

Description and Analysis of The Gambia Catfish Stock Assessment 2013



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Introduction

There are several species of catfish harvested from the Gambian waters. Recent interviews with local fishermen indicate that up to 8 species are found in saltwater while 6 are identified in estuary/freshwater environment. Investigation at beach landing sites positively identified three species: *Arius heudelot* (Ngunja or smooth head sea catfish) (Figure 1), *Arius latiscutatus* (black kong or rough head sea catfish) (Figure 2) and *Arius parkii* (white kong) (Figure 3) (Gabis et al., 2012).



Figure 1. Smooth head catfish (Ngunja) *Arius heudelot* with characteristic mouth plates.



Figure 2. Rough head catfish, *Arius laticulatus* with characteristic mouth plates



Figure 3. White kong. *Arius parkii* with characteristic mouth plates.

The marine catfish complex is a very important one for local consumption and export product. Smoked product is packed in locally weaved baskets for marketing. 90% of the product is for the local market and 10% is exported.

The Gambian Department of Fisheries maintains annual landings information on the catfish (Figure 4). Landings have increased since 2005.

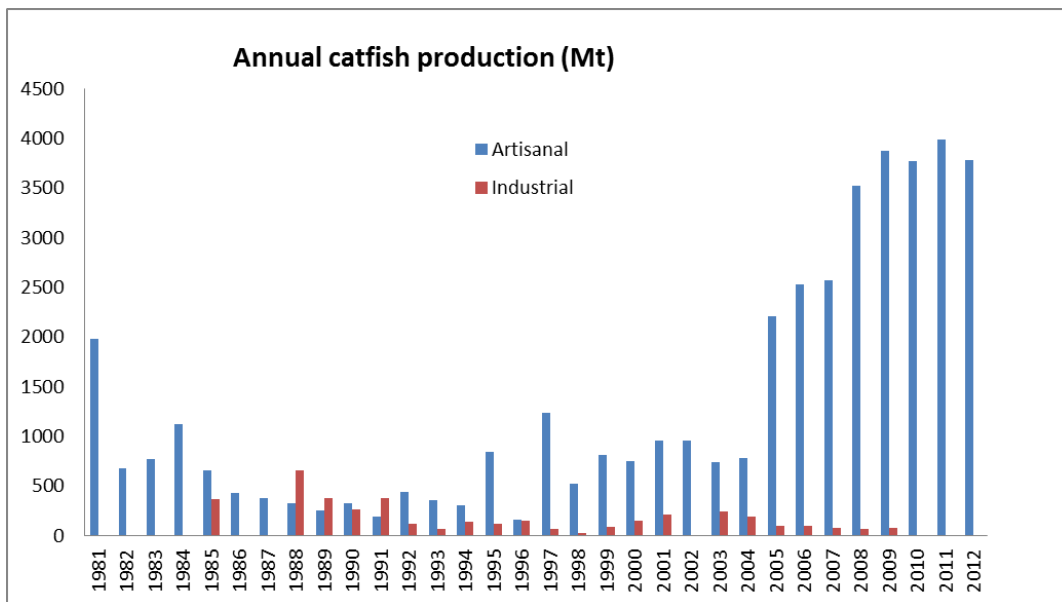


Figure 4. Landings data for marine catfish (combined species) from 1981-2011. (From The Gambian Department of Fisheries).

The catfish is a major bycatch species in the sole bottom gillnet fishery. The life history characteristics of the catfish species makes it highly vulnerable - long life span, slow growth, low fecundity and large parental investment for care of young (males mouth brood).

Methods

To establish baseline information on catfish status, a simple stock assessment was conducted in 2013. The assessment compares the results of Yield per Recruit (YPR) and Spawning Stock Biomass per Recruit (SSBPR) analysis to establish overfishing reference points to the results of a length-based catch curve (LCCA) to estimate the fishing mortality rate.

The data used in this assessment was from the length frequency data collection in the gillnet catch comparison study. This was conducted from May 25-June 22, 2013 in the Kartong area. Two mesh sizes were evaluated (84 and 92 mm stretched mesh) which is larger than the regulated size of 80 mm. A total of 1540 catfish were measured consisting of two species: *Arius latisculatus* and *Arius parkii* (Figure 5).

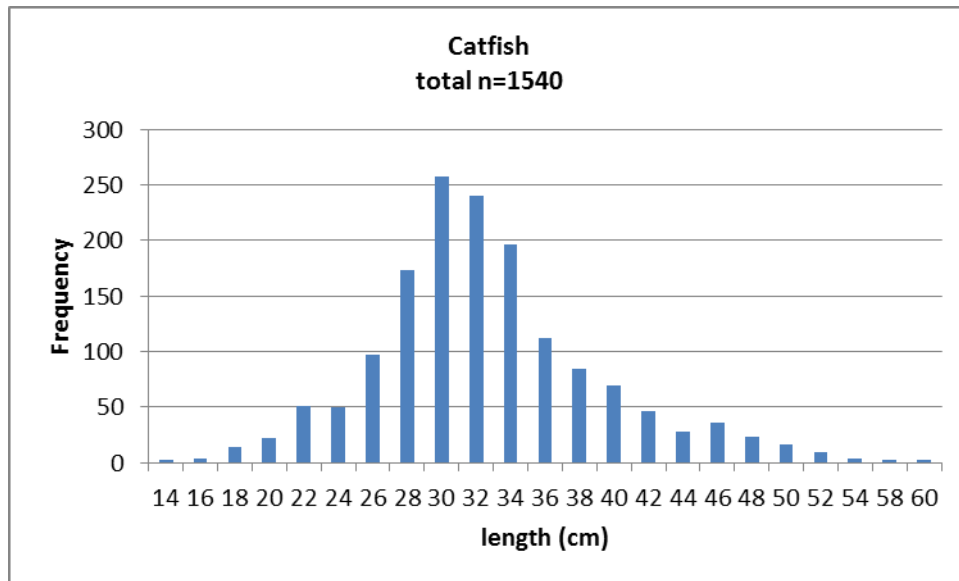


Figure 5. Length frequency of the catfish captured in the gillnet study.

Reference Points

These species of catfish occur along the west coast of Africa. Conand et al (1995) conducted an age and growth study of the *Arius* spp in Guinea using dorsal spines. We used the estimate of K from this paper. However they estimated an Lmax of 65 which seems low given the max size observed is 80 cm. We used 90% of the max size to obtain a Lmax of 72 cms. M was estimated to be 0.2.

Growth Parameters	
L0	0
K	0.154
Lmax	72

The input maturity function was linear between ages 2.1-3.0 with all year 3 and older fish being classified as mature.

The fish are assumed to recruit in a linear manner from Age 2.6 with all fish 30 cm and above are assumed to be retained by the gear 100%. No information is available for 80 mm gillnet.

The a and b parameters of the Length-Weight function were determined to be as follows (From Fishbase):

a	0.011
b	2.98

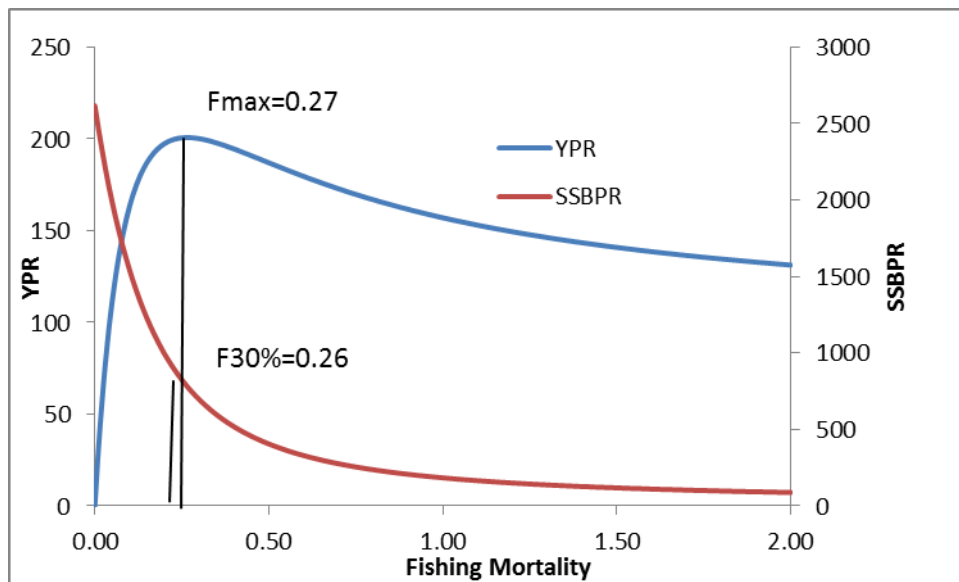


Figure 6. YPR and SSBPR reference points for catfish.

LCCA Procedures

Based on life history characteristics chosen for sole, we estimated the age for the lengths using the von Bertalanffy growth equation.

The von Bertalanffy equation is:

$$L_t = L_\infty * (1 - e^{-(K*T)})$$

Length category (cm)	Total numbers	Age (years)
14	3	1.4
16	4	1.6
18	14	1.9
20	22	2.1
22	51	2.4
24	50	2.6
26	97	2.9
28	173	3.2
30	258	3.5
32	240	3.8
34	196	4.1
36	112	4.5
38	84	4.9
40	70	5.3
42	46	5.7
44	28	6.1
46	36	6.6
48	23	7.1
50	16	7.7
52	9	8.3
54	4	9.0
58	2	10.6
60	2	11.6

Table 1. Estimated age by length category.

The Ln (number of fish) is plotted against age to determine total mortality Z. Only fish assumed to recruit to the gear at 100% are used for the analysis. The predicted Z = 0.6484. Assuming M=0.2, then F=0.45.

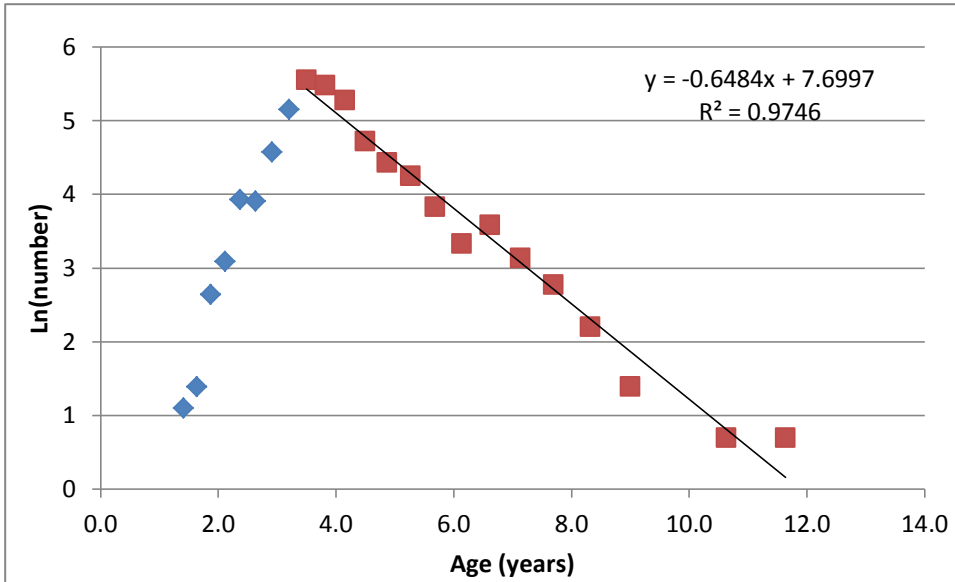


Figure 7. Catch curve analysis showing plot of age and ln (number). This regression line produces an estimate of Z, total mortality of 0.65..

Conclusion

The results of the LCCA analysis suggests that the best estimate of fishing mortality (F) for catfish species is 0.45 based on Lmax , K and M values of 72 cm, 0.154 and 0.2 for combined species.

The reference points for growth and recruitment overfishing, Fmax and F30%, for catfish are 0.27 and 0.26, respectively. Comparing the results of the LCCA to the reference points estimated in the YPR and SSBPR analysis, catfish experienced growth and recruitment overfishing in 2013.

Species	F calculated	F max	F30%	Conclusion
Catfish	0.45	0.27	0.26	Recruitment overfishing; growth overfishing

Immediate action is recommended to reduce fishing mortality of the catfish species. The closed season/area from May-October should protect the animals during their spawning season and an increased mesh size in the gillnet will increase the mean size of animal captured. A recommended immediate study would be to evaluate hook size selection in the longline fishery. The National Sole Fishery Co-Management Committee (NASCOM) should carefully monitor this species and be prepared for further action in the future to continue protecting them.

References

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