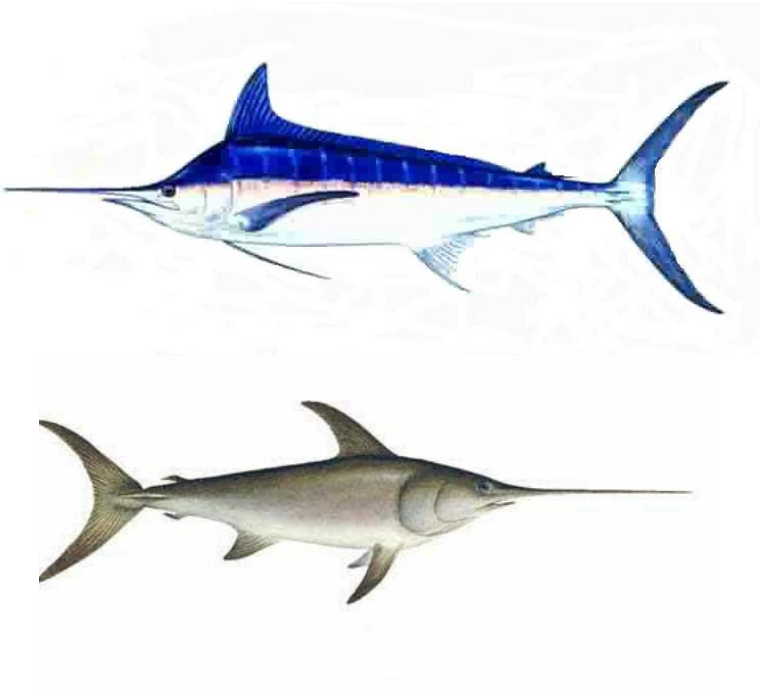
A review of Taiwan's billfish fisheries in the North Pacific, 1997-2009

Chi-Lu Sun
Nan-Jay Su
Su-Zan Yeh
Yi-Jay Chang
Institute of Oceanography
National Taiwan University
1, Sect. 4, Roosevelt Rd., Taipei, Taiwan 106



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Chi-Lu Sun, Nan-Jay Su, Su-Zan Yeh, and Yi-Jay Chang

Institute of Oceanography, National Taiwan University

Taipei, Taiwan

Abstract

Catches of billfish, including swordfish, striped marlin, blue marlin, black marlin, and sailfish, in the Taiwanese longline, gillnet, harpoon, and set net fisheries in the North Pacific Ocean were collected for 1997-2009 in this study. Most of billfish catches was caught in the Taiwanese offshore longline fishery. The largest proportion of catches in the distant-water fishery is swordfish, while most of catches in the offshore longline fishery is blue marlin. Sailfish and black marlin are caught mainly in gillnet, harpoon, and set net fisheries in offshore and coastal waters off Taiwan, of which black marlin has the largest proportion in catches of the Taiwanese coastal harpoon fishery.

Keywords: billfish, catch, longline, gillnet, harpoon, set net

Introduction

The billfish catches are commercially important in the distant-water and offshore longline, offshore and coastal gillnet, and coastal harpoon and set net fisheries (Sun and Yeh, 2008). There are five species of billfish recorded in the Taiwanese fisheries, including swordfish (*Xiphias gladius*), blue marlin (*Makaira nigricans*), black marlin (*Makaira indica*), striped marlin (*Kajikia audax*), and sailfish (*Istiophorus albicans*). Catch data of billfish in the Taiwanese fisheries in the North Pacific Ocean from 1997 to 2009 were collected from the Oversea Fisheries Development Council (OFDC, Taiwan), and summarized by fishery and by species in this study. The review of catch information in Taiwan's billfish fisheries in the North Pacific Ocean is important and necessary to conducting stock assessments and implementing fisheries management for sustainable use of billfish resources.

The billfish fishery in Taiwan

The billfish fishery (five species considered) in Taiwan in the North Pacific Ocean is composed primarily of the distant-water longline, offshore longline, offshore and coastal gillnet, coastal harpoon, and coastal set net fisheries. The catches of billfish in

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the other fisheries (e.g. coastal longline and other net fisheries) are very minor. Most of billfish catches (in weight) were caught in the offshore longline fisheries in Taiwan, followed by distant-water longline fisheries (Fig. 1a). The catches of billfish caught in the offshore longline fisheries range between 6000 and 8000 mt, while billfish catches from all the other fisheries are below 2000 mt (Fig. 1b). This is because the offshore longline fleets mainly operate in the North Pacific Ocean near Taiwan while the main fishing grounds for the Taiwanese distant-water longline fleets distribute mainly in the South Pacific Ocean. Therefore, catches of billfishes from Taiwanese offshore tuna longline fishery are larger that that of distant-water longline fishery.

The largest proportion of billfish catches in the Taiwanese fisheries in the North Pacific Ocean is contributed by blue marlin and swordfish (Fig. 2a). However, blue marlin and swordfish are taken as bycatch species in Taiwanese fisheries (Sun et al., 2005). The total catches of blue marlin over all fisheries exceed 3000 mt, while the total swordfish catches are less, but close to 3000 mt during 1997-2009 (Fig. 2b). The total catches of striped marlin, black marlin, and sailfish over all fisheries considered are generally below 1000 mt (Fig. 2b).

The longline fisheries

Billfishes are primarily taken as bycatch in the Taiwanese distant-water and offshore longline fishery targeting tunas (Sun and Yeh, 2008). The catches of swordfish greatly increased during 2001-2004 (Fig. 3a), because the Taiwanese distant-water longline fleets changed their targeting practices to bigeye tuna (*Thunnus obesus*). The catches of swordfish have been larger than that of blue marlin and striped marlin, and that of other billfishes (Fig. 3b). However, the swordfish catches in the distant-water longline fishery in the North Pacific Ocean have decreased to about 400 mt since 2005 until 2009 (Fig. 3b).

On the other hand, the catches of billfish caught in the offshore longline fisheries seem quite stable during 1997 to 2009 (Fig. 4a). The catches of swordfish and blue marlin usually substantially exceed that of the other billfishes (i.e. striped marlin, black marlin, and sailfish; Fig. 4a). Although the catches of swordfish have increased gradually since 1997, the catches of blue marlin are stabilized between 3000 to 4500 mt over 1997-2009 (Fig. 4b). The catches of striped marlin, black marlin, and sailfish caught in the Taiwanese offshore longline fisheries in the North Pacific Ocean are less 1000 mt, which is a small proportion compared to that of swordfish and blue marlin (Fig. 4b).

The gillnet, harpoon, and set net fisheries

In general, the catches of billfish caught in the offshore and coastal gillnet fisheries have increased since 1997 (Fig. 5a). Sailfish and black marlin are consist of the largest proportion of billfish catches in the gillnet fishery in the North Pacific Ocean. The catches of sailfish and black marlin caught in this fishery showed an increasing trend over 1997-2009, but a decreasing trend in recent years (Fig. 5b).

Black marlin is taken as a target species in the coastal harpoon fishery in winter months in Taiwan. The other billfishes are only constituted of a small proportion of the catch in the harpoon fisheries (Fig. 6a). However, the catches of black marlin increased dramatically during 2005 to 2008 (Fig. 6b). Compared with other fisheries, i.e. longline fisheries, the largest proportion of catch in the set net fishery in Taiwan is sailfish (Fig. 7a). The highest catch of sailfish in the set net fishery occurred in 1998, with averaged sailfish catches ranging between 40-100 mt (Fig. 7b). The catches of other billfishes, such as swordfish, blue marlin, striped marlin, and sailfish, in the Taiwanese set net fishery are generally below 50 mt over 1997-2009 (Fig. 7b).

Research

Among billfishes, our laboratory at National Taiwan University (NTU) has conducted biological studies for swordfish, sailfish, blue marlin, black marlin, and striped marlin. We also have finished the studies on population dynamics and stock assessments for swordfish, sailfish, and blue marlin. Currently, we are conducting a stock assessment study for black marlin, and continuously collecting the biological data and samples for black marlin and striped marlin. A tagging program for billfishes is being conducted by Taiwan Fisheries Research Institute. We just finished holding a successful billfish symposium during 7-12 November 2010, in Taitung, Taiwan. We expect that more results from billfish studies will come out in the near future.

References

Sun, C.L., Yeh, S.Z. (2008). A review of Taiwan's billfish fisheries in the North Pacific Ocean. The Intercessional Workshop of the Billfish Working Group of the International Scientific Committee for Tuna and Tuna-like Species in the North Pacific Ocean. 11-19 June 2008, Hokkaido, Japan. ISC/08/BILLWG-WP-11. 6 pp.

Sun, C.L., Yeh, S.Z., Wang, S.P., Chiang, W.C., Su, N.J. (2005). A review of Taiwan's billfish fishery in the Pacific Ocean. The 1st Joint Intercessional Meeting of the Marlin and Swordfish Working Groups of the International Scientific Committee

for Tuna and Tuna-like Species in the North Pacific. 29 August-2 September 2005, Shimizu, Japan. ISC/05/MAR&SWO-WGs/7. 16 pp.

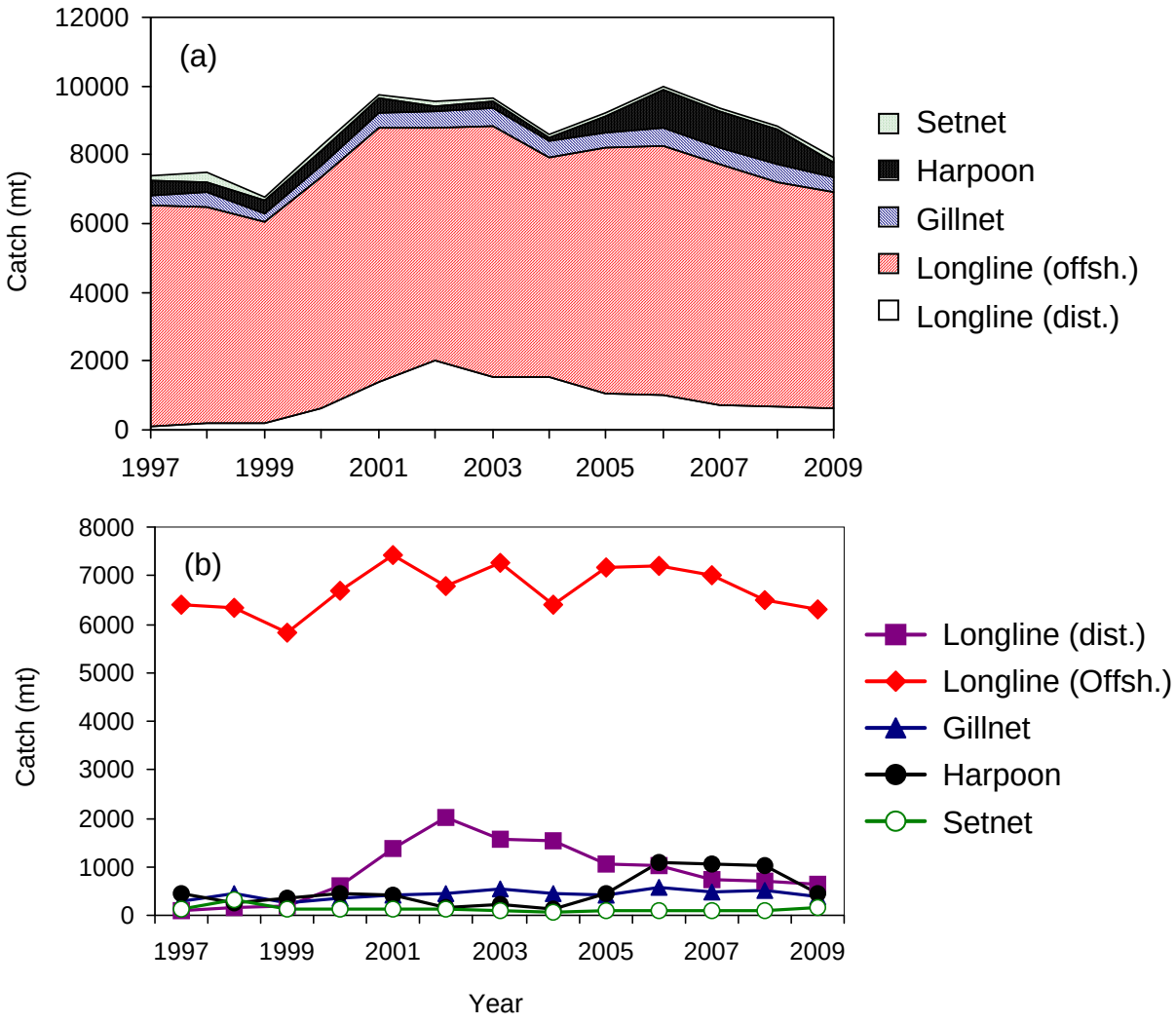

Fig. 1. Annual billfish catches (a) accumulative and (b) for each gear in the Taiwanese billfish fisheries, summed over five species of billfish in the North Pacific Ocean.

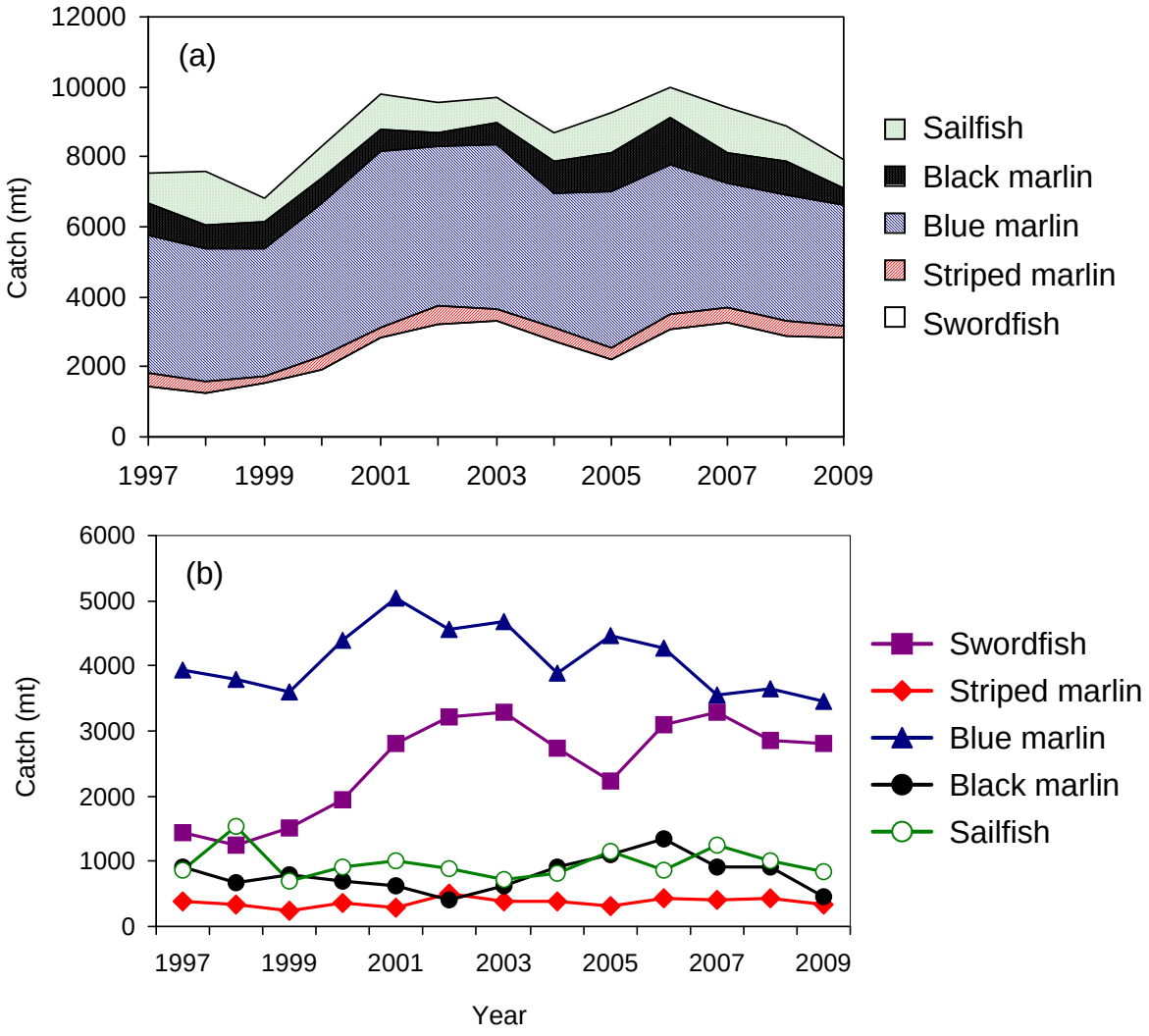

Fig. 2. Annual billfish catches (a) accumulative and (b) for each species in the Taiwanese billfish fisheries, summed over longline, gillnet, harpoon, and set net fisheries in the North Pacific Ocean.

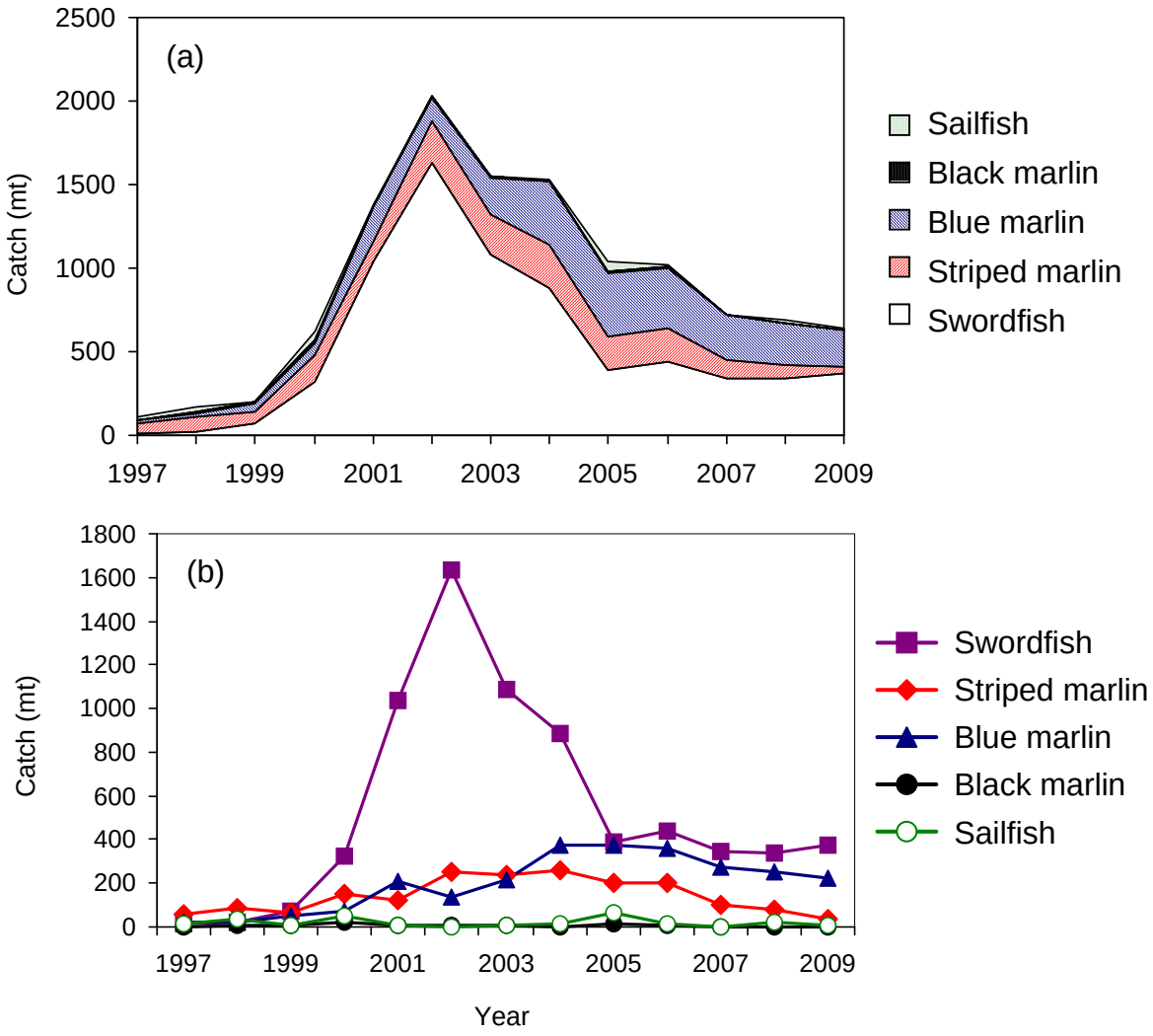

Fig. 3. Annual billfish catches (a) accumulative and (b) for each species in the Taiwanese distant-water tuna longline fisheries in the North Pacific Ocean.

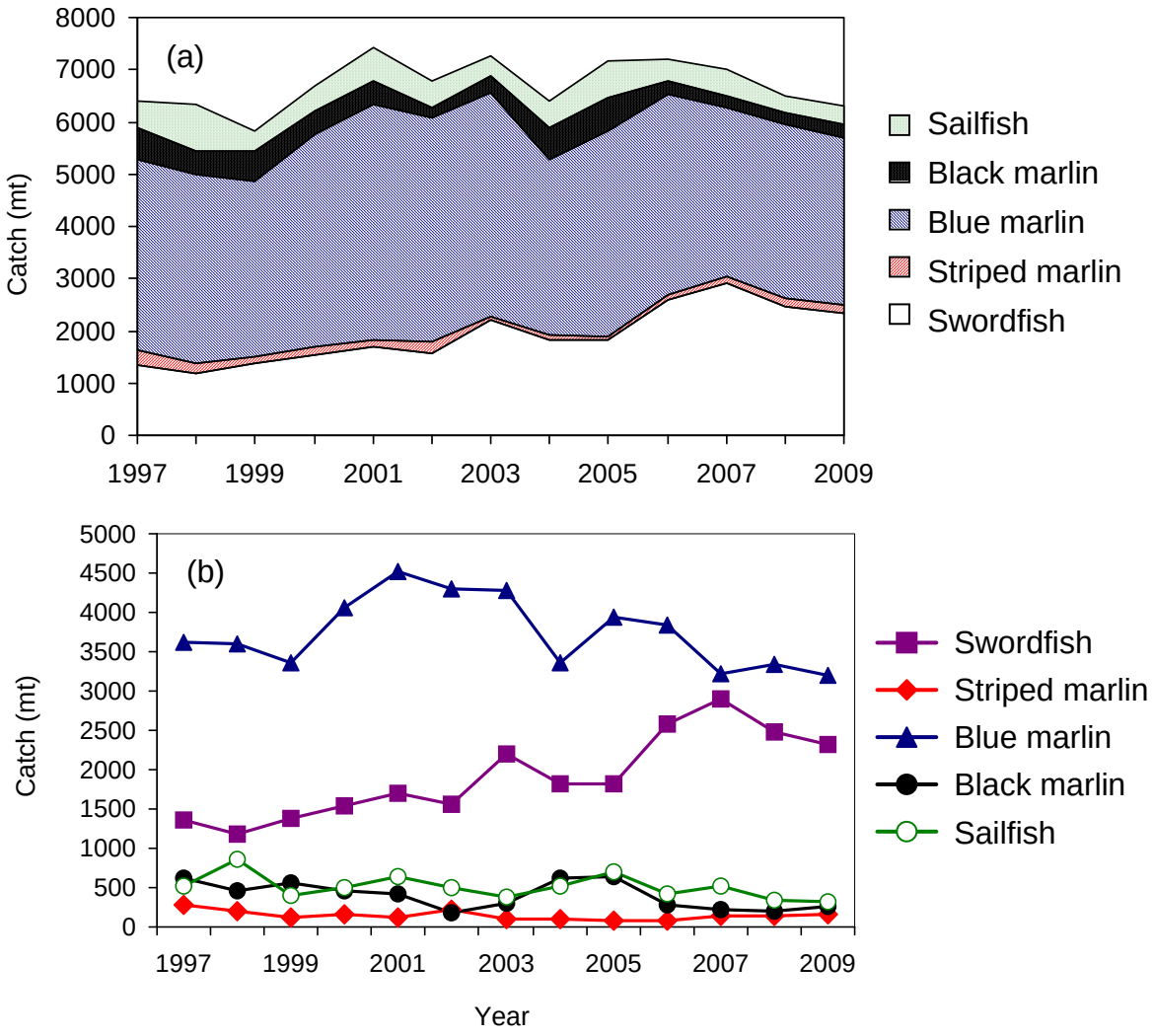

Fig. 4. Annual billfish catches (a) accumulative and (b) for each species in the Taiwanese offshore tuna longline fisheries in the North Pacific Ocean.

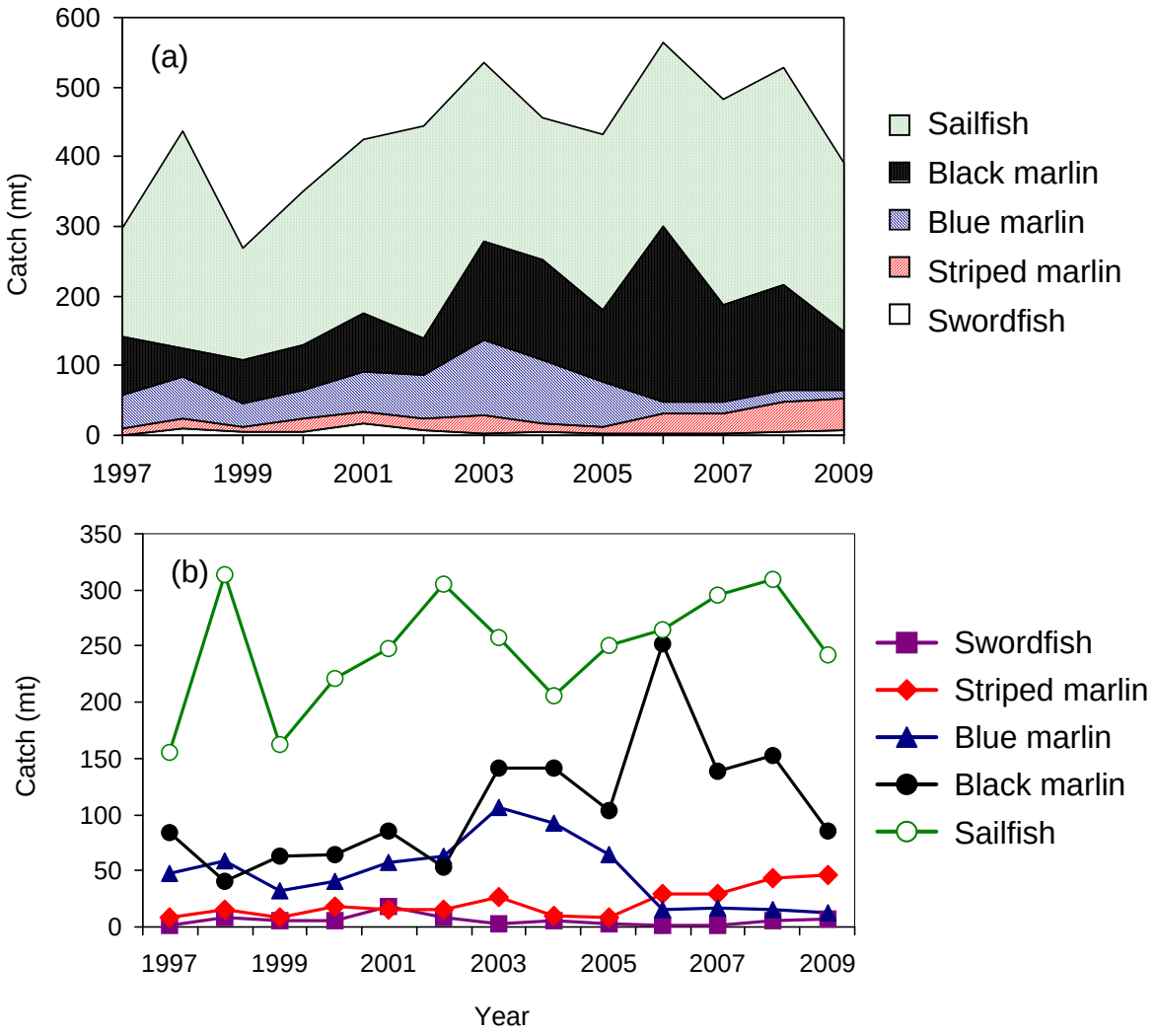

Fig. 5. Annual billfish catches (a) accumulative and (b) for each species in the Taiwanese offshore and coastal gillnet fisheries in the North Pacific Ocean.

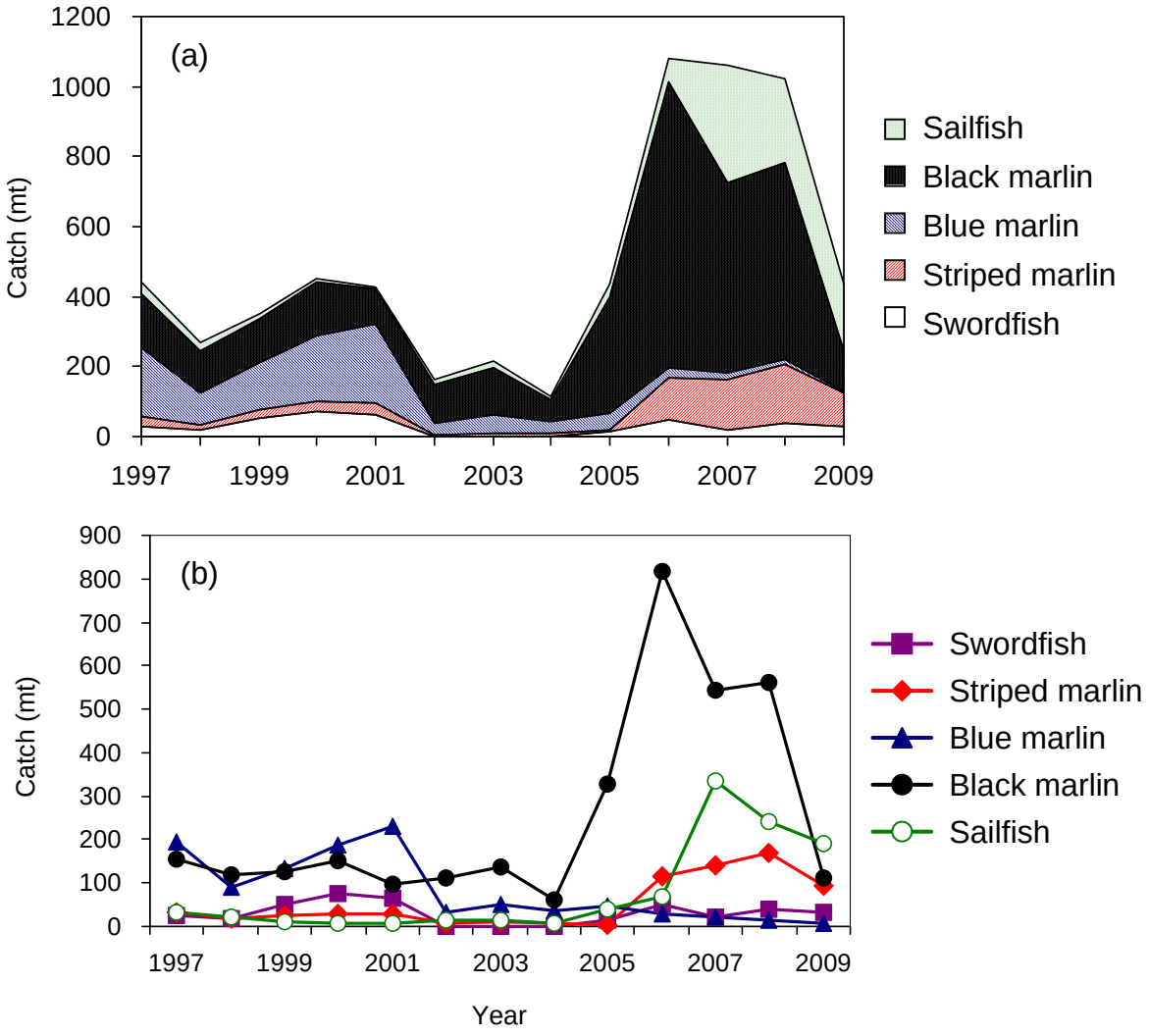

Fig. 6. Annual billfish catches (a) accumulative and (b) for each species in the Taiwanese coastal harpoon fisheries in the North Pacific Ocean.

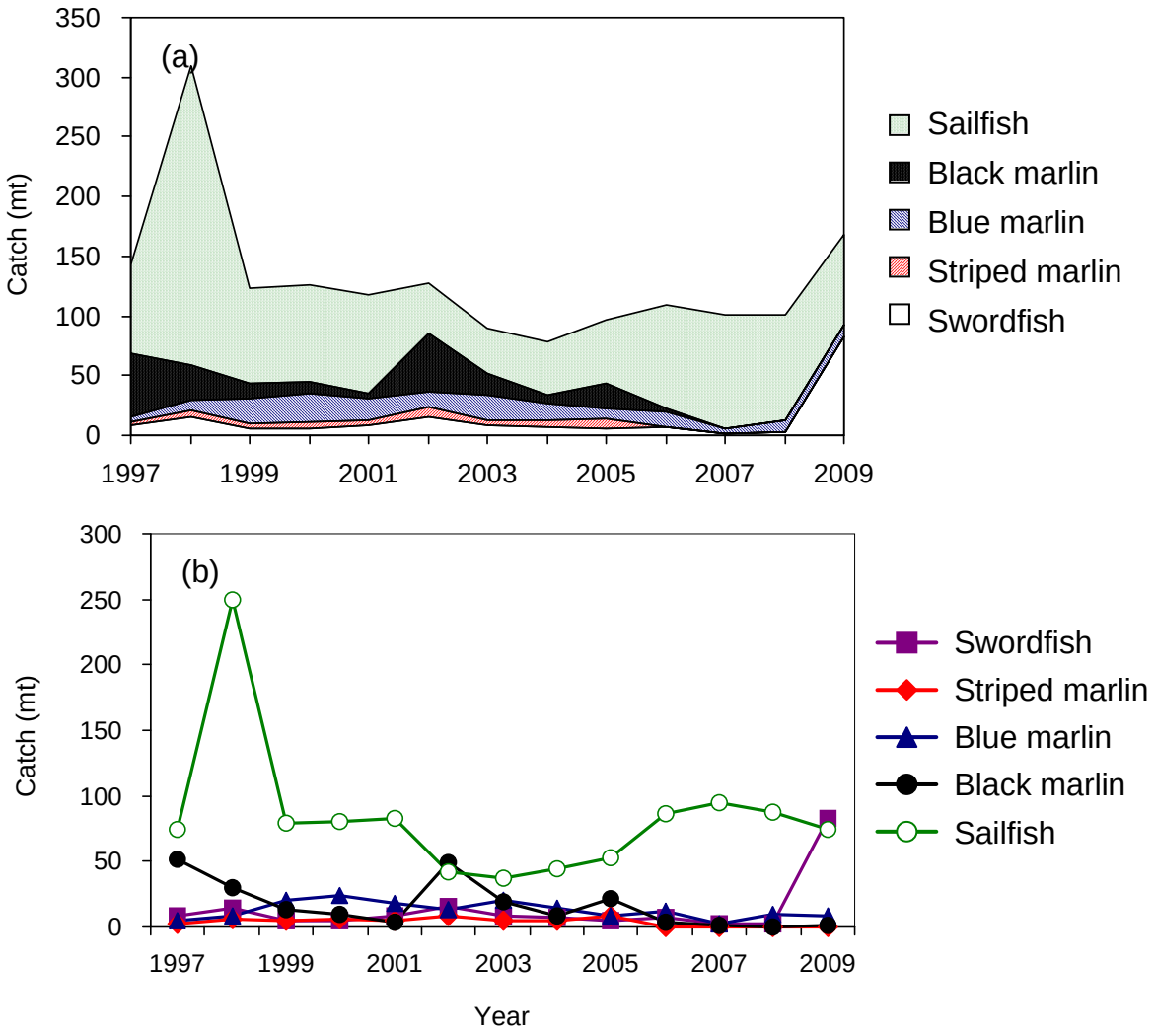

Fig. 7. Annual billfish catches (a) accumulative and (b) for each species in the Taiwanese coastal set net fisheries in the North Pacific Ocean.