

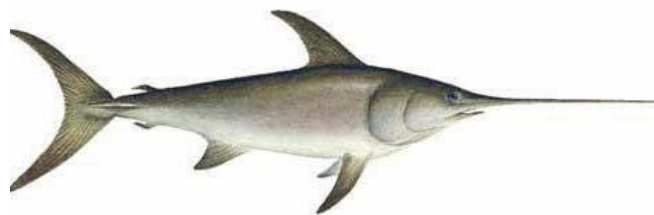
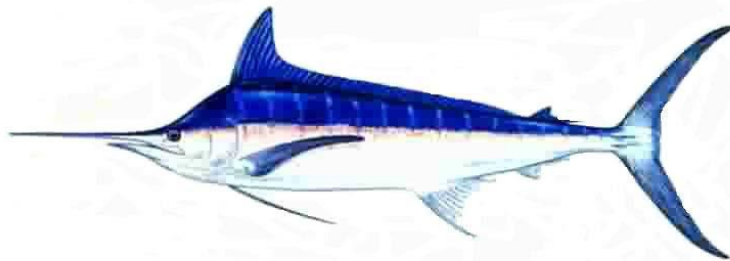


Spatial Distribution of Swordfish Catches for longline fisheries in the Western and Central North Pacific and Eastern Ocean*

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*Working document submitted to the ISC Billfish Working Group Workshop, 11-19 February 2014, Honolulu, Hawaii, USA. Document not to be cited without author's written permission.

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Abstract

This working paper presents recent spatial distributions for swordfish (*Xiphias gladius*) caught in the western central North Pacific and eastern Pacific Ocean from 2007-2012. The data were provided by the WCPFC in the North Pacific and by the IATTC in the eastern Pacific for longline catches. The purpose is to provide the ISC Billfish Working Group with catch and spatial distribution data for swordfish from WCPFC and IATTC member countries which are not available in the ISC or ISC Working Group's data holdings. This represents the first time this catch data has been made available to the ISC for stock assessment purposes.

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Introduction

The Western and Central Pacific Fisheries Commission (WCPFC) was established by the Convention for the Conservation and Management of Highly Migratory Fish Stocks in the Western and Central Pacific Ocean (WCPFC Convention) in June 2004. The WCPFC has 25 member countries, 7 Participating Territories, and 7 Cooperating Non-Members. The Inter-American Tropical Tuna Commission (IATTC) was established in 1949 and has 21 member countries and 4 Cooperating Non-Members. The following member countries are ISC members as well as members of the WCPFC and IATTC: Japan, Chinese Taipei, Korea, China, and U.S.A. Many other WCPFC and IATTC member countries fish in the North Pacific but are not members of the ISC.

The ISC swordfish (*Xiphias gladius*) assessment model assumes a two-stock scenario for the stock structure, WCNPO stock and EPO stock (Figure 1), with a diagonal boundary from Baja, California (25°N x 110°W) to approximately 170°W at the Equator and no mixing between the stock areas (ISC/08/BILLWG-SS/04).

Category II data (catch and effort by 5 degree squares) from the WCPFC and IATTC provide important information on areas of fishing activity by country for both WCNPO and EPO swordfish stocks. The purpose of this working paper is to present the spatial distributions of swordfish catches for each fishing country in relation to the stock areas using Category II data from WCPFC and IATTC. Data from the WCPFC and IATTC are necessary as the catch data obtained from ISC member countries do not represent the total catch for swordfish in the Pacific Ocean.

Methods

The WCPFC provided to the ISC Billfish Working Group historical longline catch data for swordfish (*Xiphias gladius*) in the North Pacific. The IATTC provided swordfish catch data in the eastern Pacific Ocean east of the 150° W longitude. All data were provided for the years 2007-2012. These Category I data are presented in Table 1 by country for cumulative catch in metric tons and total years. Note that the WCPFC data are from the entire North Pacific Ocean and overlap the IATTC area in the North Pacific Ocean east of the 150° W longitude.

The WCPFC and IATTC also provided Category II data, aggregated catch and effort data by 5-degree squares and by year, for member countries for the most recent 6-year period (2007-2012). These data are summarized in Table 2 by member country for cumulative catch in numbers of fish and total years. Note that the WCPFC Category II data are for the North Pacific Ocean west of the 150° W longitude; and the IATTC data are from the North and South Pacific Ocean east of the 150° W longitude. There is no overlap in the Category II data.

The Category II data are plotted by 5-degree squares in Figures 2-7 for the top 6 countries: Japan, Taiwan, Korea, USA, China, and Spain. The data are also plotted for the WCPFC countries with smaller catches in Figure 8, and for the IATTC countries with smaller catches in Figure 9.

The IATTC also provided Category III data, size frequency data by 5-degree squares and year. These data will be briefly summarized in a separate presentation but will not be described in a working paper.

Results

Swordfish longline cumulative catches in weight (mt) from WCPFC data for the North Pacific Ocean were summed across 2007-2012 for each country (Table 1). WCPFC catches for both ISC member countries and non-ISC member countries are presented. Note that the WCPFC catches are from the entire North Pacific Ocean and overlaps the IATTC area in the North Pacific Ocean east of the 150° W longitude. As such, the IATTC catches north of the Equator are also included in the WCPFC catch totals.

The total longline catch of swordfish for WCPFC members in the North Pacific Ocean in 2007-2012 is 73,165 metric tons (Table 1). Over 93% of the WCPFC total catch is accounted for by ISC member countries: Japan (45%), Taiwan (28%), USA (14%), and Korea (7%). Japan produced a mean catch of over 5,500 metric tons per year from 2007-2012. The only non-ISC WCPFC member countries with significant catches (1,800-2,500 mt) were Vietnam (3%) and China (2.5%).

Swordfish longline cumulative catches in weight (mt) from IATTC data from the eastern Pacific Ocean were summed across 2007-2012 for each country (Table 1). IATTC catches for both ISC member countries and non-ISC member countries are presented.

The total longline catch of swordfish for IATTC members in the eastern Pacific Ocean in 2007-2012 is 93,510 metric tons (Table 1). The largest producer Spain caught over 51% (47,734 mt) of the total catch. Spain averaged nearly 8,000 metric tons per year from 2007-2012. ISC member countries accounted for over 33% of the IATTC total catch. Japan caught 16,533 metric tons (18%) from 2007-2012, averaging 2,800 metric tons per year during that six-year period. Other WCPFC member countries with significant catches (2,300-4,000 mt) were China, Ecuador, Costa Rica, Mexico, and Belize.

Table 2 summarizes the swordfish cumulative catches in numbers of fish by country from the WCPFC and IATTC Category II data for 2007-2012. Note that the WCPFC Category II data is only for the North Pacific Ocean west of the 150° W longitude; and the IATTC data is from the North and South Pacific Ocean east of the 150° W longitude.

While Category I data provides the best estimates for annual catch by gear and country, and Category II catches are generally a subset of the Category I catches, Category II data does provide spatial distribution of the catch and effort by gear and country. The numbers in Table 2 are presented for comparative purposes only.

Japan, Taiwan, Korea and China generally fished throughout the western, central, and eastern Pacific Ocean in 2007-2012 (Figures 2, 3, 4, and 6). The USA fished in the central and eastern Pacific Ocean north of the Equator (Figure 5).

Of the non-ISC member countries, Spain (IATTC member) fished extensively in the eastern Pacific Ocean south of the Equator (Figure 7). And Vanuatu (WCPFC member) fished across the western and central North Pacific Ocean. Belize fished in both the western-central North Pacific and the eastern Pacific Ocean. Other WCPFC and IATTC member countries concentrated their fishing effort in relatively small areas.

Table 1. Swordfish longline cumulative catch (in mt) by country from WCPFC and IATTC Category I data for years 2007-2012.

	WCPFC	WCPFC	IATTC	IATTC	
ISC Members	No. Years	Catch in MT	No. Years	Catch in MT	
Japan	6	33,076	6	16,533	
Taiwan	6	20,128	6	5,658	
USA	6	10,157	6	3,484	
Korea	6	4,826	6	4,780	
sub-total		68,187		30,455	
Non-ISC Members					
Spain			6	47,734	
China	6	1,830	6	4,005	
Ecuador			5	3,511	
Costa Rica			6	3,028	
Vietnam	6	2,442			
Mexico			6	2,413	
Belize			6	2,364	
Vanuatu	6	380			
Philippines	6	148			
Micronesia	6	146			
Marshall	6	22			
Kiribati	1	10			
sub-total		4,978		63,055	
TOTAL		73,165		93,510	

Table 2. Swordfish longline cumulative catch (in numbers) by country from WCPFC and IATTC Category II data for years 2007-2012.

	WCPFC	WCPFC	IATTC	IATTC	TOTAL
ISC Members	No. Years	Catch in Numbers	No. Years	Catch in Numbers	
Taiwan	6	474,486	6	55,090	529,576
Japan	6	237,906	6	278,959	516,865
Korea	6	72,251	6	64,244	136,495
USA	6	80,679	6	31,772	112,451
sub-total		865,322		430,065	1,295,387
Non-ISC Members					
Spain			6	937,634	937,634
China	6	28,284	5	84,544	112,828
Belize	4	184	3	10,460	10,644
Vanuatu	6	5,142			5,142
French Polynesia			6	4,026	4,026
Micronesia	6	2,796			2,796
Marshall	6	682			682
Tuvalu	2	464			464
Kiribati	3	236			236
Fiji	4	181			181
Papua New Guinea	1	35			35
Senegal	1	28			28
Cooke	1	2			2
sub-total		38,034		1,036,664	1,074,698
TOTAL		903,356		1,466,729	2,370,085

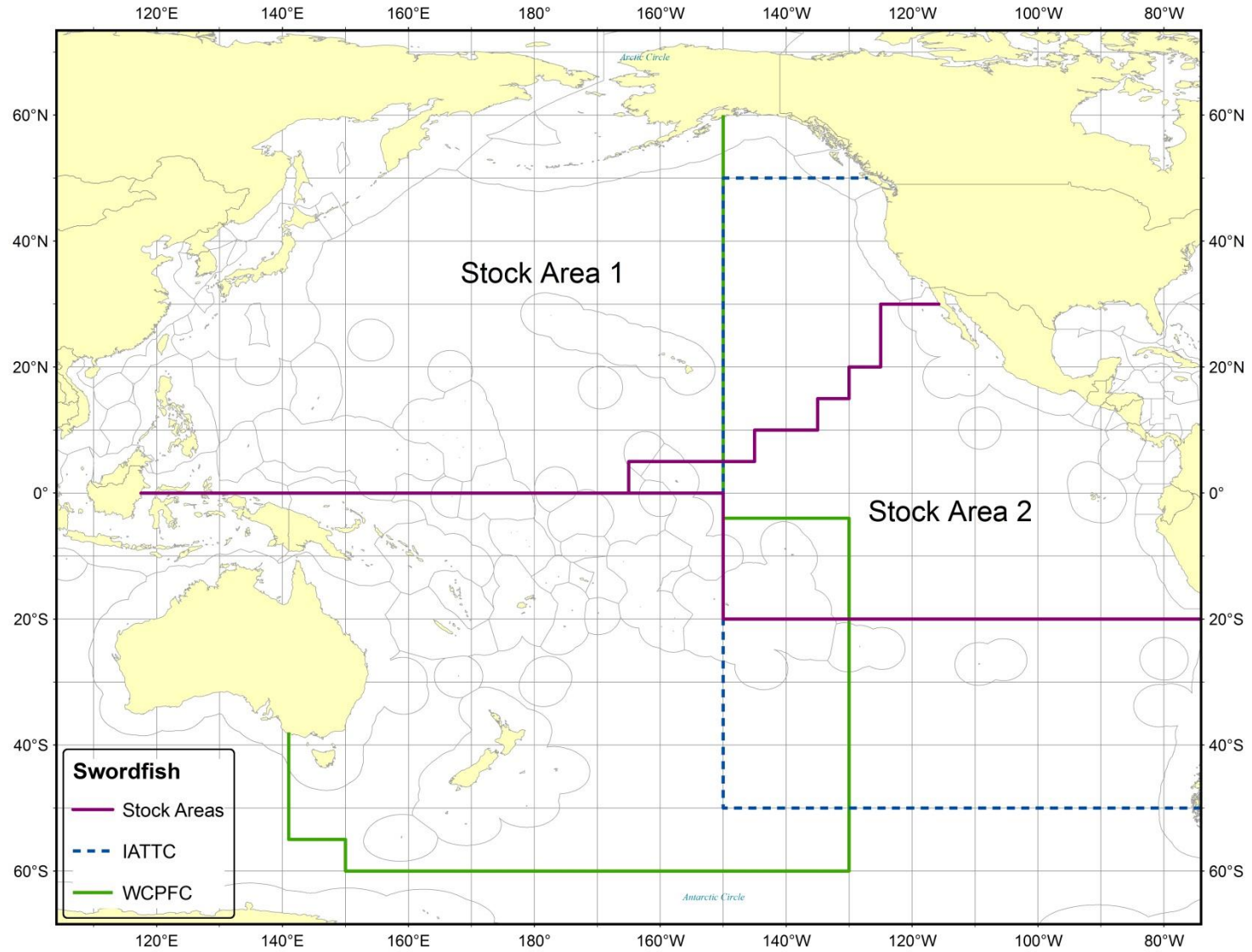


Figure 1. Swordfish stock areas for the ISC assessment model under a 2-stock scenario.

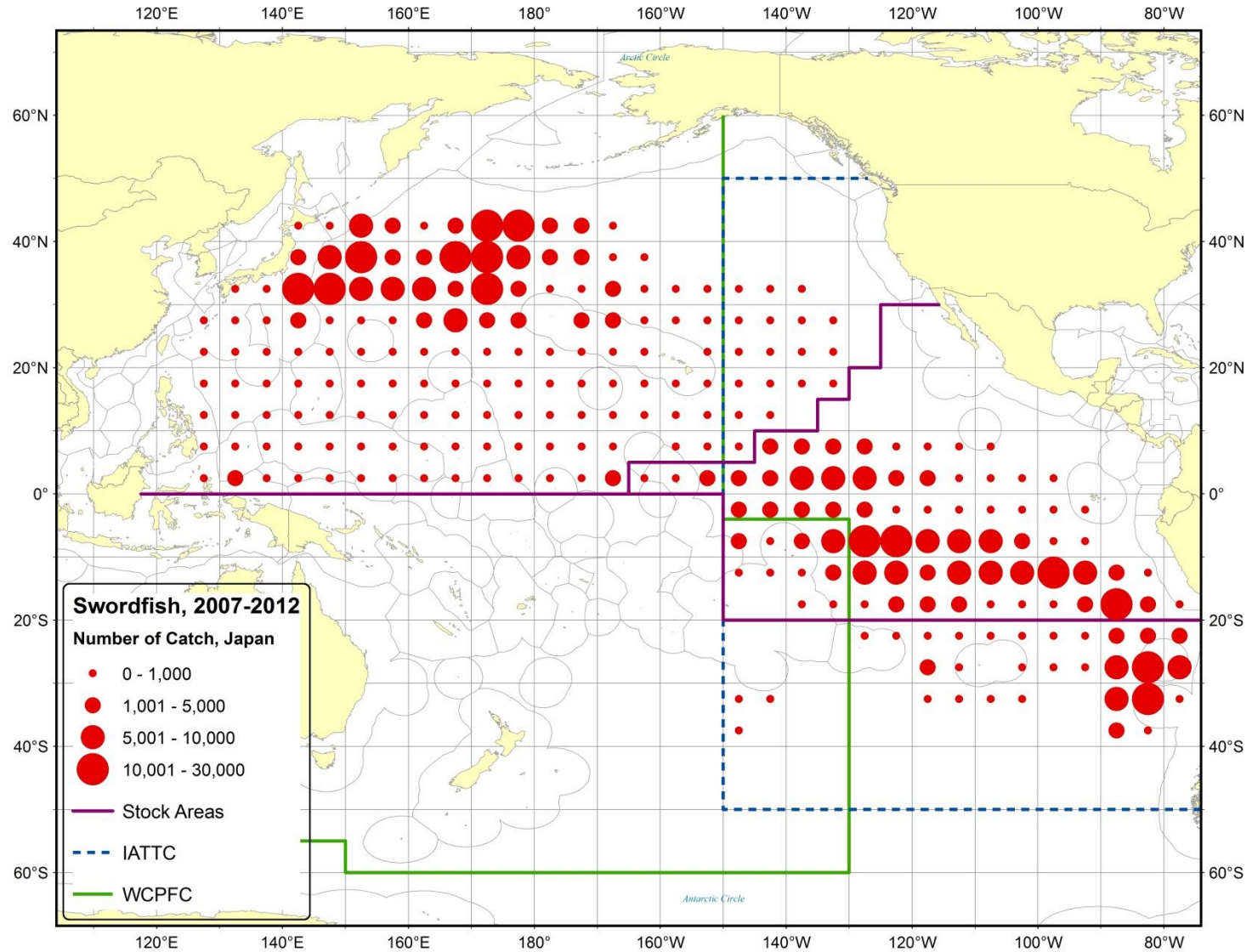


Figure 2. Japan: distribution of swordfish longline catch in numbers of fish from WCPFC and IATTC data from 2007-2012.

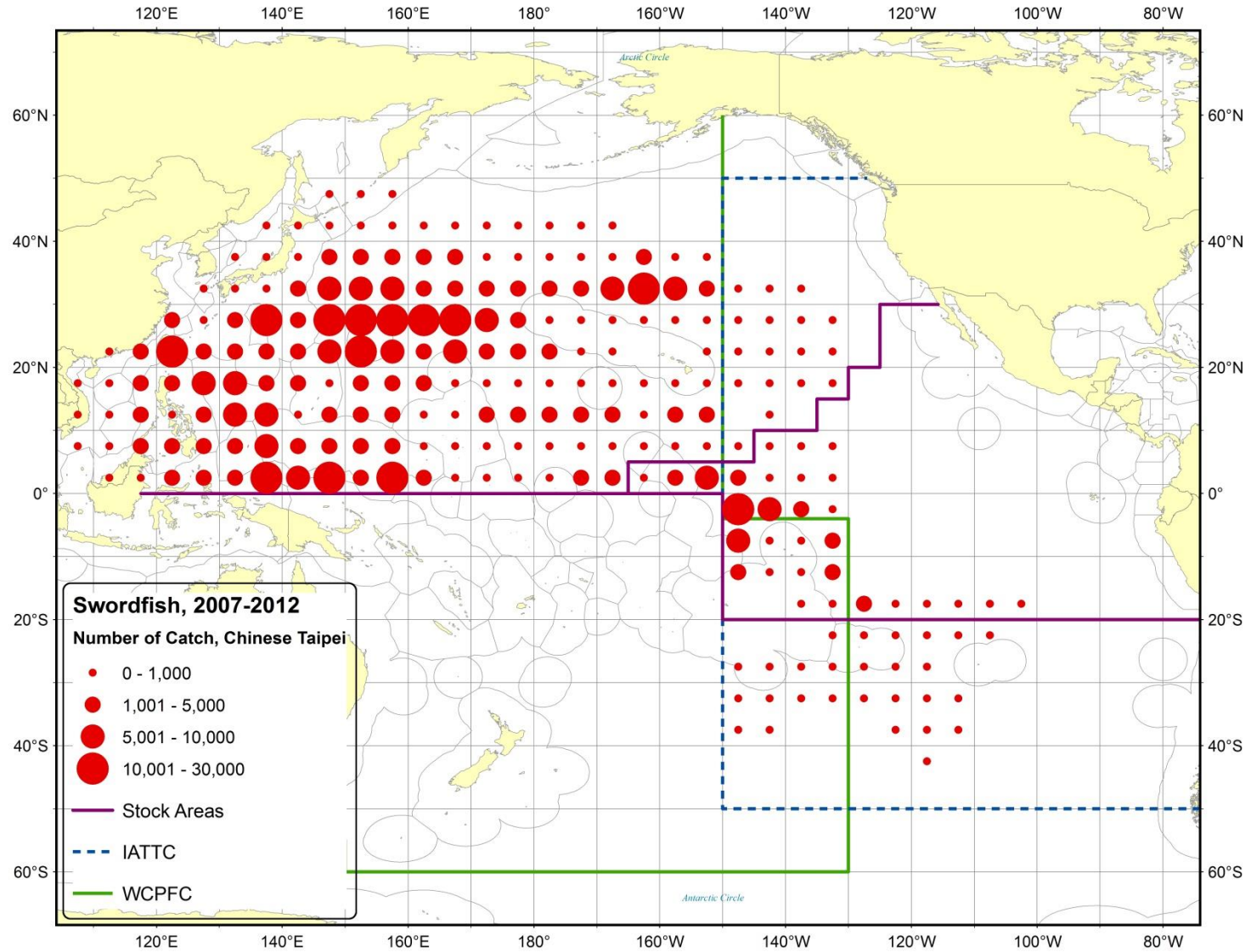


Figure 3. Taiwan: distribution of swordfish longline catch in numbers of fish from WCPFC and IATTC data from 2007-2012.

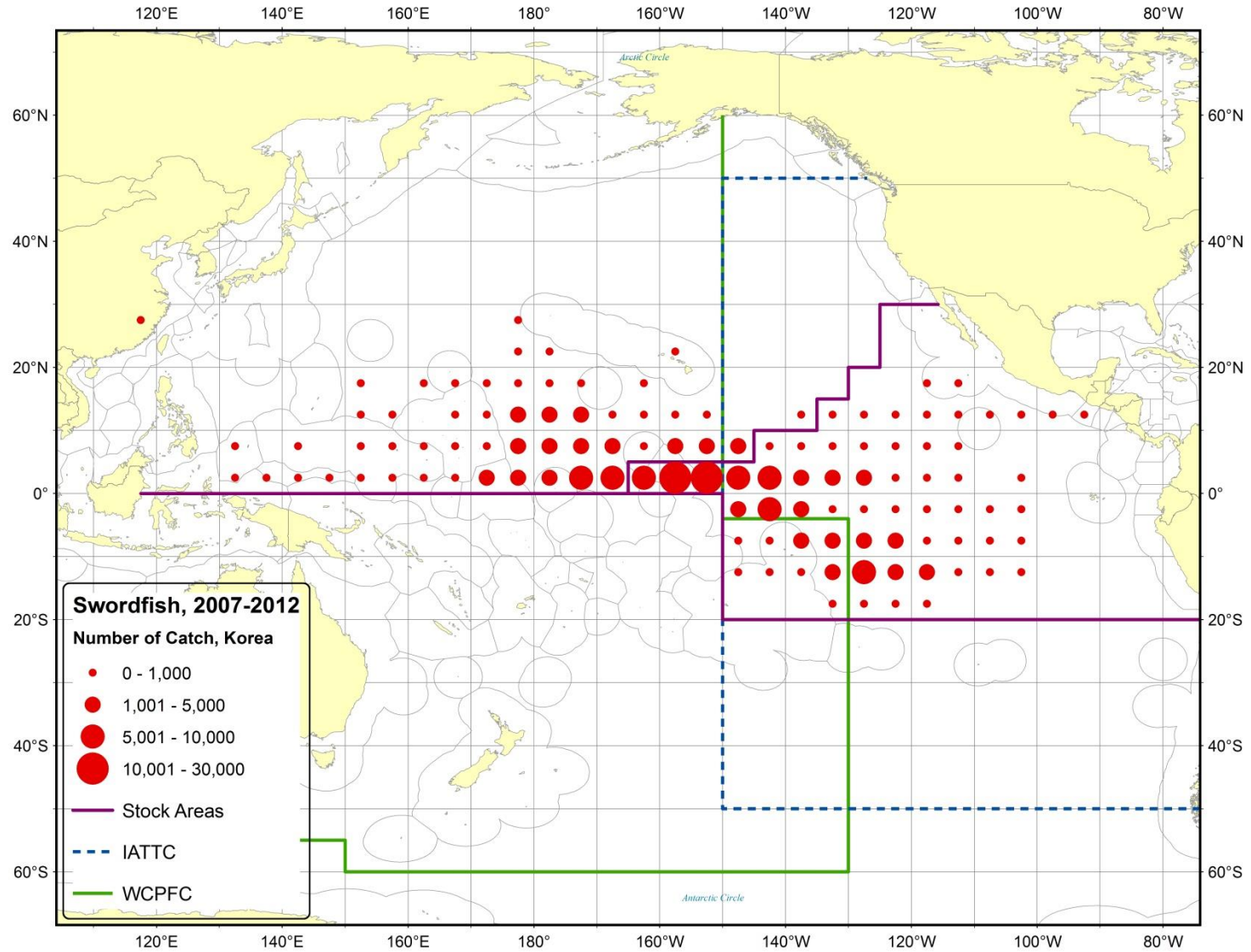


Figure 4. Korea: distribution of swordfish longline catch in numbers of fish from WCPFC and IATTC data from 2007-2012.

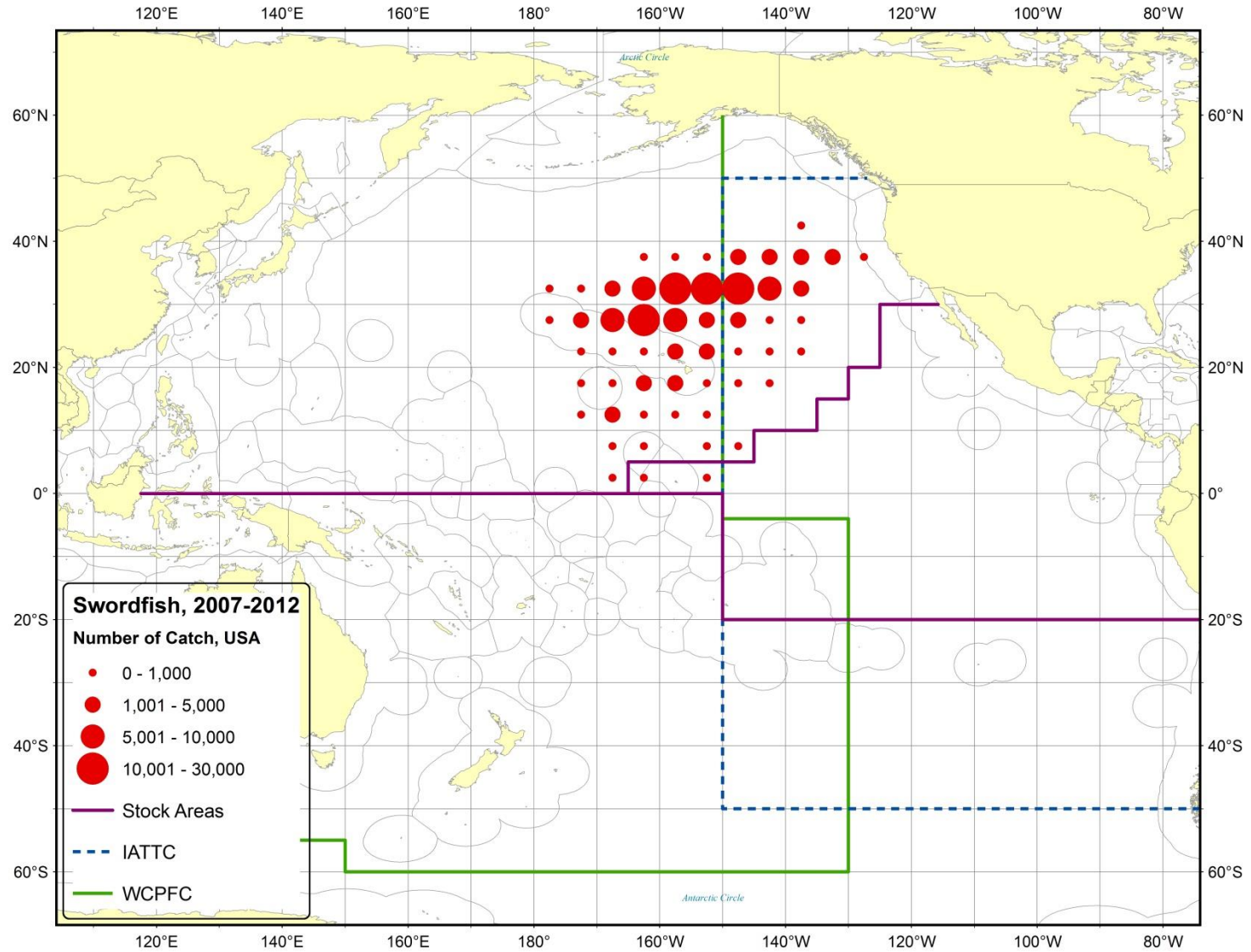


Figure 5. USA: distribution of swordfish longline catch in numbers of fish from WCPFC and IATTC data from 2007-2012.

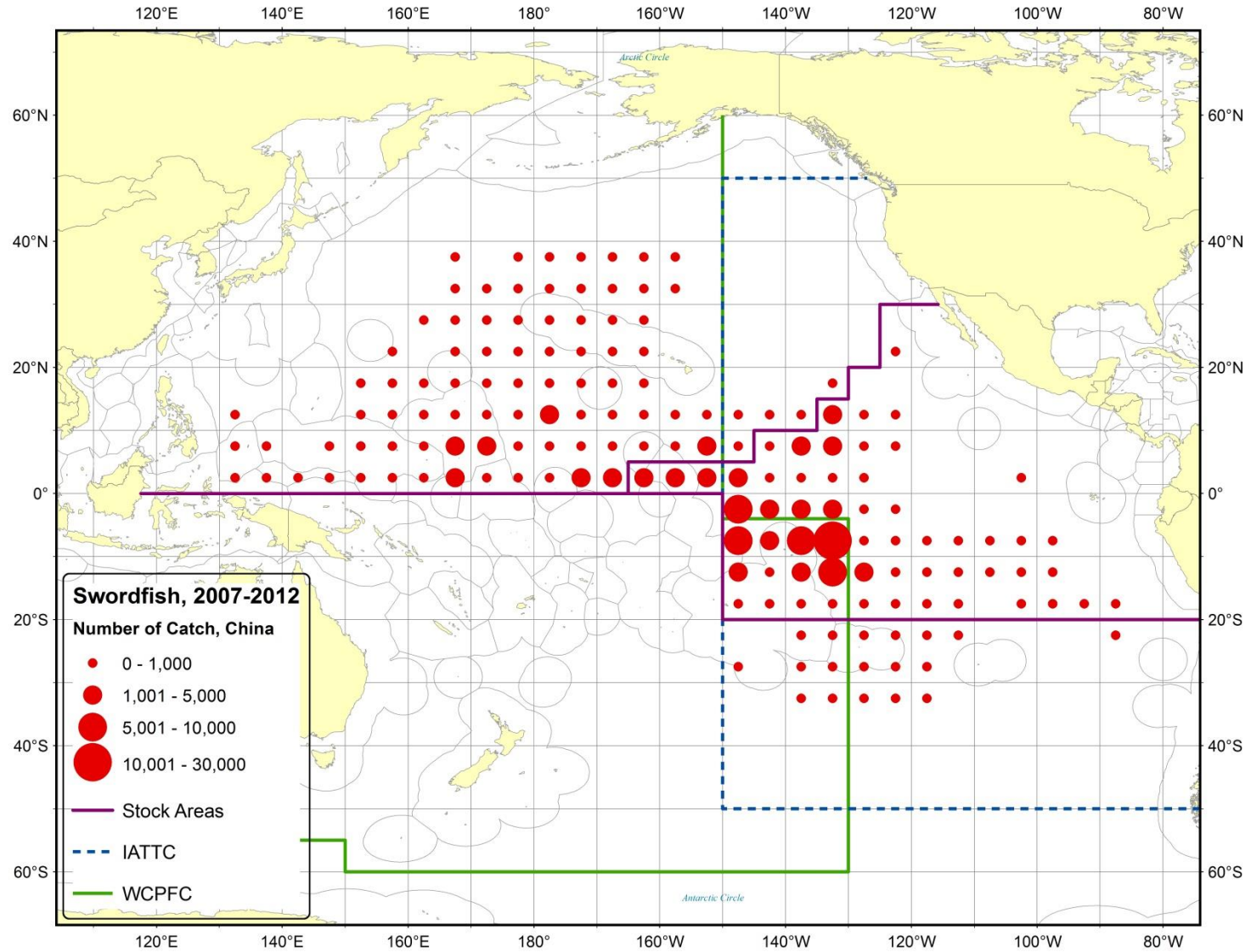


Figure 6. China: distribution of swordfish longline catch in numbers of fish from WCPFC and IATTC data from 2007-2012.

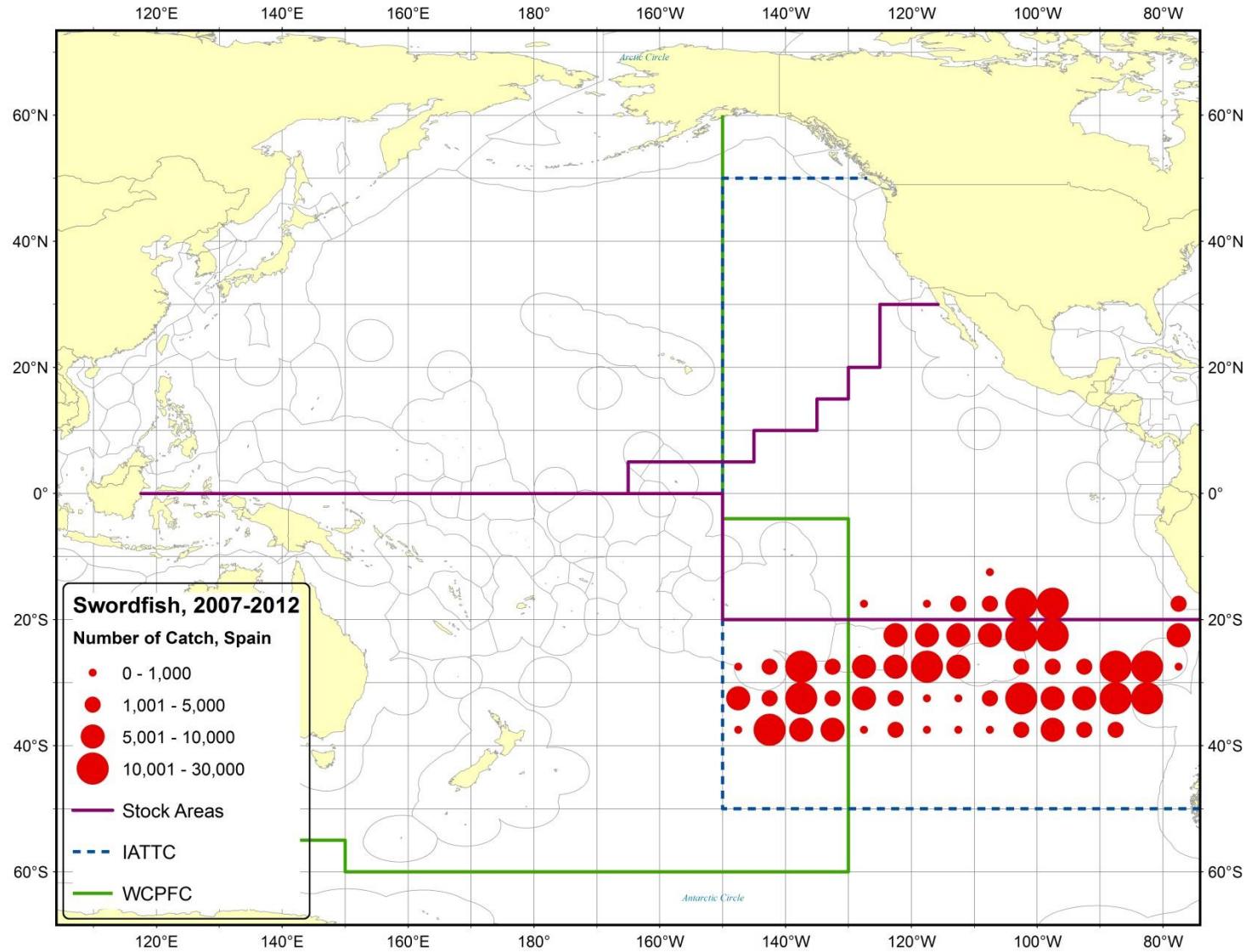


Figure 7. Spain: distribution of swordfish longline catch in numbers of fish from IATTC data from 2007-2012.

Figure 8. Distribution of swordfish longline catch in numbers of fish by WCPFC member countries in the North Pacific Ocean west of the 150 ° W longitude for 2007-2012.

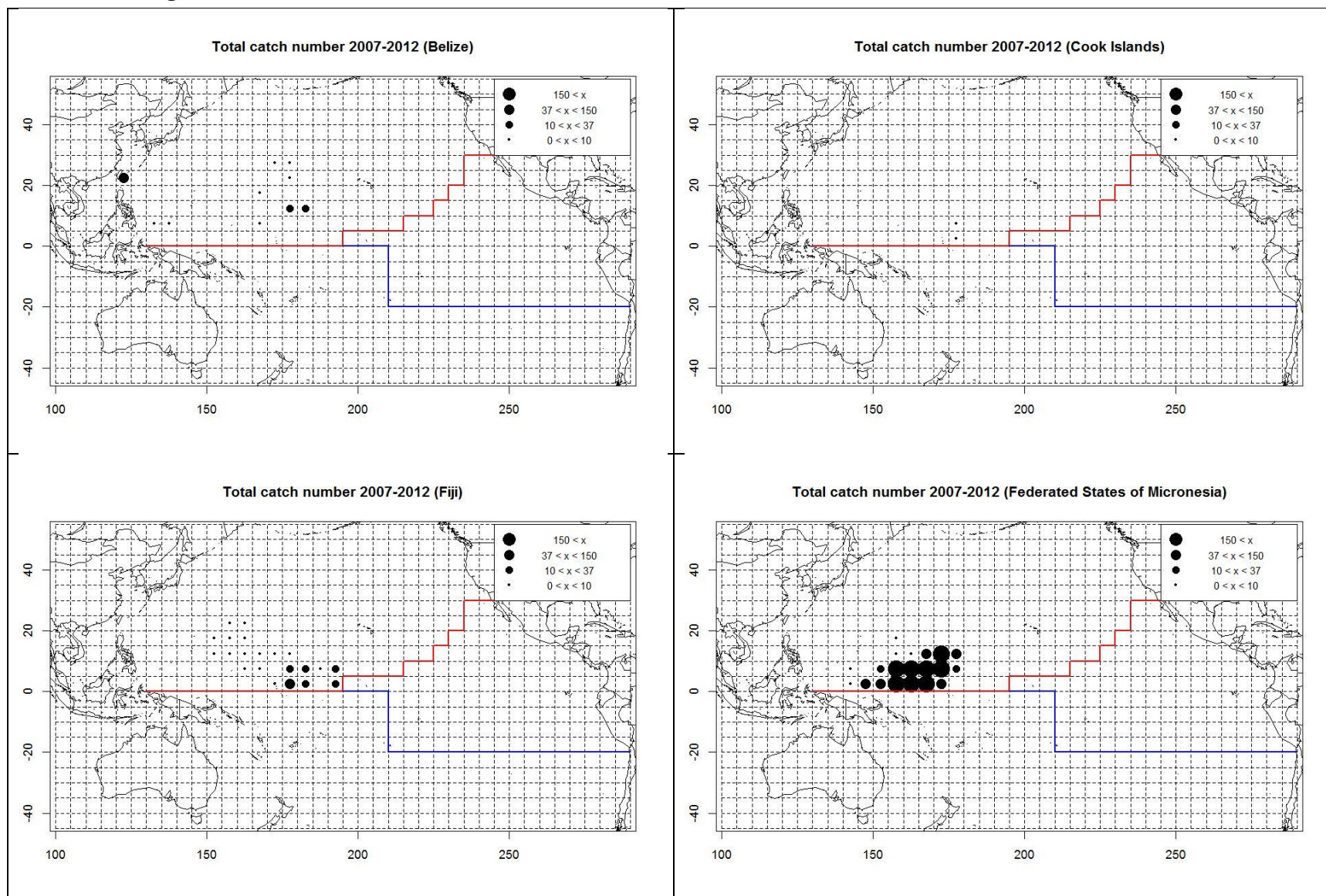


Figure 8. Continued.

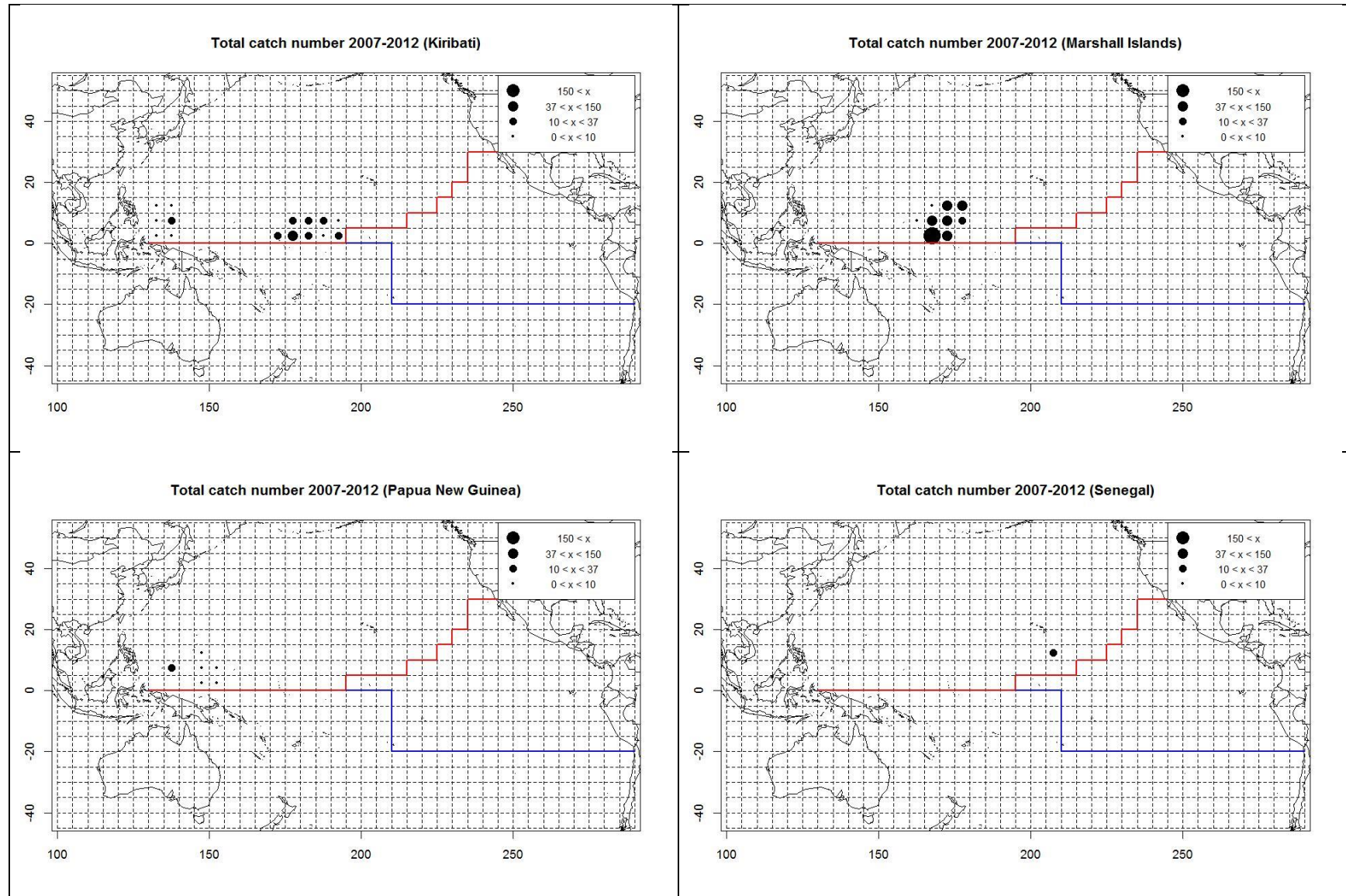


Figure 8. Continued.

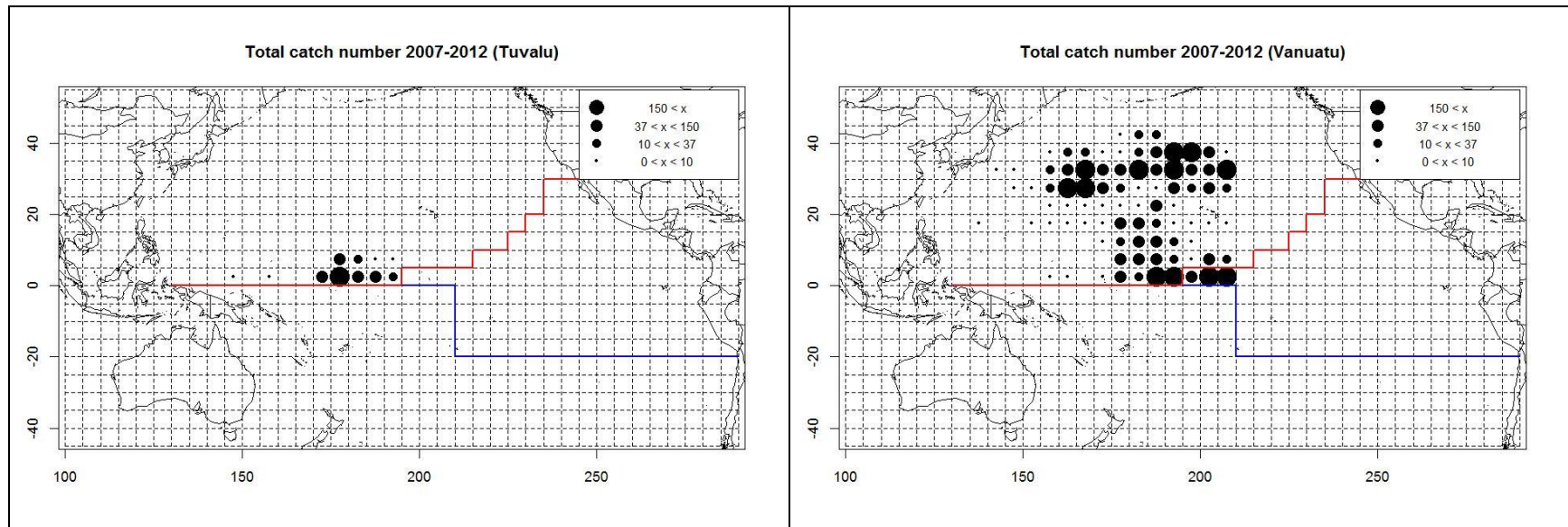


Figure 9. Distribution of swordfish longline catch in numbers of fish by IATTC member countries in the eastern Pacific Ocean for 2007-2012.

