7th MEETING OF THE SCIENTIFIC COMMITTEE

La Havana, Cuba, 7 to 12 October 2019

SC7-Doc28

Chinese Taipei's Annual report

Chinese Taipei

PO Box 3797, Wellington 6140, New Zealand
P: +64 4 499 9889 – F: +64 4 473 9579 – E: secretariat@sprfmo.int
www.sprfmo.int

2019 National Report of Chinese Taipei
to SPRFMO Scientific Committee
on the Squid Jigging Fishery in the Southeast Pacific Ocean

Tung-Hsieh Chiang[1], Chih-Shin Chen[2], Ming-Feng Wu[3]

1. Overseas Fisheries Development Council of the Republic of China, Taipei 106, Taiwan (R.O.C.)

2. Institute of Marine Affairs and Resource Management, National Taiwan Ocean University, Keelung 202, Taiwan (R.O.C.)

3. Fisheries Agency, Council of Agriculture, Executive Yuan, Kaohsiung 806, Taiwan (R.O.C.)

Summary

Jumbo flying squid inhabit in the eastern Pacific and have been targeted by Chinese Taipei's squid-jigging fleet since 2002. The number of fishing vessels varied from 5 to 29 between 2002 and 2018. There were 14 vessels involved in the fishery in 2018, and produced 3,848 tons of Jumbo flying squid. The nominal CPUE was 2.76 t/vessel/day in 2018 which was lower than the previous year. The major fishing grounds for the fishing vessels were located around 75°–83°W and 15°–20°S, while few vessels operated in the waters around equator (95°–115°W) in 2018. Data of logbook, transshipment and landing of Chinese Taipei's squid-jigging fleet have been collected entirely and submitted to the Secretariat of SPRFMO. Researches on the stock status and spatial dynamics of Jumbo flying squid have been conducted. The length composition of Jumbo flying squid was converted from weight category. Two squid samples were collected in the fishing season of 2017 and preliminary examined in this year. A biological sampling program has been designed following the protocol of the SPRFMO and will be carried out by one fishing vessel in the fishing season of 2019. No bycatch was recorded for the squid-jigging fleet in the fishing season of 2018. The observer program for squid fishery has been developed in 2018 and ten observers has finished the training course in April 2019.

1. Description of the Fishery

Jumbo flying squid (*Dosidicus gigas*), also known as Humboldt squid, is a large pelagic squid inhabiting in the eastern Pacific Ocean. The squid distributes a wide range longitudinally and occasionally reaches 50° North and South regions. Jumbo flying squid has been targeted by Chinese Taipei's distant-water squid-jigging fleet in the Southeast (SE) Pacific since 2002. The number of vessels varied from 5 to 29 vessels between 2002 and 2018 (Fig. 1). There were 14 vessels involved in the fishery in 2018.

The monthly number of vessels for Chinese Taipei's squid-jigging fleet in the SE Pacific varied between 2014 and 2018 (Fig. 2). The monthly operation days ranged from 23 to 325 days in 2018 (Fig. 3). The main fishing season occurred from October to December in 2018.

2. Catch, Effort and CPUE Summaries

Annual catch and fishing efforts of Chinese Taipei's squid-jigging fleet in the SE Pacific from 2014 to 2018 is shown in Table 1. The catch of Jumbo flying squid was 3,848 tons in 2018, which was lower than that of 2017 (7,338 tons). The fishing effort (vessel-day) was 1396 v-d in 2018, slightly higher than that of 2017 (1228 v-d).

The annual nominal CPUE (tons/vessel-day) of Chinese Taipei's squid-jigging fleet in the SE Pacific from 2002 to 2018 was shown in Figure 4. The nominal CPUE value was 2.76 tons/vessel-day in 2018, lower than the previous years.

The spatial distribution of annual average CPUE (tons/vessel-day) of Chinese Taipei's squid-jigging fleet in the SE Pacific from 2014 to 2018 was shown in Figure 5. The

major fishing ground for the fishing vessels was around 12°–29°S and 74°–84°W. There had been a number of fishing vessels operating within the EEZ of Peru between 2007 and 2010 while was permitted by the competent authority of Peru. However, Chinese Taipei's squid-jigging fleet operated in the high-sea regions of the SE Pacific during the period of 2011–2018. The fishing ground for the fishery located around 75°–83°W and 15°–20°S in 2018, while there were 8 vessels operated in the waters around equator (95°–115°W).

The spatial distribution of catch by size (commercial category) in 2018 was shown in Figure 6. The catch composition mainly comprised large-size individuals (non-categorized, usually >4 kg) in the waters off southern Peru, while the catch mainly comprised small-size individuals (<1 kg) in the waters near the equator.

3. Fisheries Data Collection and Research Activities

3.1. Logbook system

All of Chinese Taipei's squid-jigging vessels have been required to maintain fishing logbooks on a daily basis. All of the logbooks of the fishing vessels had been retrieved in 2018. In addition, Chinese Taipei's squid-jigging vessels have been required to be equipped with electronic logbook system (e-logbook) on board since 2007. The fishermen are required to submit the catch record through this system on a daily basis.

3.2. Transshipment and landing data collection

In accordance with Chinese Taipei's domestic regulations, the relevant information of transshipment and landing for Jumbo flying squid fishery in the SE Pacific has been collected by the competent authorities and has been submitted to the Secretariat of

SPRFMO since 2013 as per CMM 02-2018.

3.3. Research activities

Researches on the stock status and spatial dynamics of Jumbo flying squid have been conducted by the scientists of Chinese Taipei. In recent years, research programs have been carried out on spatial distribution patterns, CPUE trend, stock status and exploitation rate of this species. The results showed that the distribution of the squid abundance was higher in the coastal waters off northern Peru. The size composition harvested by Chinese Taipei's fleet has been dominated by large-sized individuals in recent years. The results of GAM suggested that the variation of squid abundance could be explained by the temporal and spatial variables to a degree. It may result from a long-distant migration pattern for the jumbo flying squid and plasticity in life-history traits of squid populations. However, a decreasing trend of the squid abundance index since 2005 was noted.

4. Biological Sampling and Length/Age Composition of Catches

4.1. Biological sampling

Two samples of Jumbo flying squid have been collected in the fishing season (September and October) of 2017 (Table 2). A total of 66 squids (41 females and 25 males) were examined. Mantle length (ML) of squid ranged from 24.9 to 51.0 cm and from 25.0 to 50.1 cm for females and males, respectively (Fig. 7). Average ML of squid in September was 26.3 cm and 26.1 cm for females and males, respectively, while increased to 28.0 cm and 27.7 cm in October for females and males, respectively (Fig. 8). There were two male squids at maturing stage, while other males and all females were at immature stage (Fig. 9).

A biological sampling program was designed and followed the protocol of the SPRFMO (SPRFMO SC-6 Report Annex 9) in 2019. The sampling vessel sailed for fishing ground in the SE Pacific in July 2019.

4.2. Length/Age composition of catches

The logbook for Chinese Taipei's Jumbo flying squid fishery includes size categories (commercial category in weight). Four categories are recorded: A, <1 kg; B, 1-2 kg; C, >2 kg; and D, processed products (i.e. head, tube and fin). The live weight of category D is calculated by a ratio between head, mantle weight and body weight. The processed products might comprise various size categories of the squid, while almost dominated by the extra-large size (>4 kg) individuals. The annual catch by size compositions of Jumbo flying squid between 2014 and 2018 was shown in Table 3. The monthly catches by size composition in 2018 was shown in Table 4.

5. Ecosystem Approach considerations

There was no bycatch record for the Chinese Taipei's squid-jigging fleet in the SE Pacific in 2018. This may be a result of performing highly selective fishing gear (jigging) and method by the squid-jigging fleet.

6. Observer Implementation Reports

The observer program of Chinese Taipei's Jumbo flying squid fishery is modified from the observer program for tuna fishery which has been accredited by the Regional Fisheries Management Organizations in the Western and Central Pacific. The National Observer Training Program has been revised in March 2019 to include the observer program for squid fisheries. The working items for observers onboard squid vessels,

such as domestic regulations, fishing gear and method, squid species identification, squid sampling and measurement and bycatch issues, were included in the training course. A total of ten observers has finished the training course in April 2019, who are capable to conduct the duty on squid-jigging vessels as well as longline vessels.

Table 1. Annual catches of *Dosidicus gigas* and fishing effort of Chinese Taipei's squid-jigging fleet in the Southeast Pacific between 2014 and 2018.

Year	No. of vessels	Fishing effort (vessel-day)	Catch (tons)
2014	5	474	4795
2015	9	616	10072
2016	11	1880	12989
2017	13	1228	7338
2018	14	1396	3848

Table 2. Summary information for *Dosidicus gigas* samples in the Southeast Pacific in 2017.

Date	Latitude (South)	Longitude (West)	Female	Male	Total
20-Sep-17	19.58	80.41	22	14	36
15-Oct-17	20.44	79.30	19	11	30

Table 3. Annual catches (tons) by size composition of *Dosidicus gigas* for Chinese Taipei's squid-jigging fleet in the Southeast Pacific between 2014 and 2018. (Category: A, <1 kg; B, 1-2 kg; C, >2 kg; D, non-categorized)

Year	A	B	C	D	Total
2014	50	1	1	4743	4795
2015	33	41	1	9996	10072
2016	210	62	23	12694	12989
2017	123	12	6	7197	7338
2018	671	25	49	3104	3848

Table 4. Monthly catches (tons) by size composition of *Dosidicus gigas* for Chinese Taipei's squid-jigging fleet in the Southeast Pacific in 2018. (Category: A, <1 kg; B, 1-2 kg; C, >2 kg; D, non-categorized)

Month	A	B	C	D	Total
Jan.	120	0	0	259	379
Feb.	172	0	0	32	204
Mar.	131	0	0	23	155
Apr.	112	0	0	18	130
May	59	0	2	53	114
Jun.	3	0	0	19	23
Jul.	0	0	4	29	34
Aug.	24	14	6	53	97
Sep.	45	9	1	191	247
Oct.	0	0	19	1115	1135
Nov.	0	0	9	712	721
Dec.	3	2	7	600	611

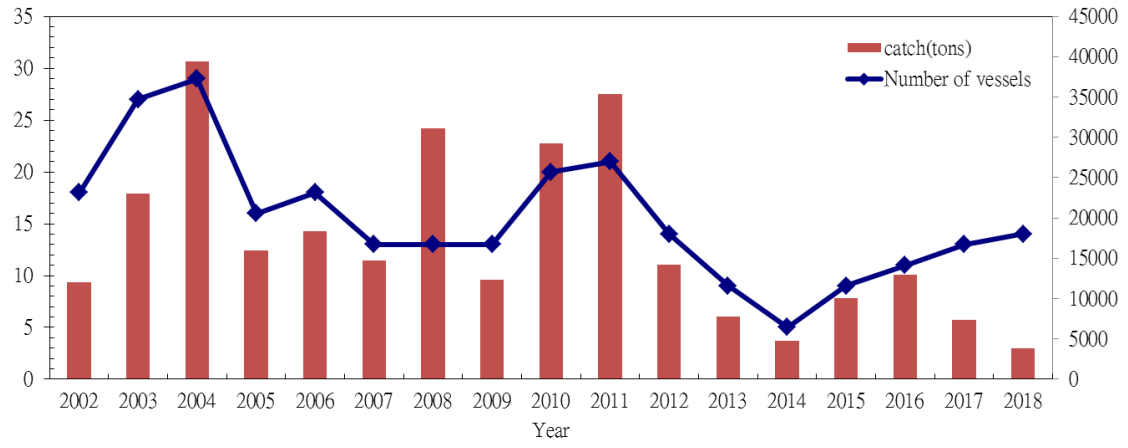

Figure 1. Annual variations in catch and number of vessels for Chinese Taipei's squid-jigging fishery in the Southeast Pacific between 2002 and 2018.

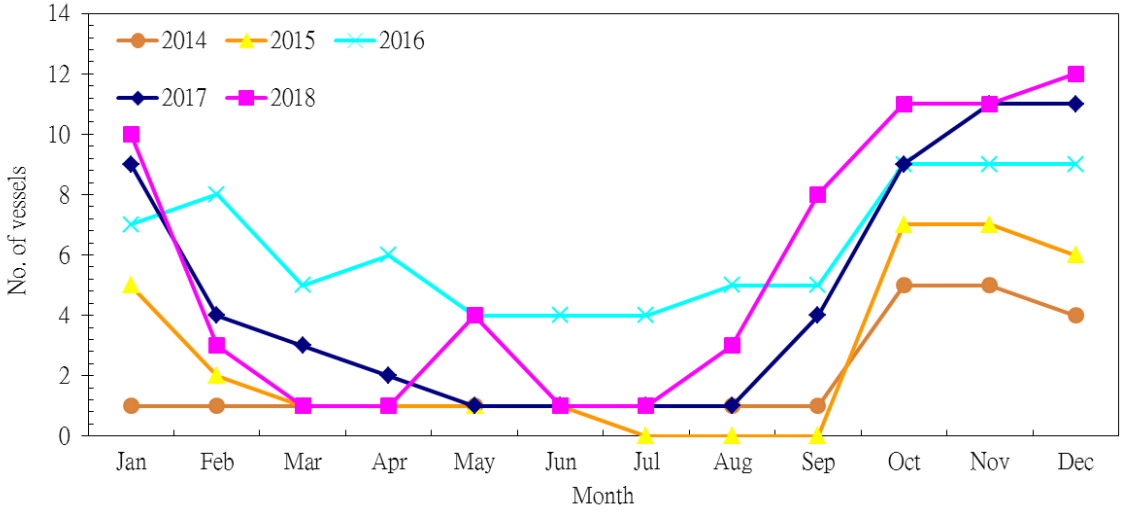

Figure 2. Monthly variations in number of vessels for Chinese Taipei's squid-jigging fishery in the Southeast Pacific from 2014 to 2018.

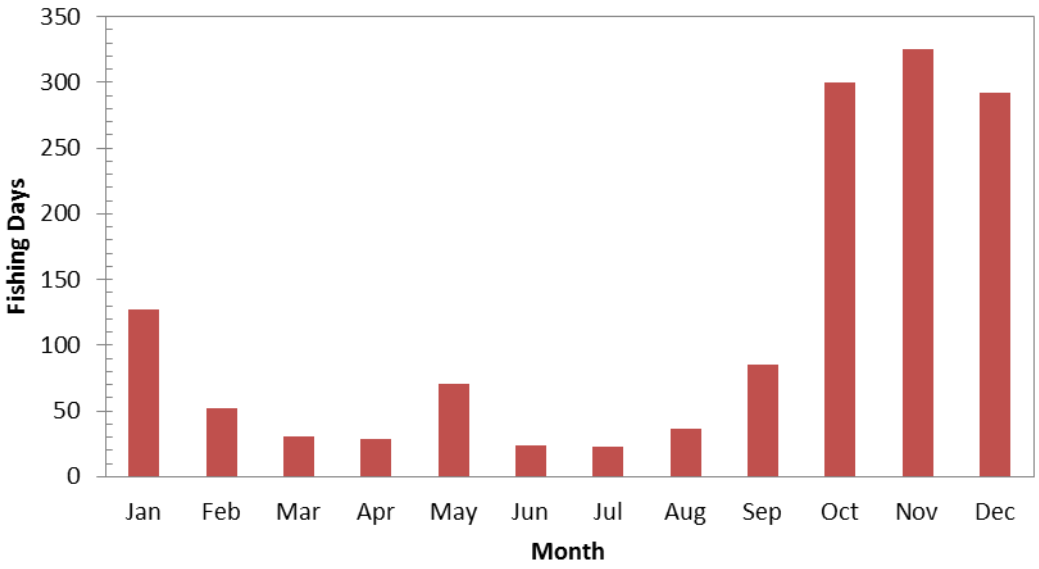

Figure 3. Monthly fishing days deployed by Chinese Taipei's squid-jigging fishery in the Southeast Pacific in 2018.

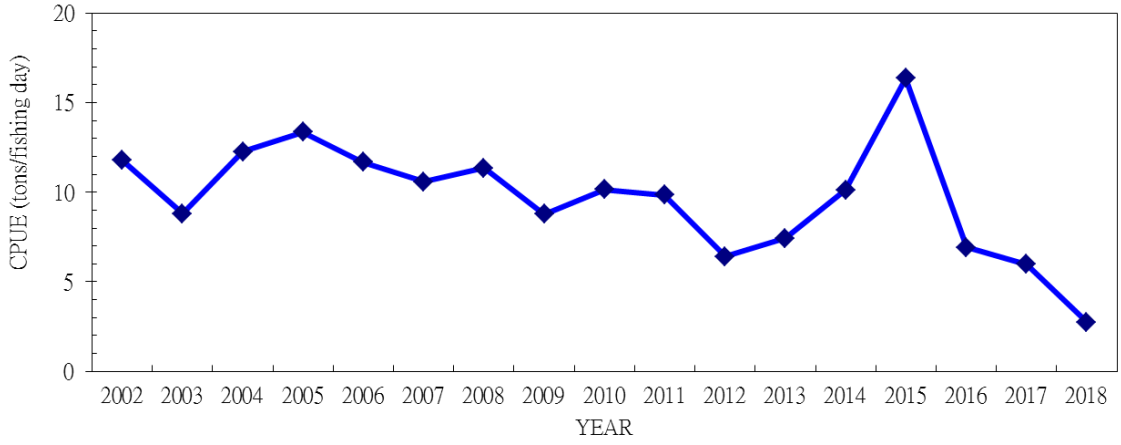

Figure 4. Annual nominal CPUE of *Dosidicus gigas* of Chinese Taipei's squid-jigging fishery in the Southeast Pacific between 2002 and 2018.

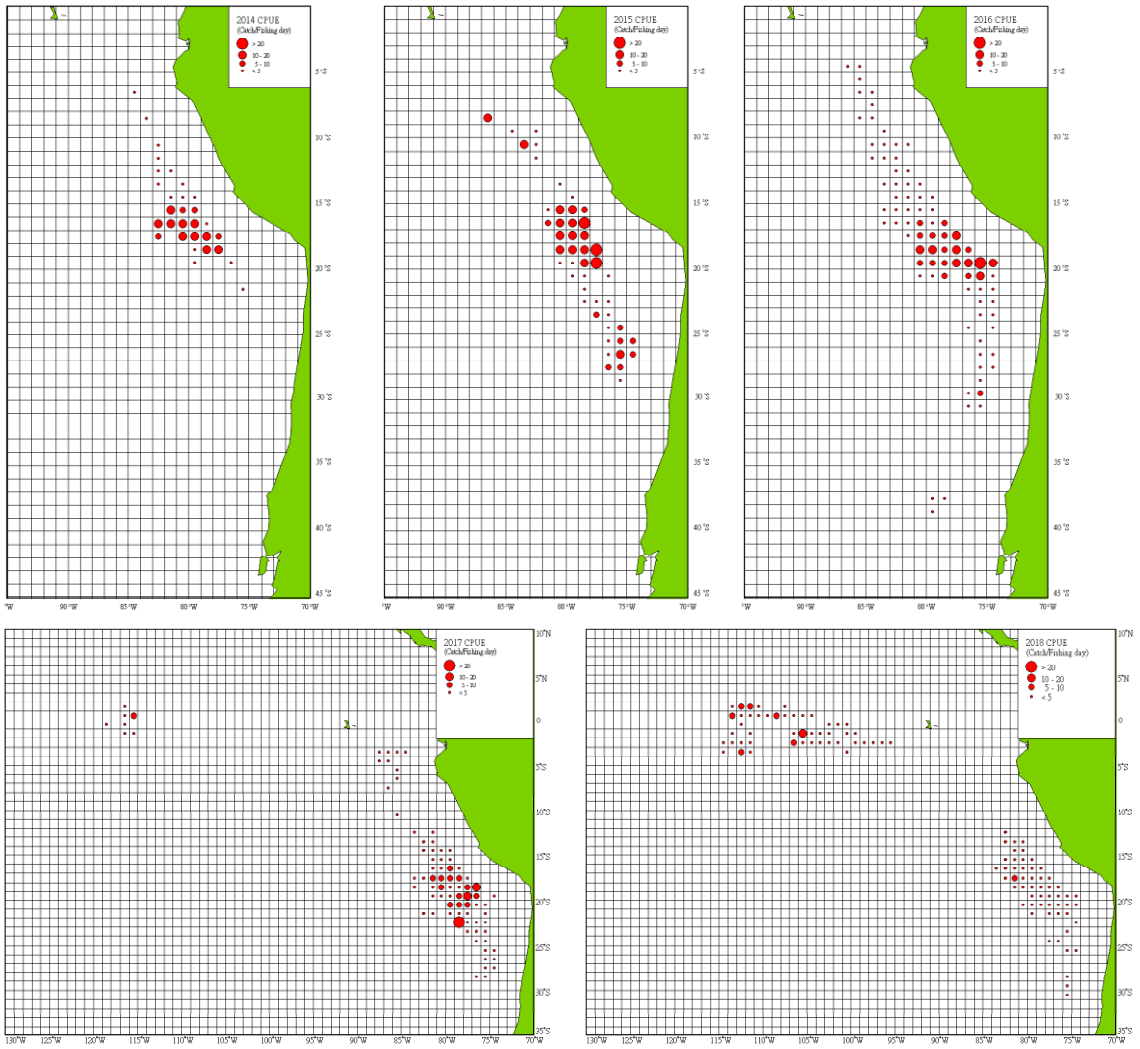

Figure 5. Spatial distributions of annual average CPUE of *Dosidicus gigas* of Chinese Taipei's squid-jigging fishery in the Southeast Pacific from 2014 to 2018.

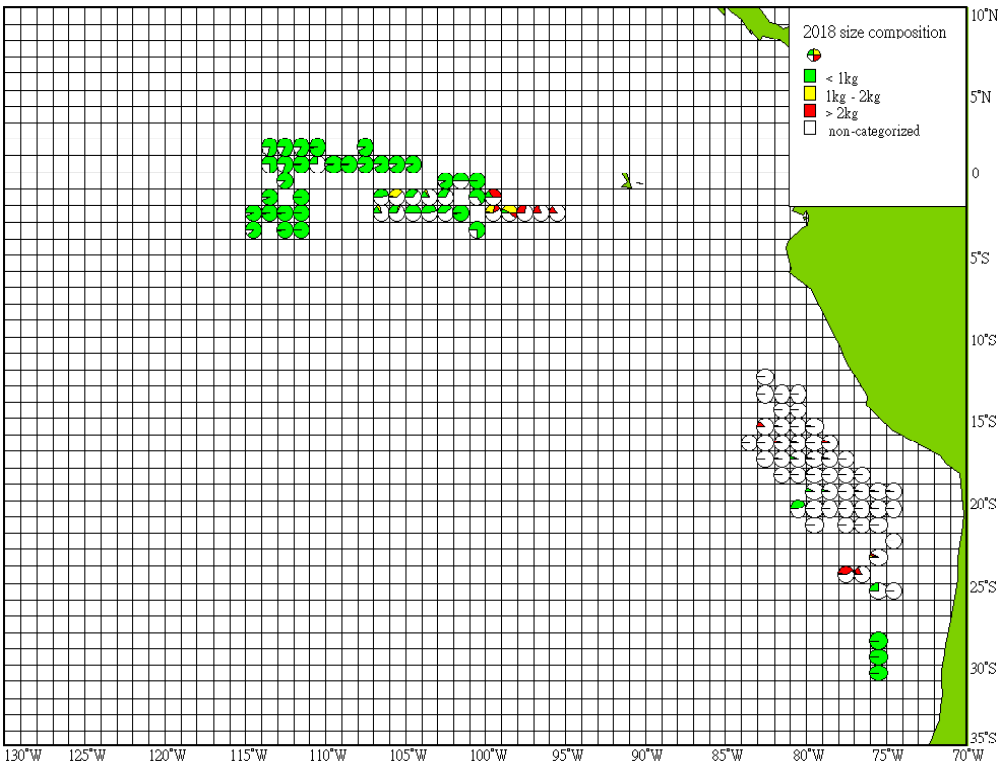

Figure 6. Spatial distributions of annual catch by size composition of *Dosidicus gigas* of Chinese Taipei's squid-jigging fishery in the Southeast Pacific in 2018.

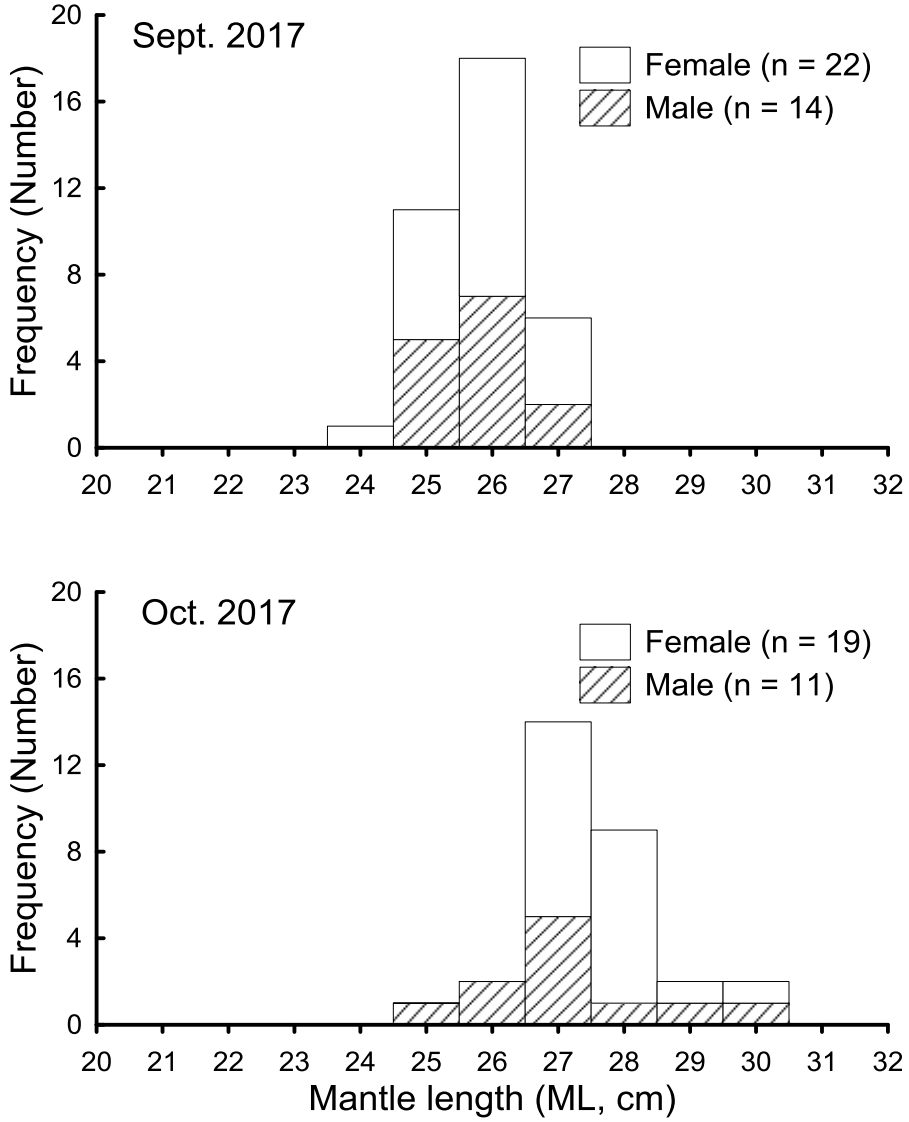

Figure 7. Length frequency distribution for *Dosidicus gigas* samples in the Southeast Pacific.

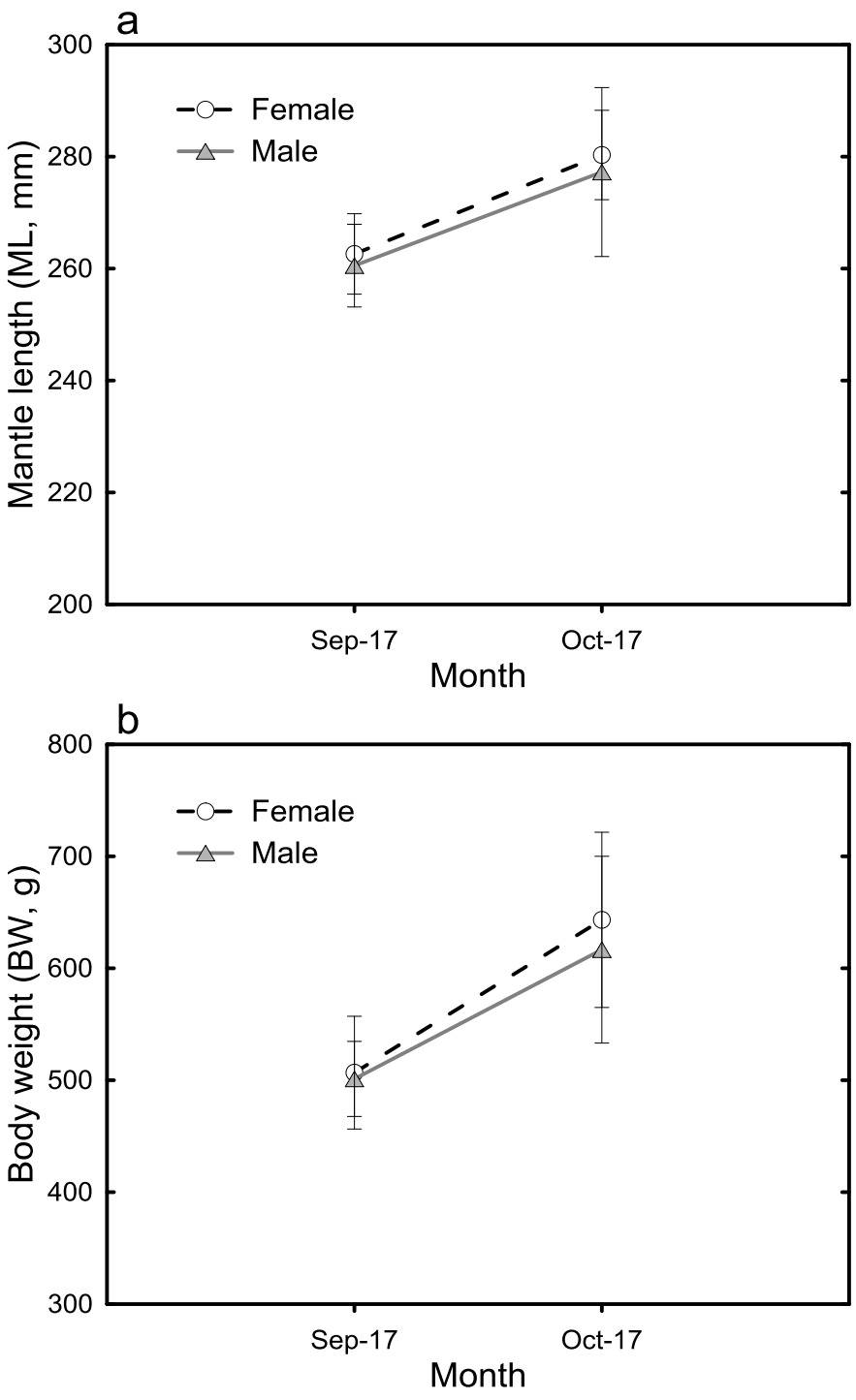

Figure 8. Monthly variation in (a) mantle length (mean and standard deviation) and (b) body weight for *Dosidicus gigas* samples in the Southeast Pacific.

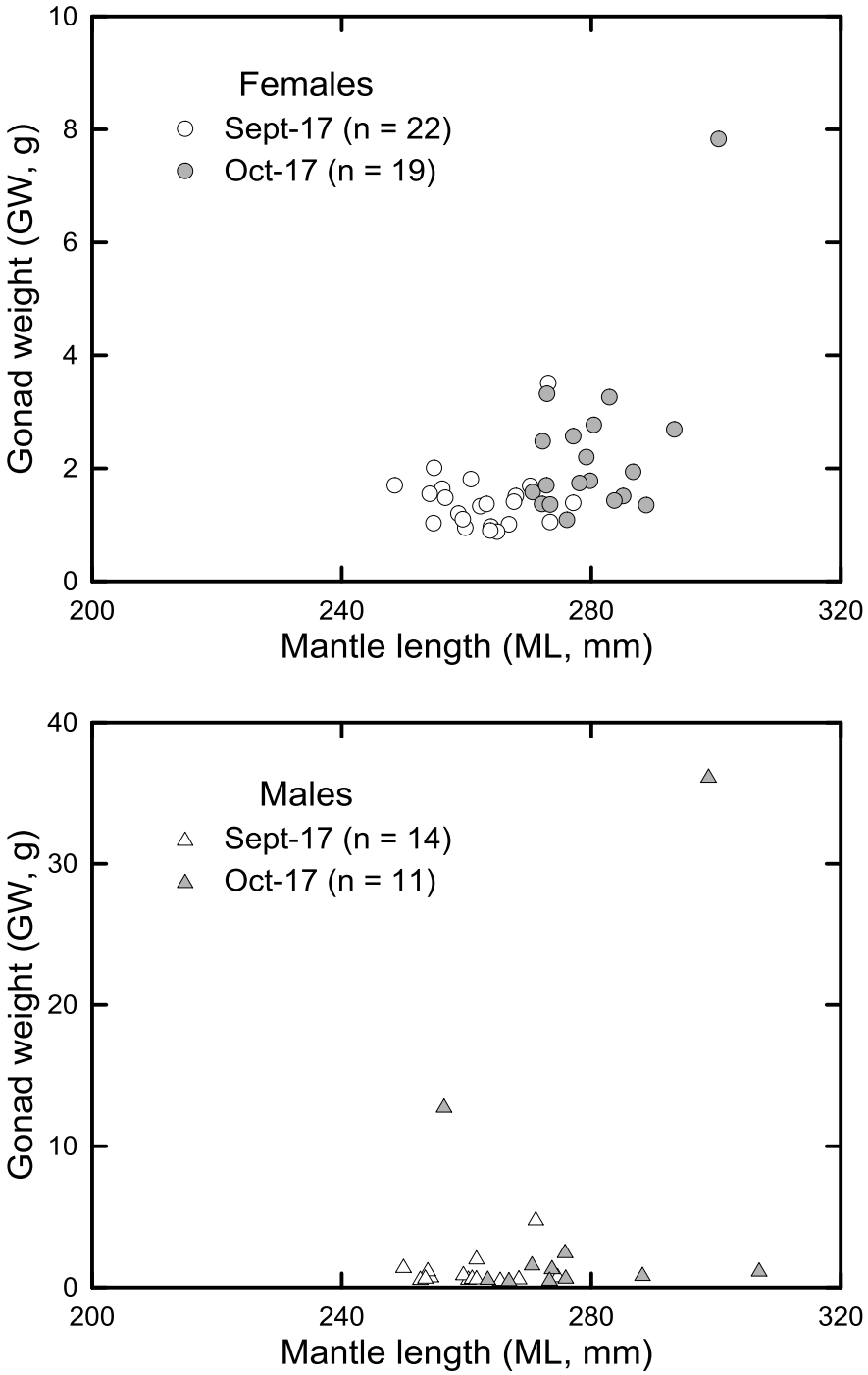

Figure 9. Scatter plot of mantle length and gonad weight for *Dosidicus gigas* samples in the Southeast Pacific.