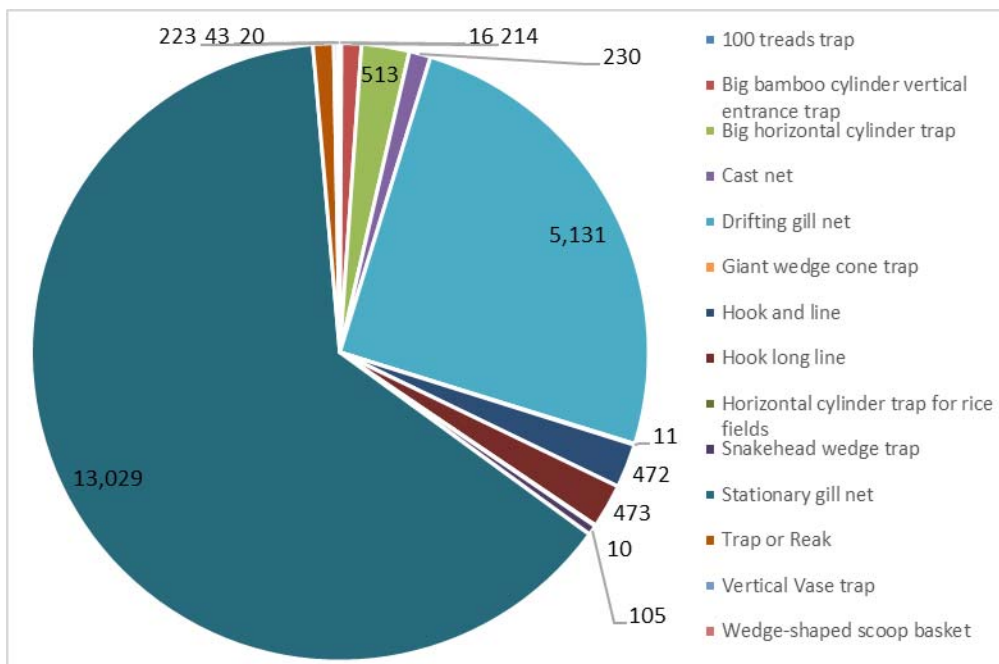


Figure 18: Annual fish catch by gear types

3.4.4 Total catch by target monitoring sites by gear types

Gill net (stationary gill net, and drifting gill net) are used more frequency, and all sites, therefore catch from gill net also highest. There are nearly 100% of all gears total catch took from gill net in Ou Run, Sang Var, and Day Lo villages (Figure 19). Big horizontal cylinder trap, and Hook long line also comment fishing gears in 3 sites of studies arrears (Koh Khne, Fang, and Pres bang sites), and there are 4 fishing gears only used in one site such as 100 instead trap, Vertical Vase trap, Snakehead wedge trap, and Wedge-shaped scoop basket.

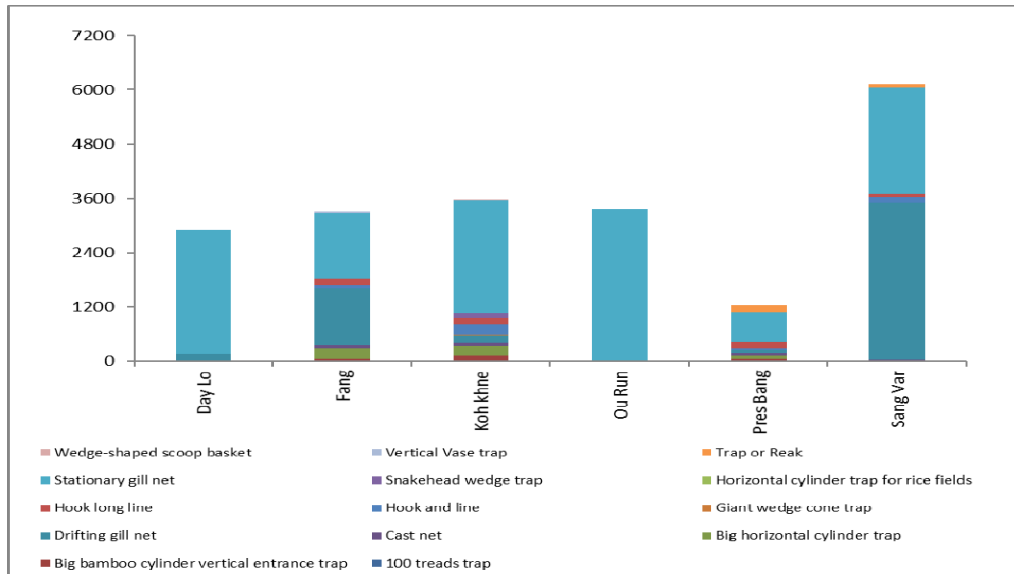


Figure 19: Catch by target monitoring sites by gear types

3.4.5 Total catch by habitats types

Through one-year study we found 7 habitat types. Mekong tributaries comprised 13,385 kg of total fish catch, Mekong River comprised 6,766 kg of the total catch, the third is Stream comprised 188 kg, and other 4 habitats have total catches small.

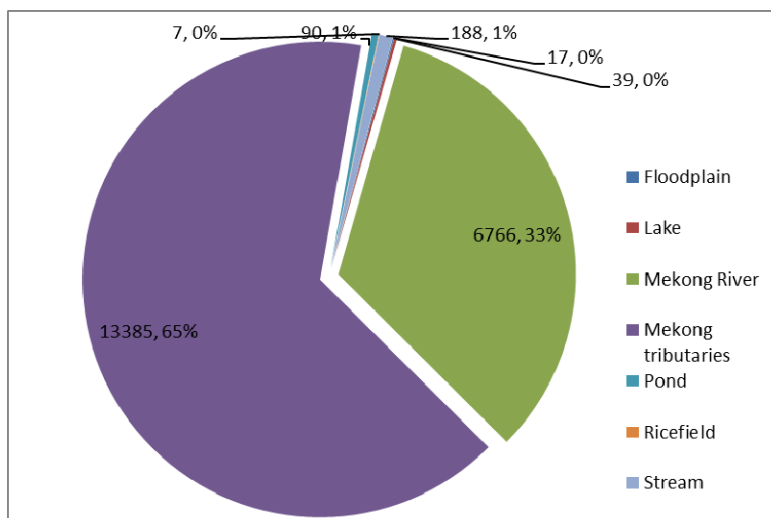


Figure 20: Total catch by habitat types

3.4.6 Total catch by habitat types by sites

Catch in sites Sang Var, Ou Run, and Koh khne come from only two fishing habitats type, these sites are located along Tonle Sap River of Kandal province, and Mekong River of Kratie, and Stung Treng provinces. The catch from other three sites (Pres Bang, Fang, and Day Lo), high have catches most habitats, and the big catches come from one fishing habitat types is Mekong tributaries. Pres Bang is the site have many habitats if compare to other sites (6 habitats in 7 of habitats total), this site has big impacted from dam construction at upper stream and fishers tried to find any habitats for fishing.

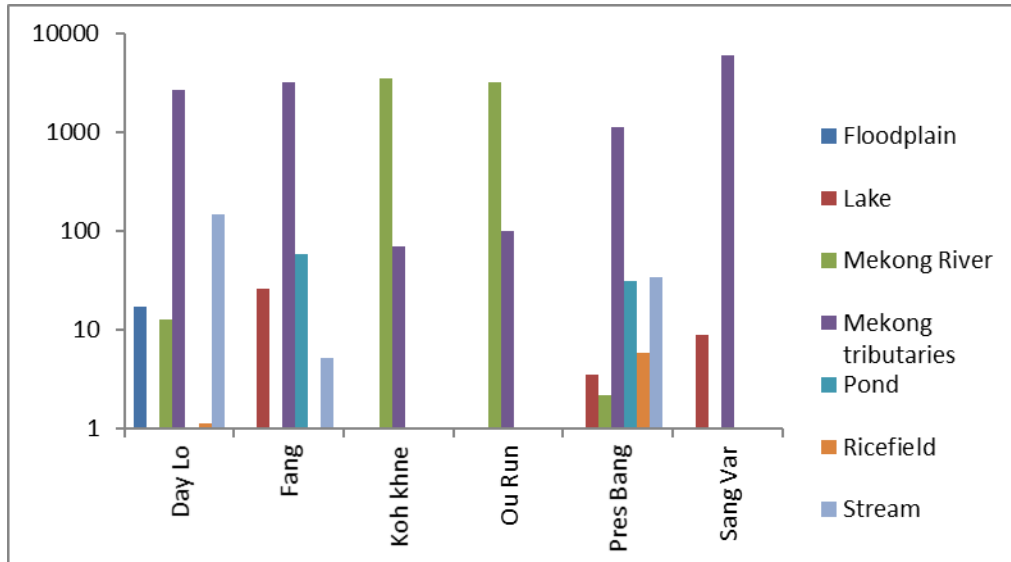


Figure 21: Catch by habitat types by sites

3.4.7 Total catch of Mekong species versus introduced species

Proportion of catch of Mekong species versus introduced species is showed in figure 22. Especially Exotic catch only 0.06 % of the total catch, and made up in all sites of study areas. There are 5 exotic species recorded such as *Cirrhinus cirrhosis*, *Cyprinus carpio*, *Hypostomus plecostomus*, *Oreochromis niloticus*, and *Labeo rohita*.

Species name	Day Lo	Fang	Koh khne	Pres Bang
<i>Cirrhinus cirrhosis</i>				1.02
<i>Cyprinus carpio</i>			7.50	0.12
<i>Hypostomus plecostomus</i>	0.12			
<i>Labeo rohita</i>		0.30	10.90	
<i>Oreochromis niloticus</i>		4.80		

Table3: Total catch exotic (kg) species by site

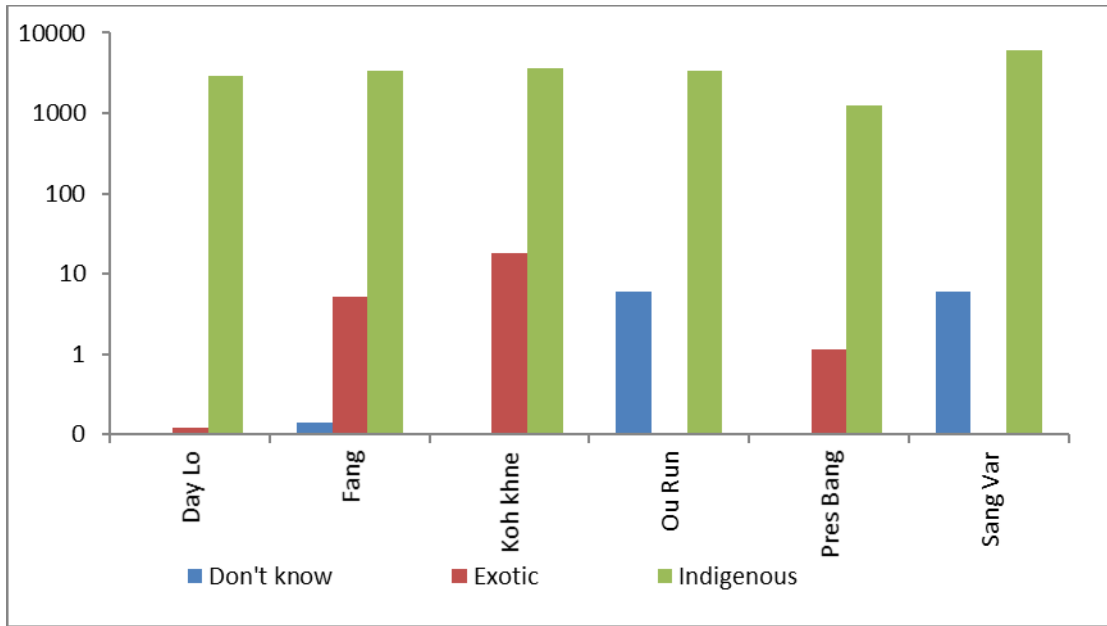


Figure 22: Catch of Mekong species versus introduced species

3.4.8 Total catch by fish feeding types (Herbivorous, Omnivorous, and Carnivorous)

There are four main feeding types (Omnivorous, Carnivorous, Herbivorous, and Herbi/omnivorous), other species may be characterized by combined these types such as: Carni/Omnivorous, Molluscivorous, Don't know, Omni/Herbivorous, Piscivorous, and Filter-feeder phyto-bacteria. Catch from Omnivorous, and Carnivorous are dominant with 67% and 12 feeding types, 20% respectively (Figure 23).

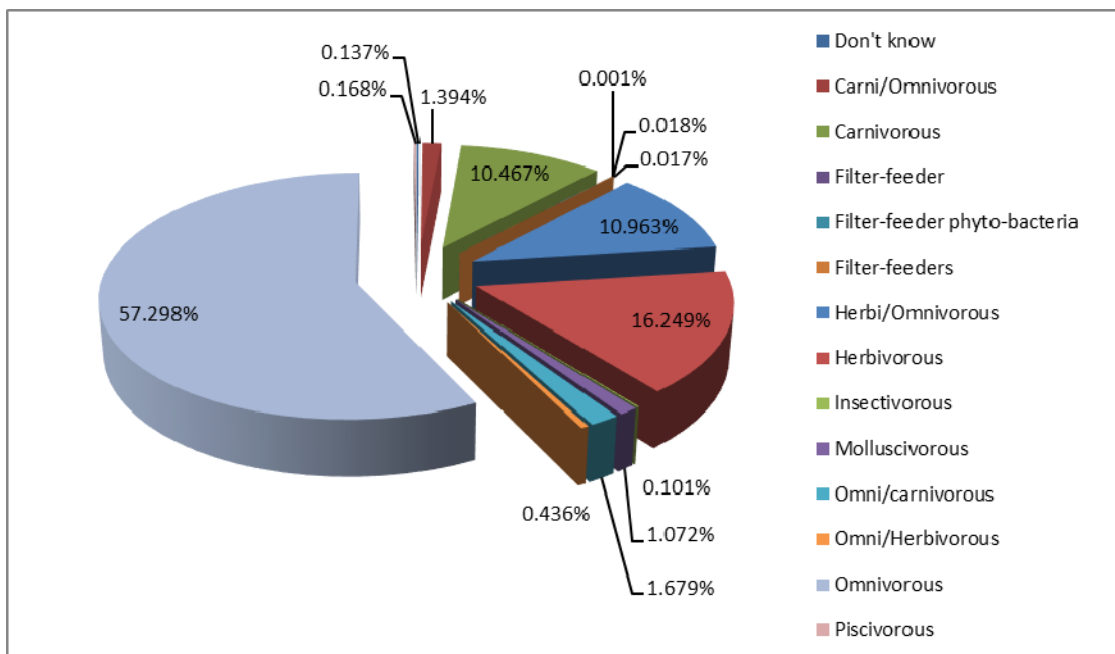


Figure 23 Catch by fish feeding types

3.4.9 Total catch by fish feeding types by sites

Catch by fish feeding types and by sites are showed in Figure 24. Omnivorous specie is the most important in the total catch by all sites of the study arrears. Filter-feeder catch in only in Pres Bang site with 0.2 kg from all total catches.

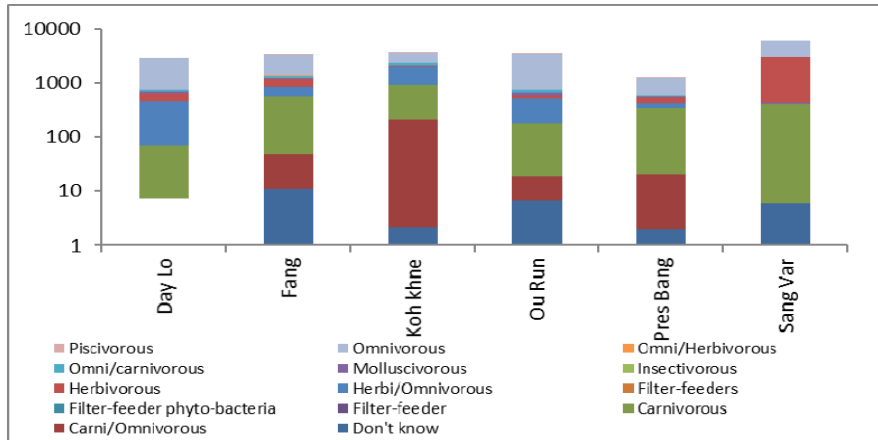


Figure 24: Catch by fish feeding types by sites

3.4.10 Total catch by feeding types by sites by habitats

Total of catch by feeding types by sites by habitats is showed in Figure 25. Omnivore comes from mainly in all sites, while species are caught mainly in Mekong River and Mekong tributary.

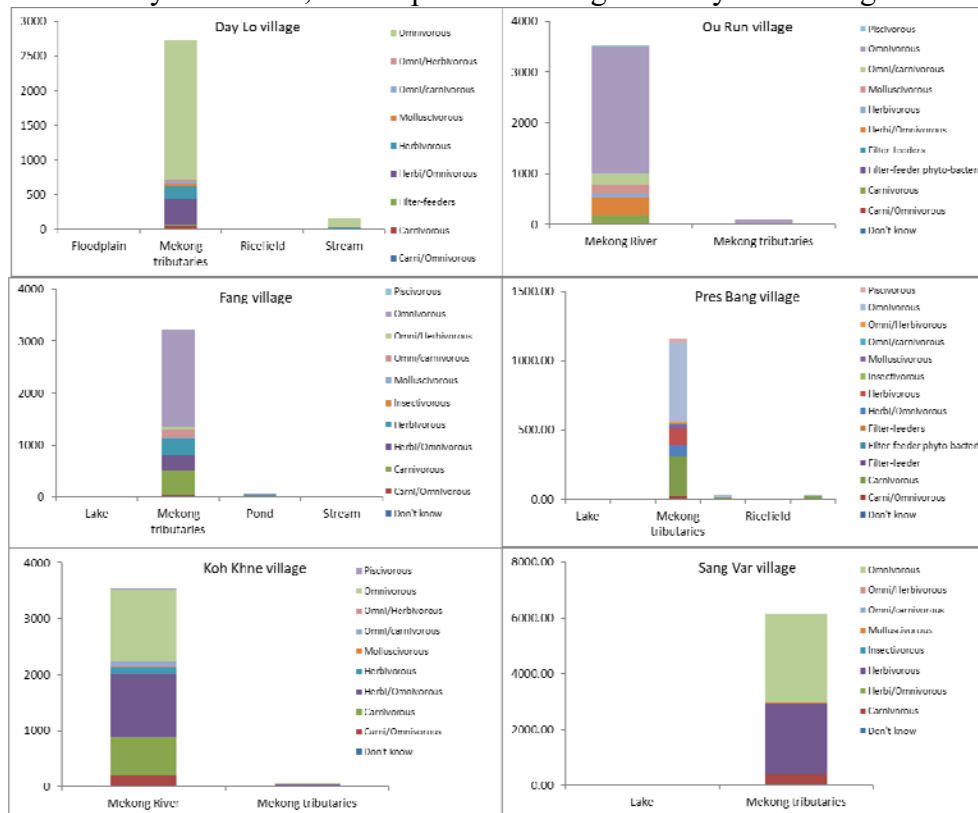


Figure 25: Catch by feeding types by sites by habitats

3.4.11 Total catches by ecological characteristic of fish species

Species caught are mainly white fish group (97.76% of the total catch), followed by black fish group (2.18%) (Figure 26). Don't know, Marine fish group and estuarine fish group catches less (Marine 2 kg, estuarine 15 kg and Don't know 17 kg). Those species can distribute in estuarine and further inland water, especially during the dry season as brackish water intrusion penetrates further in land waters.

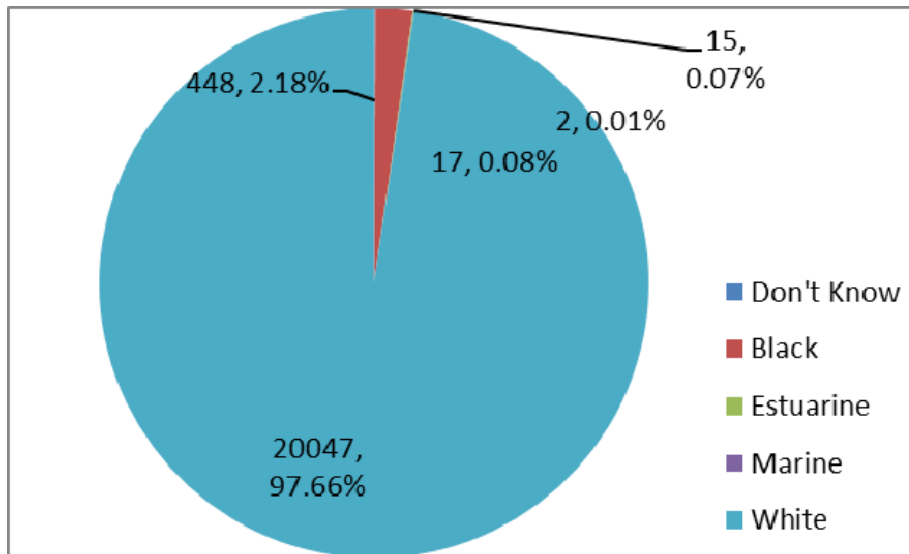


Figure 26: Catch by ecological characteristic of fish species

3.4.12 Total catches by ecological characteristic of fish species by habitats

Species caught are mainly white (20,047 kg) and black (448 kg) fish group found in all habitats, while don't know, estuarine and marine species are dominant in river and Pond system not found in 4 habitats: Floodplain, Stream, Lake, and Rice Field (Figure 27).

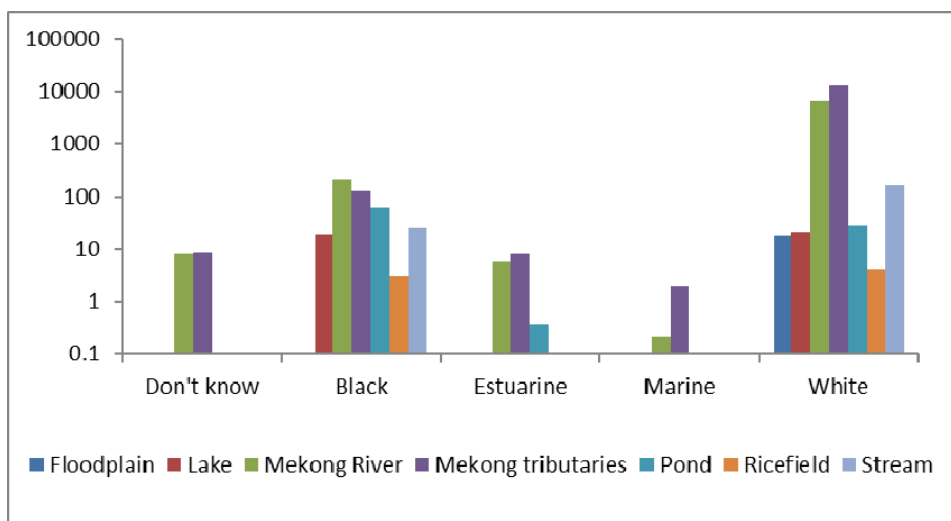


Figure 27: Catch by ecological characteristic of fish species by habitats

3.5 Catch Rate (CPUE)

3.5.1 Monthly average catch rate of daily catch versus average actual fishing hour per fishing day by fisher

At all sites combined, daily catch rates per fisher are relatively high in January, as the water flow out from Great Lake; in the term of fish migration down to Main stream (Figure 28).

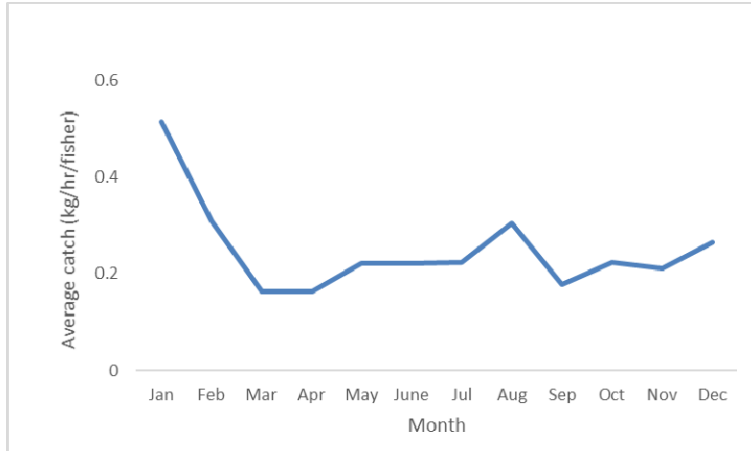


Figure 28: Monthly average catch rates

3.5.2 Monthly average catch rate of daily catch versus average actual fishing hour per fishing time by sites

Monthly catch rates highest in Sang Var (2.28 kg/hour/fisher/) relatively high in January, and August, in January fish migrated from the stream to river to find habitat for dry season, in term of fish migrated from Gear Lake to down main stream it makes catches rat high. August is the time of raining season, the water level in river start to increase and flowed in to the steam, fish migration to feed in plodded areas,

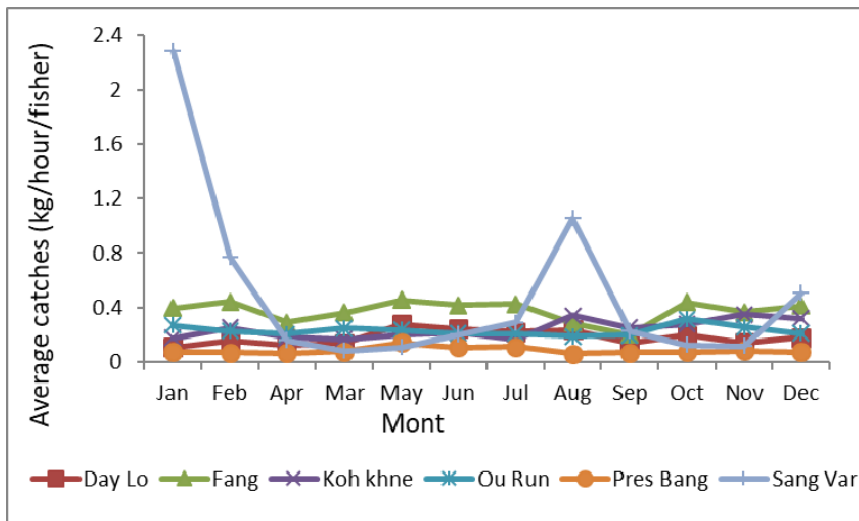


Figure 29: Monthly average catch rate per actual fishing hour per fishing time by sites

3.5.3 Monthly average catch rate per fisher by gear types

Catch rates between gears are showed in Figure 30. Four fishing gears were caught all year round (Stationary gill net, drifting gill net, Hook long line, and Hook and line) The catch rates by fishing gear are quite high by drifting gill net, and the big caught has in December, and January while fish migration from Great Lake down to main stream.

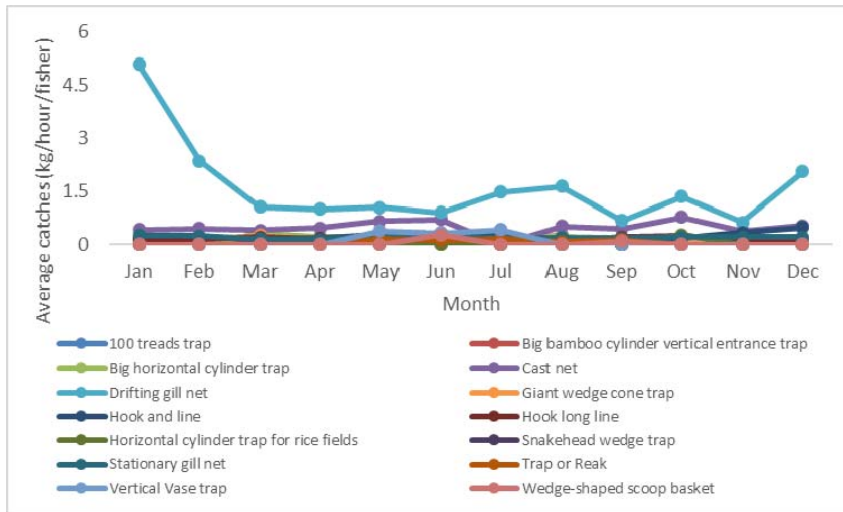


Figure 30: Monthly catch rate per fisher by gear types

3.5.4 Daily variation in catch rate per fisher

At all sites combined, average catch rates in terms of (kg/hour/fisher) is showed in Figure 31. Fish catch to be relatively high during the start flood season, and the peak migration of fish. Considerably the catch is suddenly high from June to the middle of July, but the catch in site Sang Var therefore catch is very high from the first week to the second of January.

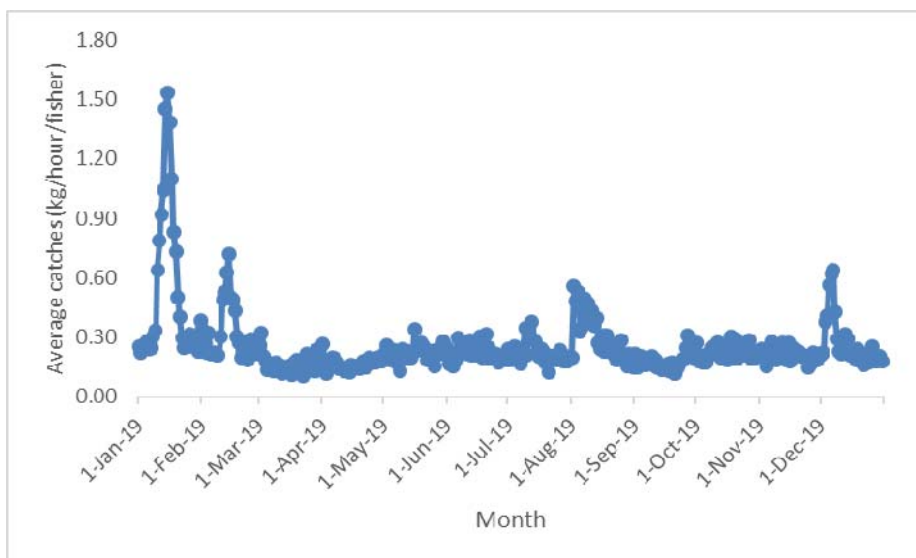


Figure 31: Daily variation in catch rate per fisher

3.5.5 Daily catch rate per fisher by gear types

Daily catch rate by gear types is showed in Figure 32. Catch rates are relatively high by drifting gill net during the fish peak migration down from flooded plan to main stream.

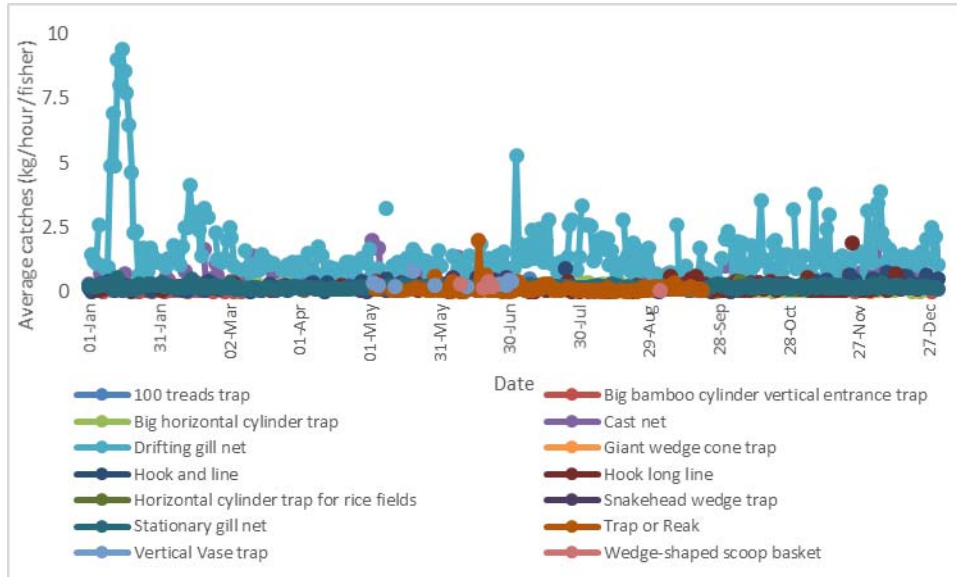


Figure 32: Daily catch rate by gear types

3.5.6 Catch rate per hour per fisher (by a unit of stationary gill net)

Catch rates in terms of (g) per Stationary gill net fishing hour per 100m² of net are examined (Figure 33). The catch rates are big high in second week of January, first week of June, second week of January, and second week of December. The high catch rate ranges from 0.006kg/hr/100m² to 0.13kg/hr/100m².

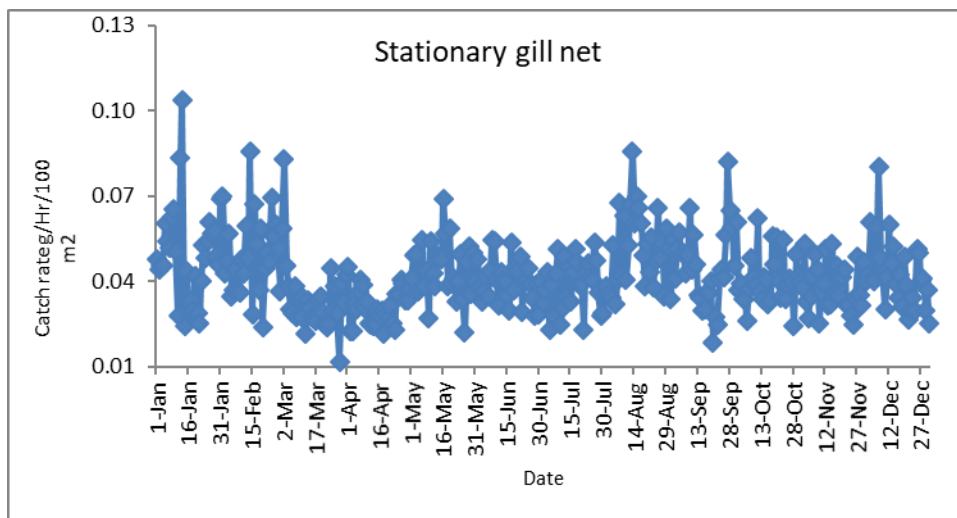


Figure 33: Daily catch rates per gill net fishing hour per 100m²

3.5.7 Correlation between catch rates versus water level

Catch rates in terms of g per fishing hour per m² of net are examined in relation to tide conditions. For stationary gill net: catch rates in relation to tide conditions are different by sites (Figure 34). Catch rates all sites are the highest in falling time. Day Lo and Fang sites Catch rates highest till 1.08 to 2.15 g per fishing hour per m² during Don't know times.

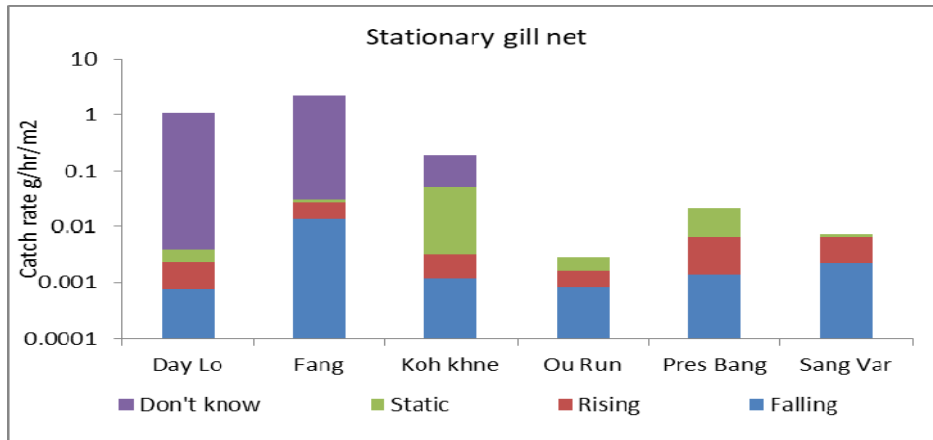


Figure 34: Catch rates by tide conditions of Stationary gill net

3.6. Species diversity

3.6.1. Species composition

There are 248 fish species recorded at all sites. The highest no. of species is site Pres Bang with 163 species and the lowest is site Sang Var with 79 species.

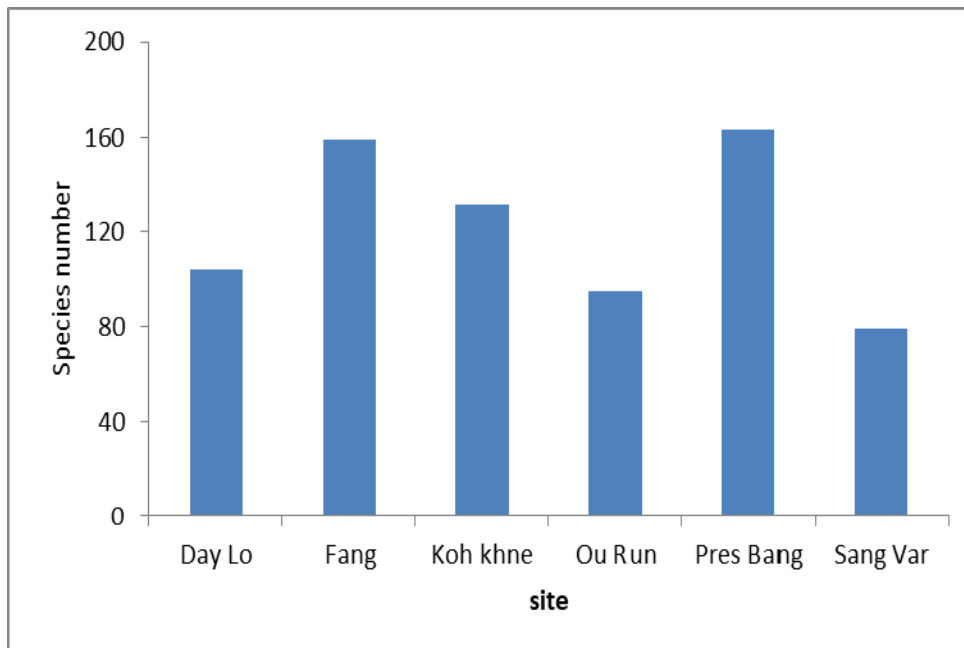


Figure 35: Species composition by sites

3.6.2. Species composition by gear types by sites

Here we show two fishing gears it is Stationary gill net and Hook long line. Species composition by gear types are a great different between Stationary gill net and Hook long line with the highest 141 species compared with 50 species, respectively.

for the Stationary gill net, the highest species composition is site Pres Bang(141sp), and les species site Sang Var(57sp). For Hook long line, the highest species composition is site Fang(50sp), and les species site Day Lo (5 sp).

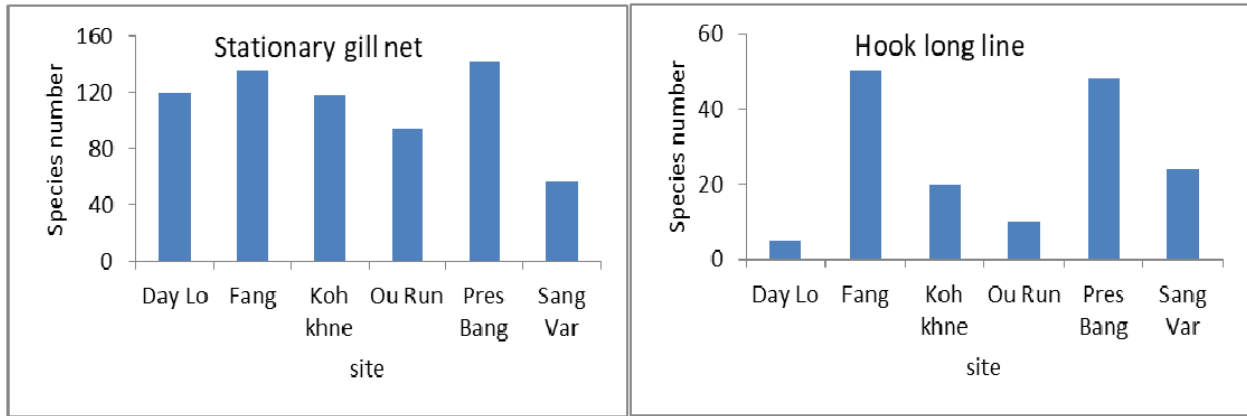


Figure 36: Species composition by Stationary gill net sites and Hook long line site

3.7. Maximum length frequencies (top ten species)

3.7.1 Distribution of maximum length by species

Top ten species in terms of amount of catch made up 57% of all distribution of maximum length of the top ten species. Distribution of maximum length by species is displayed in Figure 37.

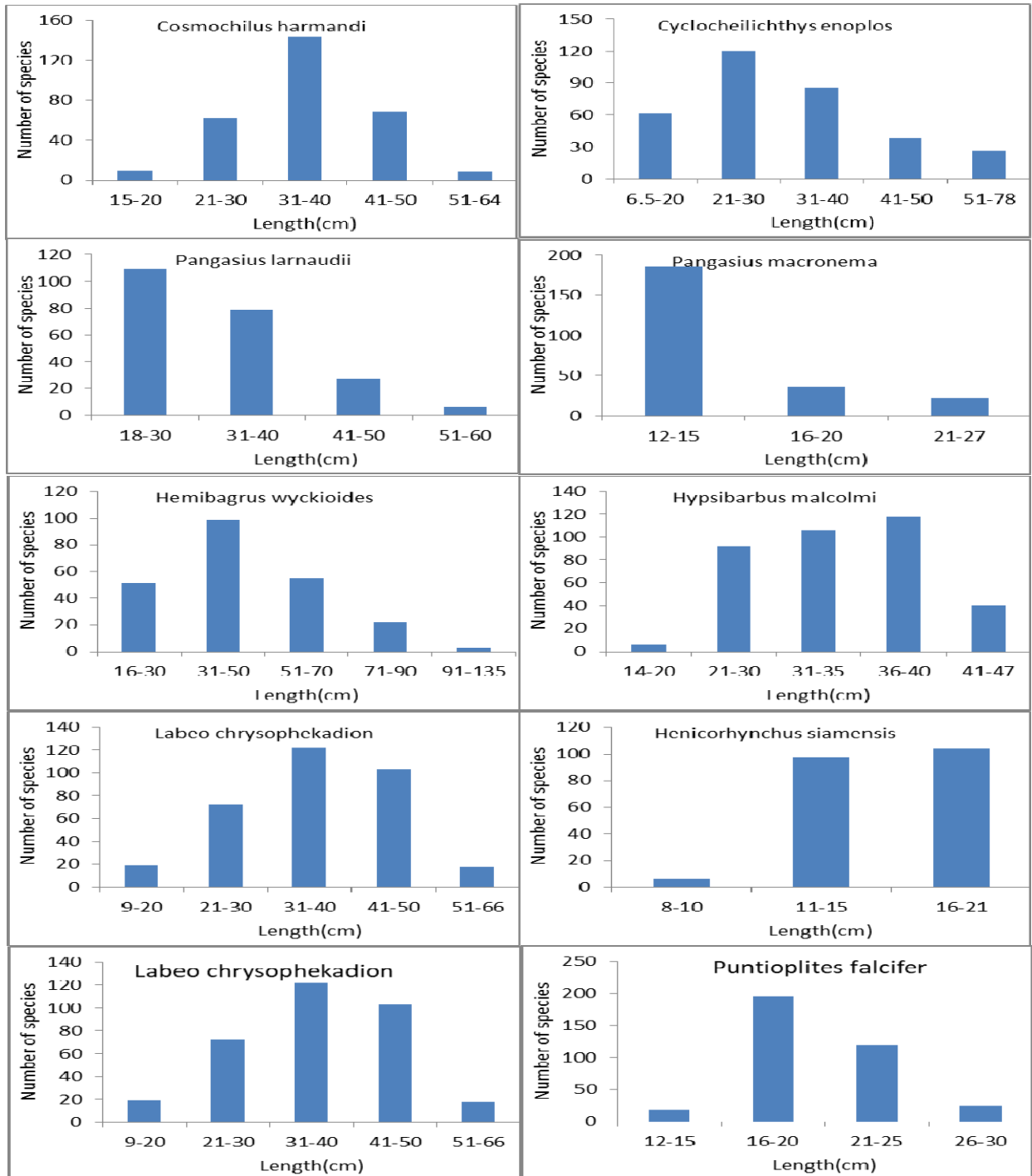


Figure37: Distribution of maximum length

3.7.2 Distribution of maximum length by species by gear types

Top ten species by Stationary gill net in terms of amount of catch made up 62% of all distribution of maximum length of the top ten species. Distribution of maximum length by species is displayed in Figure 37.

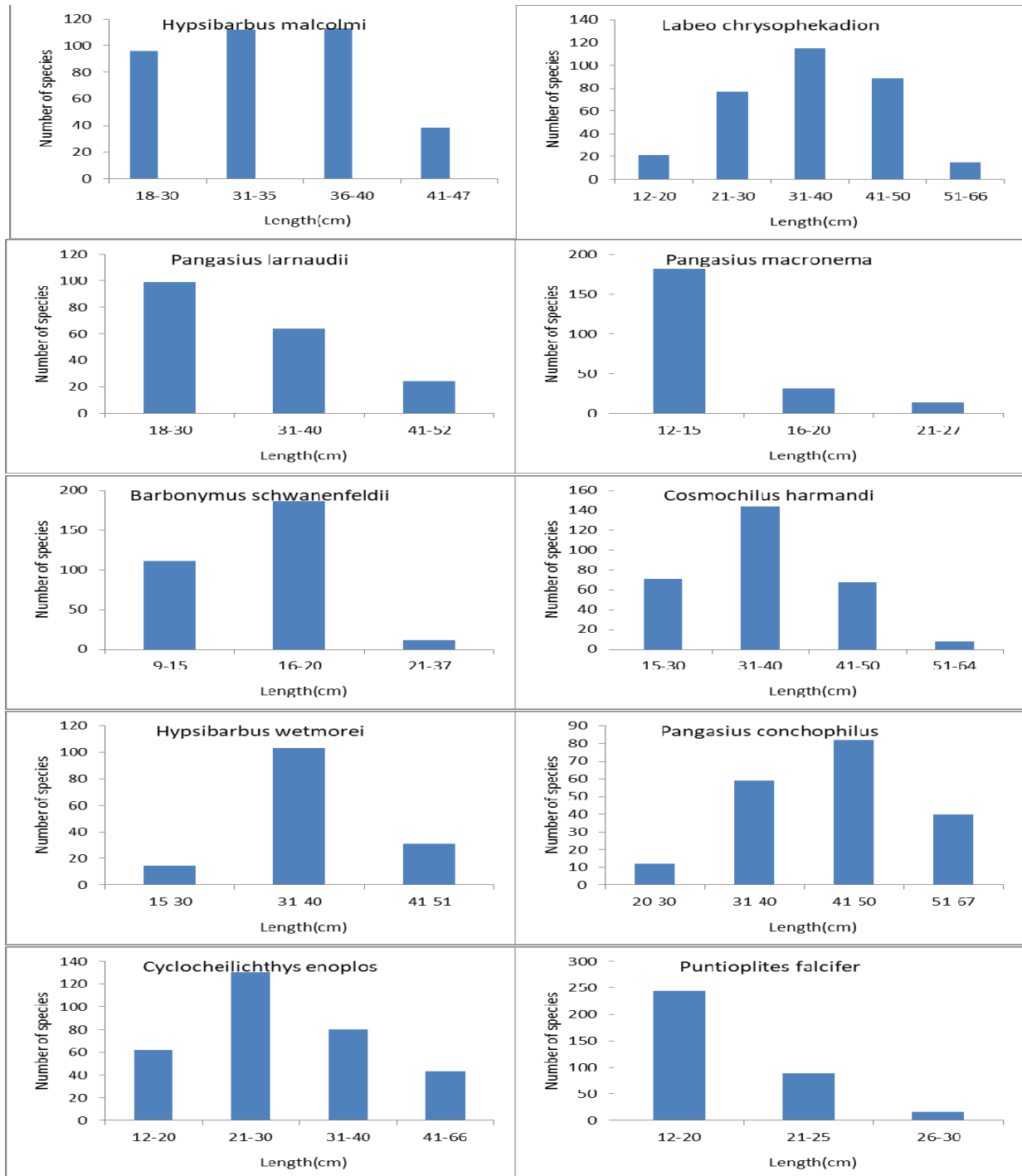


Figure38: Distribution of maximum length

4. Discussions

Fisher profiles: Fishers are full-time and have long time fishing experience (13 to 45 years). They have relatively low education, almost of fishers are primary school (66.67%), and secondary school (33.33%)

Fishing habitat: Fishers do fish in eight habitats: Mekong tributaries, Mekong River, Stream, Rice field, Pond, Lake, Deep pool, and flood plan, but Just Mekong tributaries, and Mekong River is the most fishing habitats cause it have large boundary for fishing and the places that fisher can fishing all year round.

Fishing effort: Fishers used 14 types of fishing gears. Stationary gill nets were the most common and effective gears, followed by drifting gill net. On the average, each fisher spent 7 hours to 15 hours for one fishing time (soaking time).

Fish catch and catch rates: At all sites combined, daily catch rates per fisher are relatively high during started of raining season, and December is the water flow out from Great Lake; in terms of fish migration down to Main stream. On average for one year period each fisher caught from 1.53 kg/day to 6.39 kg/day. Fishery in the seasonal flooded areas is likely influenced by fisheries upstream (migratory species) or by the development conservation activities upstream. After commercial fishing lot in Cambodia was banned and open for middle scale and small scale, and fishers in upper Mekong of Cambodia caught much of species migrated.

Species diversity: Some fish species such as: *Butis butis*, *Corbicula sp*, *Glossogobius giuris*, *Lutjanus malabaricus*, *Lycotrissa crocodilus*, *Monotrete barbatus*, *Polynemus longipectoralis*, *Polynemus melanochir*, *Arius leptotacanthus*, *Arius maculatus*, *Netuma thalassinus*, *Stolephorus insularis*, *Trachurus sp* are usually distributed in estuarine and marine water but it was recorded in the study sites.

5. Conclusions

– A total of 248 species belong to 48 family were recorded in the monitoring period (Jan – Dec 2018)

– Fish catch high during the started flooded in upper Mekong of Cambodia (May to July). However, fish catch in upper Mekong areas relatively high from September to October compared to other months.

– There are 8 habitats: Mekong River (28.58%), Mekong tributaries (64.82%), Stream (5.74%), Floodplain (0.05%), Pond (0.08%), were found during one year study period from May 2017 to April 2018 of Fish Abundance and Diversity Monitoring along Mekong River and its tributaries in Cambodia.

– Species caught are mainly white fish group (97.17% of the total catch), marine fish group (0.05%), estuarine fish group (0.04%), species miss identify (0.03%), Don't know 0.16%, and black fish group (2.55%).

- Top ten species made up 61% of the total catch: *Cosmochilus harmandi* , *Cyclocheilichthys enoplos*, *Hemibagrus wyckioides*, *Hypsibarbus malcolmi*, *Labeo chrysophekadion*, *Pangasius larnaudii*, *Pangasius macronema*, *Labeo chrysophekadion*, *Puntioplites falcifer*, and *Henicorhynchus siamensis*.
- Alien species: There are 7 exotic species recorded such as *Clarias gariepinus*, *Cyprinus carpio*, *Hypophthalmichthys*, *Hypostomus plecostomus*, *Misgurnus anguillicaudatus*, *Oreochromis niloticus*, and *Piaractus brachypomus*. Catch of alien species 7.96 kg (five sites combined).
- Catch rates in terms of kg per day per fisher from 1.53 kg/day to 6.39 kg/day.

6. Recommendations

The “Fisher catch monitoring programme” in the Mekong Delta together with in other riparian countries is a unique and systematic programme in the Mekong Delta that has been implemented since 2007. Fishers’ catch and fishing effort are monitored on a daily basis. Data of this programme is important to assess the status and trend of the fishery in the Mekong Delta, and also important for impact assessment purposes of development activities in the upstream. Therefore, the monitoring programme should be continued for the next period.

Gill nets were used at all sites of the study areas, thus, gill-nets can be considered a major barrier to fish migrations by constituting a “wall of death” (depending on the mesh size and hanging ratio of the net) for any fish species, which need to travel long distances during their life cycle. Hence, regulating gill net usage would to regulate catch and conserve stocks should be considered a high priority in any river fishery management.

Generally, river fishers make relatively large catches over very short periods of time at the start or end of the annual flood, or at both times. For accurate annual estimates of catches, monitoring during these peak periods should be daily, but could be less frequent (perhaps weekly to monthly) at other times. Interviews with the fishers after the study suggest that they tend to underestimate their average catches because they do not take into account the large effect of seasonal peaks. Hence, any long-term monitoring should include interviews of representative fishers, and monitoring of some fishers to relate the monitoring data of fish catch to the local fishing context in the community as well as to the family and household context of the individual fisher (this could easily explain individual differences in fish catches in the same monitoring site).

Illegal fishing gears were used in all sites of the study area having a negative impact on many fish species. Fisheries authority needs to enforce the fisheries law, and announce to fishers about the negative impacts and dangers from illegal fishing gear for fisheries resources.

The number of fishers has been increasing from year to year leading to reduced catch per unit effort and, potentially, over fishing and decline of fish stocks. Should integrating aquaculture and rice field fishery.

The current species names, photo flip chart as well as database being used were updated since year 2008 and some fish species names seem to be outdated though species names have been

updated by various researchers. There is a need to update species list and fish photos in the photo flipchart as well as the regional database, respectively.

7. References

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8. Appendices

Appendix 1: Fisher logbook

FISHER CATCH MONITORING FORM

FISHING EFFORT:

DATE (DD/MM/YY):


HABITAT:

TOTAL CATCH (kg)

CATCH SAMPLE (kg) (if applicable)

WATER LEVEL:
 RISING
 STATIC
 FALLING

WEATHER:



GEAR:

DIMENSIONS:
 LENGTH OR
 WIDTH (m) HEIGHT (m)

MESH OR HOOK SIZE:

UNITS:

ENGINE HP:

DATE (DD/MM/YY):
 START END

TIME (HH:MM):

HOURS FISHING:

CATCH BY SPECIES:

CODE	LOCAL NAME	N	WEIGHT (kg)	MAXIMUM LENGTH (cm)	SAMPLE?	
					YES	NO

Fishermen's general information									
No	Name	Sex	Date of birth	Experience (Year)	Province	District	Commune	Village	Habitat
1	Khut Thon	Male	1970	29	Ratanakiri	Lum Phat	Chey Udom	Day Lo	Srepork river
2	Luoeng Ouk	Male	1971	21	Ratanakiri	Lum Phat	Chey Udom	Day Lo	Srepork river
3	Seang Samnang	Male	1973	19	Ratanakiri	Lum Phat	Chey Udom	Day Lo	Srepork river
4	Si Phat	Male	1947	39	Ratanakiri	Veounsai	Banpong	Fang	Sesan river
5	Nhut Sony	Male	1964	21	Ratanakiri	Veounsai	Banpong	Fang	Sesan river
6	Kang Sean	Male	1957	37	Ratanakiri	Veounsai	Banpong	Fang	Sesan river
7	Eou Bunthon	Male	1956	39	Stung Treng	Siem Pang	Tmar Keo	Pres Bang	Sekong river
8	Phe Vannham	Male	1959	39	Stung Treng	Siem Pang	Tmar Keo	Pres Bang	Sekong river
9	Nu Phansophy	Male	1957	36	Stung Treng	Siem Pang	Tmar Keo	Pres Bang	Sekong river
10	Kung Chanthy	Male	1965	36	Stung Treng	Talarborivat	Ou Svay	Ou Run	Mekong river
11	Kung Chaina	Male	1979	16	Stung Treng	Talarborivat	Ou Svay	Ou Run	Mekong river
12	Ku Samnang	Male	1969	29	Stung Treng	Talarborivat	Ou Svay	Ou Run	Mekong river
13	Ke Kuch	Male	1958	51	Kra Tie	Sambo	Ou Krieng	Koh Khne	Mekong river
14	An Hour	Male	1970	34	Kra Tie	Sambo	Ou Krieng	Koh Khne	Mekong river
15	An Viasna	Male	1978	16	Kra Tie	Sambo	Ou Krieng	Koh Khne	Mekong river
16	To Hong	Male	1973	21	Kandal	Ponhea Leu	Kampong Luong	Sang Var	Tonlesap river
17	Toeng Vang	Male	1965	31	Kandal	Ponhea Leu	Kampong Luong	Sang Var	Tonlesap river
18	Pai Seang	Male	1980	21	Kandal	Ponhea Leu	Kampong Luong	Sang Var	Tonlesap river

Appendix 2: Weight and maximum fork length by species

No	Species name	Family	Max length cm	Total weight Kg
1	<i>Acanthopsis sp.1</i>	Cobitidae	17	0.21
2	<i>Achiroides leucorhynchus</i>	Soleidae	26	5.27
3	<i>Achiroides melanorhynchus</i>	Soleidae	13	0.20
4	<i>Albulichthys albuloides</i>	Cyprinidae	36	0.51
5	<i>Ambassis gymnocephalus</i>	Chandidae	32	0.30
6	<i>Amblyrhynchichthys truncatus</i>	Cyprinidae	27	40.48
7	<i>Anabas testudineus</i>	Anabantidae	19	42.03
8	<i>Arius caelatus</i>	Ariidae	35	2.94
9	<i>Arius leptanotacanthus</i>	Ariidae	24	0.50
10	<i>Arius maculatus</i>	Ariidae	18	0.21
11	<i>Arius sagor</i>	Ariidae	16	0.21
12	<i>Bagarius suchus</i>	Sisoridae	67	103.21
13	<i>Bagarius yarrelli</i>	Sisoridae	58	31.40
14	<i>Bagrichthys macracanthus</i>	Bagriichthidae	35	41.13
15	<i>Bagrichthys obscurus</i>	Bagriichthidae	35	130.02
16	<i>Balantiocheilos melanopterus</i>	Cyprinidae	13	1.15
17	<i>Bangana behri</i>	Cyprinidae	57	19.70
18	<i>Barbichthys nitidus</i>	Cyprinidae	25	24.87
19	<i>Barbonymus altus</i>	Cyprinidae	28	173.69
20	<i>Barbonymus gonionotus</i>	Cyprinidae	36	39.90
21	<i>Barbonymus schwanefeldii</i>	Cyprinidae	37	389.69
22	<i>Belodontichthys truncatus</i>	Siluridae	77	176.23
23	<i>Boesemania microlepis</i>	Sciaenidae	74	156.23
24	<i>Botia caudipunctata</i>	Cobitidae	17	0.29
25	<i>Botia eos</i>	Cobitidae	16	0.30
26	<i>Botia helodes</i>	Cobitidae	21	10.85
27	<i>Botia lecontei</i>	Cobitidae	16	0.20
28	<i>Botia longidorsalis</i>	Cobitidae	20	0.50
29	<i>Botia modesta</i>	Cobitidae	20	20.18
30	<i>Botia sidhimunki</i>	Cobitidae	41	1.60
31	<i>Botia sp. cf. beauforti</i>	Siluridae	16	0.38
32	<i>Botia splendida</i>	Cobitidae	29	8.36
33	<i>Brachirus harmandi</i>	Soleidae	14	0.79
34	<i>Brachirus orientalis</i>	Soleidae	26	6.23
35	<i>Brachirus panoides</i>	Soleidae	30	16.11
36	<i>Butis butis</i>	Eleotridae	24	2.15
37	<i>Butis koilomatodon</i>	Eleotridae	30	0.79

38	<i>Catlocarpio siamensis</i>	Cyprinidae	16	1.25
39	<i>Channa gachua</i>	Channidae	27	11.07
40	<i>Channa lucius</i>	Channidae	58	1.20
41	<i>Channa maruloides</i>	Channidae	73	102.80
42	<i>Channa melasoma</i>	Channidae	41	0.50
43	<i>Channa micropeltes</i>	Channidae	74	59.95
44	<i>Channa striata</i>	Channidae	47	129.12
45	<i>Chaudhuria fusipinnis</i>	Chaudhuriidae	19	0.60
46	<i>Chela laubuca</i>	Cyprinidae	47	2.00
47	<i>Chitala blanci</i>	Notopteridae	84	270.35
48	<i>Chitala lopis</i>	Notopteridae	61	11.76
49	<i>Chitala ornata</i>	Notopteridae	73	9.53
50	<i>Cirrhinus jullieni</i>	Cyprinidae	26	39.80
51	<i>Cirrhinus microlepis</i>	Cyprinidae	54	81.66
52	<i>Cirrhinus molitorella</i>	Cyprinidae	25	57.34
53	<i>Cirrhinus spilopleura</i>	Cyprinidae	17	8.04
54	<i>Clarias batrachus</i>	Clariidae	35	72.50
55	<i>Clarias fuscus</i>	Clariidae	19	0.06
56	<i>Clarias gariepinus</i>	Clariidae	17	0.34
57	<i>Clarias macrocephalus</i>	Clariidae	31	12.64
58	<i>Clarias meladerma</i>	Clariidae	28	3.41
59	<i>Clupeichthys aesarnensis</i>	Clupeidae	39	3.80
60	<i>Clupisoma sinensis</i>	Schilbeidae	26	6.47
61	<i>Cosmochilus cardinalis</i>	Cyprinidae	15	0.30
62	<i>Cosmochilus harmandi</i>	Cyprinidae	64	925.24
63	<i>Crossocheilus atrilimes</i>	Cyprinidae	31	6.47
64	<i>Crossocheilus reticulatus</i>	Cyprinidae	16	5.40
65	<i>Cyclocheilichthys apogon</i>	Cyprinidae	21	79.67
66	<i>Cyclocheilichthys armatus</i>	Cyprinidae	19	17.61
67	<i>Cyclocheilichthys enoplos</i>	Cyprinidae	78	622.88
68	<i>Cyclocheilichthys furcatus</i>	Cyprinidae	65	49.24
69	<i>Cyclocheilichthys lagleri</i>	Cyprinidae	22	58.64
70	<i>Cyclocheilichthys mekongensis</i>	Cyprinidae	16	0.65
71	<i>Cyclocheilichthys repasson</i>	Cyprinidae	30	101.65
72	<i>Cyclocheilichthys tapiensis</i>	Cyprinidae	31	23.41
73	<i>Cynoglossus bilineatus</i>	Cynoglossidae	16	0.12
74	<i>Cynoglossus puncticeps</i>	Cynoglossidae	24	0.16
75	<i>Cyprinus carpio</i>	Cyprinidae	18	0.20
76	<i>Datnioides quadrifasciatus</i>	Datnioididae	29	1.75
77	<i>Datnioides undecimradiatus</i>	Datnioididae	38	135.41
78	<i>Discherodontus ashmeadi</i>	Cyprinidae	19	2.86
79	Don't know		57	4.80
80	<i>Eleutheronema tetradactylum</i>	Polynemidae	24	0.69

81	<i>Epalzeorhynchus frenatum</i>	Cyprinidae	14.5	0.19
82	<i>Epalzeorhynchus munense</i>	Cyprinidae	36	1.20
83	<i>Eugnathogobius microps</i>	Gobiidae	18	0.20
84	<i>Folifer brevifilis</i>	Cyprinidae	20	0.46
85	<i>Glyptothorax macromaculatus</i>	Sisoridae	20	0.07
86	<i>Gymnothorax tile</i>	Muraenidae	39	1.00
87	<i>Gyrinocheilus pennocki</i>	Gyrinocheilidae	31	18.46
88	<i>Hampala dispar</i>	Cyprinidae	46	203.03
89	<i>Hampala macrolepidota</i>	Cyprinidae	40	51.50
90	<i>Helicophagus waandersi</i>	Pangasiidae	56	274.19
91	<i>Hemiaris stormii</i>	Ariidae	15	0.35
92	<i>Hemibagrus filamentus</i>	Bagridae	51	81.23
93	<i>Hemibagrus sp.</i>	Bagridae	44	31.49
94	<i>Hemibagrus spilopterus</i>	Bagridae	97	442.99
95	<i>Hemibagrus wyckii</i>	Bagridae	45	23.36
96	<i>Hemibagrus wyckioides</i>	Bagridae	135	594.25
97	<i>Hemisilurus mekongensis</i>	Siluridae	42	12.42
98	<i>Henicorhynchus lobatus</i>	Cyprinidae	45	49.14
99	<i>Henicorhynchus siamensis</i>	Cyprinidae	38	581.33
100	<i>Heterobagrus bocourti</i>	Bagridae	26	24.39
101	<i>Heteropneustes kemratensis</i>	Heteropneustidae	20	0.80
102	<i>Himantura imbricata</i>	Dasyatidae	79	10.70
103	<i>Hypophthalmichthys molitrix</i>	Cyprinidae	37	0.90
104	<i>Hyporhamphus limbatus</i>	Hemiramphidae	47	0.70
105	<i>Hypostomus plecostomus</i>	Loricariidae	31	2.19
106	<i>Hypsibarbus lagleri</i>	Cyprinidae	52	156.81
107	<i>Hypsibarbus malcolmi</i>	Cyprinidae	47	1642.23
108	<i>Hypsibarbus pierrei</i>	Cyprinidae	41	35.79
109	<i>Hypsibarbus suvattii</i>	Cyprinidae	38	378.72
110	<i>Hypsibarbus wetmorei</i>	Cyprinidae	51	428.89
111	<i>Kryptopterus kryptopterus</i>	Siluridae	33	15.07
112	<i>Kryptopterus dissitus</i>	Siluridae	21	3.38
113	<i>Kryptopterus micronema</i>	Siluridae	64	152.00
114	<i>Kryptopterus palembangensis</i>	Siluridae	23	1.50
115	<i>Kryptopterus schilbeides</i>	Siluridae	20	2.33
116	<i>Labeo chrysophekadion</i>	Cyprinidae	66	2152.37
117	<i>Labeo dyocheilus</i>	Cyprinidae	73	62.69
118	<i>Labeo pierrei</i>	Cyprinidae	14	0.20
119	<i>Labiobarbus lineata</i>	Cyprinidae	20	5.56
120	<i>Labiobarbus siamensis</i>	Cyprinidae	22	199.66
121	<i>Lalates longibarbis</i>	Schilbeidae	28	3.21
122	<i>Laocypris hispida</i>	Cyprinidae	28	2.60
123	<i>Leptobarbus hoeveni</i>	Cyprinidae	45	208.47

124	<i>Lobocheilos melanotaenia</i>	Cyprinidae	36	10.11
125	<i>Luciocyprinus striolatus</i>	Cyprinidae	16	0.20
126	<i>Luciosoma bleekeri</i>	Cyprinidae	37	8.75
127	<i>Luciosoma setigerum</i>	Cyprinidae	15	0.30
128	<i>Lutjanus malabaricus</i>	Lutjanidae	24	0.50
129	<i>Lycothrissa crocodilus</i>	Engraulidae	28	2.12
130	<i>Macrobrachium rosenbergii</i>	Palaeomonidae	28	0.90
131	<i>Macrochirichthys macrochirus</i>	Cyprinidae	53	19.24
132	<i>Macrogathus maculatus</i>	Mastacembelidae	24	0.45
133	<i>Macrogathus semiocellatus</i>	Mastacembelidae	65	6.52
134	<i>Macrogathus siamensis</i>	Mastacembelidae	25	1.66
135	<i>Macrogathus taeniagaster</i>	Mastacembelidae	27	0.34
136	<i>Mastacembelus armatus</i>	Mastacembelidae	58	57.47
137	<i>Mastacembelus erythrotaenia</i>	Mastacembelidae	38	1.02
138	<i>Megalops cyprinoides</i>	Megalopidae	16	0.20
139	<i>Mekongina erythrospila</i>	Cyprinidae	33	11.21
140	<i>Micronema apogon</i>	Siluridae	76	42.43
141	<i>Micronema bleekeri</i>	Siluridae	99	177.07
142	<i>Micronema cheveyi</i>	Siluridae	38	42.33
143	<i>Misgurnus anguillicaudatus</i>	Cobitidae	18	0.63
144	<i>Monopterus albus</i>	Synbranchidae	70	2.00
145	<i>Monotrete barbatus</i>	Tetraodontidae	17	1.71
146	<i>Monotrete cambodgiensis</i>	Tetraodontidae	18	3.70
147	<i>Monotrete suvattii</i>	Tetraodontidae	17	0.40
148	<i>Monotrete turgidus</i>	Tetraodontidae	19	0.24
149	<i>Mussels</i>	MIXED	62	19.11
150	<i>Mystacoleucus chilopterus</i>	Cyprinidae	15	5.22
151	<i>Mystacoleucus greenwayi</i>	Cyprinidae	22	7.88
152	<i>Mystacoleucus marginatus</i>	Cyprinidae	16	3.41
153	<i>Mystus albolineatus</i>	Bagridae	18	5.66
154	<i>Mystus atrifasciatus</i>	Bagridae	15	4.06
155	<i>Mystus multiradiatus</i>	Bagridae	23	16.76
156	<i>Mystus mysticetus</i>	Bagridae	21	17.91
157	<i>Mystus rhegma</i>	Bagridae	16	0.77
158	<i>Mystus singaringan</i>	Bagridae	22	4.83
159	<i>Mystus wolffii</i>	Bagridae	18	9.00
160	<i>Neolissochilus blanci</i>	Cyprinidae	16	0.08
161	<i>Neolissochilus stracheyi</i>	Cyprinidae	19	0.12
162	<i>Notopterus notopterus</i>	Notopteridae	42	46.12
163	<i>Ompok bimaculatus</i>	Siluridae	27	23.73
164	<i>Ompok hypophthalmus</i>	Siluridae	13	0.57
165	<i>Onychostoma fusiforme</i>	Cyprinidae	16	34.28
166	<i>Onychostoma gerlachi</i>	Cyprinidae	21	18.41

167	<i>Opsarius pulchellus</i>	Cyprinidae	16	10.00
168	<i>Oreochromis niloticus</i>	Cichlidae	32	3.22
169	<i>Osphronemus exodon</i>	Osphronemidae	35	2.40
170	<i>Osphronemus goramy</i>	Osphronemidae	65	105.57
171	<i>Osteochilus hasselti</i>	Cyprinidae	24	85.93
172	<i>Osteochilus lini</i>	Cyprinidae	19	12.78
173	<i>Osteochilus melanopleura</i>	Cyprinidae	49	83.27
174	<i>Osteochilus microcephalus</i>	Cyprinidae	18	11.94
175	<i>Osteochilus schlegeli</i>	Cyprinidae	30	21.47
176	<i>Osteochilus waandersii</i>	Cyprinidae	15.5	6.82
177	<i>Oxyeleotris marmorata</i>	Eleotridae	43	73.99
178	<i>Pangasianodon gigas</i>	Pangasiidae	42	2.30
179	<i>Pangasianodon hypophthalmus</i>	Pangasiidae	110	53.28
180	<i>Pangasius bocourti</i>	Pangasiidae	57	22.34
181	<i>Pangasius conchophilus</i>	Pangasiidae	67	508.17
182	<i>Pangasius djambal</i>	Pangasiidae	77	6.01
183	<i>Pangasius krempfi</i>	Pangasiidae	87	49.66
184	<i>Pangasius larnaudii</i>	Pangasiidae	60	583.88
185	<i>Pangasius macronema</i>	Pangasiidae	27	1543.66
186	<i>Pangasius mekongensis</i>	Pangasiidae	85	13.40
187	<i>Pangasius micronemus</i>	Pangasiidae	26	13.44
188	<i>Pangasius nasutus</i>	Pangasiidae	17	0.14
189	<i>Pangasius pangasius</i>	Pangasiidae	70	2.50
190	<i>Pangasius pleurotaenia</i>	Pangasiidae	30	50.36
191	<i>Pangasius polyuranodon</i>	Pangasiidae	35	8.08
192	<i>Pangasius siamensis</i>	Pangasiidae	12	0.25
193	<i>Pangio myersi</i>	Cobitidae	17	0.10
194	<i>Paralaubuca barroni</i>	Cyprinidae	17	10.22
195	<i>Paralaubuca typus</i>	Cyprinidae	22	1997.06
196	<i>Parambassis siamensis</i>	Chandidae	18	0.81
197	<i>Parambassis wolffi</i>	Chandidae	18	8.37
198	<i>Piaractus brachypomus</i>	Characidae	22	0.49
199	<i>Polynemus longipectoralis</i>	Polynemidae	23	1.76
200	<i>Polynemus melanochir</i>	Polynemidae	18	0.41
201	<i>Poropuntius deauratus</i>	Cyprinidae	19	1.48
202	<i>Pristolepis fasciata</i>	Nandidae	21	60.60
203	<i>Probarbus jullieni</i>	Cyprinidae	90	58.56
204	<i>Probarbus labeamajor</i>	Cyprinidae	73	37.90
205	<i>Probarbus labeaminor</i>	Cyprinidae	39	34.47
206	<i>Pseudecheneis immaculata</i>	Sisoridae	26	0.38
207	<i>Pseudecheneis sulcatoides</i>	Sisoridae	17	0.08
208	<i>Pseudomystus siamensis</i>	Bagridae	48	29.95
209	<i>Puntioplites bulu</i>	Cyprinidae	20	5.86

210	<i>Puntioplites falcifer</i>	Cyprinidae	30	680.61
211	<i>Puntioplites proctozysron</i>	Cyprinidae	50	2733.68
212	<i>Puntioplites waandersi</i>	Cyprinidae	18	0.70
213	<i>Puntius binotatus</i>	Cyprinidae	12	0.04
214	<i>Puntius brevis</i>	Cyprinidae	15	0.28
215	<i>Puntius orphoides</i>	Cyprinidae	22	79.59
216	<i>Puntius partipentazona</i>	Cyprinidae	19	3.57
217	<i>Puntius rhombeus</i>	Cyprinidae	20	4.52
218	<i>Racoma grisea</i>	Cyprinidae	14	2.00
219	<i>Raiamas guttatus</i>	Cyprinidae	32	58.96
220	<i>Rasbora borapetensis</i>	Cyprinidae	59	3.40
221	<i>Rasbora myersi</i>	Cyprinidae	12	0.03
222	<i>Rasbora palustris</i>	Cyprinidae	18	0.13
223	<i>Rasbora paviei</i>	Cyprinidae	10	7.37
224	<i>Rasbora tornieri</i>	Cyprinidae	35	0.57
225	<i>Rasbora trilineata</i>	Cyprinidae	17	0.50
226	<i>Repomucenus fluviatilis</i>	Callionymidae	18	0.20
227	<i>Scaphognathops bandanensis</i>	Cyprinidae	27	60.58
228	<i>Scaphognathops stejneri</i>	Cyprinidae	35	257.63
229	<i>Schistura athos</i>	Balitoridae	20	0.08
230	<i>Schistura laterivittata</i>	Balitoridae	17	0.20
231	<i>Scleropages formosus</i>	Osteoglossidae	54	12.40
232	<i>Serpenticobitis cingulata</i>	Cobitidae	24	0.45
233	<i>Serpenticobitis zonata</i>	Cobitidae	15	0.07
234	<i>Tenualosa thibaudeaui</i>	Clupeidae	21.5	0.65
235	<i>Tenualosa toli</i>	Clupeidae	26	0.54
236	<i>Terapon puta</i>	Terapontidae	19	0.14
237	<i>Tetraodon nigroviridis</i>	Tetraodontidae	18	0.10
238	<i>Thynnichthys thynnoides</i>	Cyprinidae	38	7.24
239	<i>Tor sinensis</i>	Cyprinidae	70	13.55
240	<i>Tor tambroides</i>	Cyprinidae	16	0.20
241	<i>Toxotes microlepis</i>	Toxotidae	18	0.20
242	<i>Trichogaster microlepis</i>	Osphronemidae	11	0.03
243	<i>Trichogaster pectoralis</i>	Osphronemidae	41	1.50
244	<i>Trichogaster trichopterus</i>	Osphronemidae	30	4.89
245	<i>Wallago attu</i>	Siluridae	95	109.10
246	<i>Wallago leerii</i>	Siluridae	48	27.75
247	<i>Xenentodon cancila</i>	Belonidae	25	1.13
248	<i>Zenarchopterus ectuntio</i>	Hemiramphidae	17	0.04