Size and age composition of the SBT caught by Taiwanese longliners in 2006-2013

Jen-Chieh Shiao
Institute of Oceanography, National Taiwan University

Taiwan conducted the observer system to collect fishery data and biological samples for the southern bluefin tuna (*Thunnus maccoyii*, SBT) in the Indian Ocean since 2002. The collected data and samples (otoliths) provided valuable information about the population dynamics of the SBT. For example, the size and age composition of the SBT caught by Taiwanese longliners in 2002-2005 were predominantly immature individuals[1]. This document updated the size and age composition of the SBT caught by Taiwanese longliners in 2006-2013. The observers collected otoliths from 1451 SBT in 2002-2013 and their ages were determined according to "A manual for age determination of southern bluefin tuna *Thunnus maccoyii*". An age-length-key (ALK) was generated based on these 1451 samples with 10 cm interval of the fork length (FL, Table 1). This ALK was used to convert FL data in the fishery logbook or measured by the observers into age data. The size composition of logbook data was shown in Figs. 1-2, with the mean FL ranging from 115 ± 16.7 cm in 2012 to 125 ± 16.1 cm in 2010. The observer data was shown in Fig. 1, with the mean FL ranging from 107.5 ± 12.2 cm in 2008 to 124.3 ± 15.5 cm in 2010. In 2011, there was no observer deployed in the longline vessel targeting for the SBT due a Taiwanese longline vessel hijacked by the Somalia pirate in the same year. The mean FL measured by the observers were all smaller than the logbook data with the largest difference of 10 cm in 2007-2008 followed by decrease to < 3 cm in recent years. The difference between logbook and observer's data may be due to the small cover rate of the latter, which predominantly monitored the catch in the middle to lower latitude in the central Indian Ocean. The age composition estimated from logbook data and observer's data were shown in Figs. 3-4. Although mean age estimated from observer's data were 0.2 to 1 year smaller than the logbook data, the relative composition among the age classes were highly consistent between these two data sets. Age 4 occupied the highest percentage in the catch, followed by age 5 or age 3 then the other older age classes. Both data sets suggested that Taiwanese longliners predominantly caught young SBT between age 2-9 with very few percentages of the SBT > age 10. These results were consistent to the age composition in 2002-2005 (Shiao et al. 2008), suggesting no obvious changes of fishing behaviors of the Taiwanese longliners targeting for the SBT.

[1] Shiao JC, Chang SK, Lin YT, Tzeng WN (2008) Size and age composition of southern bluefin tuna (*Thunnus maccoyii*) in the central Indian Ocean inferred from fisheries and otolith data. Zoological Studies 47:158-171.

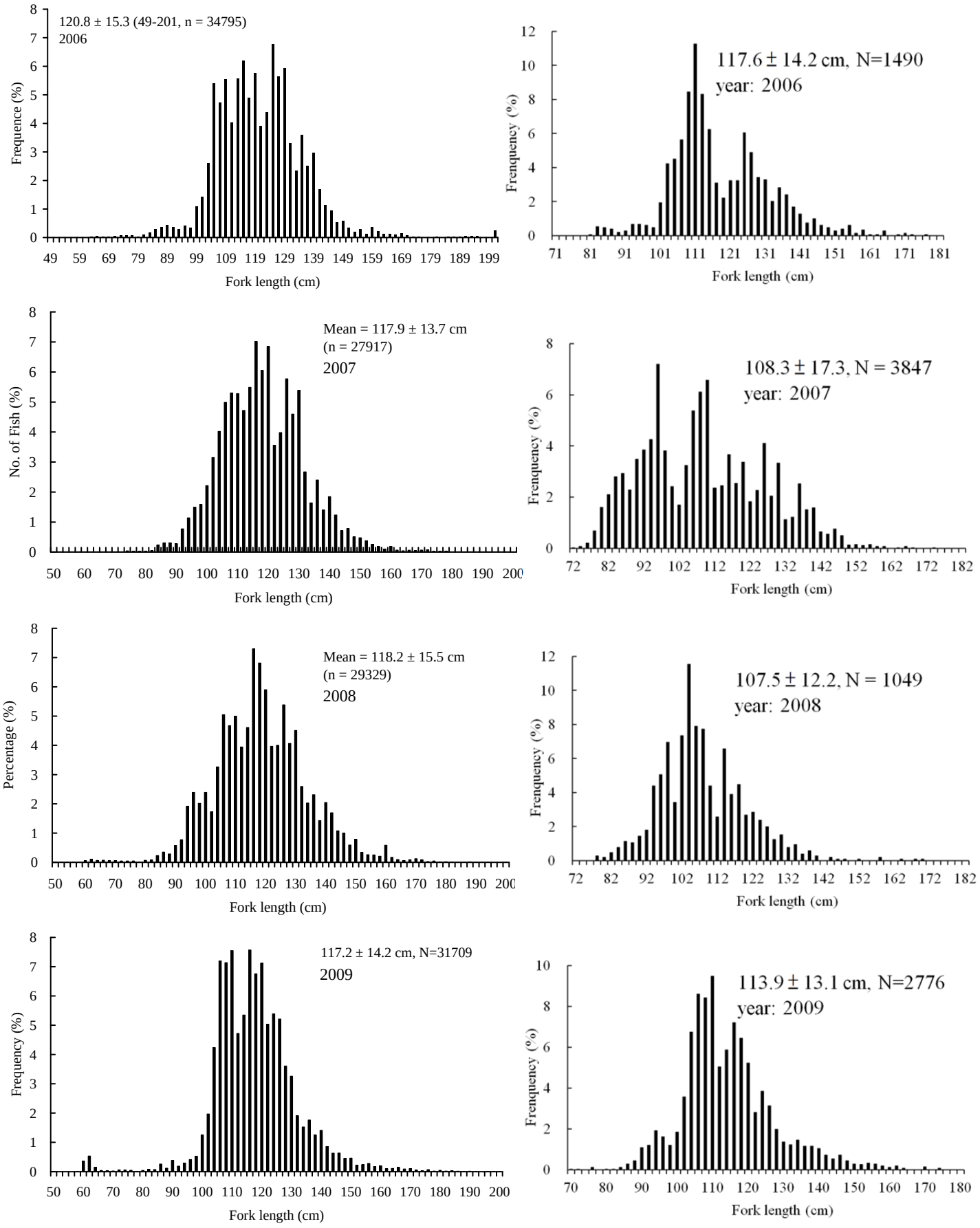

Fig. 1. Size composition of the SBT from logbook (left) and observer data (right).

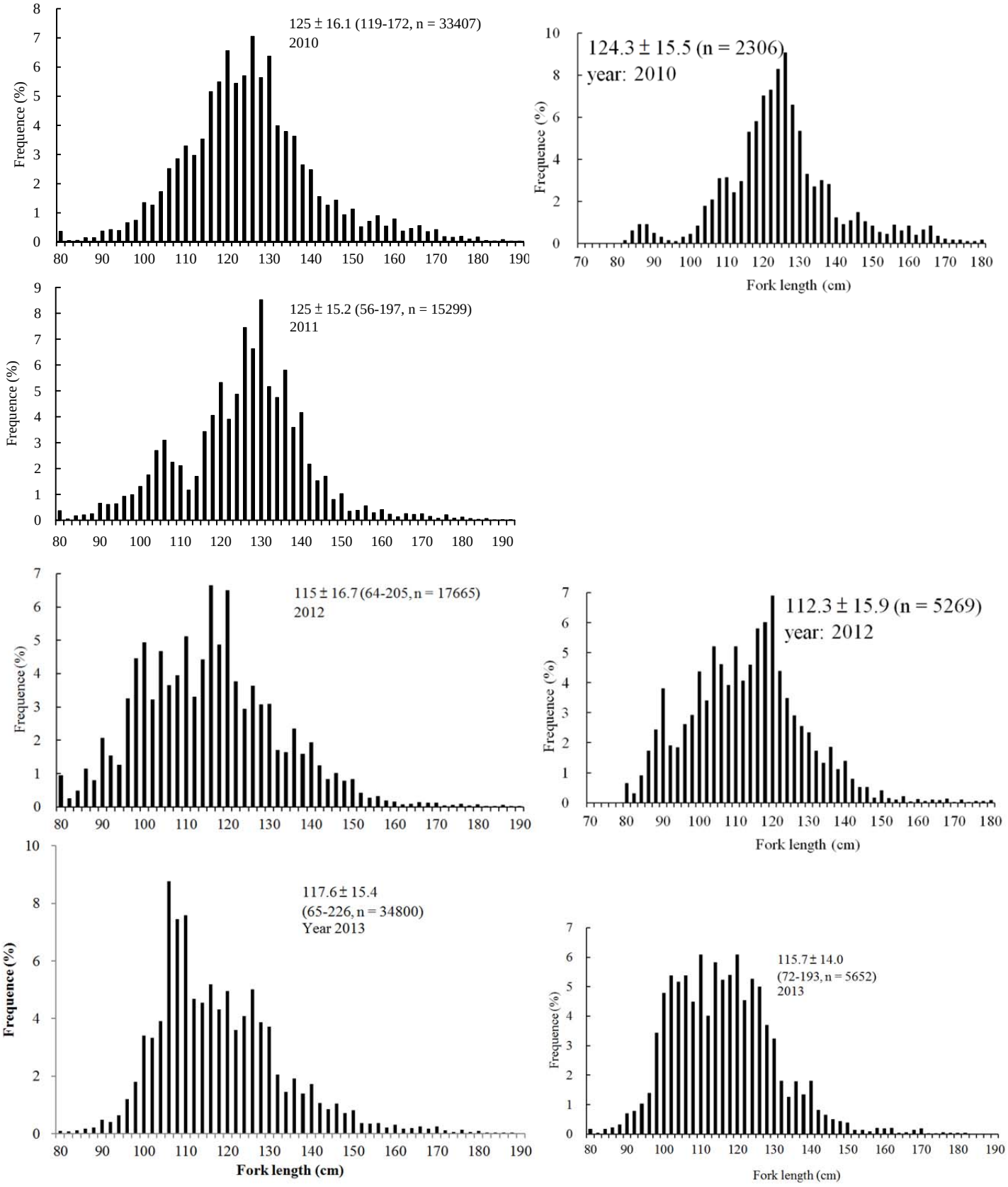

Fig. 2. Size composition of the SBT from logbook (left) and observer data (right).

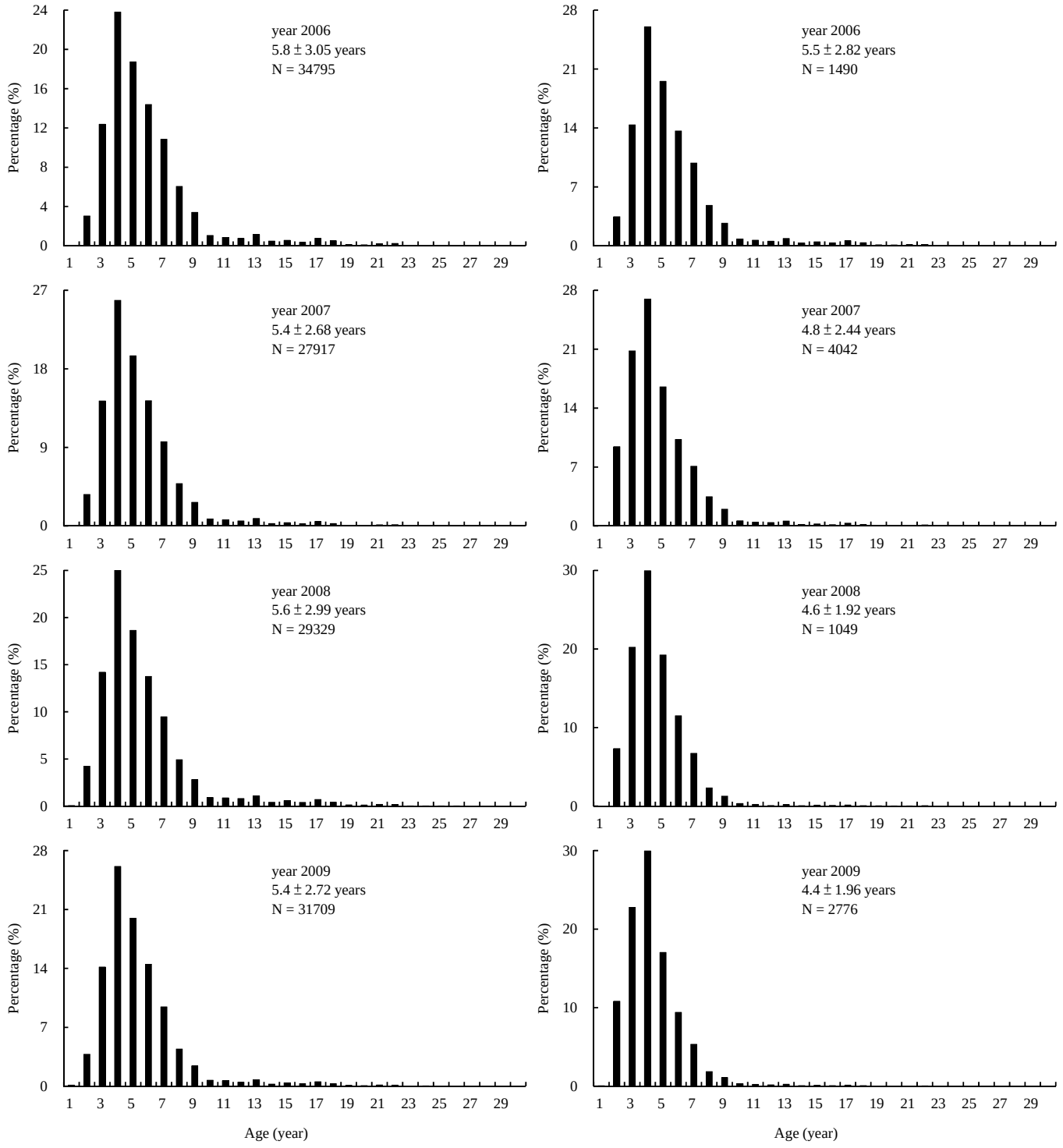

Fig. 3. Age composition of the SBT from logbook (left) and observer data (right).

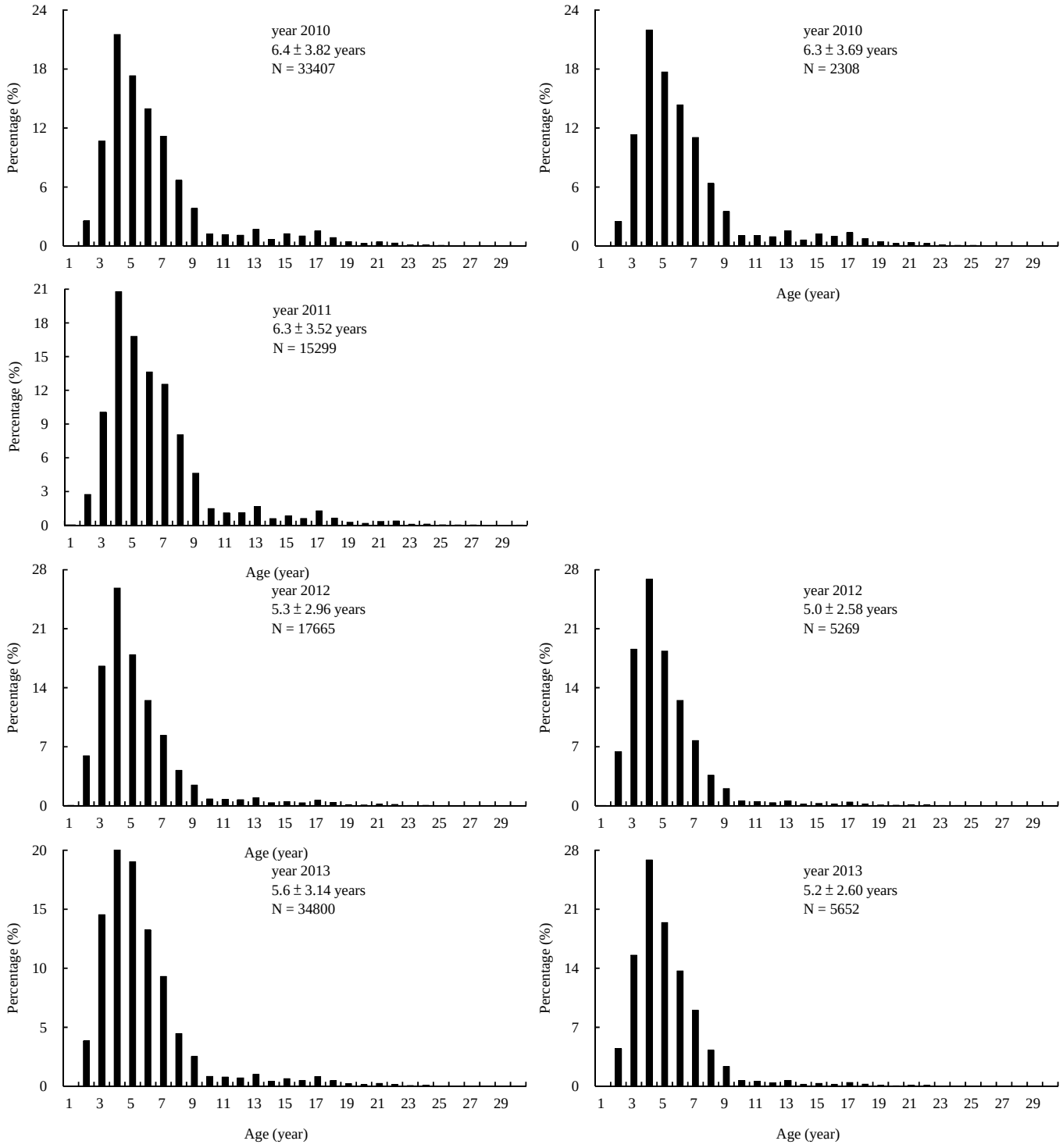

Fig. 4. Age composition of the SBT from logbook (left) and observer data (right).

Table 1. Age-Length Key based on otolith age and fork length (FL, cm) of 1451 SBT collected in 2003-2013.

FL/age	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	N-FL
40-50	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	**0**
50-60	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	**0**
60-70	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	**0**
70-80	16.7	83.3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	**6**
80-90	2.0	59.2	18.4	20.4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	**49**
90-100	0	20.7	45.6	23.8	8.3	1.6	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	**193**
100-110	0	16.6	28.1	33.2	13.6	6.0	1.7	0.4	0.4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	**235**
110-120	0	4.9	19.2	33.1	22.2	10.2	7.9	1.5	0.8	0.4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	**266**
120-130	0	1.7	17.0	29.3	24.0	19.7	5.7	1.3	0.9	0	0.4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	**229**
130-140	0	1.9	9.0	23.9	20.0	18.1	14.2	7.7	3.2	0.6	0.6	0	0.6	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	**155**
140-150	0	0	1.5	11.8	13.2	13.2	22.1	19.1	11.8	2.9	0	0	1.5	0	0	0	1.5	0	0	0	0	1.5	0	0	0	0	0	0	0	0	**68**
150-160	0	0	0	1.9	3.8	3.8	13.2	9.4	7.5	7.5	9.4	13.2	11.3	5.7	3.8	0	3.8	3.8	0	0	1.9	0	0	0	0	0	0	0	0	0	**53**
160-170	0	0	0	0	0	0	2.1	1.1	3.2	0	6.4	7.4	10.6	3.2	14.9	17.0	12.8	8.5	2.1	5.3	3.2	0	0	0	1.1	1.1	0	0	0	0	**94**
170-180	0	0	0	0	0	0	0	1.5	0	0	1.5	0	7.6	7.6	21.2	13.6	13.6	10.6	12.1	1.5	3.0	3.0	0	0	1.5	0	0	0	0	1.5	**66**
180-190	0	0	0	0	0	0	0	0	0	0	0	0	0	3.2	3.2	16.1	29.0	0	12.9	6.5	6.5	0	12.9	6.5	0	0	3.2	0	0	0	**31**
190-200	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	25.0	25.0	0	0	25.0	0	0	25	0	0	0	0	0	0	**4**
200-210	0	0	0	0	0	0	0	0	0	0	0	0	0	50	0	0	0	50.0	0	0	0	0	0	0	0	0	0	0	0	0	**2**
210-220	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	**0**
220-230	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	**0**
230-240	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	**0**
240-250	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	**0**
250-260	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	**0**
260-270	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	**0**
N-Age	**2**	**133**	**268**	**335**	**204**	**128**	**84**	**40**	**25**	**8**	**14**	**14**	**23**	**13**	**31**	**30**	**34**	**19**	**14**	**8**	**9**	**3**	**4**	**3**	**2**	**1**	**1**	**0**	**0**	**1**	**1451**