SEDAR 22 DW-10

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

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Abstract

This report documents the observed length frequency distributions for tilefish collected by TIP samplers between 1984 and 2009 and outlines the differences in length frequency distributions between otolith samples and length samples. Length samples collected from hand line fisheries generally had small sample sizes and may not have been representative of the actual length frequency distributions for hand line samples. There are significant differences in sample sizes and length frequency distributions between tilefish otolith and length samples taken before 2007. If age frequency distributions and growth curves are to be estimated from sub-samples of these otolith samples, it may be necessary to adjust the estimated age frequency distributions of growth curves by re-weighting them with the length frequency distributions of tilefish 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. These 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 for 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 for age samples would also be significantly different from that for length samples. All lengths are reported as total length in centimeters.

Results and discussion

The majority of tile fish length and otolith samples were collected from long line fisheries (Table 1) . Yearly length frequency distributions for samples collected from long line fisheries (with sample sizes larger than 200) are shown in Fig 2. Otolith sample sizes were considerably smaller than length sample sizes before 2007 (Table 1). Trip sample sizes for otolith samples are typically small (Fig 3). Otolith samples sizes for more than 40%

of trips were less than 5. Because the ranges in the length frequency distributions for tilefish 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 5. As a result, the length frequency distributions for otolith samples were significantly different from those for length samples collected before 2007 (Fig 4). For example, about 30% of length samples and 48% of otolith samples were larger than 70 cm in 2006. These results demonstrate that age frequency distributions or growth curves estimated from otolith samples or age samples before 2007 may need to be re-weighted by the length frequency distribution for length samples (Chih, 2009a, 2009b).

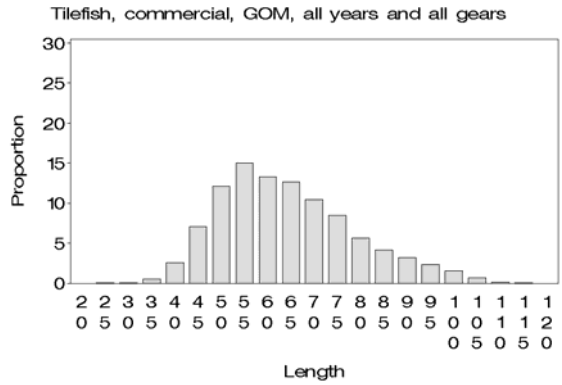
References

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.

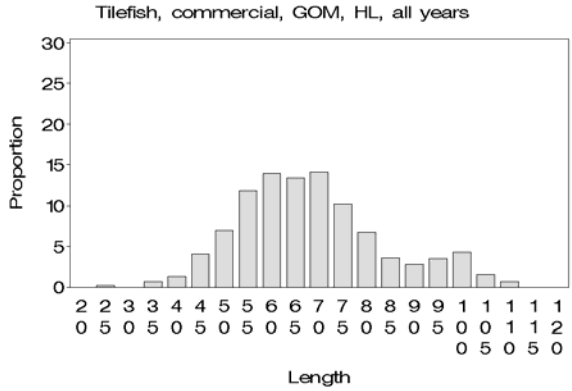
Chih, C.-P. 2009b. The effects of otolith sampling methods on the precision of growth curves. North American Journal of Fisheries Management 29: 1519-1528.

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

(a) All gears



(b) Hand line



(c) Long line

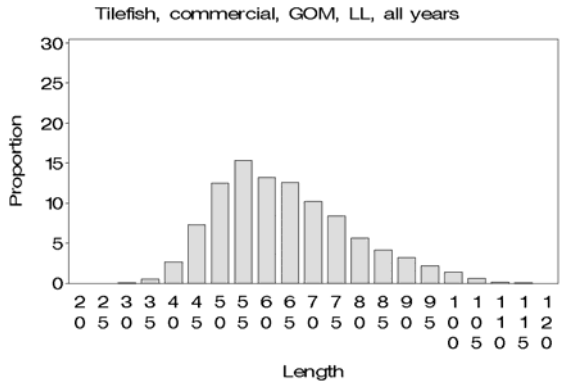
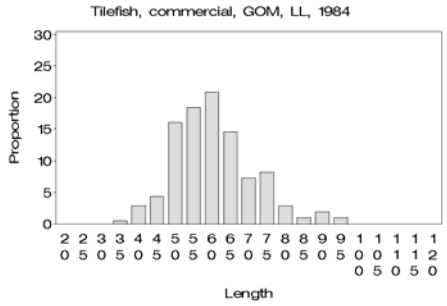
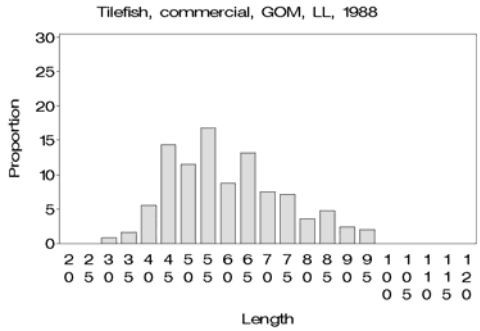
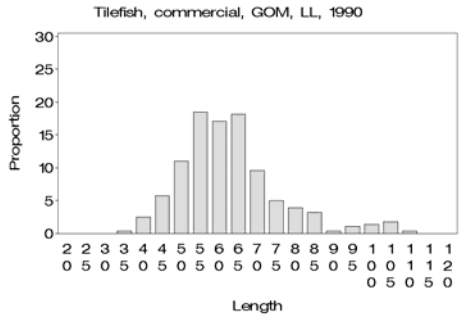
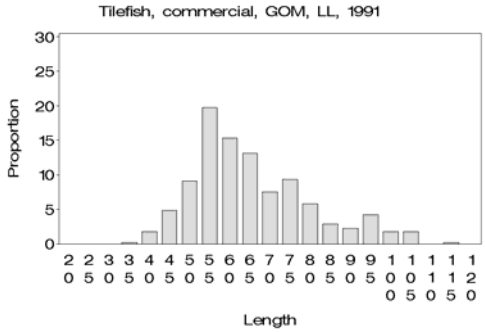


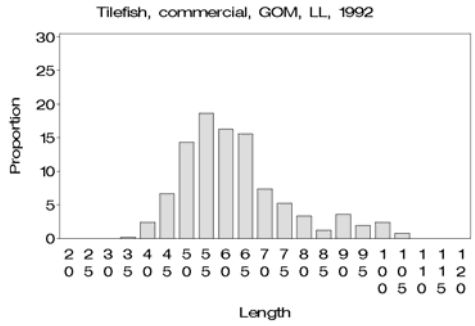
Fig 2 Yearly length frequency distributions for tile fish collected from the Gulf of Mexico from 1984 to 2009 (only those years with sample sizes larger than 200 were included).

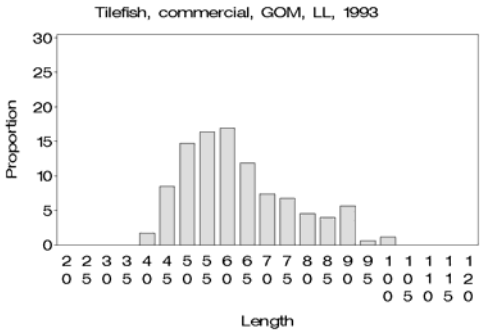


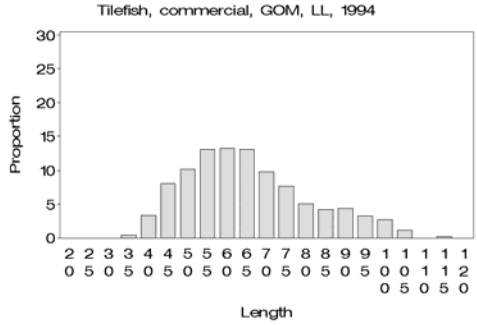


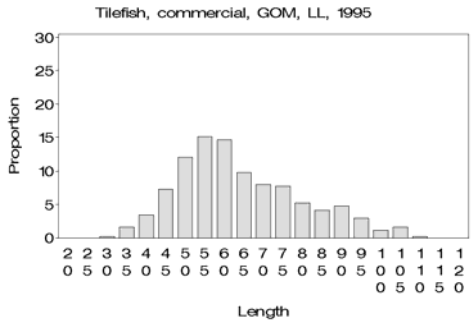












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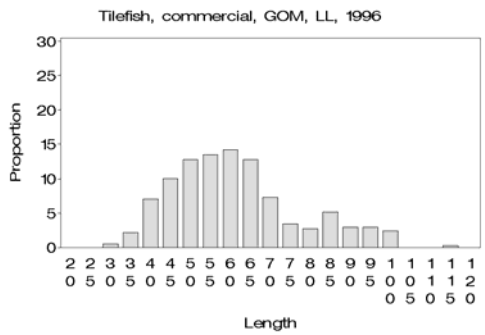
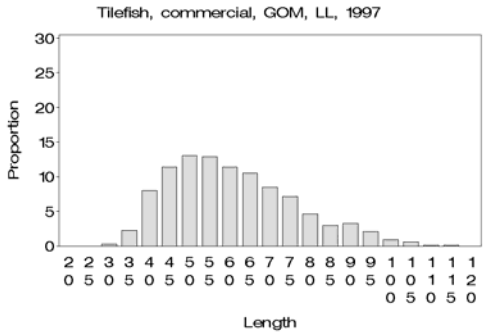
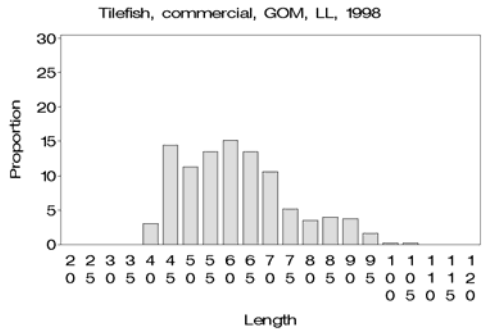
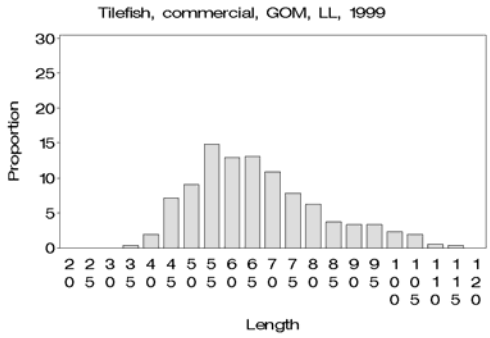
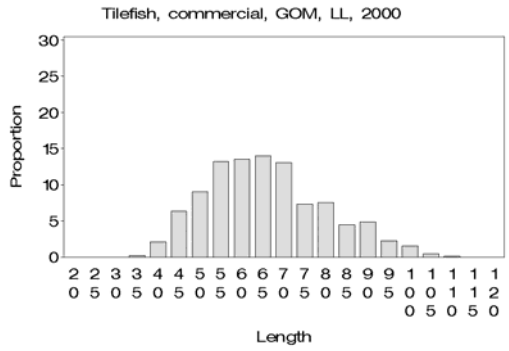
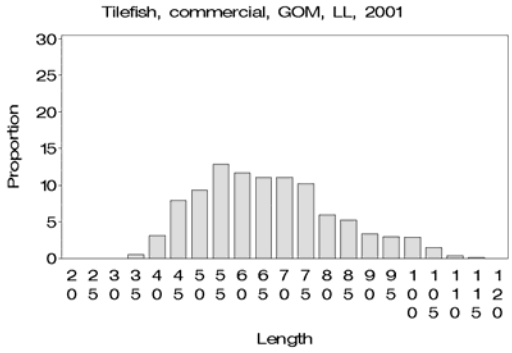


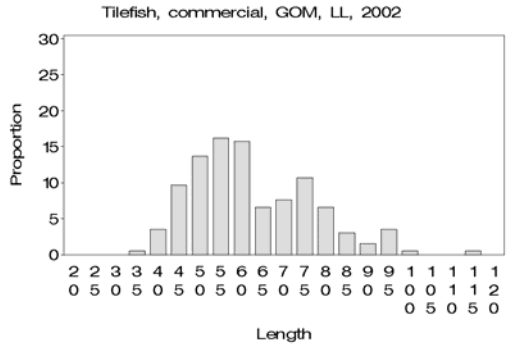












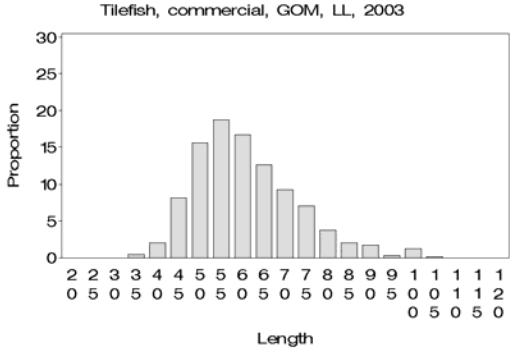
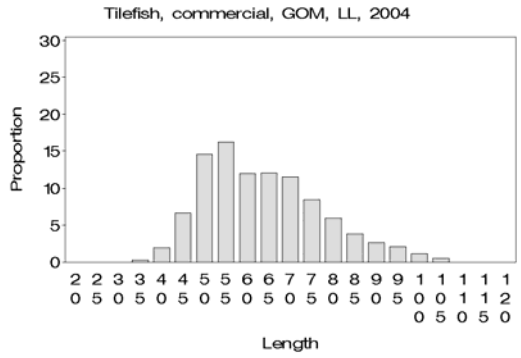
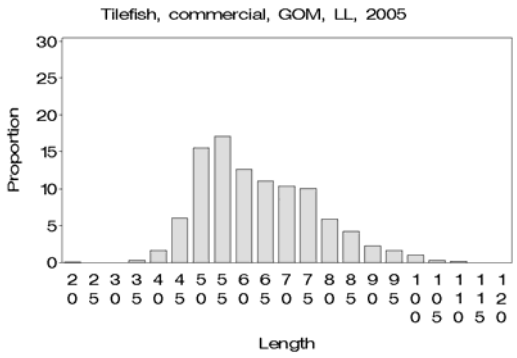
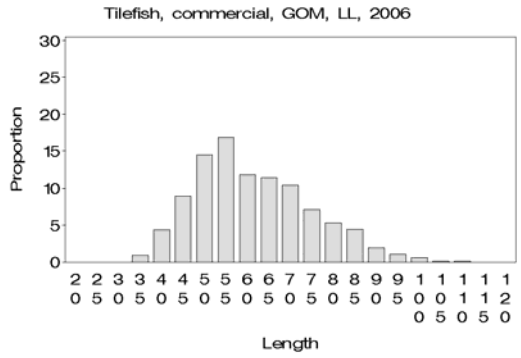
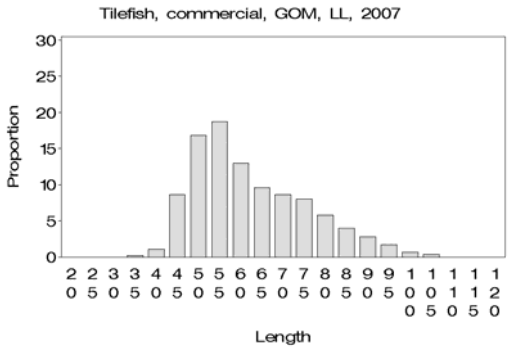


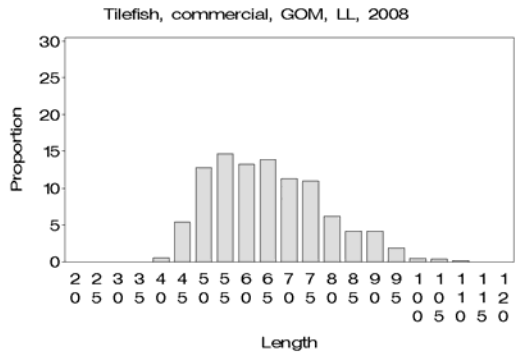
Fig 2. Continued.











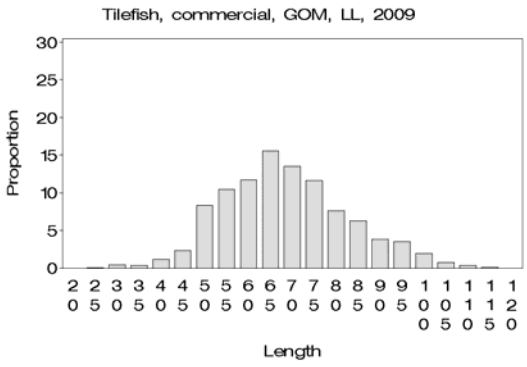
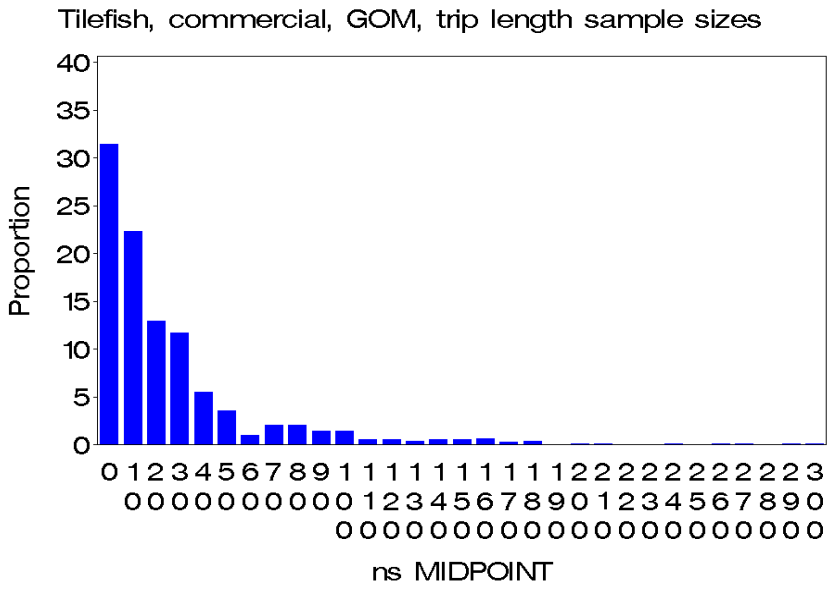


Fig 3. Distributions of trip sample sizes for length and otolith samples (ns – trip sample size for length samples; no – trip sample size for otolith samples).



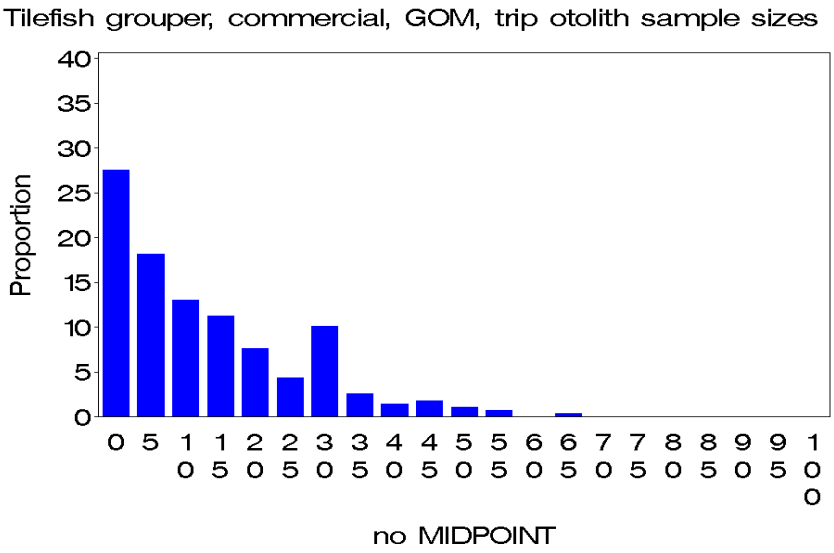
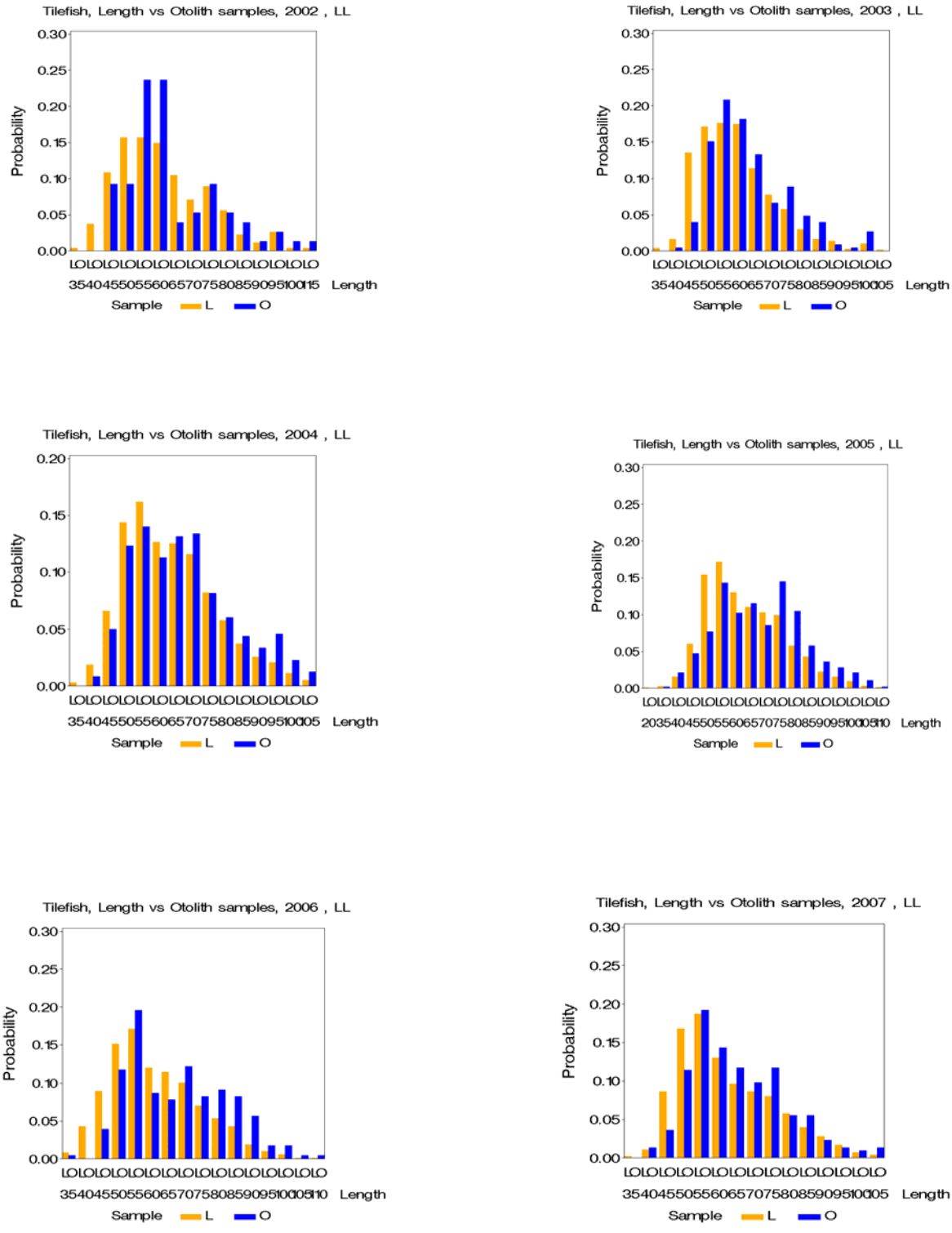
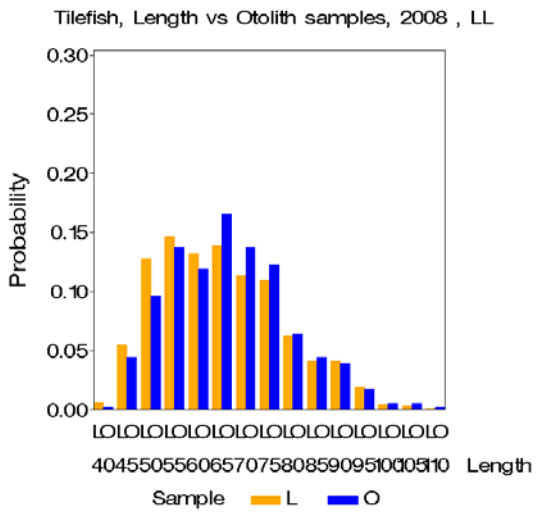


Fig 4. Comparisons of length frequency distributions for length (L) and otolith samples (O) collected from tilefish long line fisheries (LL) from 2002 to 2009. For sample sizes, see Table 1.




Tilefish, Length vs Otolith samples, 2008 , LL
Probability
0.30
0.25
0.20
0.15
0.10
0.05
0.00
Length
Sample L O

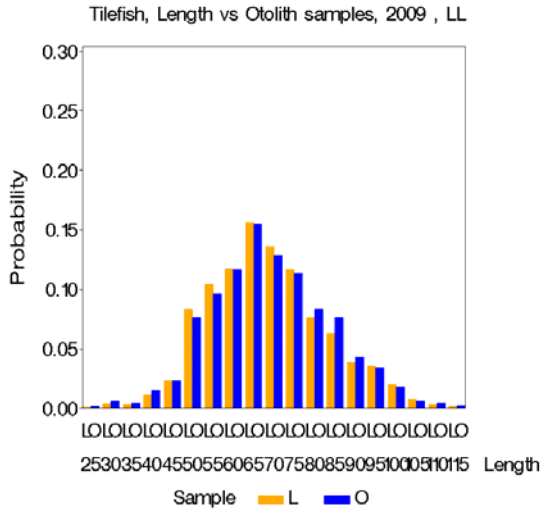

Tilefish, Length vs Otolith samples, 2009 , LL
Probability
0.30
0.25
0.20
0.15
0.10
0.05
0.00
Length
Sample L O

Table 1. Number of tilefish 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					207
1986					63
1987			1		151
1988			1		252
1989					84
1990			3		281
1991			33		454
1992			96		418
1993			41		292
1994			49		1699
1995			9		645
1996		1	50	31	801
1997			20	43	1249
1998			19	6	546
1999			42		1019
2000		9	30	11	1387
2001		1	156	49	1067
2002		24	103	76	268
2003		20	21	226	800
2004		8	10	479	1781
2005		109	196	468	1569
2006		3	3	230	1186
2007		10	10	307	1000
2008		56	56	563	901
2009		59	59	866	1218

Table 2. Number of tilefish sampling trips from 1984 to 2009.

YEAR	hand line trip	long line trips	total trips
1984		7	7
1986		5	5
1987	1	6	7
1988	1	9	10
1989		5	5
1990	3	10	13
1991	9	28	37
1992	20	23	43
1993	7	16	23
1994	11	34	45
1995	6	22	28
1996	7	18	25
1997	5	18	24
1998	5	19	24
1999	6	19	25
2000	3	37	40
2001	10	31	41
2002	4	18	23
2003	3	40	43
2004	2	60	62
2005	14	47	64
2006	1	29	30
2007	3	38	41
2008	10	45	55
2009	10	50	60