

A PRELIMINARY ASSESSMENT OF THE FRENCH FISHERY TARGETED PORBEAGLE SHARK (*Lamna nasus*) IN THE NORTHEAST ATLANTIC OCEAN: BIOLOGY AND CATCH STATISTICS

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ABSTRACT

A population of porbeagle sharks (Lamna nasus) from the Northeast Atlantic Ocean bears a targeted fishery since the 60's. This seasonal and traditional drifting longline activity reveals decreasing landings for 15 years. A first TAC was introduced last December based on international scientific advice considering the life history of porbeagle shark and the lack of reliable information available. In 2008, a cooperative research program called EPPARTIY was initiated by the French National Fishery Committee (CNPMM), the Association pour l'Etude et la Conservation des Sélaciens (APECS) and the commercial fishery to collect scientific basis for the stock evaluation. EPPARTIY gather various data by onboard observers and fish market landings such as length-weight, sex maturation, geographical distribution; long term series statistic of landings and logbook as well as biological samples (stomach contents, gonads, muscle, vertebrae and liver) in order to improve biological knowledge of the exploited population. CPUE by fishing trip is relatively constant (oscillating between 6 and 10 tons) but proportion of small porbeagle landed increases. Preliminary proposal to manage the fishery is presented.

KEY WORDS

Porbeagle shark, biological sampling, catch composition, drifting longline, targeted fishery, Northeast Ocean

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Data sources

EPPARTIY program (Etude de la Pêche Palangrière de l'Ile D'Yeu) uses two different types of information, (a) statistics from the Yeu Fishing Organisation (Organisation de producteurs de l'île d'Yeu) and (b) EPPARTIY data collected by APECS scientists among fishing markets landings and onboard commercial fishing vessels from Ile d'Yeu targeting porbeagle shark (*Lamna nasus*) in the North Atlantic Ocean.

(a) OP Yeu includes:

- statistics of the Ile d'Yeu fleet landings from all the different fishing markets frequented for the landings from 1992 to 2007
- economical data of the targeted porbeagle activity for the vessels turnover

(b) EPPARTIY data includes:

- onboard observers collecting fishing activity information, counting lengths (curve fork, total and interdorsal), status (dead or alive), uses (keep onboard for commercial landed, keep onboard for crew consuming, release), maturity indicators such as claspers length, rotation and plasticity for males and external character of female sexual activity of each porbeagle captured as well as report of all by-catches. For each fishing operation with less than 30 porbeagle sharks, a simple tag is attached on the caudal fin in order to track the animal from the fishing ground to the sampling location (no sample before the sale has been allowed by the professional).
- fishing market inquiries for each landing of the Yeu porbeagle fishery: dressed weight of all the tagged shark minimum, biological samples (vertebrae, gonads, muscle, stomach content and liver) for a couple of porbeagle per 10 centimetres category as well as price of the auction.

Ile d'Yeu fishery

- Targeted porbeagle fleet

<i>Year</i>	<i>1992</i>	<i>1993</i>	<i>1994</i>	<i>1995</i>	<i>1996</i>	<i>1997</i>	<i>1998</i>	<i>1999</i>	<i>2000</i>
<i>Number of vessels targeting porbeagle</i>	6	10	8	8	10	11	8	8	8
<i>Year</i>	<i>2001</i>	<i>2002</i>	<i>2003</i>	<i>2004</i>	<i>2005</i>	<i>2006</i>	<i>2007</i>	<i>2008</i>	
<i>Number of vessels targeting porbeagle</i>	8	6	6	5	4	3	6	5	

Tableau 1: Evolution of the number of boats targeted porbeagle by year, 1992 to 2008 - for 2008 data stopped in July- (source: OP Yeu)

The Ile d'Yeu fleet vary between a minimum vessels in 2006 to a maximum 11 vessels in 1997. Since 1997, the number of vessels constantly decrease until the actual size of a 5 boats fleet. This diminution is mostly due to the definitive depart of vessels from the fleet. In 2007 a tuna purse seine vessel experiment the porbeagle drifting long-line in march but give up.

In 2008, the fleet is composed of 4 steel boats and 1 plastic boat, their length over all is 18 to 24 meters long.

All the vessels concerned by the targeted porbeagle fishery are members of the Fishing Organisation from Yeu (Organisation de producteur : OP Yeu), one vessel was member of an other fishing oraganisation between 2001 and 2004 (OP : From Bretagne). All the vessels are based in Port Joinville, Yeu ilsand, Atlantic coast of France. and they land mainly in Les Sables d'Olonne, Port Joinville and sporadically in some Atlantic fishing harbours while back from sea (Le Guilvinec or Saint Gilles Croix de Vie).

- Fishing activity

One Fishing trip could 10 to 18 days except sea injuries; mean fishing trip is 14 days. The crew is composed of 5 to 6 men plus the captain, which is also the ship-owner for 4 vessels on the five targeting porbeagle in 2008.

Porbeagle are targeted with drifting long-line by 220/230 meters depth. One long-line measure 1500 meters is composed of 84 hooks ballasted with 1 kilogramme of lead every 14th hooks. Each vessel board 10 long-lines.

The fishing activity occurs during the day, a first set in the early morning with 3 or 4 long-lines functioning for 3h30 to 4h00 and a second set in the afternoon functioning for 4h30 to 5h00 with the ten long-lines berth for the same period. Frozen mackerel (*Scomber scombrus*) is used has bait, one third of fish per hook.

Fishing grounds stretch between the continental shelf, Celtic Sea and the Channel covering all the ICES area from VIIIc to VIIIj through VIIg to VIIe. The fishing activity occurs between springtime to autumn, with annual variation of the number of fishing trips.(cf. Fig.2)

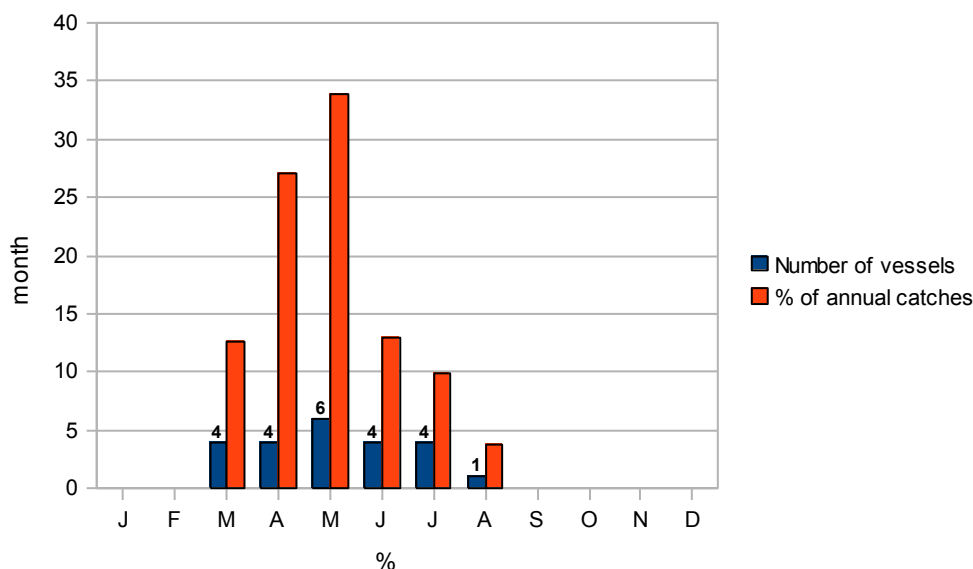


Figure 1 Monthly distribution of the porbeagle catches in percent of the total catches and the number of vessels in activity by the Yeu fishery in 2007 (source : OP Yeu)

Landings

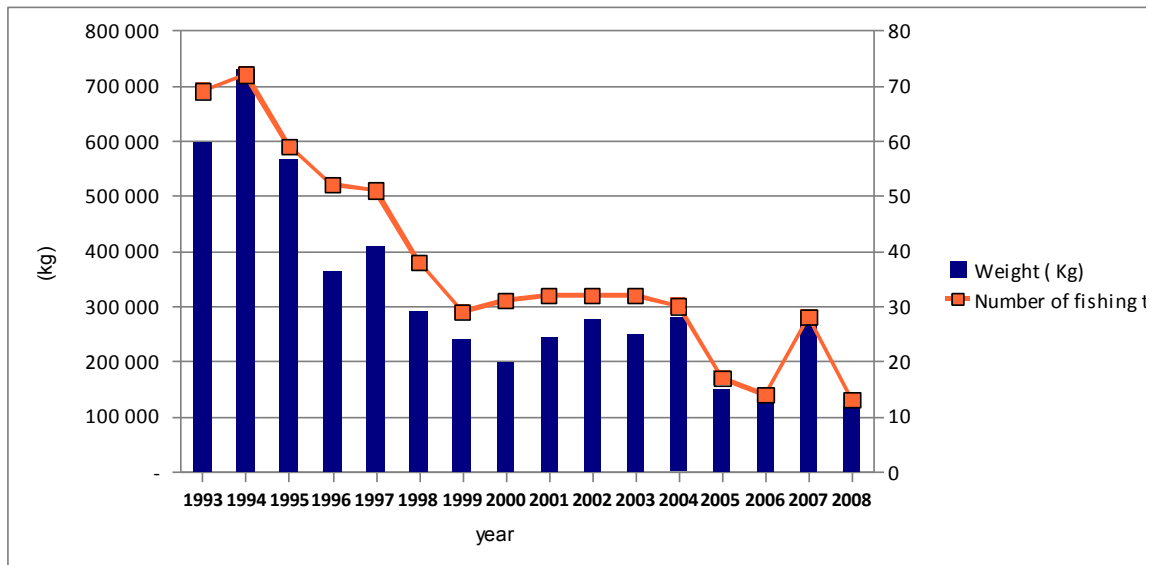


Figure 2: Landings of porbeagle and number of fishing trip of the Yeu fishery targeting porbeagle per year, 1993-2008 (source : OP Yeu Apecs / Eppartiy)

Evolution of the landings of the Yeu porbeagle fishery is oscillating between 730 168 kg in 1994 to 143 385 Kg in 2006. Catches increased until 1994 and strongly decreased through 1999 to follow a variable landings around 200 000 annual kilos (mean from 1993 to 2007 : 218 464 kg). For 2008, data were treated until July included, some few more fishing trips may occur (one vessel is still targeted porbeagle since mid July).

The number of fishing trip is correlated with the annual landings variations. The decrease of catches recorded since 1994 could be one direct consequence of the decrease of activity

Catch per unit effort

- Per fishing trip

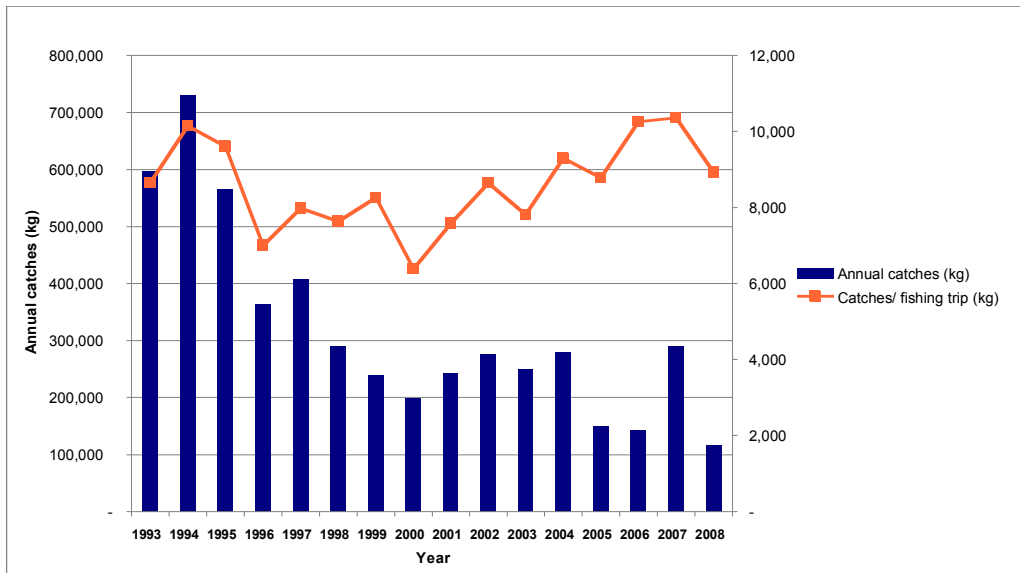


Figure 3 Yearly distribution of the Yeu fishery catches and catches per fishing trip, 1993-2003 (source : OP Yeu / Apecs-Eppartiy)

Evolution of porbeagle catches per fishing trip vary between a maximum of 10 358 kg in 2007 and a minimum of 6 387 kg in 2000, with a mean value of 8 923 kg. After a peak in 1994, the catches per fishing trip tend to decrease until 2000 and increase since 2000.

- Kilogram per hook

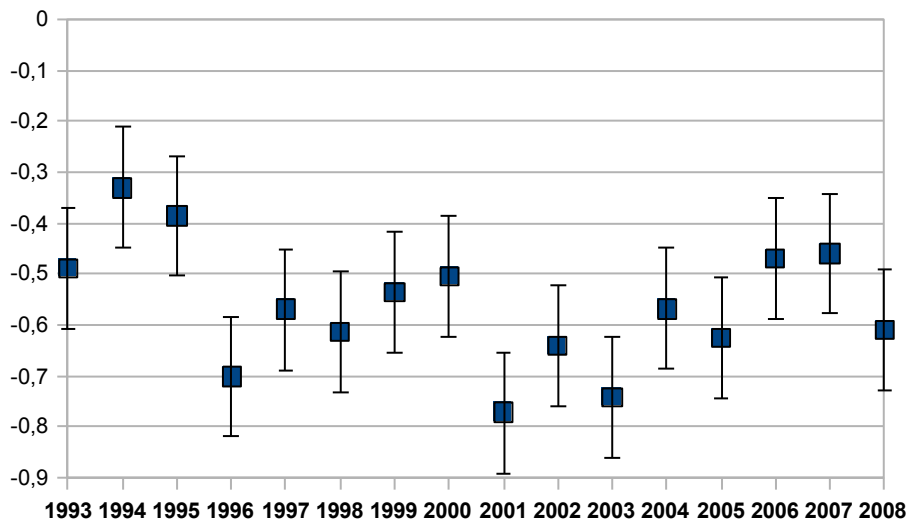


Figure 3: Standardize catch of porbeagle of the Yeu targeting fishery per unit effort in weight (kg) per hook and by year. Data ponderate with the evolution of the number of gear on board and Ln transformed. (Source : OP Yeu / Apecs-Eppartiy)

Variation between year are notable but no real tendancy can rise. While taking in consideration the evolution of the fishing activity (number of long-line on board) gives a more accurate image of the situation.

- Lengh distribution

<i>Year</i>	<i>1992</i>	<i>1993</i>	<i>1994</i>	<i>1995</i>	<i>1996</i>	<i>1997</i>	<i>1998</i>	<i>1999</i>	<i>2000</i>
<i>% Weight of in the catches of porbeagle < 50 k g</i>	26	29,7	33,1	49,9	31,9	39,2	<i>Data not available by weight category</i>		
<i>% Weight in the catches of porbeagle ≥ 50</i>	74	70,3	66,9	53,1	68,1	60,8			
<i>Year</i>	<i>2001</i>	<i>2002</i>	<i>2003</i>	<i>2004</i>	<i>2005</i>	<i>2006</i>	<i>2007</i>	<i>2008</i>	
<i>% Weight of in the catches of porbeagle < 50 k g</i>	<i>Data not available by weight category</i>		53	44	40	44,3	44,9	48,1	
<i>% Weight in the catches of porbeagle ≥ 50</i>			46,3	56	60	55,7	55,1	51,9	

Tableau 2 : Distribution of weight category by year for the landings recorded by OP Yeu, 1992-July 2008 (Source : OP Yeu/Apecs-Eppartiy)

Auction markets uses two weight categories, less than 50 kilograms and more than 50 kilograms. The proportion of porbeagle landed in 1992 was 26% less than 50 kg and 74% more than 50 kg. These proportions constantly invert through 2008 with 48, 1 % of porbeagle landed weight less than 50 kilograms.

According 2008 length-weight relationship 50 kilograms correspond to a 171 cm long porbeagle (Apecs-Eppartiy) which is above the average length at maturity determine by Jensen (2002) of 173, 7 cm for male and 217, 5 cm for female for Atlantic North West stock. The Yeu fishery catches more than 50 % of immature porbeagle. However, Lallemand-Lemoine (1990) gives an average weight of the same porbeagle targueted fishery of 40 kilograms in 1980 for 250 data sample collected by Ifremer (Institut rançais de recherche pour l'exploitation de la mer)

By-catches composition and uses

Species	Blue shark <i>Prionace glauca</i>	Thresher shark <i>Alopias vulpinus</i>	Spiny dogfish <i>Squalus acanthias</i>	<i>Ling Molva molva</i>	Atlantic pomfret <i>Brama brama</i>	King of the herrings <i>Regalus glesne</i>	Northern gannet <i>Sula bassanus</i>
Weight in kg and/or (number)	6 248	312 (2)	28 (1)	12 (1)	21 (42)	(1)	(2)
Percent of the total commercial	5,41 %	0,27 %	0,02 %	0,01 %			
Uses	Sold to the auction fish market				Eaten on board or given to the crew	Released alive	Released dead

Tableau 3: By-catch composition in weight or/and number, percent of the total commercial catches and purpose, 2008 (APECS)

94 % of the catches in weight are composed by porbeagle sharks and 5, 7% by other sharks : blue shark, thresher shark and spiny dogfish, all sold when landed. Other fish by-catch are very rare 42 Atlantic pomfret, 1 Ling and 1 King of the herring. Two birds were captured and released dead : Northern gannets. No report of turtle or marine mammals captured in the drifting long-line during the 2008 study (neither during the past years according the fishermen).

One vessel used to fish Atlantic mackerel (*Scomber scombrus*) as bait with hand line to reduce the costs of frozen bait, variable catches around ten of kilograms per fishing trip

Economical factors

The income realised by the porbeagle targeted fishery vary between 26% to 42% of the global turnover (mean from 2002-2007 source : Yeu Fishing Organisation)

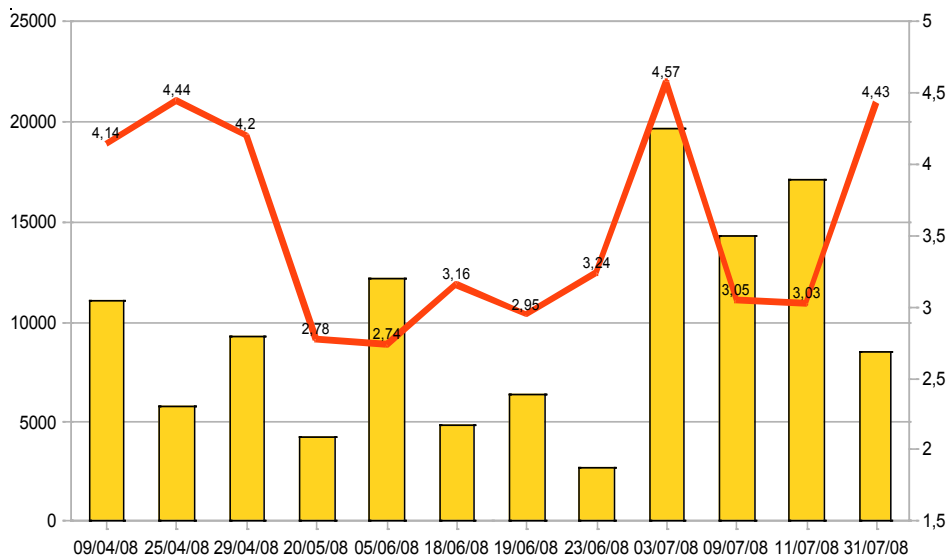


Figure 5: Catches of porbeagle and mean prices (euro/kg) for auction markets visited by the Yeu fishery (Les Sables d'Olonne, Port Joinville, Le Guilvinec), 2008 (source : Apecs- Eppartiy)

Porbeagle prices vary around a mean of 3,5 euros per kilogram. Usual fluctuation are related with the number of landings and or quantities of porbaegle per week ; prices are higher when landings are spaced with average quantities (mean catches for 2008 : 8 923 kg/landing, mean price 3, 56 euros/kg). A rapid decrease of the prices ocured in mai due to strike movements started in Les Sables d'Olonne fishing habourg concerning fuel crisis, the troubles last for one month.

Biological parameters

- Length-weight relationship

Lenght-Weight relationship is presented for pobeagle sharks fished in the North east Altantic.

$$y = 2, 559e^{0,0179x} \quad R^2 = 0, 932 (n = 532)$$

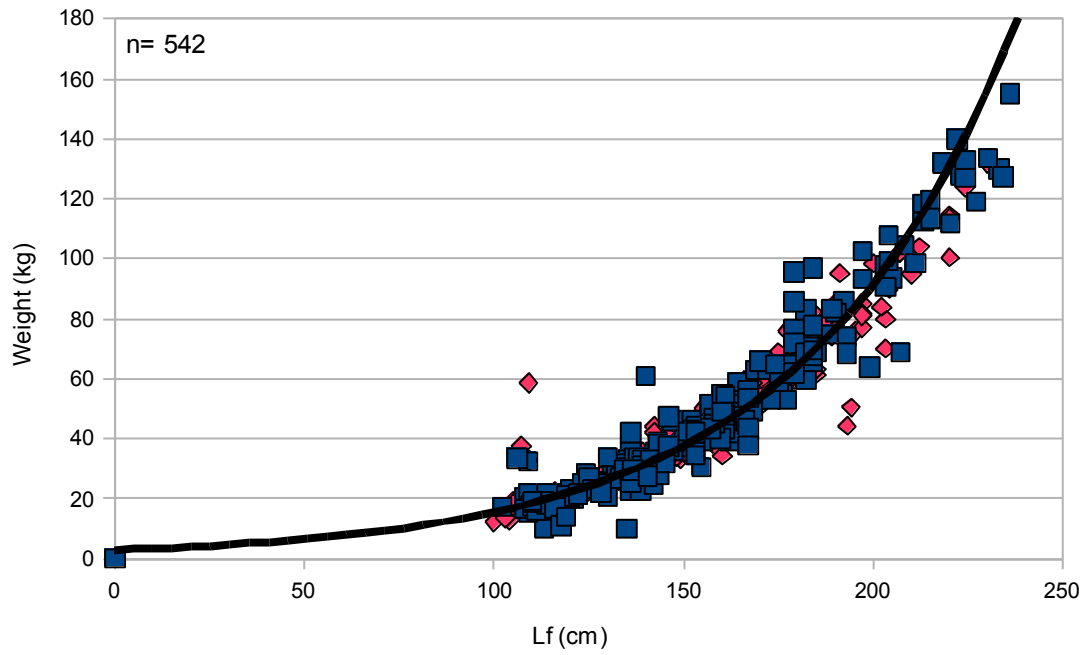


Figure 4: Length-weight relationship for male and female porbeagle caught between April and July 2008 by the Yeu fishery. All length are curved fork length, all weight are dressed. (Source : Apecs-Eppartiy 2008)

- Monthly length frequencies

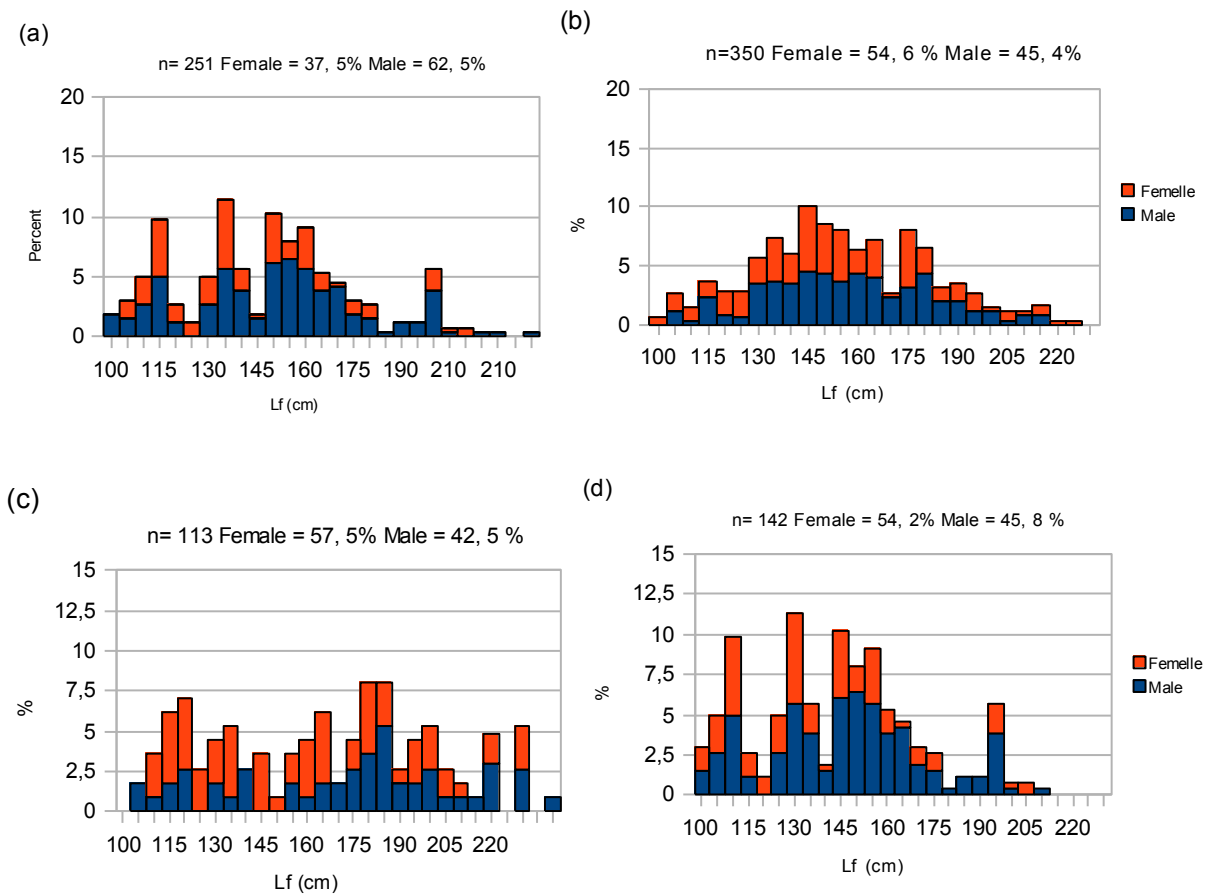


Figure 7: Monthly length distribution for porbeagle landings of the Yeu fishery in percent of the total catch per month, 2008 (a) April (b) May (c) June (d) July. Lengths are curved fork lengths grouped by 5 centimeters categories (sources : Apecs/Eppartiy)

- 2008 boardings

In 2008, up to 31 of July 54 % of the porbeagle reaching the boat were alived. Four gravid females were caught in April, their length (curved fork length) were respectively : 222, 215 and 205 cm for the smallest one, the fourth one was released alived.

Fishery management thoughts

Regarding the situation of the stock exploited, data are still missing especially the sexual maturity analyse ; but facing emergency of managing the fishery, the preservation of young sharks as well as mature females should be a primary objective.

The frequency of sharks alive allow a good success of releases. Minimum length catches can be imagine and allready discussed with some of the captains. Maximum length capture for female should be a good option, but practical feasibility seems to be much more difficult due to the weight of such animals.

July fishing grounds (Saint Georges Channel, ICES division VIIg and VIIf), and in bigger proportion August (data not presented), seems to present a large proportion of first age classes, the restriction of this area may also be a proposition of management, if further results confirmed the tendency.

These first tracks are to be discussed but no measure will be efficient without concerting management with the fisheries producing porbeagle as by-catches or accidental catches.

Other biological parameters

Epartiy program is still in progress, sexual maturity data will be analysed this autumn. Aging of the vertebrae collected and stomach content determination will be process in the first 2009 semester.

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