SEDAR 22 DW-9

Observed length frequency distributions and otolith sampling issues for yellowedge grouper caught in the Gulf of Mexico from 1984 to 2009

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Abstract

This report documents the observed length frequency distributions for yellowedge groupers collected by TIP samplers between 1984 and 2009 and outlines the differences in length frequency distributions between otolith samples and length samples. Most yellowedge grouper length samples were collected from long line fisheries. There are significant differences in sample sizes and length frequency distributions between yellowedge grouper otolith and length samples taken before 2005. If age frequency distributions and growth curves are to be estimated from sub-samples of these otolith samples, the estimated age frequency distributions for growth curves may need to be adjusted by re-weighting the growth curves with the length frequency distributions of yellowedge grouper length samples (Chih, 2009a, 2009b).

Materials and methods

All data used in this analysis came from the TIP database. Otolith samples were sub-samples of length samples. The lengths of otolith samples were included in the estimation of length frequency distributions. All otolith samples were sent to the Panama City Laboratory, SEFSC, NMFS for age determination. Otolith samples from the TIP database are the major source of age samples in the Panama City Laboratory age database. If the length distribution for otolith samples was significantly different from that for length samples, then the length distribution of age samples would also be different from that for length samples. All lengths are reported as total length in centimeters.

Results and discussion

Most yellowedge grouper length and otolith samples were collected from long line fisheries (Table 1) . The yearly length frequency distributions for samples collected from long line and hand line fisheries (with sample size larger than 200) are shown in Fig 2. Otolith sample sizes were considerably smaller than length sample sizes before 2005 (Table 1). Trip sample sizes for otolith samples are typically small (Fig 3). Otolith samples sizes for more than 50% of trips were less than 10. Because the ranges in the length frequency distribution for yellowedge groupers are quite large, it is difficult to obtain representative samples that can properly reflect the variability in trip length frequency

distributions when trip sample sizes are less than 10. As a result, the length frequency distributions for otolith samples were significantly different from those for length samples collected before 2005 (Fig 4). In some years, there were higher percentages of large fish in otolith samples than in length samples. For example, about 42% of otolith samples and 18% of length samples were larger than 80 cm in 2000. In other years, there were higher percentages of small fish in otolith samples than in length samples. For example, about 25% of length samples and 40% of otolith samples were less than 55 cm in 2005. These results demonstrate that age frequency distributions or growth curves estimated from otolith samples or age samples before 2005 may need to be re-weighted by the length frequency distribution for length samples (Chih, 2009a, 2009b).

References

Chih, C.-P. 2009a. Evaluation of the sampling efficiency of three otolith sampling methods for commercial king mackerel fisheries. Transactions of the American Fisheries Society 138: 990-999.

Chih, C.-P. 2009b. The effects of otolith sampling methods on the precision of growth curves. North American Journal of Fisheries Management 29: 1519-1528.

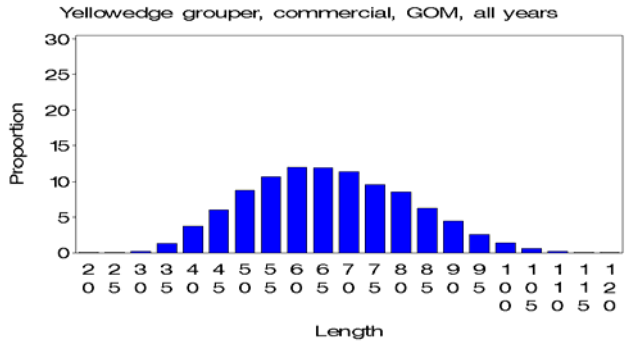
Table 1. Number of yellowedge grouper otolith and length samples collected from hand line and long line fisheries by TIP samplers from 1984 to 2009 (H- hand line, L –long line).

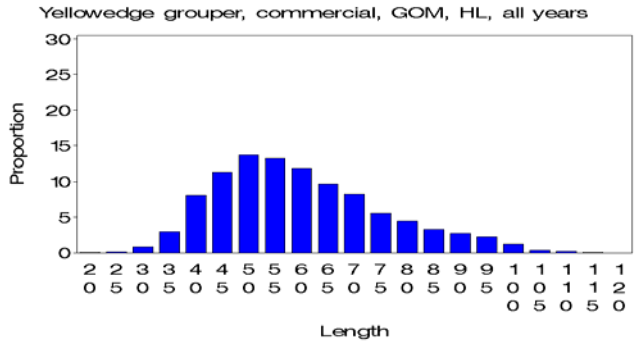
Year	H otolith	H length	L otolith	L length	
1984			179		1280
1985		2	597		2344
1986		28	374	58	1361
1987			97		1074
1988			142		275
1989			90		245
1990			401		929
1991		30	777	174	2031
1992		65	929	69	1907
1993		34	309	86	1056
1994		2	782		2288
1995			607	1	2067
1996		3	743		1124
1997			427		1718
1998			301	50	4158
1999			246	57	5113
2000		13	117	130	10483
2001		44	89	491	4194
2002		39	92	178	2465
2003		52	76	742	3722
2004		48	83	435	2633
2005		88	139	578	2171
2006		55	116	411	705
2007		130	132	1229	1790
2008		247	291	1257	1345
2009		314	333	1981	2058

Table 2. Number of yellowedge grouper sampling trips from 1984 to 2009.

YEAR	hand line trip	long line trips	total trips
1984	21	34	56
1985	52	46	108
1986	33	42	79
1987	20	29	49
1988	19	14	33
1989	18	9	27
1990	76	32	110
1991	125	58	183
1992	146	57	205
1993	66	45	114
1994	111	62	175
1995	79	55	134
1996	82	28	111
1997	83	44	127
1998	53	82	135
1999	45	87	132
2000	15	123	138
2001	24	94	119
2002	22	70	93
2003	29	112	142
2004	16	81	97
2005	24	72	98
2006	19	61	80
2007	21	88	109
2008	26	85	112
2009	29	102	132

Fig 1. Length frequency distributions for tile fish collected from the Gulf of Mexico from 1984 to 2009.





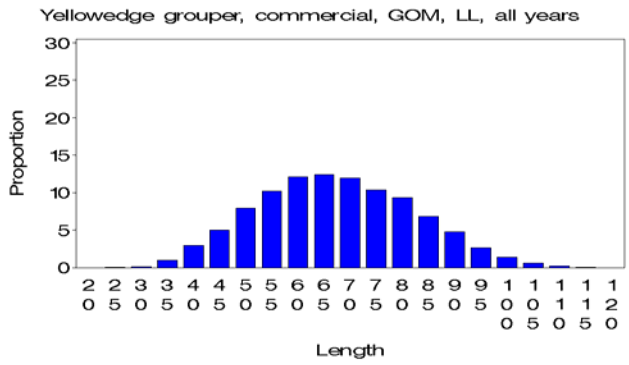
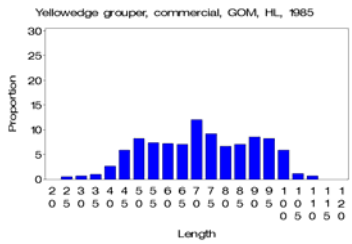
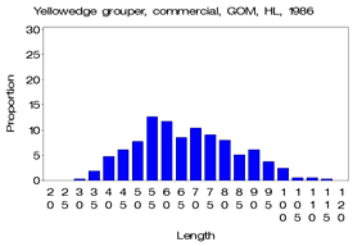
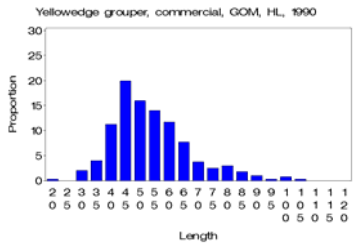


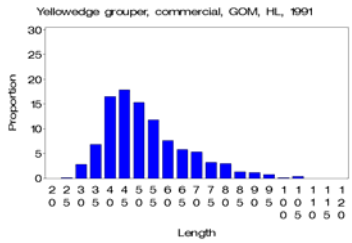
Fig 2 Yearly length frequency distributions for tile fish collected from the Gulf of Mexico from 1984 to 2009 (only those years with sample sizes larger than 200 were included).

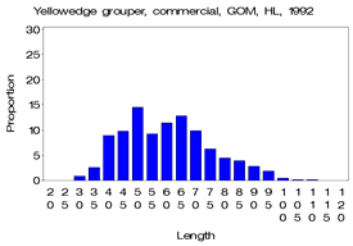
(A) Hand line

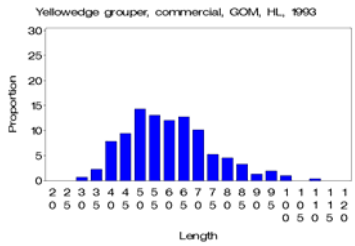


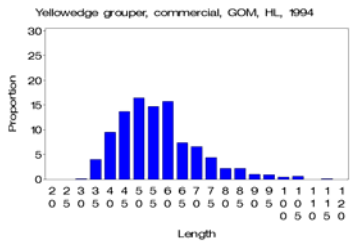


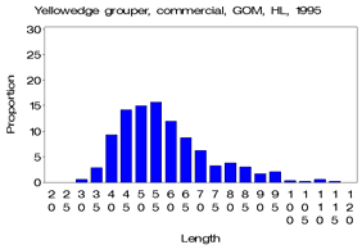


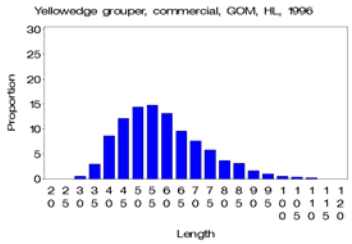


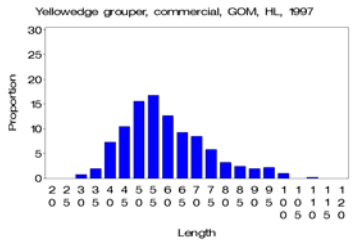


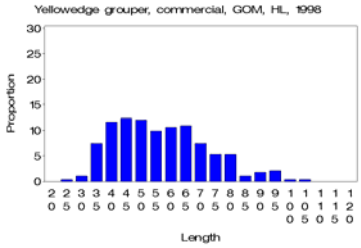


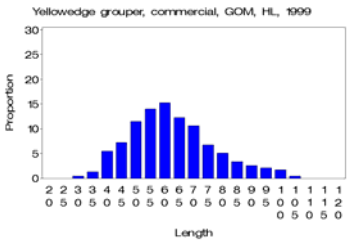


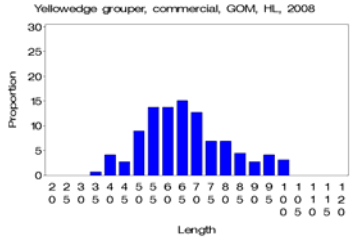












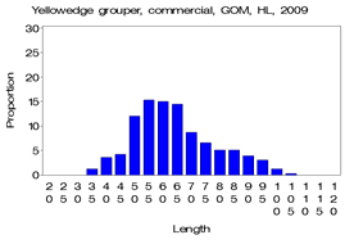


Fig 2. (B) Long line

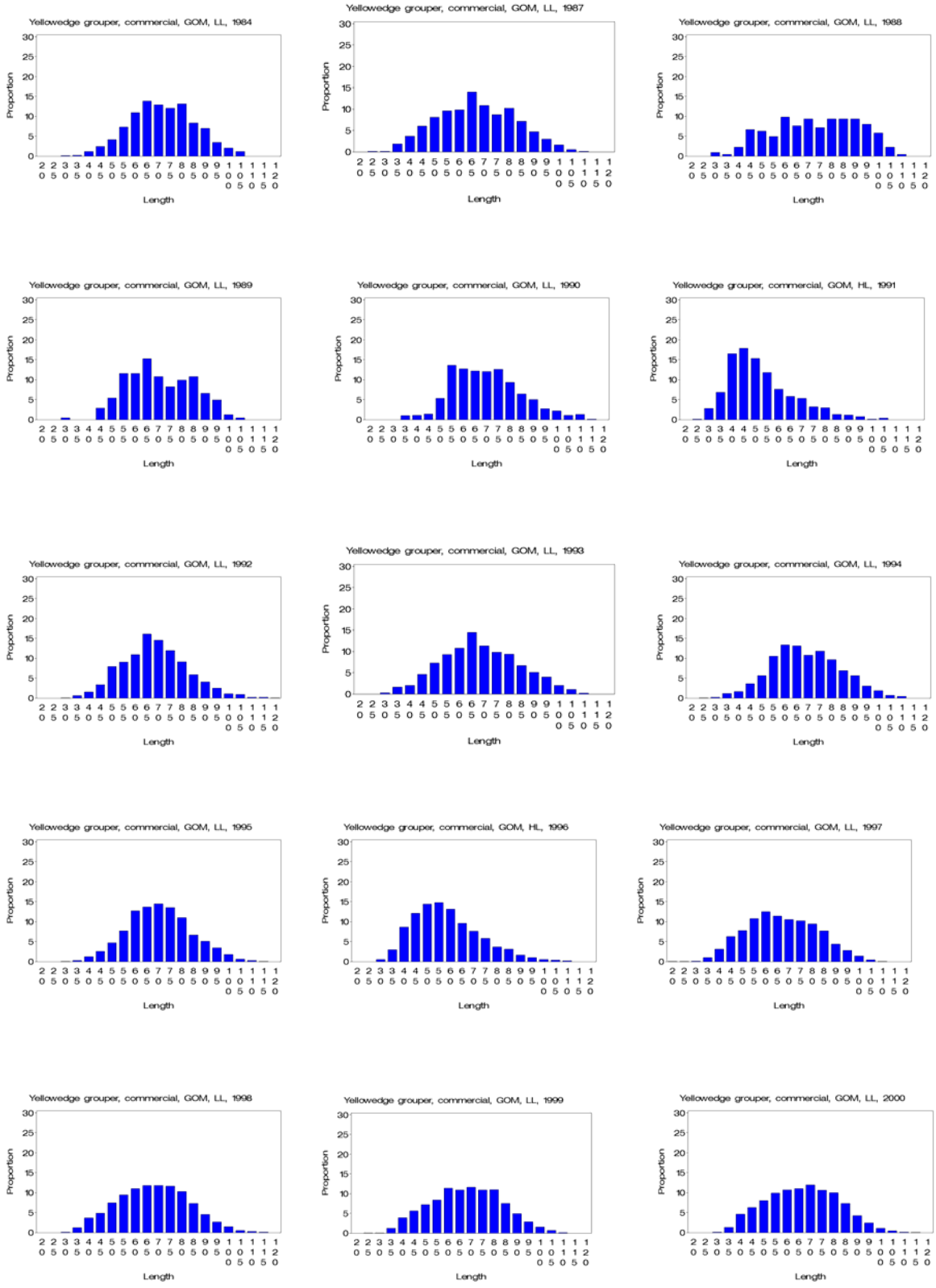
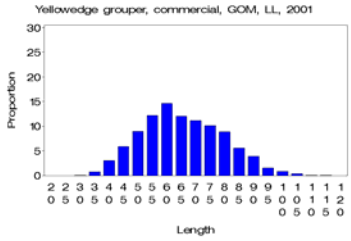
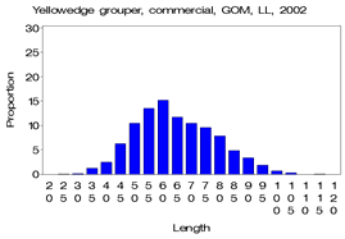
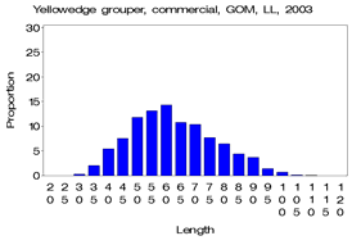
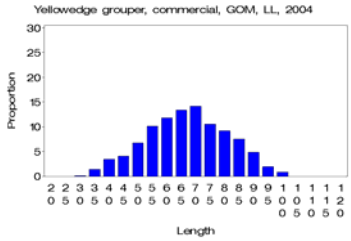


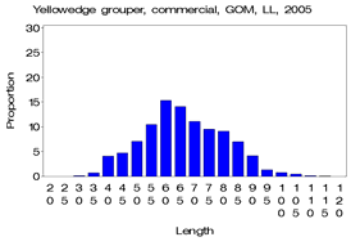
Fig 2. (B) Long line (continued).

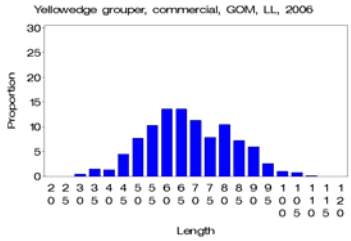


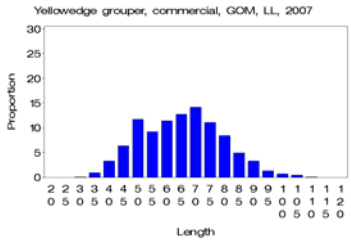


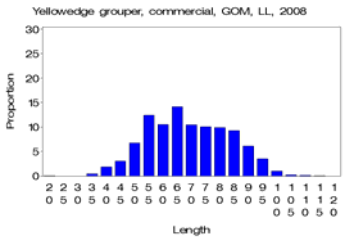












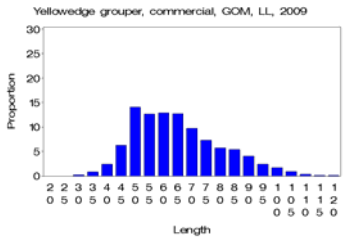
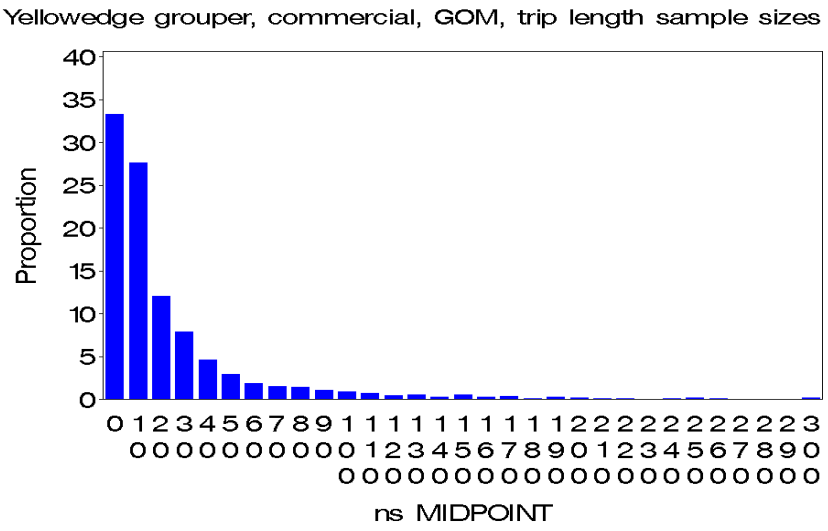


Fig 3. Distributions of trip sample sizes for length and otolith samples (ns – trip sample size for length samples; no – trip sample size for otolith samples).



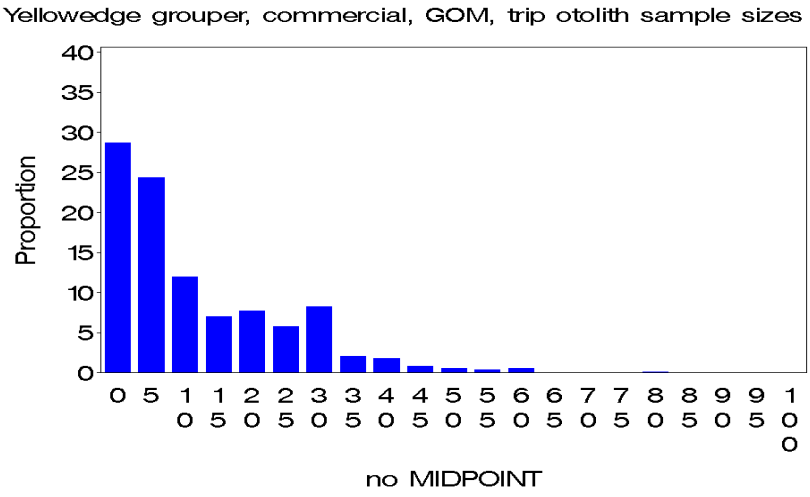
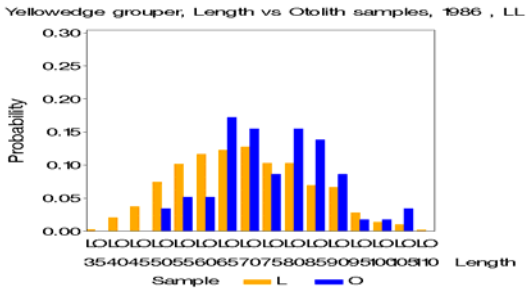
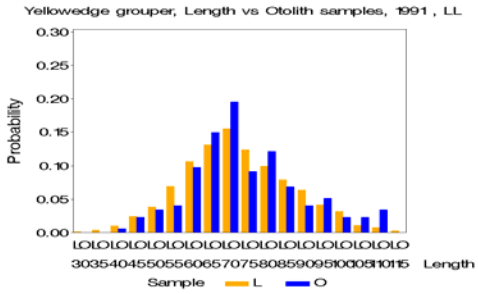
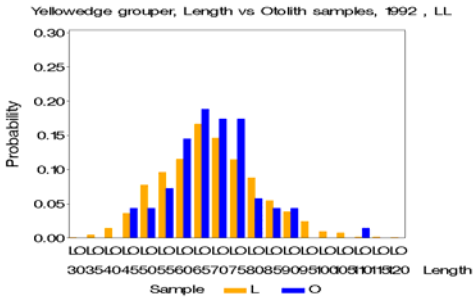
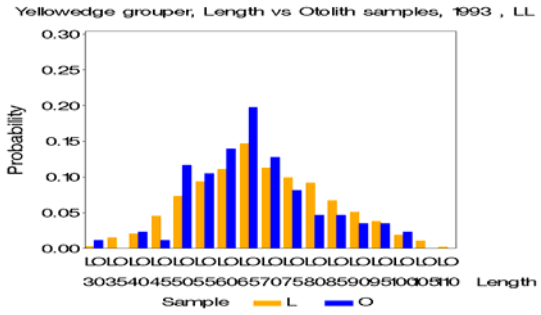


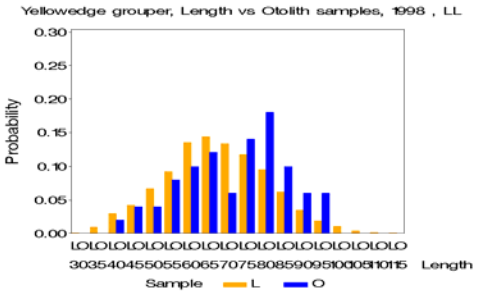
Fig 4. Comparisons of length frequency distributions for length and otolith samples collected from yellowedge grouper long line fisheries from 1986 to 2009. For sample sizes, see Table 1.

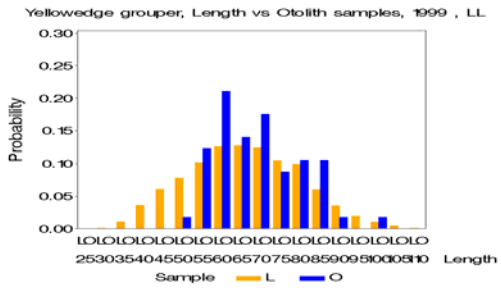


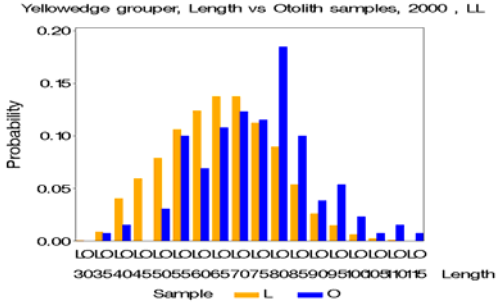


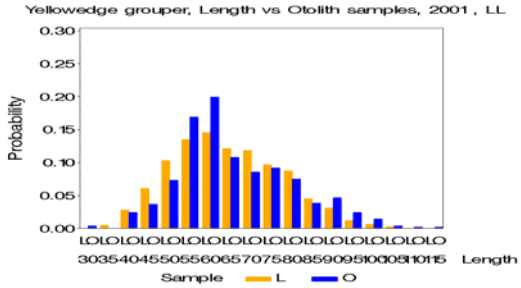


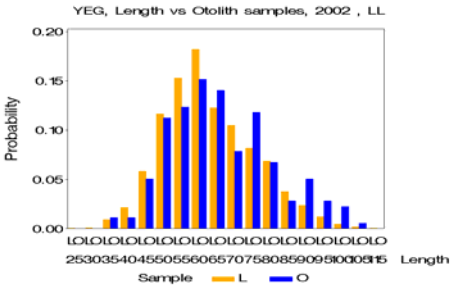


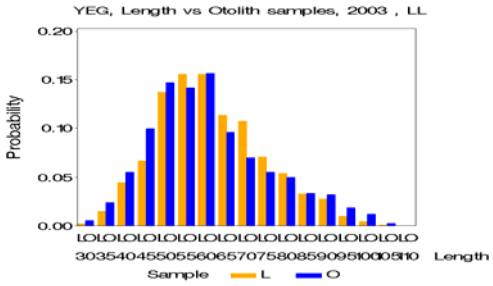









YEG, Length vs Otolith samples, 2002 , LL
Probability
0.20
0.15
0.10
0.05
0.00
Length
Sample L O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Probability
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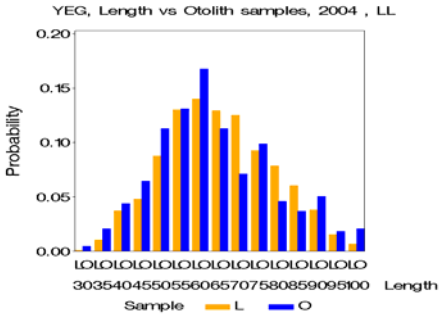
Length
Sample L O


YEG, Length vs Otolith samples, 2004 , LL
Probability
0.20
0.15
0.10
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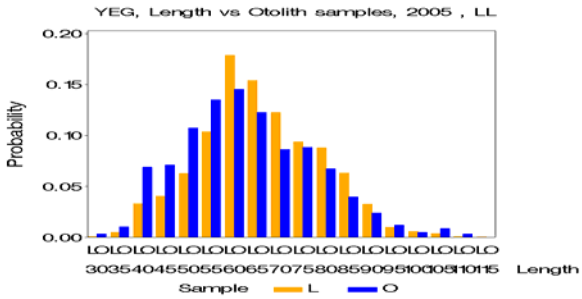
0.00
Length
Sample L O


YEG, Length vs Otolith samples, 2005 , LL
Probability
0.20
0.15
0.10
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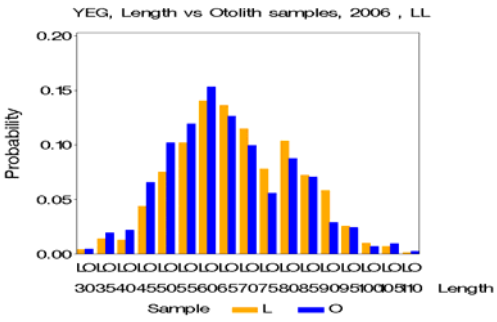
0.00
Length
Sample L O


YEG, Length vs Otolith samples, 2006 , LL
Probability
0.20
0.15
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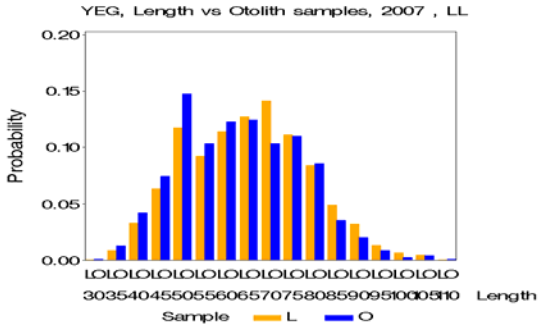
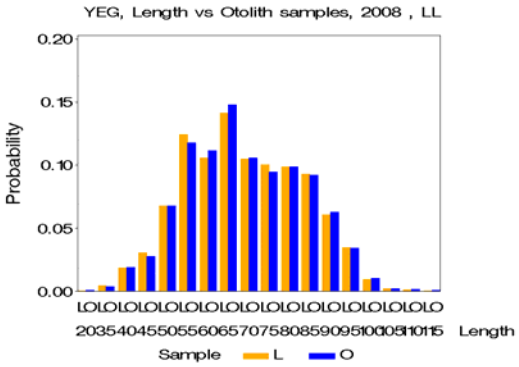
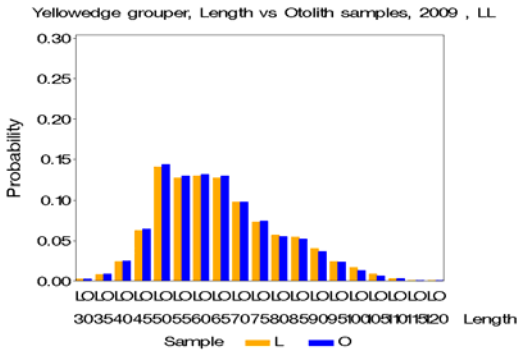
0.05
0.00
Length
Sample L O


YEG, Length vs Otolith samples, 2007 , LL
Probability
0.20
0.15
0.10
0.05
0.00
Length
Sample L O


YEG, Length vs Otolith samples, 2008 , LL
Probability
0.20
0.15
0.10
0.05
0.00
Length
Sample L O


Yellowedge grouper, Length vs Otolith samples, 2009 , LL
Probability
0.30
0.25
0.20
0.15
0.10
0.05
0.00
Length
Sample L O