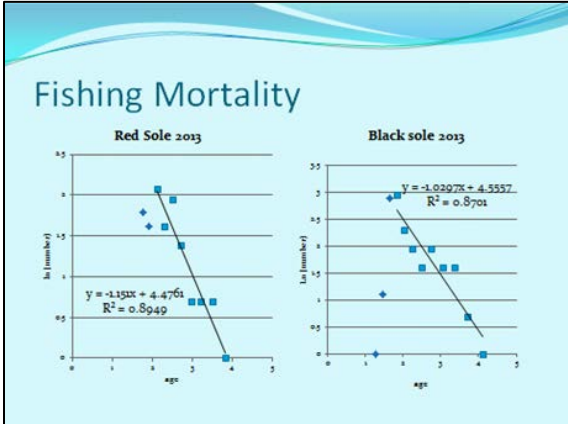


DESCRIPTION AND ANALYSIS OF THE GAMBIA SOLE STOCK ASSESSMENT 2013



December 2013



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INTRODUCTION

This report presents the stock assessment of the Gambian sole fishery for 2013. Although several species of sole fish are reported to inhabit the coastal waters of the Gambia, two species predominate the catch and landings: Red sole (*Cynoglossus senegalensis*) and Black sole (*Synaptura cadenati*). The purpose of this report is to summarize what is known for the resource in the Gambia in 2013.

LENGTH WEIGHT RELATIONSHIP

The parameters used for the length weight relationship were from the last stock assessment (Ceesay et al., 2012).

	a	b
Red	0.10725	2.14
Black	0.01874	2.76

Table 1: Parameter values for Red and Black sole using non-linear methods

ESTIMATION OF THE LEVEL OF EXPLOITATION

For this analysis the only data available was from a research project conducted in May-June 2013. A total of 84 Black sole and 41 Red sole were captured (Figures 1 and 2). Using a length converted catch curve, F was obtained and compared that a reference point. Reference points from the 2012 analyses were used.

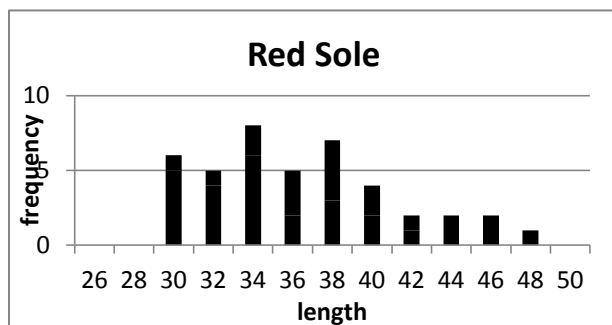


Figure 1: Length frequency of Red sole

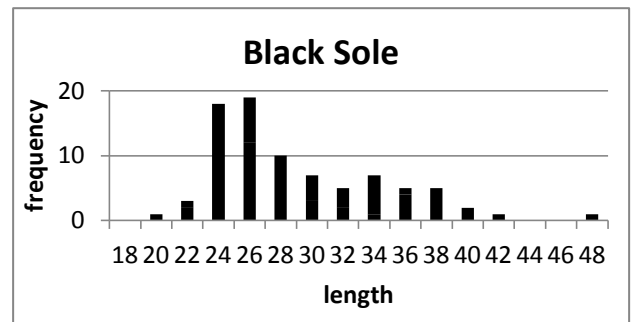


Figure 2: Length frequency of Black sole

The Length-based Catch Curve Analysis (LCCA) was conducted on length frequency distribution. The lengths of the fish length were converted to mean age using a von Bertalanffy growth equation, using a specific value of Linf and K, the growth coefficient. To determine the total mortality (Z), the natural log of the numbers captured was plotted versus the estimated age at mean length.

The natural log of numbers captured was plotted versus the estimated age at mean length; the regression slope was estimated on fish which were fully recruited to fishery.

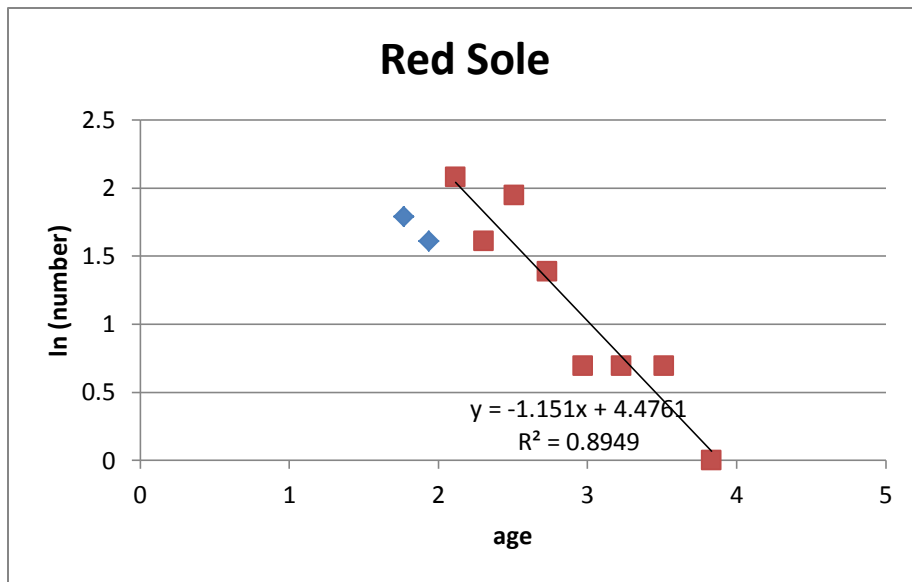


Figure 3: Results of LCCA for red sole

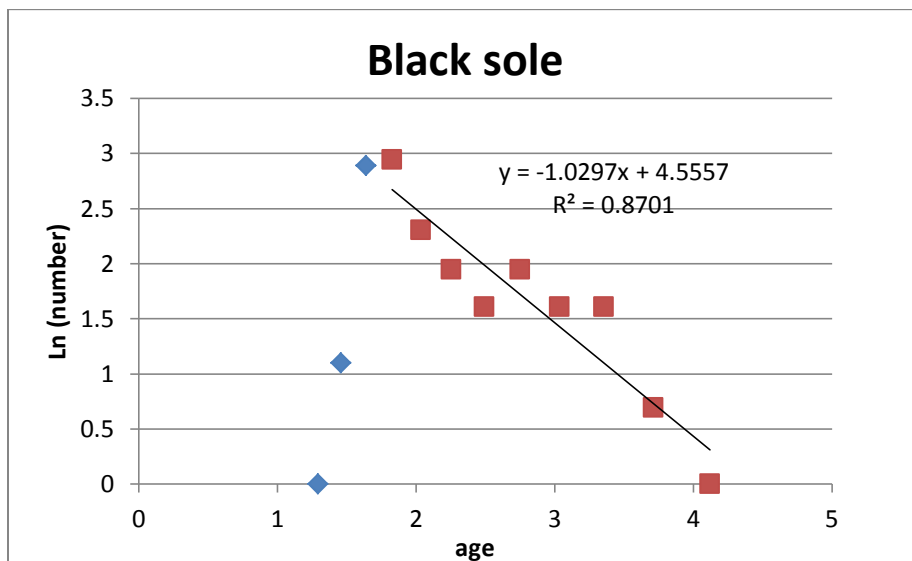


Figure 4: Results of LCCA for black sole

The results of the length-based Catch Curve Analysis of the red and black sole indicated that the slope of the linear regression of the natural log of numbers versus the age, the total mortality was 1.15 for red sole and 1.03 for black sole.

Using the value for $M=0.4$, F is calculated as: Red sole = 0.75 and black sole 0.63. This analysis was based on the following parameters for the life history characteristics: $L_{inf}= 65$ cm, $K= 0.35$ and $M= 0.4$ for red sole and $L_{inf}= 55$ cm, $k=0.35$ and $M=0.4$ for black sole.

REFERENCE POINTS

Using the estimates of $M= 0.4$ and a larger L_{inf} for red sole, the new YPR and SSBPR reference points are shown below (Figures 3 and 4). $F_{30\%}$ and $F_{20\%}$ were estimated for comparison purposes.

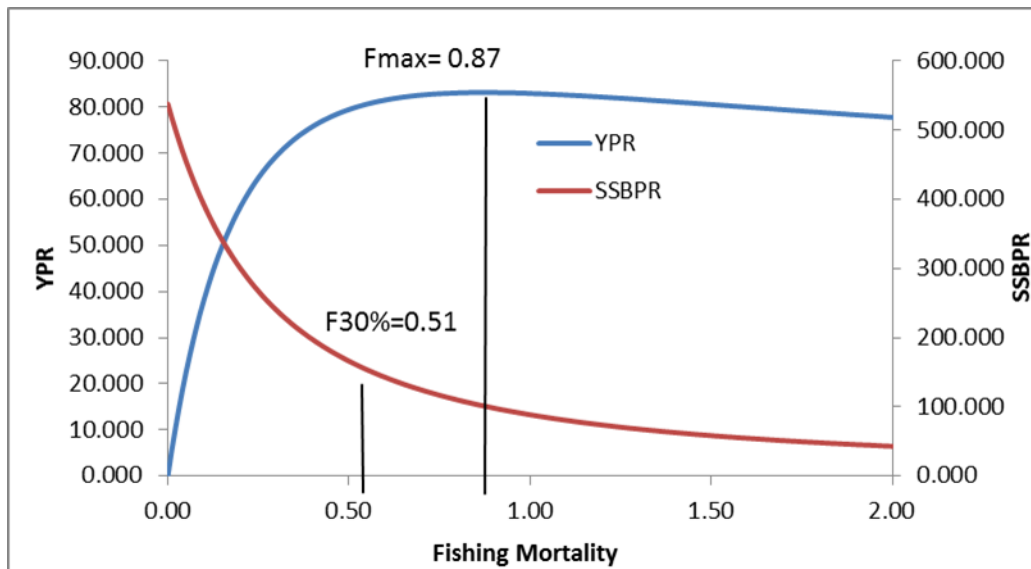


Figure 5: Reference points for red sole. $F_{max} = 0.87$ and $F_{30\%} = 0.51$.

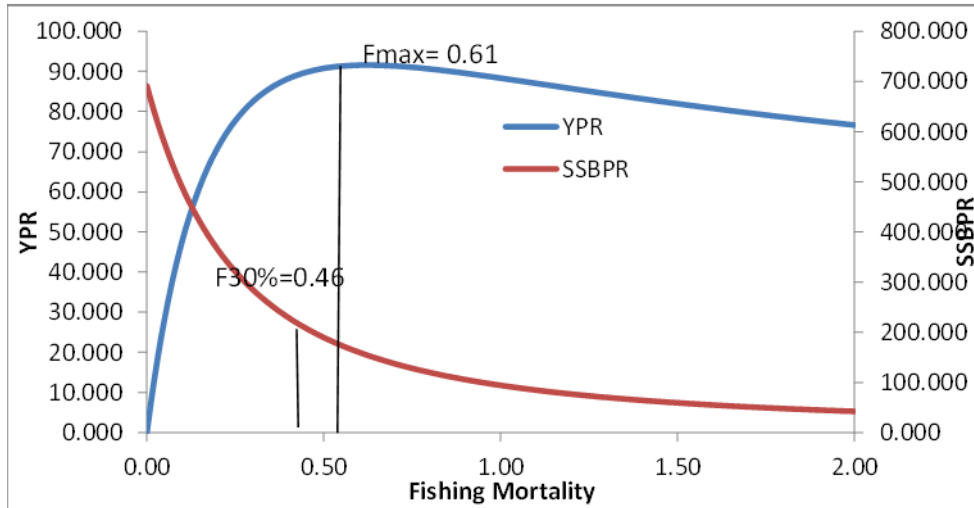


Figure 6: Reference points for black sole. $F_{max}=0.61$ and $F_{30\%}=0.46$.

SUMMARY, CONCLUSION AND RECOMMENDATIONS

The following results indicate levels of overfishing for the Gambian sole using new life history parameters.

Species	F calculated	F max	F30%	F20%	Conclusion
Red sole	0.75	0.87	0.51	0.80	Recruitment overfishing; no growth overfishing
Black sole	0.63	0.61	0.46	0.68	Both recruitment and growth overfishing

Based on these results, it is recommended that fishing mortality be reduced, so that the stock can begin to recover. To reduce fishing mortality the following measures are recommended:

- Mesh size control: Larger mesh sizes need to be used to reduce catch of small fish.
- Fishing effort must be reduced: this can be achieved through limiting the number of fishing days, nets or fishing boats.
- Closed season or closed areas should continue.

Most importantly, it is critical to have the data needed for accurate stock assessments. The Department of Fisheries should continue collecting landings and effort data and length-weight data from the landing sites through independent data collectors rather than base stock assessment only on the data available from a fishing company (as in 2012) or a once only research project(as in 2013)

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