An investigation report into China's marine trash fish fisheries

Media Briefing

Greenpeace East Asia

The past 30 years have witnessed the aggravation of overfishing as the biggest obstacle for the sustainable development of China's domestic marine fisheries. The official data for China's marine total allowance catch is 8 to 9 million tons every year[1]. However, according to China Fisheries Statistic Year Book, China's marine catch exceed this limit and kept growing since 1994. In 2015, China's marine catch reached 13.14 million tons.

Greenpeace East Asia observations show that, although the volume of catch and value of China's fishing industry has maintained stability overall, its structure has undergone massive changes over the last 50 years. A large part of the total marine catch is now comprised of so called "trash fish"[2] , a mixture of juvenile and undersized fish. Mass fishing of trash fish is causing further damage to China's coastal marine ecosystem and hindering the much-needed structural adjustment of domestic fisheries.

Now we have encountered new opportunities under China's 13th five year plan, with new policy frameworks in place and ambitious management goals put forward. Tackling trash fish is key to promoting China's sustainable fisheries development, protecting the marine ecosystem and promoting a sustainable marine economy.

In order to better understand China's trash fish fisheries, Greenpeace East Asia conducted on-site sampling surveys at 22 fishing ports located across the 8 main fishing provinces[3] in the country, including questionnaires for local fishermen, random sampling of trash fish, and collection and analysis of previously documented data and statistics.

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Key Terms:

[1] http://www.scio.gov.cn/xwfbh/gbwxwfbh/xwfbh/nyb/Document/1540973/1540973.htm

[2] in this study, trash fish refers to those leftovers on the port, which are usually mixture of poorly preserved, small sized and low commercial valued species of fishes and invertebrates. Not directly consumed by human, trash fish are mainly used as feeds (mainly as fish feeds and also as feeds for other types of animals)

[3] Liaoning, Shandong, Jiangsu, Zhejiang, Fujian, Guangdong, Guangxi, Hainan.

Trash fish - Trash fish refers to the proportion of catch that comprises a mixture of poorly preserved, small sized and low commercial valued species of fishes and invertebrates. Not directly consumed by human, trash fish are mainly used as feed for farmed fish and other farmed animals.

Commercial fish - Comparatively high in commercial value, with larger production volume. In this study, "commercial fish" is further divided into two groups as below:

- Edible commercial fish - fish species that could be consumed directly by humans if they were allowed to grow to mature or beyond mature body sizes
- Non-edible commercial fish - fish species that could not be consumed directly by humans even if they did grow to meet mature standard. Instead they are of value for processing into fish meal, fish oil and other non-food products

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Part One - Main Findings of the Report

1. **Fishing for trash fish has a broad impact on the state of resources of commercial fish, jeopardizing commercial fish in juvenile stages.** [4]

Findings from 80 samples showed that fishing for trash fish brings greater pressure to China's already over-exploited coastal fishing resources, jeopardizing many juvenile commercial fish. This is of serious concern in regards to the sustainability of such species since a large proportion of individuals are caught before they have been able to mature and replenish their populations for future sustainability.

- Edible commercial species accounted for 38.61% of all fish in the 80 samples, 75% of which were in their juvenile size range.
- 218 different species of fish were identified, 96 of which were edible commercial fish. This indicates that current fishing activities of trash fish have broadly impacted the resources of multiple species of edible commercial fish.
- 44 species were found to have existing stock assessments, 40 of which are categorised as over-exploited and 4 of which are categorised as fully exploited or seeing declining numbers. This shows that trash fish are in dire need of a management infrastructure for sustainable exploitation.

[4] For detailed content see part 1.2 of the Greenpeace report.

- 10 of the species found in samples are used in China's marine stock enhancement project, many of which were juvenile, indicating that the national stock enhancement efforts are being impacted by the fishing of trash fish.

2. Nearly half of the total catch by China's domestic trawlers is trash fish [5]

Through 5 months of field investigations, between August and December 2016, Greenpeace discovered that trash fish account for about 49% of all trawler catch.[6] That equals about 3 million tons per year, equivalent to the entire annual catch of Japan's fishing industry. Quantities of trash fish caught by the whole of China's domestic fishing fleet over the same period are equal to at least 30% of all catch, or at least 4 million tons..

3. China's aquaculture industry relies on 7.17 million tons domestic marine fishery resources annually.[7]

The report's research on aquaculture shows that, 76% of China's aquaculture species require trash fish as feed. In 2014, aquaculture demands at least 7.17million tons of China domestic marine fishery resources. The amount of fish feed China's marine fisheries provide for the domestic aquaculture industry is larger than the entire annual catch of the world's second largest fishing power, Indonesia.

Another 5.09 million tons was imported mainly as fishmeal or was derived from unclear sources.

Aquaculture consumption of trash fish is mainly manifest in direct feeding and production of artificial compound feed (with inputs of fishmeal and fish oil)[8].

Regarding fishmeal and fish oil, In 2014, China's aquaculture has consumed 2.51 million tons fish meal in total equal to 7.32 million tons marine fish resources. Of the overall 2.51 million tons fishmeal, at least 0.76 million tons originate from China's domestic fisheries (equals to 2.22 million tons marine fish resources). At least 1.04 million tons originate from outside China's waters (equals to 3.03 million tons). The remaining 0.71 million tons are of unclear sources.

Regarding direct feeding of trash fish, Greenpeace East Asia estimates that in 2014, approximately 4.95 million tons of trash fish were used in direct feeding aquacultures,

[5] For detailed content see part 1.2 of the report.
[6] Trawling is the most common fishing practice in China, contributing to nearly half of China's marine catch and reaching more than 6 million tons in annual catch.
[7] For detailed content see part 1.4 of the report.
[8] Direct feeding is the act of using fresh fish or frozen fresh fish (whole, cut into pieces, beaten into batter) to feed aquaculture fish or shrimp/crab. Artificial compound feed is comprised of fish meal and fish oil, both of which are derived from juvenile/trash fish.

deriving mainly from marine caught trash fish. 66% of the 4.95 million tons (3.24 million tons) has been consumed by marine aquaculture, 1.71 million tons (34%) by freshwater aquaculture. However, information and statistics on the volume, species composition, and origins are often incomplete.

Tackling trash fish is key to promoting China's sustainable fishery development

The huge amount of trash fish and its high ratio of juvenile commercial fish is evidence of the threat demand for trash fish places on the ecosystem of China's already highly exploited seas. However, there is time to turn the tide on this trend. With new policy frameworks and ambitious management goals in place, such as limiting total production volume to 10 million tons and reducing fishing capacity by 20,000 vessels, China has a chance to tackle the issue head on.

Given the current scale and expansion of the trash fish industry, it should be considered as a breaking point in tackling overfishing. If the government is able to effectively tackle the problem over the next three years, it would put China's fisheries far closer to the goal of "limiting the total production volume [of the fisheries industry] to 10 million tons by 2020", as laid out in the Fishery Bureau's 13th Five Year Plan.

Limiting the catch volume of trash fish would benefit China's fisheries in two main ways:

1) If the portion of forage fish are able to fulfil their duties in the food chain and feed commercially important wild fish, those important wild species not only come with much higher economic value, but also will have huge positive impact on marine ecosystem;

2) If the large portion of juvenile edible commercial fish were allowed to grow to mature standard, their market price would be a dozen times higher than as juvenile fish at their price as fish feed.

Research methodology[9]

This report comprises one year of on-site investigation in Liaoning, Shandong, Jiangsu, Zhejiang, Fujian, Guangdong, Guangxi, and Hainan, the eight main fisheries provinces of China. The investigation included sampling surveys, questionnaires for local fishermen and random sampling of trash fish. Desktop research into databases and statistical materials were also used in the analysis of China's aquaculture industry.

[9] For detailed content see part 1.1 of the Greenpeace report.

The report has been peer reviewed by Prof. Yvonne Sadovy from Hong Kong University, Cao Ling, Research scholar from Stanford University and special researcher from Shanghai Jiaotong University. Researchers from the Chinese Academy of Fishery Sciences, and anonymous experts from Shanghai Ocean University also provided suggestions for the report. The aquaculture analysis was conducted by Dr. Zhang Wenbo from Shanghai Ocean University. The species identification was conducted by Prof. Liu Min's fish biology lab of Xiamen University.

- Greenpeace on-site interviews of China's 8 coastal provinces included an investigative survey of a total of 22 fishing ports, with 926 valid questionnaires from local fishermen and 80 samples of trash fish.
- A questionnaire survey was conducted using stratified random sampling to interview fishing staff (such as captains, vessel owners, senior crew)in the target ports. As trawlers are the most common type of fishing gear in the trash fish fisheries and most of the target provinces, the interview was mainly focused on trawlers, but also managed to cover other types of fishing gears. The questionnaire results were used to provide information on estimating the ratio of trash fish in total catch volumes.
- During the investigative survey period, at each site of investigation, 2-3 samples were pulled from harvests of trash fish of fishing vessels returning to port. After collection, each sample (around 1-3kg) was sent to the laboratory of a domestic ichthyologist for species identification, individual numbering records, and body length measurements, as well as the analysis of ratios of juvenile fish and the stock status of the identified species.

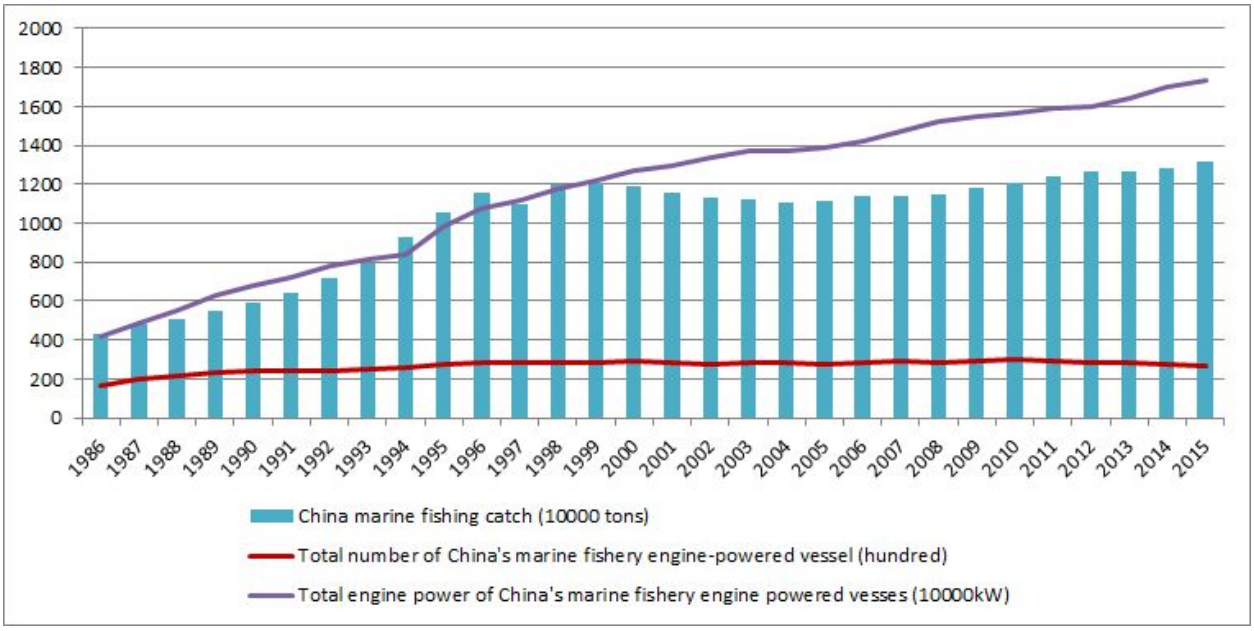
From aquaculture research:

- Through collecting and analyzing documented data and statistical materials, desktop research was first conducted to identify the extent and nature of use of trash fish in aquaculture feeds as well as the total production of China's aquaculture
- Based on conclusions of the desktop research, three species (Chinese mitten crab, large yellow croaker, largemouth black bass) were selected as representing aquaculture sectors that are particularly large in volume, and also require high levels of trash fish feeds input. Random surveys were conducted to aquaculture farms of those species.
- The volumes of the aquaculture industry's consumption of marine fishery resources was deduced by combining the results of aquaculture farm surveys with the tentative conclusions of desktop research. The results were also compared with findings from Greenpeace's investigation into marine fisheries catch.

Background

1. China's marine overfishing

From 1986 to 2015, the gross product of domestic marine fishing has increased twofold to reach 13.1 million tons. Over the same period, the total number of marine fishery engine-powered ships has increased by 64% to 270,000 ships, and aggregate engine power has increased threefold to reach 17.3 million kilowatts.[10] The rapid development has placed far to high a burden on fishery resources, resulting in the current situation of severely overfished stocks and ecosystem imbalances.



Graph 1 Development of China's domestic fishery (1986-2015)

For effective management and maintenance of fishery resources, including "Fisheries Law" (《渔业法》) and "Fisheries Permit Administrative Provisions" (《渔业捕捞许可管理

[10] Data taken from *China Fishery Statistical Yearbook.* As the statistical data regarding the number of "marine fishing boats" was only recorded starting from 2002, hence, here, the number of fishing ships and combined power are "marine fishery engine-powered ships", which includes marine fishing ships and marine aquaculture ships. In 2015, marine fishing ships totaled 187211 with power of 1441.74 kilowatts.

规定》), a series of domestic fishery administrative laws and regulations have been enforced since 1970s. China also introduced a series of management measures, including closed fishing seasons, "dual control" (controlling both the total number of marine motorized fishing vessels and the total engine power), minimum mesh size and minimum catch size. In 2015, the Ministry of Finance and Ministry of Agriculture announced a plan to reduce 60% the fuel subsidy for domestic fishing vessels with in five years.

In 2015, China's marine fishing catch reached 13.14 million tons, 1.5-1.6 times the suggested total allowance catch of about 8-9 million tons according to expert study[11]. Illegal fishing continues to be a major problem, despite a slew of strict regulations on fishing periods. This presents another obstacle for fisheries management in China.

The 13th Five Year Plan for Fishery Development put forward a goal that domestic marine fishery output must remain within 10 million tons by 2020, which requires a reduction by 3 million tons or more, the equivalent of the yearly output of China's biggest marine fishing province, Zhejiang. If this target is to be reached, adjustments must be made in terms of management mentality, especially on the amount of attention being paid on trash fish issue.

2. Environmental and economic impacts of overfishing trash fish [12]

According to Greenpeace observations, although official statistical data[13] shows that China's marine fishing catch and value have maintained stability overall, its structure has undergone massive changes with the ratio of traditional commercial fish in overall catch continuing to fall.

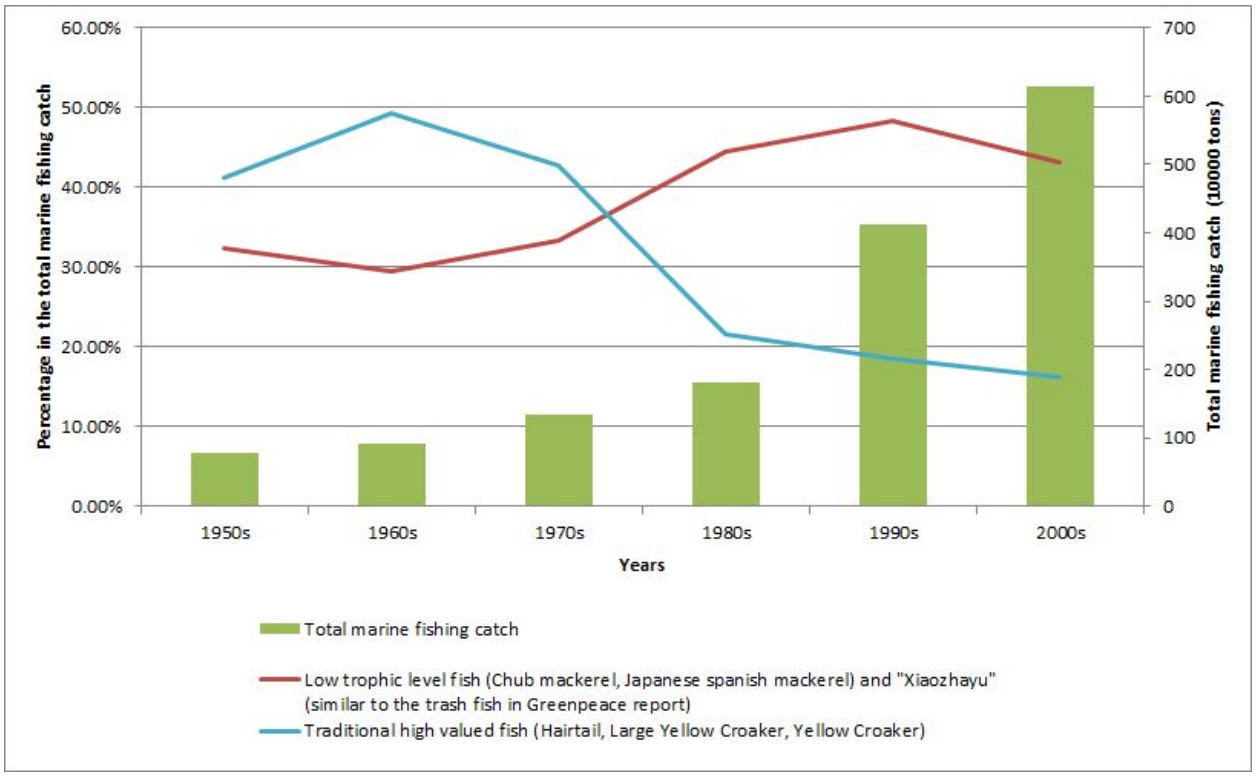
[11] http://www.scio.gov.cn/xwfbh/gbwxwfbh/xwfbh/nyb/Document/1540973/1540973.htm
[12] For detailed content see chapter 2 of the Green Peace report.
[13] China Fisheries Statistical Year Book

英文名	译名	1950-1969	1970-1979	1980-1989	1990-1999	2000-2013
Marine fishes nei	其他海洋鱼类	47.30%	47.40%	38.10%	34.00%	19.80%
Largehead hairtail	带鱼	18.60%	16.30%	11.50%	8.60%	9.00%
Marine crustaceans nei	其他海洋甲壳类	9.80%	9.70%	8.20%	7.90%	8.40%
Marine molluscs nei	其他海洋贝类	7.50%	5.50%	9.10%	10.30%	6.20%
Large yellow croaker	大黄鱼	5.90%	4.70%	1.00%	-	-
Akiami paste shrimp	毛虾	3.90%	3.00%	4.60%	3.60%	4.40%
Chub mackerel	鲐	3.90%	4.20%	3.70%	3.20%	3.40%
Cuttlefish, bobtail squids nei	乌贼类	2.00%	1.40%	1.50%	1.60%	1.30%
Yellow croaker	小黄鱼	1.00%	-	-	1.30%	2.50%
Filefishes nei	鲀	-	2.30%	7.50%	2.20%	1.50%
Pacific herring	鲱	-	2.10%	-	-	-
Seerfishes nei	马鲛	-	1.00%	2.30%	2.70%	3.30%
Scads nei	竹筴鱼	-	-	6.00%	4.50%	4.30%
Southern rough shrimp	鹰爪虾	-	-	1.60%	1.60%	2.40%
Silver pomfrets nei	银鲳	-	-	1.60%	1.80%	2.70%
Japanese anchovy	鳀鱼	-	-	-	5.90%	6.70%
Gazami crab	三疣梭子蟹	-	-	-	2.10%	2.70%
Alaska pollock	太平洋鳕鱼	-	-	-	1.70%	-
Daggertooth pike conger	海鳗	-	-	-	1.20%	2.30%
Threadfin breams nei	金线鱼类	-	-	-	1.20%	2.20%
Various squids nei	乌贼类	-	-	-	-	2.90%
Squillids nei	虾蛄	-	-	-	-	2.30%
Croakers, drums nei	石首鱼类	-	-	-	-	2.00%
Natantian decapods nei		-	-	-	-	1.80%
Pacific sandlance	玉筋鱼	-	-	-	-	1.30%
Japanese pilchard	远东拟沙丁鱼	-	-	-	-	1.20%
Porgies, seabreams nei	鲷	-	-	-	-	1.10%
So-iny (redlip) mullet	鲻	-	-	-	-	1.10%
Jumbo flying squid	茎柔鱼	-	-	-	-	1.00%
TOTAL		100.00%	97.60%	96.70%	95.40%	97.60%

Graph 2: Change of Marine Catch Structure in China from 1950 to 2013[14]

For over half a century, the marine fisheries of China's exclusive economic zone (EEZ) have gone from a "small volume, high value" catch of mostly demersal species to "high volume, low value" catch, in which about 80% of catch is low value pelagic fish such as anchovies, mackerel and scads. Available data suggest that China has been substantially fishing down the food web. Many of those "low-valued, small pelagic fish" are exactly the "trash fish" found in Greenpeace's investigation.

[14] 数据来源Cao Ling等Opportunity for marine fisheries reform in ChinaPNAS | January 17, 2017 | vol. 114 | no. 3 | 435–442 根据FAO数据整理



Graph 3: Change of marine fishing structure in East China Sea[15]

Taking East China Sea as an example (Graph 3), in the last half century, though the total marine fishing catch kept growing, the percentage of the traditional high valued fish in the total catch continued decrease. The increase of the total fishing catch are mainly from the low trophic level fish and the so called “Xiaozayu”, which is similar to the trash fish in Greenpeace report.

China’s coastal marine ecosystem has already been fragile due to years of overfishing, resulting in important commercial species depleting; trash fish fishery is speeding up this horrible trend. On the one hand, juvenile individuals of important commercial species have been largely exploited in trash fish fisheries, further threatening future existence of such resources. On the other hand, fishing down the food web is threatening the very basis of the China’s marine ecosystem, by catching low trophic level fishes such as anchovy, sand lance and sardines. If this status quo continues, fisheries will collapse completely.

[15] Compiled based on data from ZHANG Qiuhua, CHENG Jiahua, XU Hanxiang, et al. The fish-eries resources and its sustainable use in East China Sea[M] . Shanghai: Fudan University publication, 2007, page 543 to 545.

The main uses of trash fish is as feed in aquaculture production, in the form of both processed fishmeal and direct feeding. As a country that contributes to over 60% of the world's aquaculture production, what happens in China has significant implications for the rest of the world in terms of sustainable fisheries reform and the practice of eco-friendly fish farming and healthy fisheries.

Currently, the development of the aquaculture industry creates high demand[16] for trash fish as feed input and provides stable profits in return. As a result, many fishermen go to extreme lengths to fish trash fish, including using illegal fishing methods such as extremely small fishing mesh, electric nets and other extinctive fishing gears.

Other than the prominent negative impact on marine resources, trash fish fishery also largely sacrifice the potential economic value of juvenile edible commercial fish.

Currently, the average market price of trash fish used as fish feed is RMB 1-4/kg, while the price of mature edible commercial fish can be several times or several tens of times that market price. Through three randomly selected samples of juvenile fish samples, Greenpeace estimated that while the three samples total cost as fish feed was just 3 RMB, their potential cost as mature fish could have been up to 66 RMB to 344 RMB.

3. The lack of importance attached to the trash fish issue is a big challenge in administrative thinking towards overfishing

The findings of Greenpeace's investigation demonstrate that related administrative bodies have failed to fully capture the important role that trash fish play in marine ecosystem, the fishery economy, and fishery administration.

To systematically deal with the issue, both fishing and aquaculture demands must be well managed: limiting the production volume at one end, and establishing a more standard, sustainable feeding system at the other (eg. explicitly regulate species, proportions, origins of fish used as fish feeds/fishmeal).

In short, in order to reverse the recessive trend of China's coastal fishery resources, greater importance must be attached to the fishing of trash fish, taking trash fish as the entryway to detangling the complex relations of fishing and aquacultures, and quickly improve the weakness of governance with regard to overfishing.

[16] According to Greenpeace estimates, currently China's aquaculture industry can consume as much as 7.17 million tons of domestic trash fish annually.

Part 4 Regulation Suggestions[17]

1) At the fishing end: Regarding reducing the total catch of trash fish as a key point in enhancing the management of fishing resources.

- Record the amount of trash fish caught and include these statistics as part of the basic fisheries statistics.
- Research on the feasibility of adopting quota system in the fishery targeting trash fish should be conducted, based on the principle of precaution and the ecosystem-based management.[18]
- With the aim of protecting under-size commercial food fish, the set-up and implementation of regulations in terms of minimum mesh size and catchable size of the important commercial species should be enhanced.
- Safeguard important commercial fish species, by having more Marine Protected Areas (MPAs) as their breeding grounds to improve survival rates, as well as more permanent MPAs at their baiting and winter migration fields

2) At the aquaculture end: Strengthening the protection of trash fish as an emphasis in promoting the development of sustainable aquaculture

- Establish strict requirements for ecological sustainability of aquaculture industry, take "avoiding over-exertion of wild fishery resources and marine ecosystem" as the premise to explicitly enact sustainable development of the aquaculture industry.
- Further enhance the regulations on aquaculture feeds, standardizing which species, on what ratio could be used as feeds; banning the direct feeding with trash fish
- In consideration of the facts that 1) large numbers of aquacultures have already developed specialized artificial compound feeds and 2) acquired good results in their implementation, yet 3) still many aquaculture farmers retain old concepts of

[17] For detailed content see chapter 3 of Greenpeace's report.

[18] The "quota system" corresponds to the "systems of limits" that has been written in "Fishery Law" from 2000, but because of a lack of basic data and the limited capabilities of administrative supervision, it has not been possible to implement. Since the 13th Five Year Plan, the system of limits has been put forward again, with the Ministry of Agriculture requiring Liaoning, Shandong, Zhejiang, Fujian, and Guangdong to confirm city/county or sea territory to designate catchable breeds and carry out the system of limits for fishing administration, and by 2020, each coastal province must choose at least one relatively developed region from which to carry out the system of limits for fishing administration.

farming and acceptance of artificial compound feeds is lower than expectation,· education for aquaculture farmers on the adoption of artificial compound feeds should go hand in hand with the research/development of them

3) In addition, there is an urgent need for an improved fisheries management system:

- Eliminate loopholes that enable overfishing through unified regional management measures .
- In a new institutional arrangement for the fishing moratorium, combating illegal fishing with trash fish fishery as a breaking point, normalizing the surprise inspections into regular administration
- Enhance enforcement ability of fishery inspection units, leverage advanced technology, ie. electronic logging system, GPS positioning, video recording etc., to conduct stricter monitoring on fishing activity
- Increase traceability throughout whole industry chain from production to distribution, increase information disclosure

Appendix I. Key questions in the questionnaire:

Date: _____Place: _____Interviewer name:_____

1. Name, vessel and fishing area characteristics:

1) Interviewee name, position (captain, owner, fisherman other etc.), hometown, age, contact information.

2) Vessel name, description (horsepower, length)

3) Fishing area (Coastal/Inshore/Offshore) (to confirm the vessel is conducting domestic fishing)

4) Major Fishing method (Trawler (bottom or pelagic, single or double, etc.)? Stow net? Gill net? Purse seiner? Reefer?) describe as detail as possible.

2. Catch characteristics:

1) What was your fish catch after fishing moratorium till end of 2016?

		Weight (kg)	Proportion (by weight, %)
Fishes	Commercial (edible) fish		
	"Trash fish"		
Cephalopods			
Crabs			
Shrimps			
Other: _____			

2) Commercial fish species (edible) -main types?

3) "Trash fish" species-main types?

4) Where did your "trash fish" catch go? (Fish feed factory? Aquaculture farm? Freezing facility? Discard? Other?)

5) Selling price of trash fish/kg: _____

6) The ratio of income from "trash fish" in your overall income?

3. INTERVIEWER NOTES AND IMPRESSIONS. Why do you think the catch has changed compare to before? (fishing capacity increased? management? pollution? reclaiming land from sea? climate change? others?)

-End of questionnaire-

Appendix II. Stock status

(YS= Yellow Sea;
ECS=East China Sea;
SCS=South China Sea
NSCS=Northern South China Sea; **)**

Overexploited, resources decline species

	Chinese name	English name	Latin name	Stock status information
1	大吻斜齿鲨	(a kind of shark)	*Scoliodon macrorhynchos*	NSCS: Depleted, over capacity* (Ref 1) (original name in FAO report was "sharks") ECS: Sharks resource decline (Ref 5, page 306)
2	海鳗	Conger pike	*Muraenesox cinereus*	NSCS: depleted, over capacity (Ref 1); YS: Over-exploited (Ref 8, page 31); ECS: catch amount decline, size become small (Ref 3,page 305)
3	鳓	Chinese herring	*Ilisha elongata*	NSCS: depleted+over capacity (Ref 1); YS and ECS: over-exploited, resource decline to almost depleted (Ref 3, page 295; Ref 8, page 31; Ref 5, page 305)
4	康氏侧带小公鱼	Commerson's anchovy	*Stolephorus commersoni*	NSCS: overexploited+over capacity (Ref 1); (Orginal name in FAO report was "Anchovies, *Stolephorus spp.*") ECS: overexploited (Ref 9)
5	印度侧带小公鱼	Indian anchovy	*Stolephorus indicus*	NSCS: overexploited+over capacity (Ref 1); (orginal name in FAO report was "Anchovies, Stolephorus spp.") Overexploited (Ref 9)
6	日本鳀	Japanese anchovy	*Engraulis japonicus*	NWP: fully exploited (2); Over-exploited (9); YS: resource decreasing; ECS: overfished, resource declining (Ref 3, page 165-166; Ref 5, page 278; Ref 7, page 588;)

7	多齿蛇鲻	Greater lizardfish	*Saurida tumbil*	NSCS: overexploited+over capacity (1); SCS: overfished, need protection (Ref 3, page 409; Ref 7, page 326)
8	长体蛇鲻	Slender lizardfish	*Saurida elongata*	ECS: overexploited (9)
9	蓝圆鲹	Japanese scad	*Decapterus maruadsi*	NSCS: overexploited+over capacity (1); SCS: resource decline (Ref 3, page 404) Overexpolited (9); ECS: resource is fine but need to carefully exploit the immatured fish; SCS: resource declined in the 1980s, measures has been taken, and the resource has been recovered a bit (Ref 7, page 638-650)
10	日本竹荚鱼	Jack mackerel	*Trachurus japonicus*	NSCS: fully exploited+over capacity (1); NWP: fully exploited (2); Fully exploited (9); SCS: resouece decline (Ref 3, page 407) ECS: resource decline (Ref 5, page 256)
11	金线鱼	Threadfin bream	*Nemipterus virgatus*	NSCS: overexploited+over capacity (1);
12	二长棘鲷	Threadfin	*Evynnis cardinalis*	NSCS: overexploited+over capacity (1), (Ref 7, page 802);
13	大头银姑鱼	Big-head pennah croaker	*Pennahia microcephalus*	NSCS: overexploited+over capacity; (orginal name in FAO report was "Silver croakers, *Pennahia spp.")*
14	台湾叫姑鱼	(a kind of croaker)	*Johnius* sp.	SCS: overexploited (Ref 7, page 859, original wording "*Johnius Spp.*")
15	卡氏叫姑鱼	Caroun croaker	*Johnius carouna*	SCS: overexploited (Ref 7, page 859, original wording "*Johnius Spp.*")
16	婆罗叫姑鱼	Sharpnose hammer croaker	*Johnius borneensis*	SCS: overexploited (Ref 7, page 859, original wording "*Johnius Spp.*")
17	丁氏叫姑鱼	(a kind of croaker)	*Johnius distinctus*	SCS: overexploited (Ref 7, page 859, original wording "*Johnius Spp.*")
18	屈氏叫姑鱼	Trewavas croaker	*Johnius trewavasae*	SCS: overexploited (Ref 7, page 859, original wording "*Johnius Spp.*")

19	灰鳍叫姑鱼	(a kind of croaker)	*Johnius grypotus*	SCS: overexploited (Ref 7, page 859, original wording "*Johnius Spp.*")
20	截尾银姑鱼	Donkey croaker	*Pennahia anea*	NSCS: overexploited+over capacity; (orginal name in FAO report was "Silver croakers, *Pennahia spp.")*
21	银姑鱼	Silver croaker	*Pennahia argentata (synonyms of Argyrosomus argentatus)*	NSCS: overexploited+over capacity; (orginal name in FAO report was "Silver croakers, *Pennahia spp.")*
22	大黄鱼	Large Yellow Croaker	*Larimichthys crocea*	NSCS: depleted+over capacity (1); ECS: resource decreased seriously (Ref 5, page 286)
23	小黄鱼	Yellow Croaker	*Larimichthys polyactis*	NWP: fully exploited (2); Bohai, YS and ECS: overfished, resource decline (Ref 3, page 75, 182,299; Ref 7: page 701; Ref 5:page 170-183; Ref 8, page 31)
24	鮸鱼	Mi–iuy croaker	*Miichthys miiuy*	NSCS: depleted+over capacity (1);
25	纵带绯鲤	Deep-water goatfish	*Upeneus subvittatus*	NSCS: depleted+over capacity (1); (Orginal name in FAO report was "Goatfishes *Upeneus spp.")*
26	黄带绯鲤	Sulphur goatfish	*Upeneus sulphureus*	NSCS: depleted+over capacity (1); (Orginal name in FAO report was "Goatfishes *Upeneus spp.")*
27	日本绯鲤	Japanese goatfish	*Upeneus japonicus*	NSCS: depleted+over capacity (1); (Orginal name in FAO report was "Goatfishes *Upeneus spp.")*
28	刀鲚	Japanese grenadier anchovy	*Coilia nasus*	Yangtze Estuary: decreasing (suggested by an expert and Greenpeace crosschecked from published papers, e.g. Suggestions on Protecting *Coilia Nasus* at Yangtzw Estuary, by Shi Delong)

29	蓝点马鲛	Japanese Spanish mackerel	*Scomberomorus niphonius*	Bohai and YS: fully exploited (Ref 3, page67, 169, Ref 4, page 124-125;); ECS : overfished (Ref 3, page 293; Ref 5, page 272)
30	鲐	Chub mackerel	*Scomber japonicus*	NWP: fully exploited (2); fully exploited (9) Need to reduce fishing effort and protect the juveniles (Ref 4, page 166; Ref 7, page 637; Ref 5, page 218)
31	日本带鱼	Largehead hairtail	*Trichiurus japonicas(synonymized with Trichiurus lepturus)*	NSCS: overexploited+over capacity (Original name in FAO report was "Hairtails, *Trichiurus spp.*") NWP: Overexploited Bohai, YS and ECS: overfished, resource decline seriously (Ref 3, page 192, 423; Ref 4, page 129: 黄渤海带鱼资源衰退严重; Ref 5, page 169; Ref 7, page 663-680)
32	刺鲳	Pacific rudderfish	*Psenopsis anomala*	SCS: resource decline seriously (Ref 7, page 635)
33	北鲳(翎鲳)	--	*Pampus punctatissimus*	NSCS: depleted+over capacity (1); (Original name in FAO report was "Pomfrets, *Pampus spp.*)
34	银鲳	Silver pomfret	*Pampus argenteus*	NSCS: depleted+over capacity (1); (Original name in FAO report was "Pomfrets, *Pampus spp.*) ECS: overfished (Ref 3, page 292； Ref 5, page 198)
35	中国鲳	Chinese silver pomfret	*Pampus chinensis*	NSCS: depleted+over capacity (1); (Original name in FAO report was "Pomfrets, *Pampus spp.*)

36	牙鲆（褐牙鲆）	Bastard halibut	*Paralichthys olivaceus*	Bohai and YS: overfished, resource decline to almost depleted (Ref 3, page 188; Ref 4, page 172; Ref 7, page 758)
37	桂皮斑鲆	Cinnamon flounder	*Pseudorhombus cinnamoneus*	NSCS: depleted+over capacity; (Original name in FAO report was "Flounders, *Pseudorhombus spp.*")
38	角木叶鲽	Ridged-eye flounder	*Pleuronichthys cornutus*	YS: overfished, resource decline(Ref 3, page 188; Ref 7, page 759)
39	黄鳍马面鲀	Filefishes	*Thamnaconus hypargyreus*	NSCS: overexploited+over capacity (2); ECS: overfished, overexploited (Ref 3, page 303; Ref 5, page 233; Ref 7, page 731)
40	黄鲫	Common hairfin anchovy	*Setipinna tenuifilis*	Bohai and YS: decreased (Ref 3, page 64)
Fully exploited, resource decreasing species				
1	玉筋鱼	Pacific sandlance	*Ammodytes personatus*	Moderate exploited (9)
2	方氏云鳚		*Enedrias fangi*	Fully exploited (Ref 4, page 134)
3	矛尾复鰕虎鱼		*Acanthogobius hasta*	Resource decreasing (Ref 4, page 174)
4	龙头鱼	Bombay-duck	*Harpadon nehereus*	ECS: moderately fully exploited (9)

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