FISHERIES INDICATORS FOR TROPICAL TUNAS

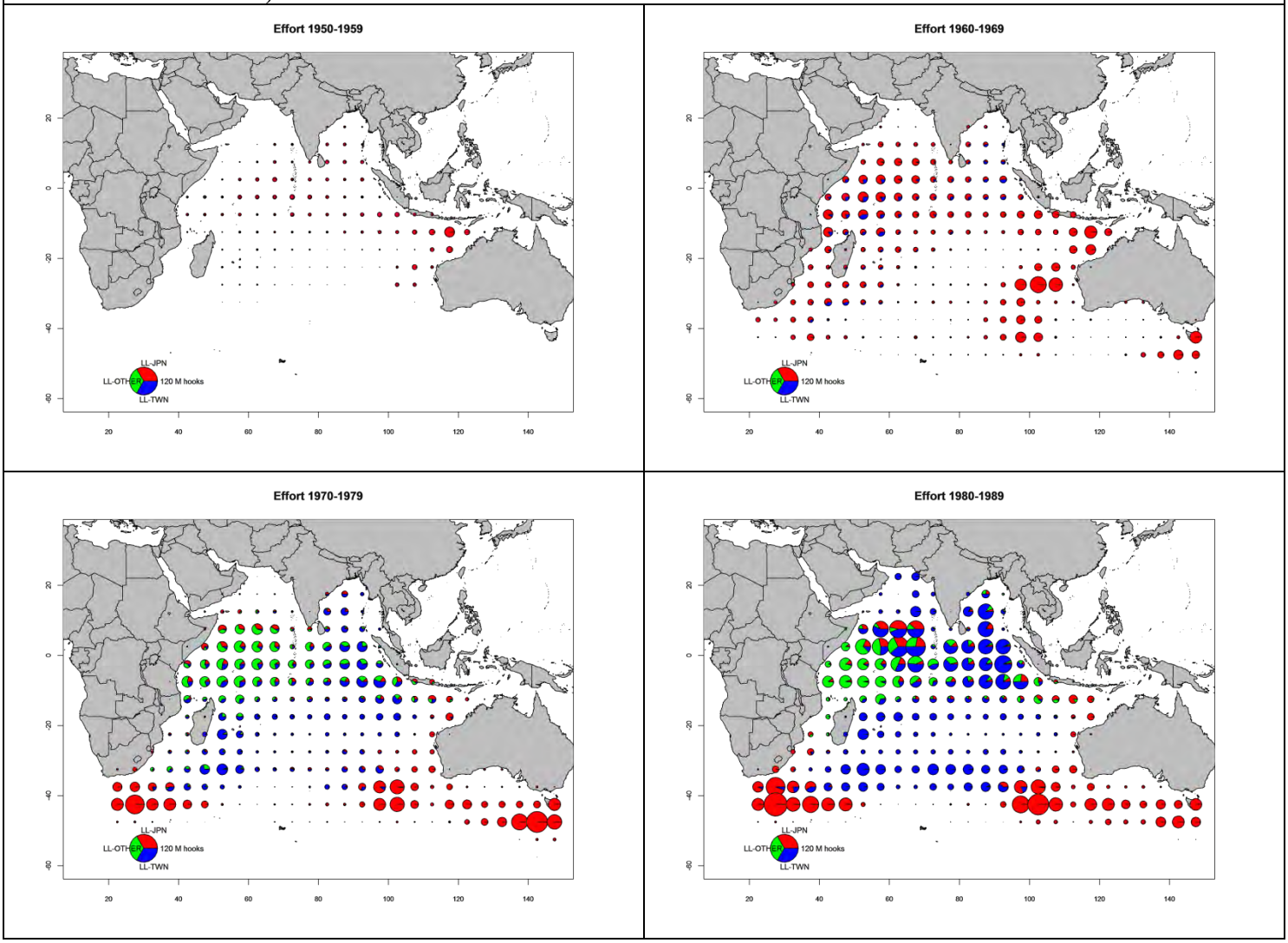
Miguel Herrera[1], *Julien Million*[2]

This document presents different fisheries indicators for the three species of Tropical Tunas.

1. EFFORT

a) *Longline*

Effort exerted by (deep-)freezing LONGLINE fleets in the Indian Ocean, in millions (M) of hooks set, by decade and main fleet:
LL-JPN (red): Longliners from Japan
LL-TWN (blue): Longliners from Taiwan,China
LL-OTHER (green): Longliners from other fleets (includes Australia, Belize, China, EU, Mauritius, Philippines, Seychelles, South Africa, South Korea and various other fleets)



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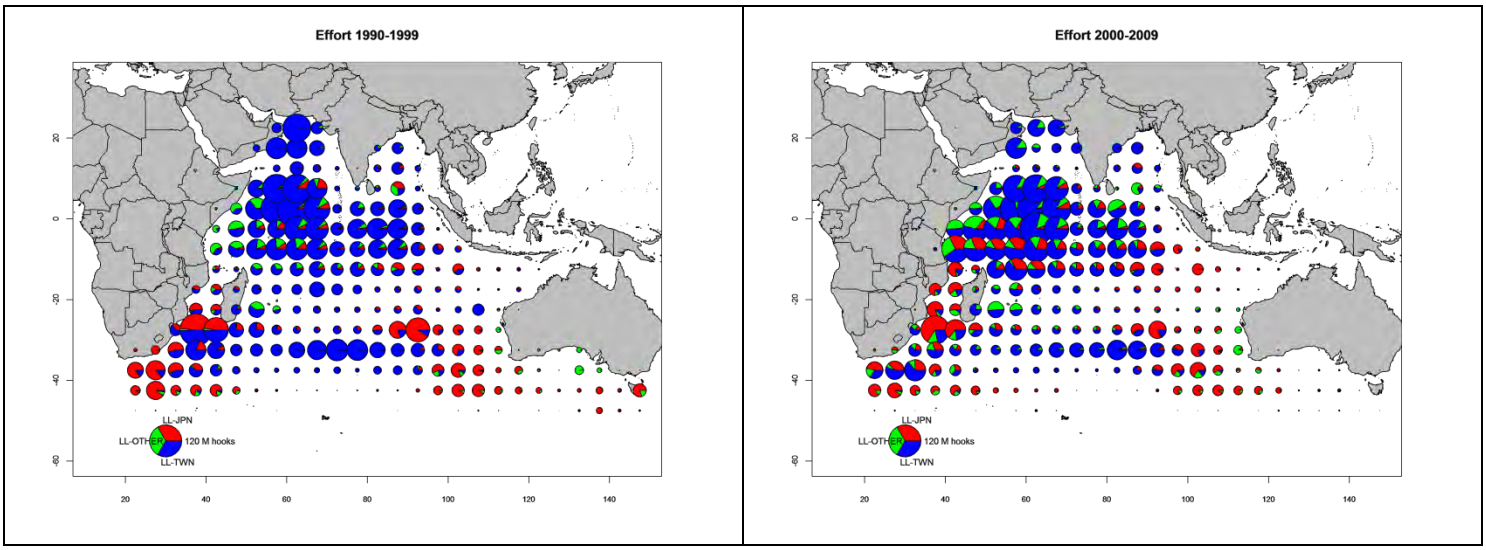
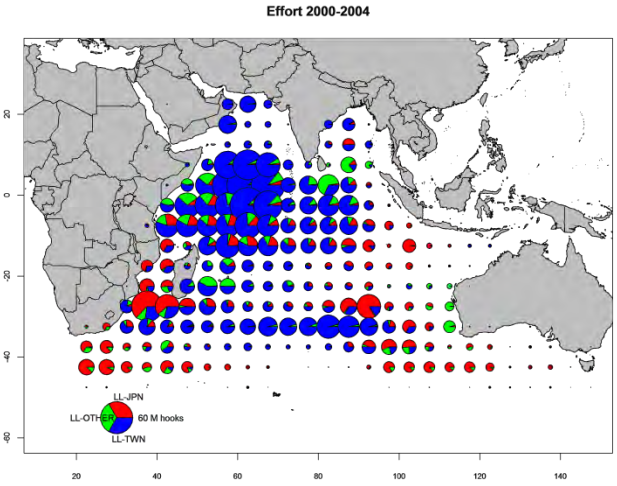
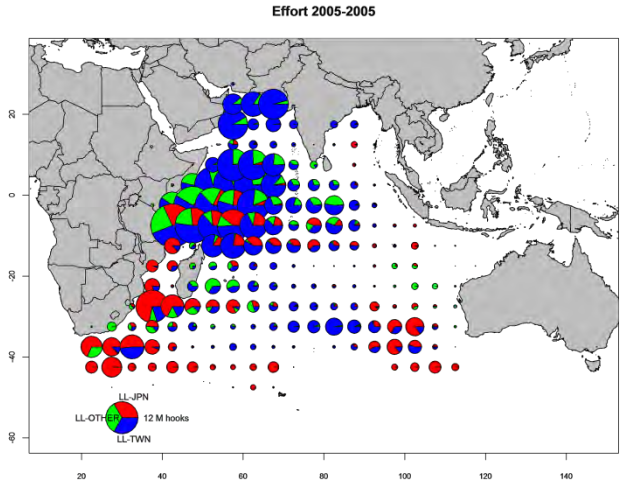
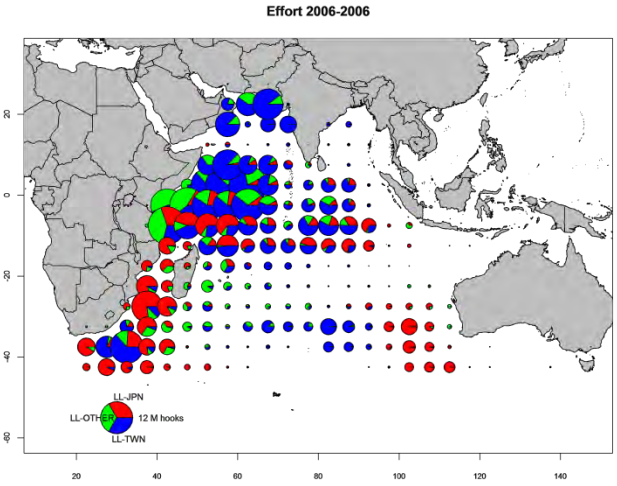
[2] Fisheries Officer, IOTC Secretariat (Julien.Million@iotc.org; jm@iotc.org)

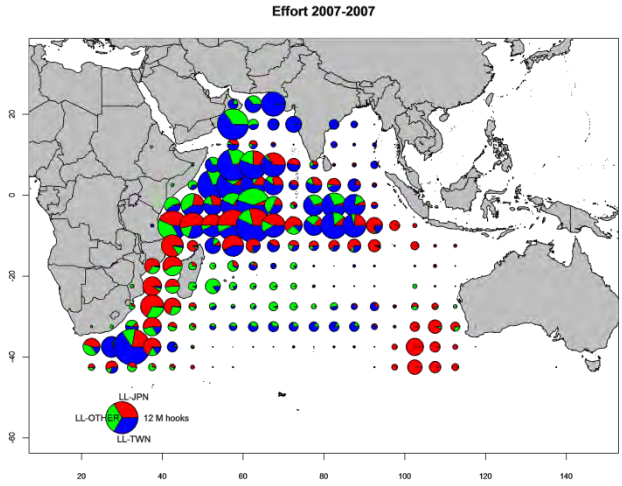

Effort 1990-1999
LL-JPN
LL-OTHER
120 M hooks
LL-TWN
Effort 2000-2009
LL-JPN
LL-OTHER
120 M hooks
LL-TWN

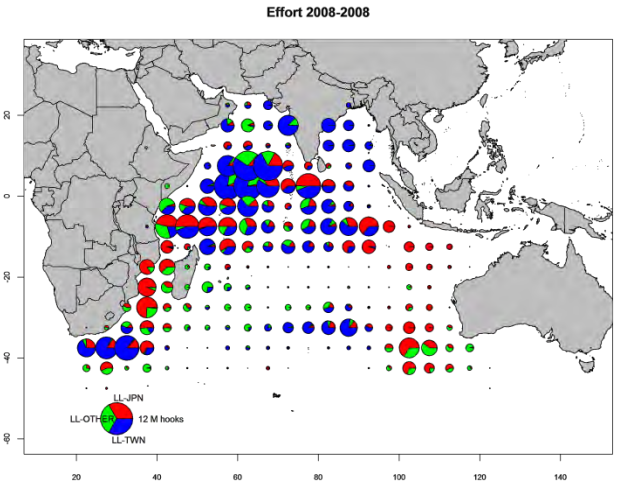
Effort exerted by (deep-)freezing LONGLINE fleets in the Indian Ocean, in millions (M) of hooks set, for 2000-04 and 2005-09, by year, and main fleet:
LL-JPN (red): Longliners from Japan
LL-TWN (blue): Longliners from Taiwan,China
LL-OTHER (green): Longliners from other fleets (includes Australia, Belize, China, EU, Mauritius, Philippines, Seychelles, South Africa, South Korea and various other fleets)

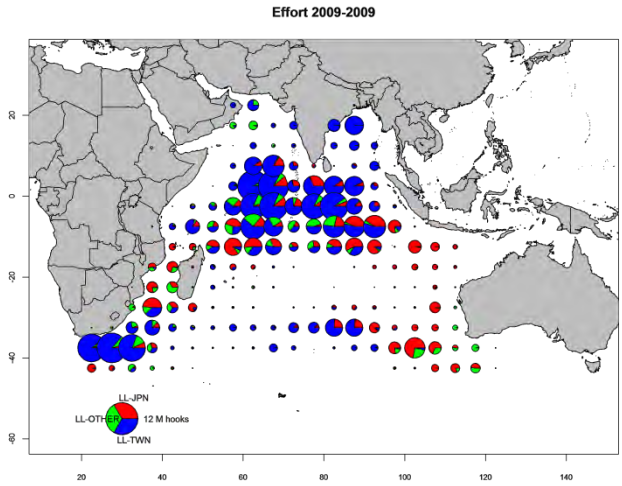






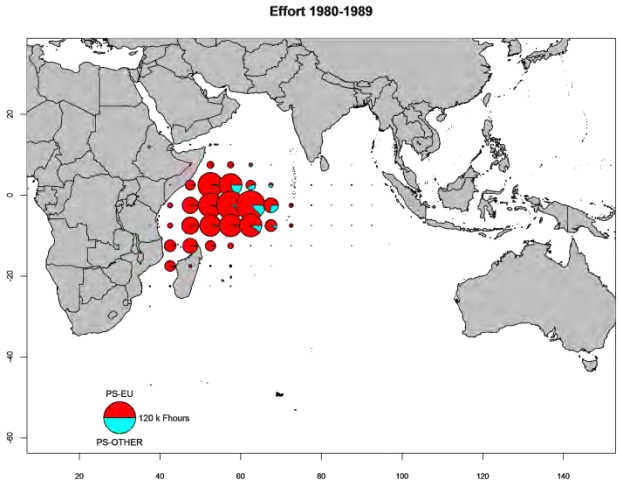


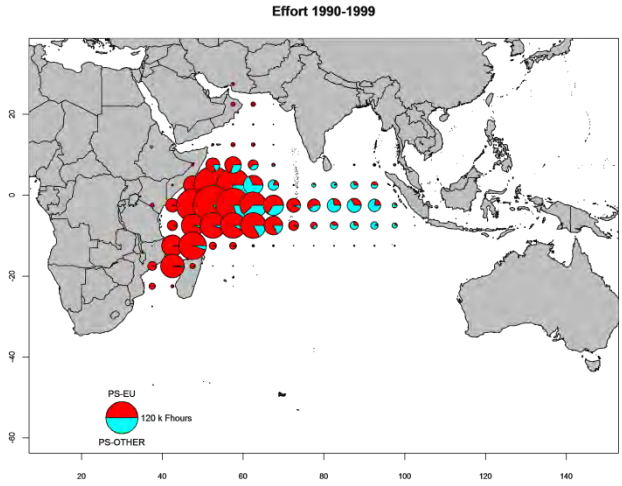


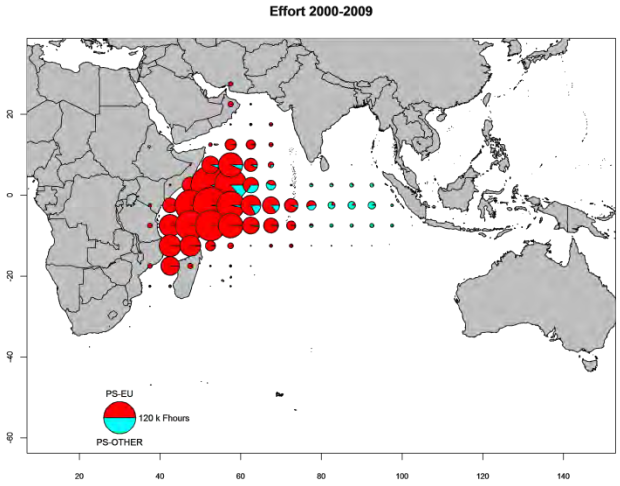


b) Purse-seine

Effort exerted by industrial PURSE SEINE fleets in the Indian Ocean, in thousands (k) of fishing hours (Fhours), by decade and main fleet:
PS-EU (red): Industrial purse seiners monitored by the EU and Seychelles (operating under flags of EU countries, Seychelles and other flags)
PS-OTHER (green): Industrial purse seiners from other fleets (includes Japan, Mauritius and purse seiners of Soviet origin)
(excludes effort data for purse seiners of Iran and Thailand)

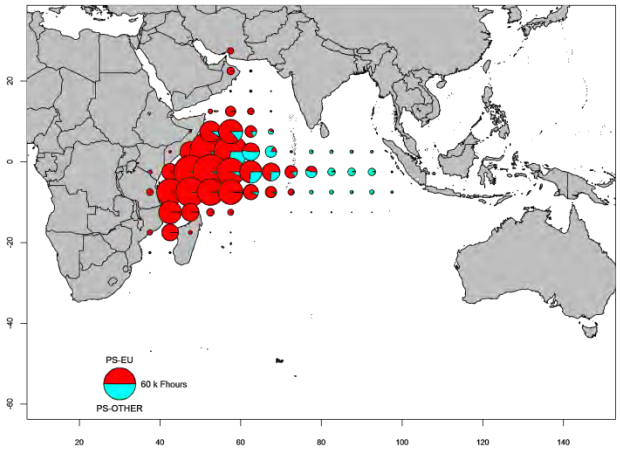




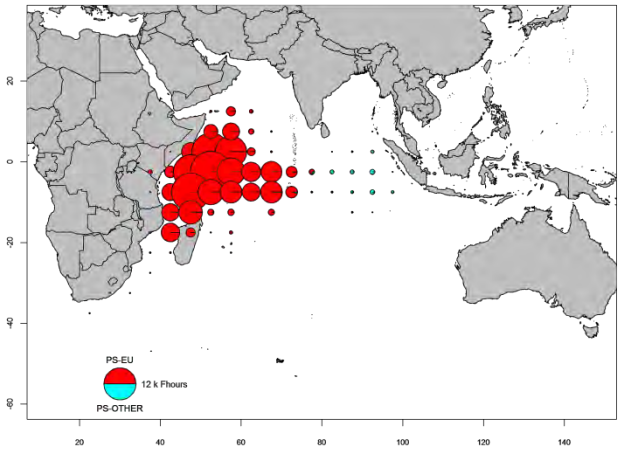


Effort exerted by industrial PURSE SEINE fleets in the Indian Ocean, in thousands (k) of fishing hours (Fhours), for 2000-04 and 2005-09, by year, and main fleet:
PS-EU (red): Industrial purse seiners monitored by the EU and Seychelles (operating under flags of EU countries, Seychelles and other flags)
PS-OTHER (green): Industrial purse seiners from other fleets (includes Japan, Mauritius and purse seiners of Soviet origin)
(excludes effort data for purse seiners of Iran and Thailand)

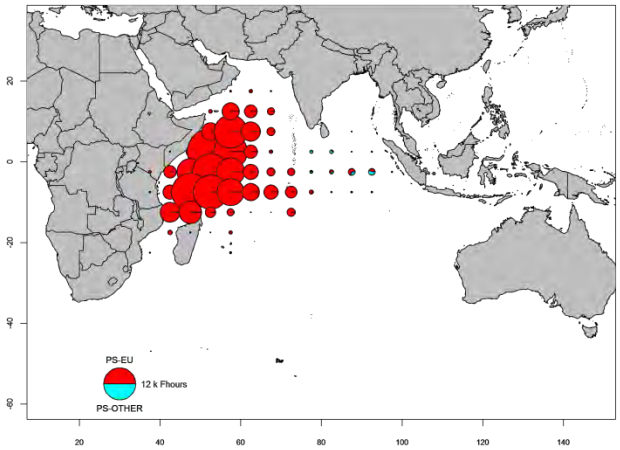
Effort 2000-2004



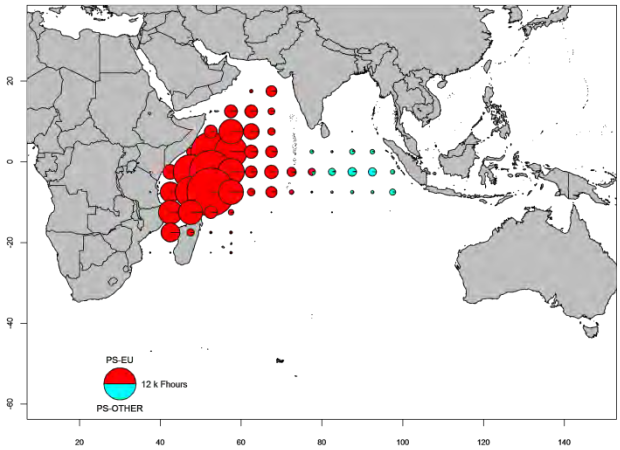
Effort 2005-2005



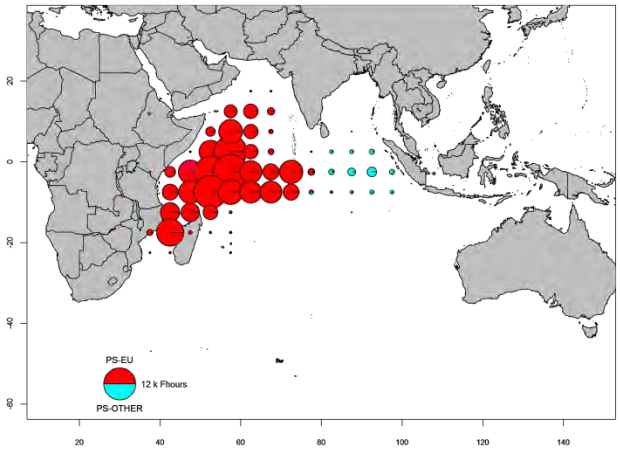
Effort 2006-2006



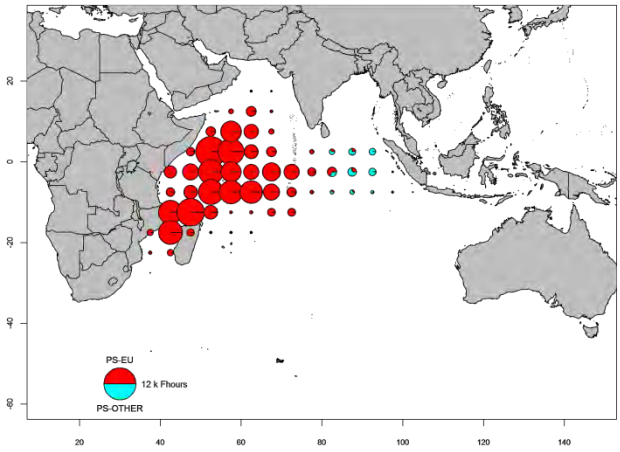
Effort 2007-2007



Effort 2008-2008



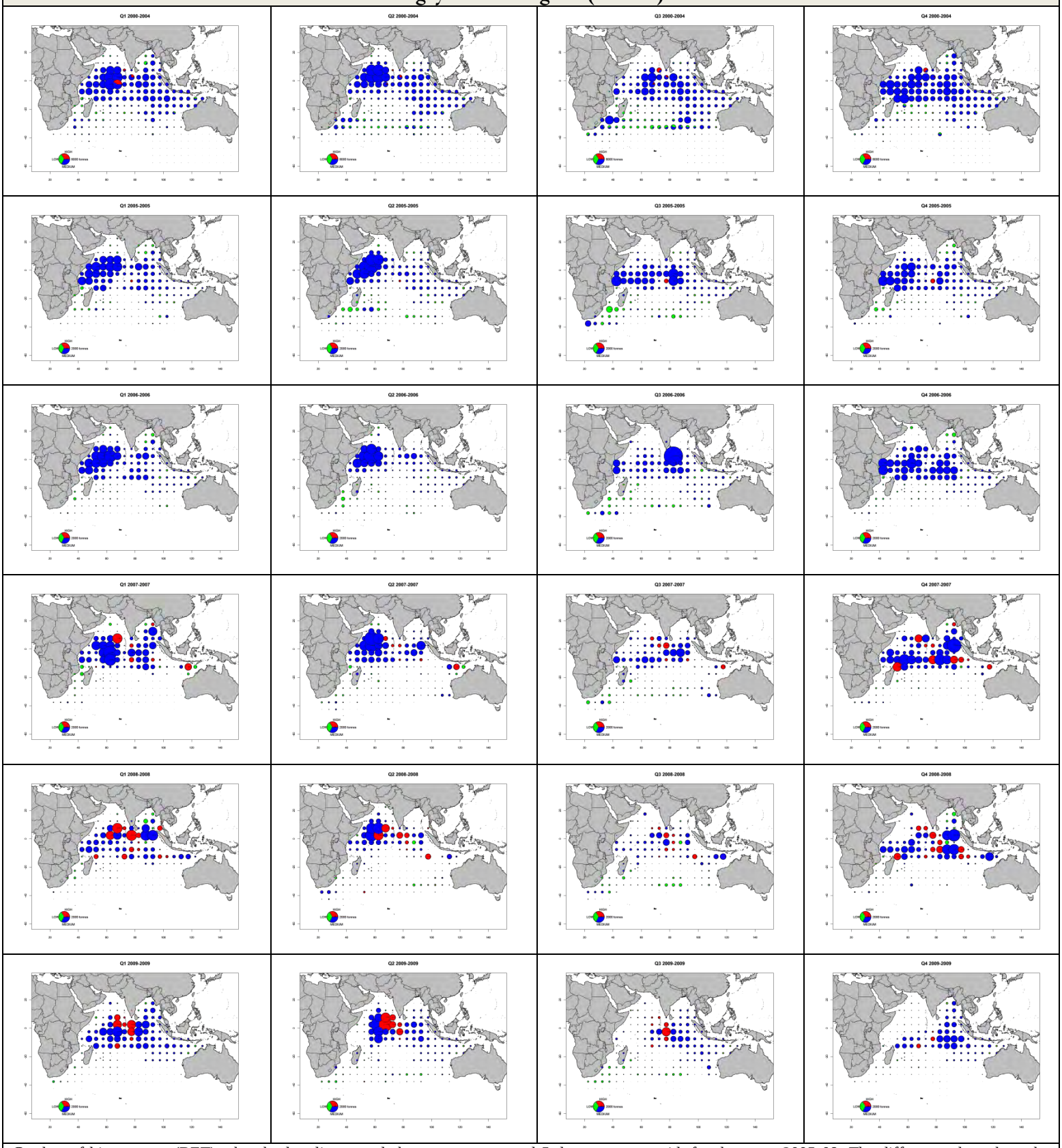
Effort 2009-2009



2. MAIN FISHING AREAS

a) *Bigeye*

Bigeye tuna: Longline (2000-09)



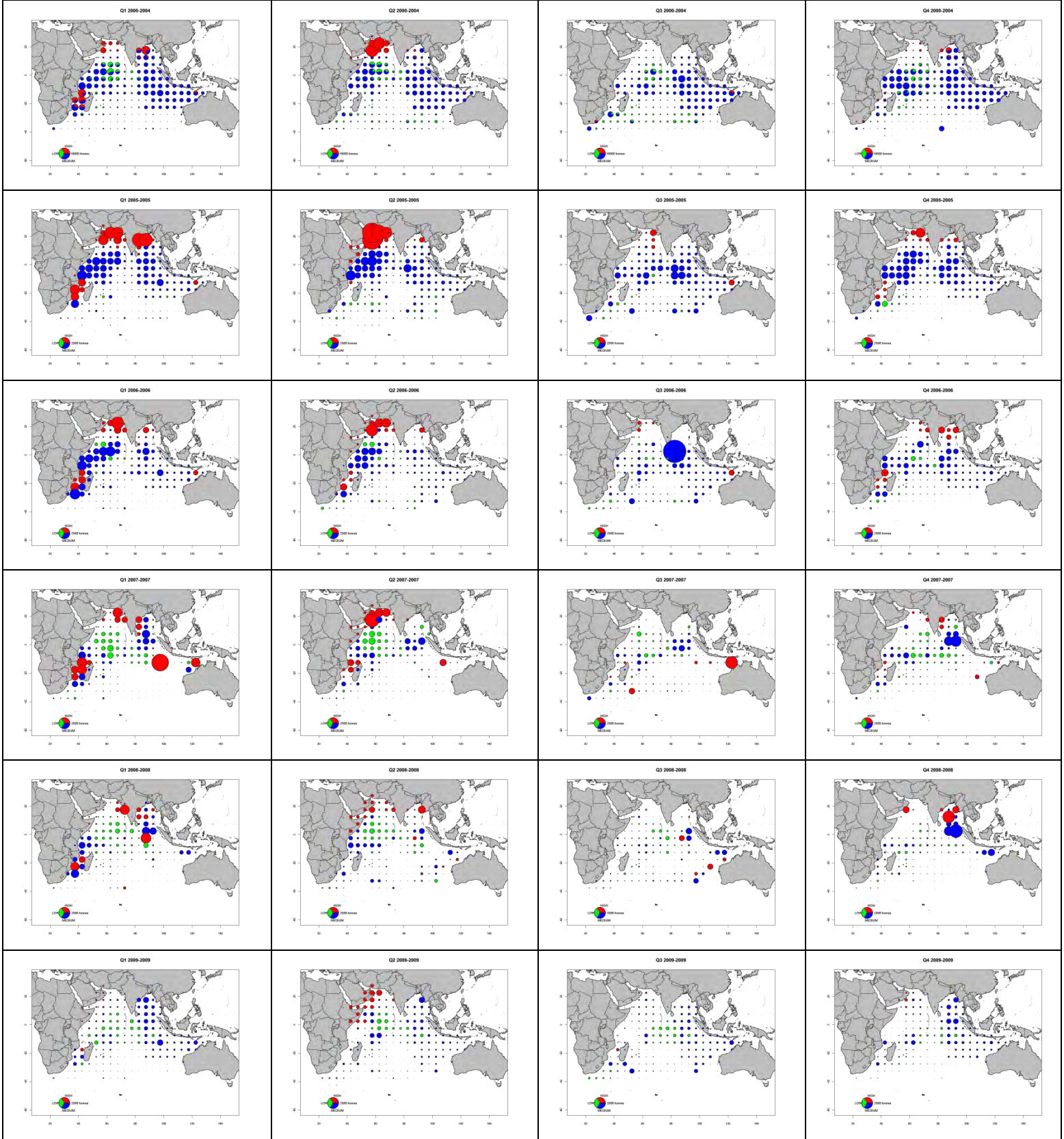
Catches of bigeye tuna (BET) taken by longline vessels by year, quarter and 5 degree square grid, for the years 2005-09. The different colors show the proportion that the catches of bigeye tuna on each quarter and 5 degrees square grid made out of the total catches of tropical tunas, albacore and swordfish

over the same area and period:

- **High** (**Red**): Catches of BET represented 75% or more of the total catches of tunas and swordfish in the grid concerned
- **Medium** (**Blue**): Catches of BET represented 25-75% of the total catches of tunas and swordfish in the grid concerned
- **Low** (**Green**): Catches of BET represented less than 25% of the total catches of tunas and swordfish in the grid concerned

b) ***Yellowfin***

Yellowfin tuna: Longline (2000-09)

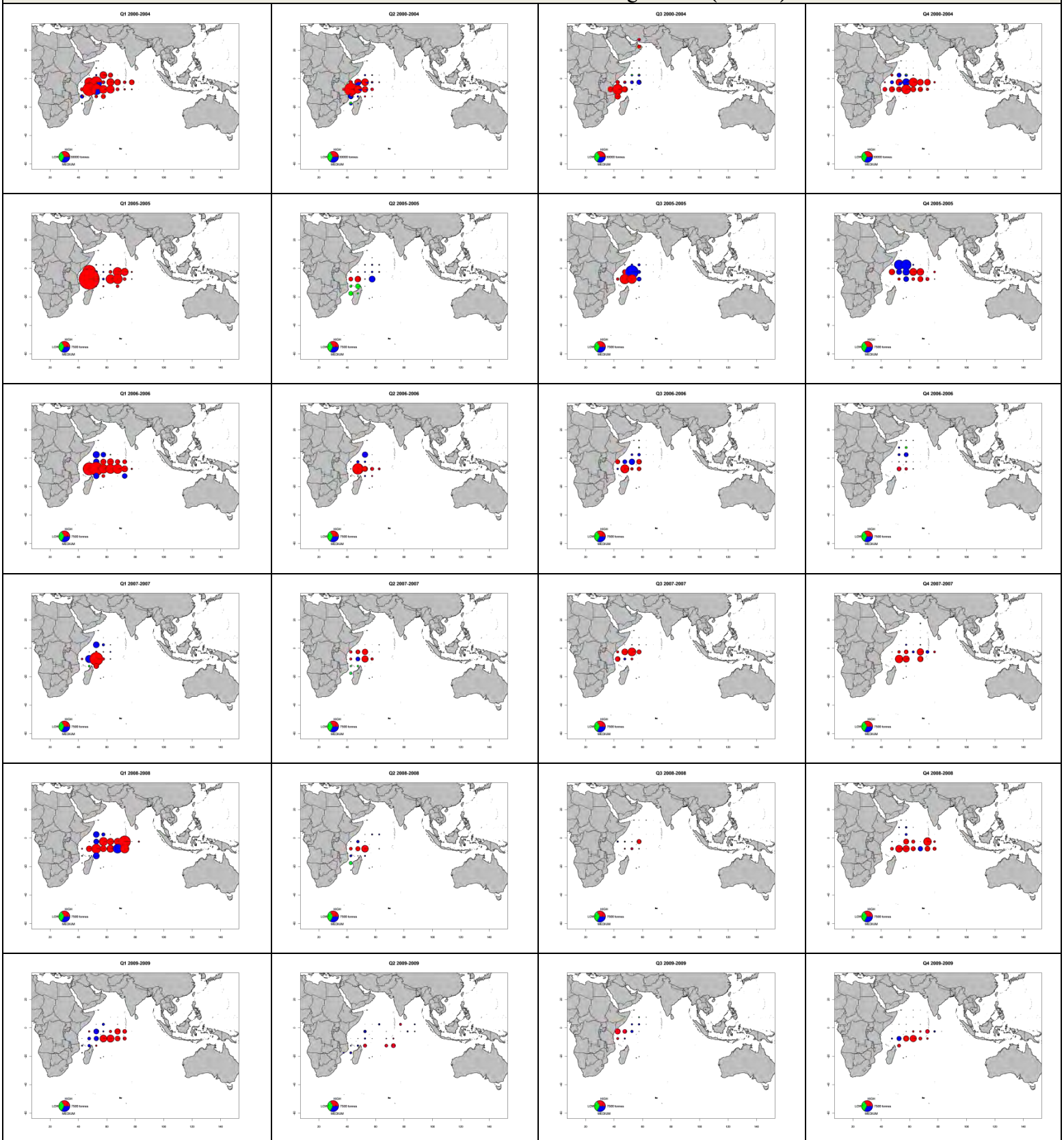


Catches of yellowfin tuna (YFT) taken by longline vessels by year, quarter and 5 degree square grid, for the years 2005-09. The different colors show the proportion that the catches of yellowfin tuna on each quarter and 5 degrees square grid made out of the total catches of tropical tunas, albacore and swordfish over the same area and period:

- **High** (**Red**): Catches of YFT represented 75% or more of the total catches of tunas and swordfish in the grid concerned
- **Medium** (**Blue**): Catches of YFT represented 25-75% of the total catches of tunas and swordfish in the grid concerned

- **Low** (**Green**): Catches of YFT represented less than 25% of the total catches of tunas and swordfish in the grid concerned

Yellowfin tuna: Purse seine free swimming schools (2000-09)



Catches of yellowfin tuna (YFT) taken by purse seine vessels on free swimming schools by year, quarter and 5 degree square grid, for the years 2005-09. The different colors show the proportion that the catches of yellowfin tuna on each quarter and 5 degrees square grid made out of the total catches of tropical tunas, albacore and swordfish over the same area and period:

- **High** (**Red**): Catches of YFT represented 75% or more of the total catches of tunas and swordfish in the grid concerned
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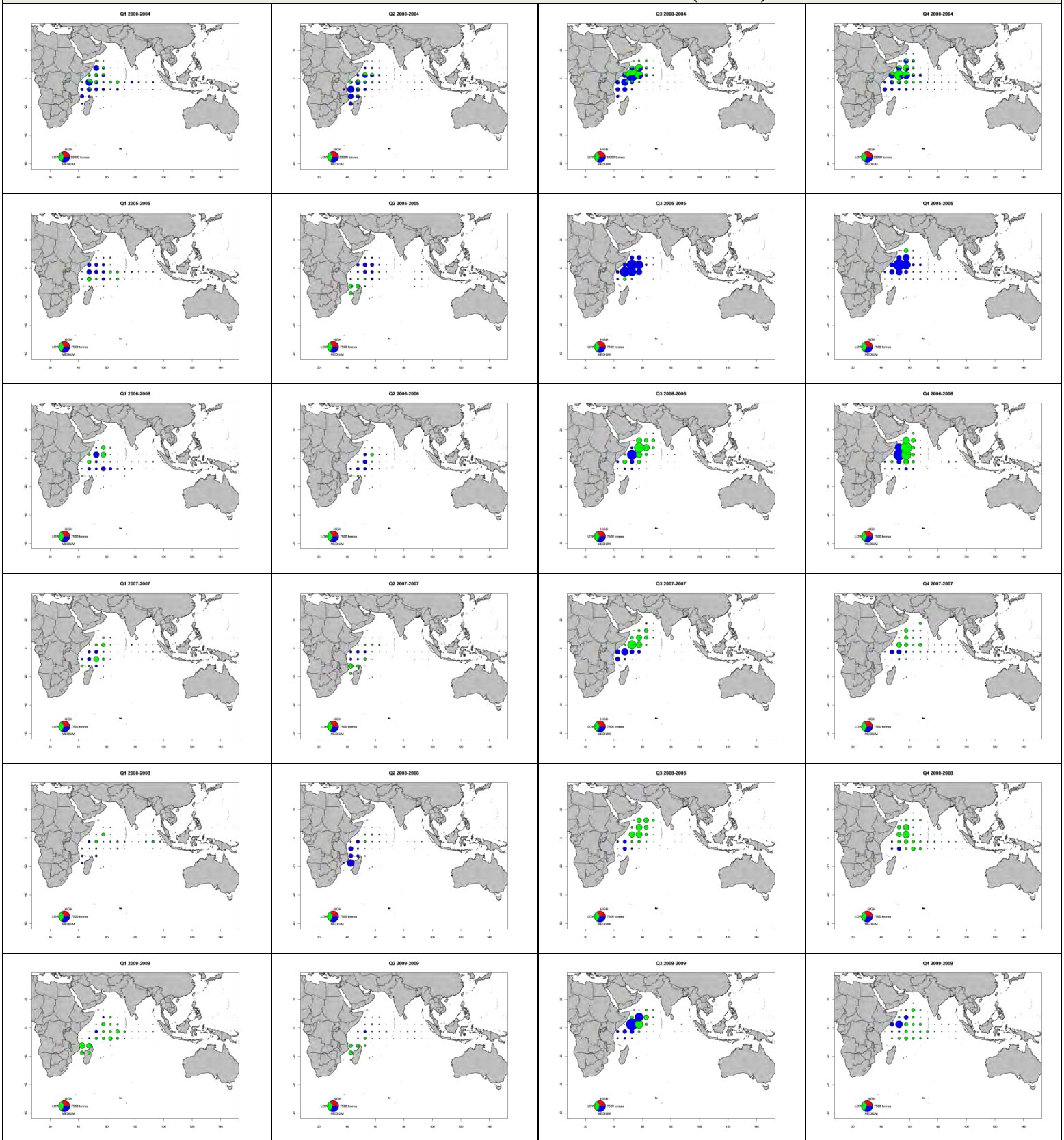
- **Low** (**Green**): Catches of YFT represented less than 25% of the total catches of tunas and swordfish in the grid concerned

Yellowfin tuna: Purse seine associated schools (2000-09)



Catches of yellowfin tuna (YFT) taken by purse seine vessels on associated schools by year, quarter and 5 degree square grid, for the years 2005-09. The different colors show the proportion that the catches of yellowfin tuna on each quarter and 5 degrees square grid made out of the total catches of tropical tunas, albacore and swordfish over the same area and period:

- **High** (**Red**): Catches of YFT represented 75% or more of the total catches of tunas and swordfish in the grid concerned
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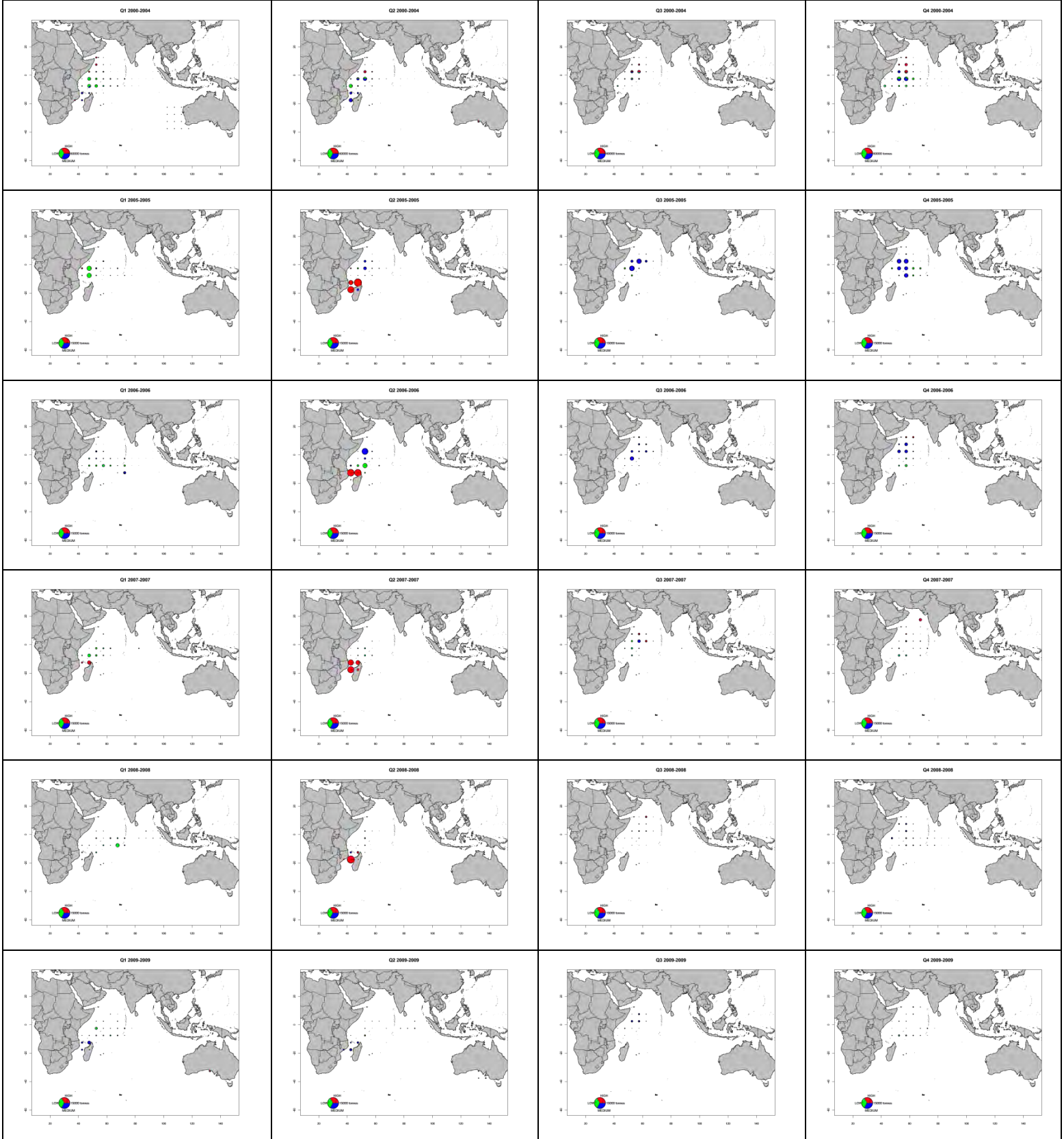
- **Low** (**Green**): Catches of YFT represented less than 25% of the total catches of tunas and swordfish in the grid concerned

c) *Skipjack*

Skipjack tuna: Purse seine free swimming schools (2000-09)

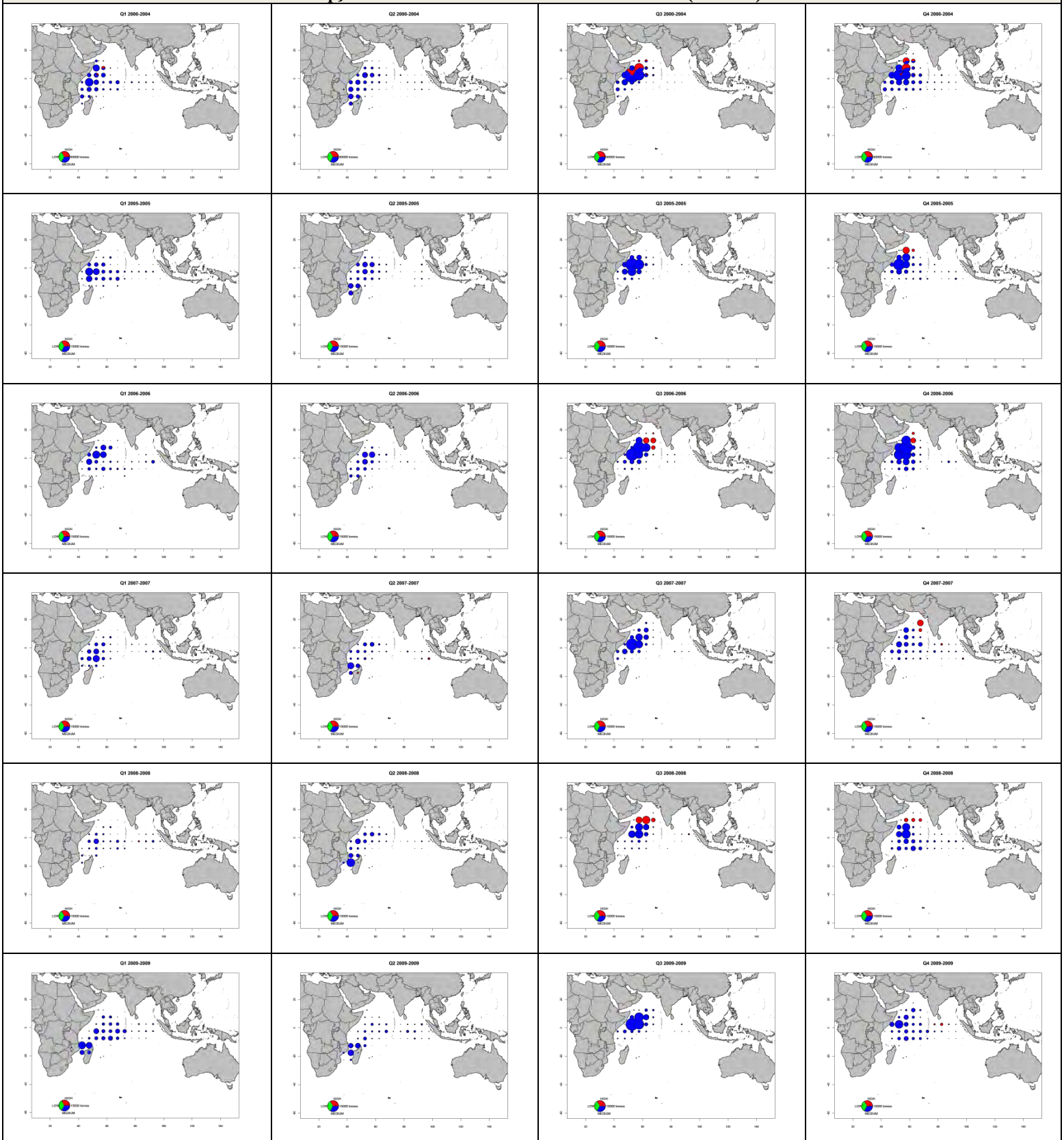


Catches of skipjack tuna (SKJ) taken by purse seine vessels on free swimming schools by year, quarter and 5 degree square grid, for the years 2005-09. The different colors show the proportion that the catches of skipjack tuna on each quarter and 5 degrees square grid made out of the total catches of tropical tunas, albacore and swordfish over the same area and period:

- **High** (**Red**): Catches of SKJ represented 75% or more of the total catches of tunas and swordfish in the grid concerned
- **Medium** (**Blue**): Catches of SKJ represented 25-75% of the total catches of tunas and swordfish in the grid concerned

- **Low** (**Green**): Catches of SKJ represented less than 25% of the total catches of tunas and swordfish in the grid concerned

Skipjack tuna: Purse seine associated schools (2000-09)

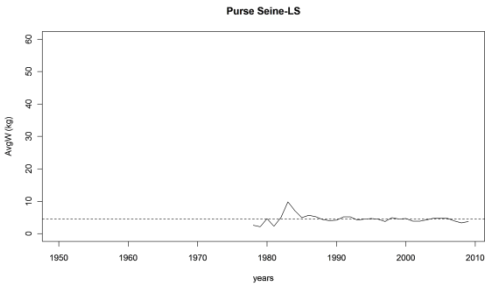


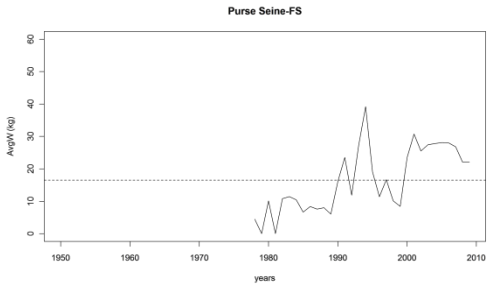
Catches of skipjack tuna (SKJ) taken by purse seine vessels on associated schools by year, quarter and 5 degree square grid, for the years 2005-09. The different colors show the proportion that the catches of skipjack tuna on each quarter and 5 degrees square grid made out of the total catches of tropical tunas, albacore and swordfish over the same area and period:

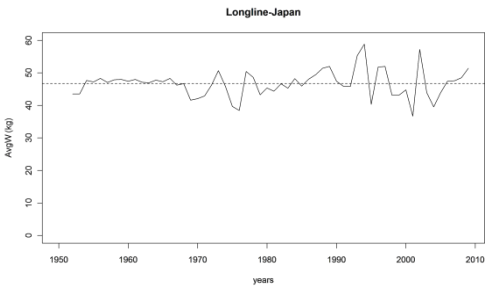
- **High** (**Red**): Catches of SKJ represented 75% or more of the total catches of tunas and swordfish in the grid concerned
- **Medium** (**Blue**): Catches of SKJ represented 25-75% of the total catches of tunas and swordfish in the grid concerned
- **Low** (**Green**): Catches of SKJ represented less than 25% of the total catches of tunas and swordfish in the grid concerned

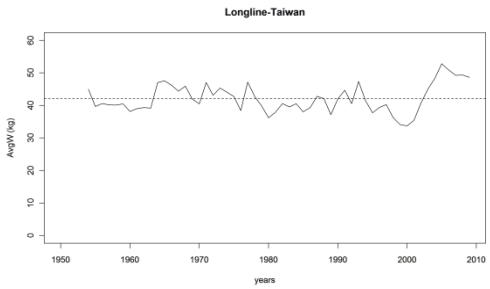
3. AVERAGE WEIGHT

a) Bigeye

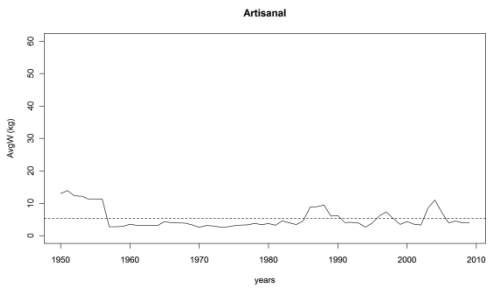




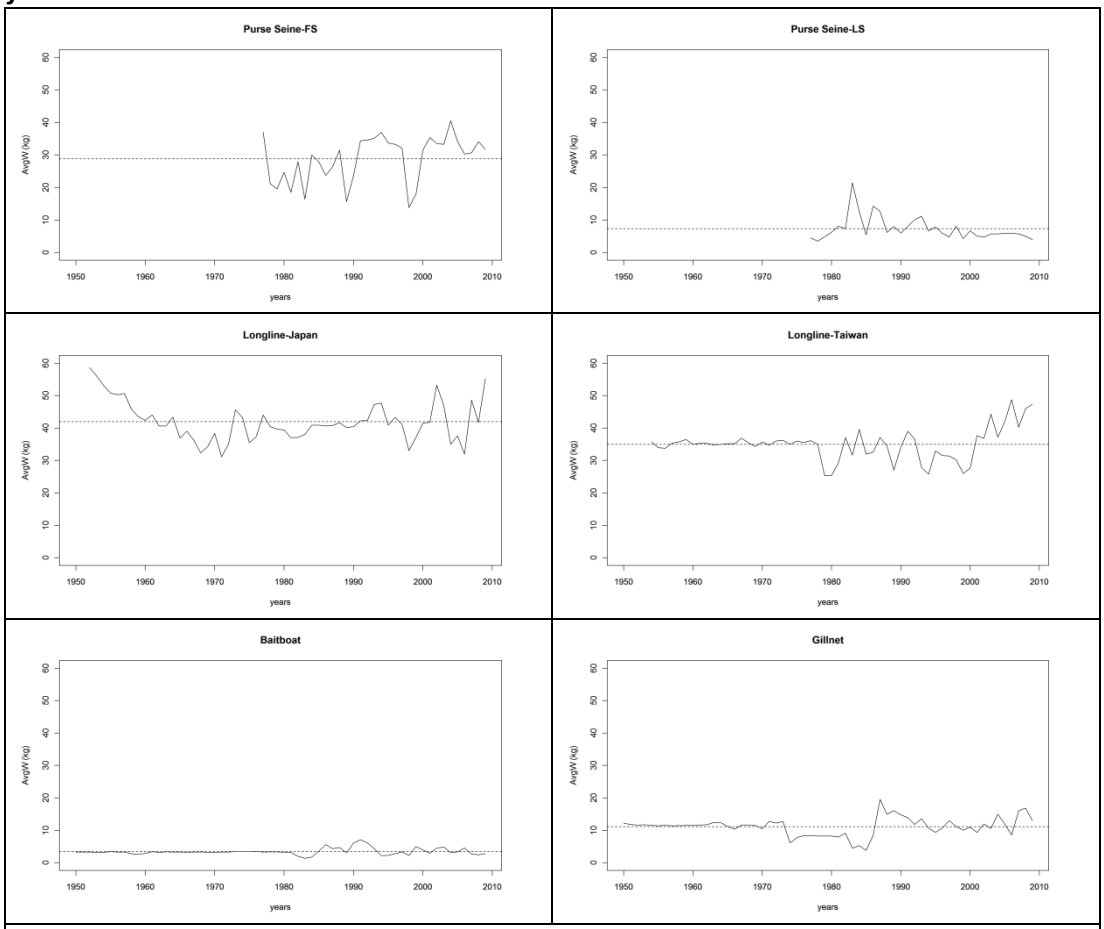




Average weight of bigeye tuna taken by purse-seine on free and associated school, by longlines from Japan and Taiwan, and by artisanal catches

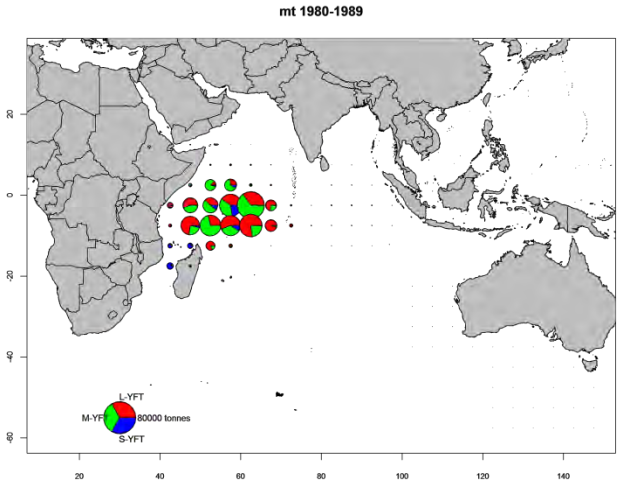


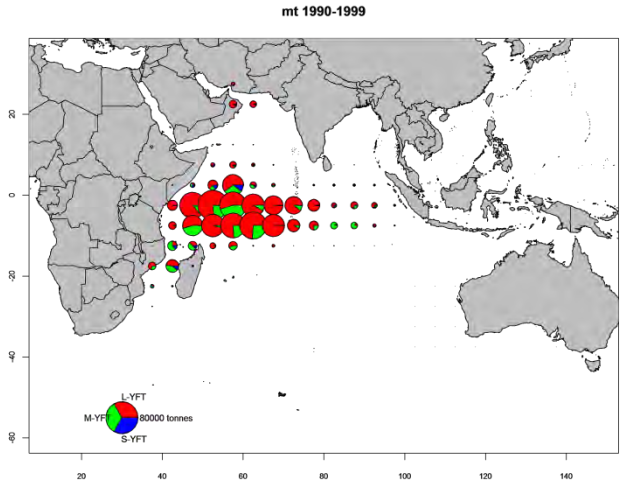
b) Yellowfin

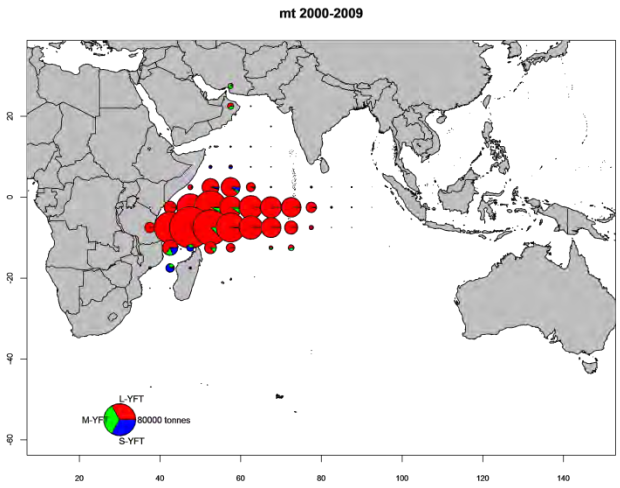


Average weight of yellowfin tuna taken by purse-seine on free and associated school, by longlines from Japan and Taiwan, by baitboat and by gillnet

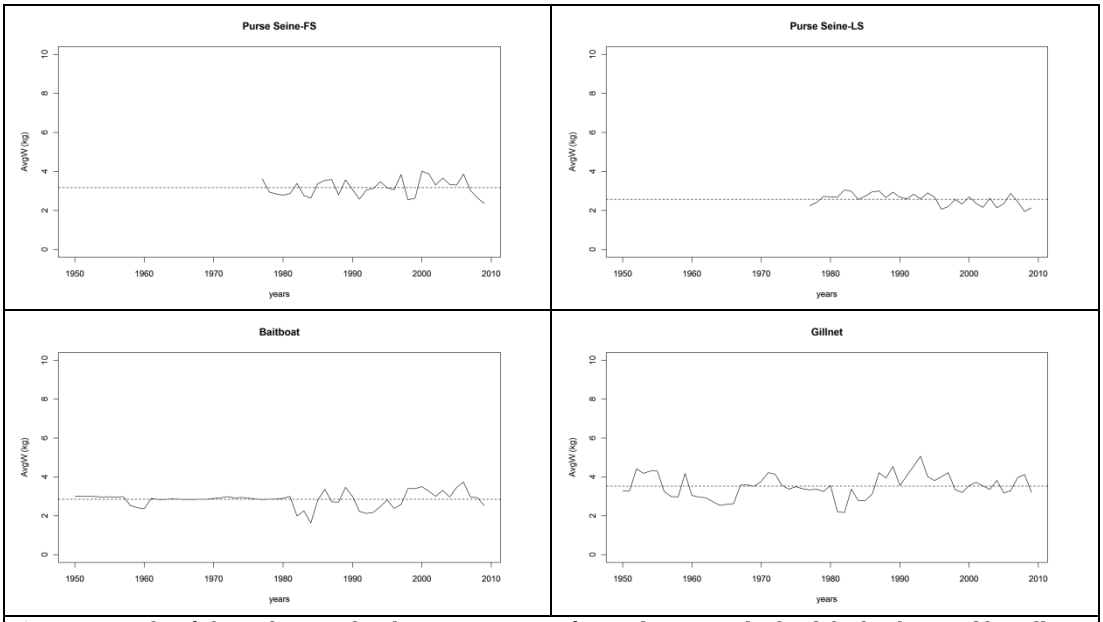
Catches of yellowfin tuna for the purse seine fishery on free-swimming schools for three different periods and types of weight:
S-YFT (blue): Catches from strata in which the average weight estimated from the CAS is 10kg or lower
M-YFT (green): Catches from strata in which the average weight estimated from the CAS is between 10kg and 30kg
L-YFT (green): Catches from strata in which the average weight estimated from the CAS is 30kg or greater







c) Skipjack



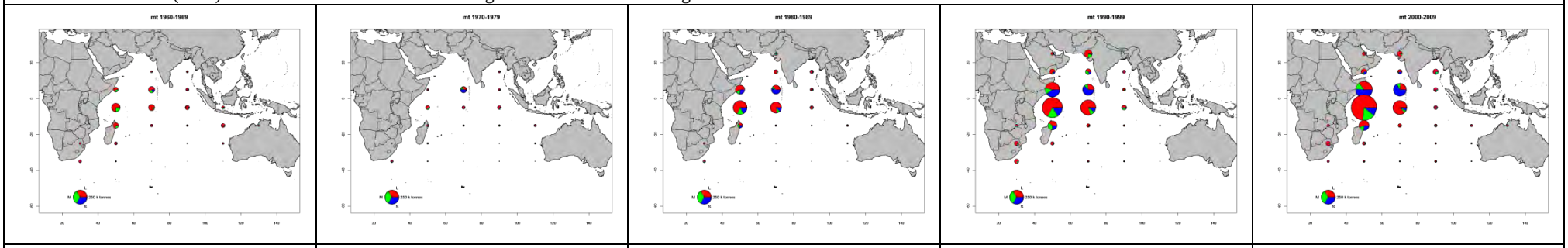
Average weight of skipjack tuna taken by purse-seine on free and associated school, by baitboat and by gillnet

4. CATCH PER SIZE CLASS

a) Yellowfin

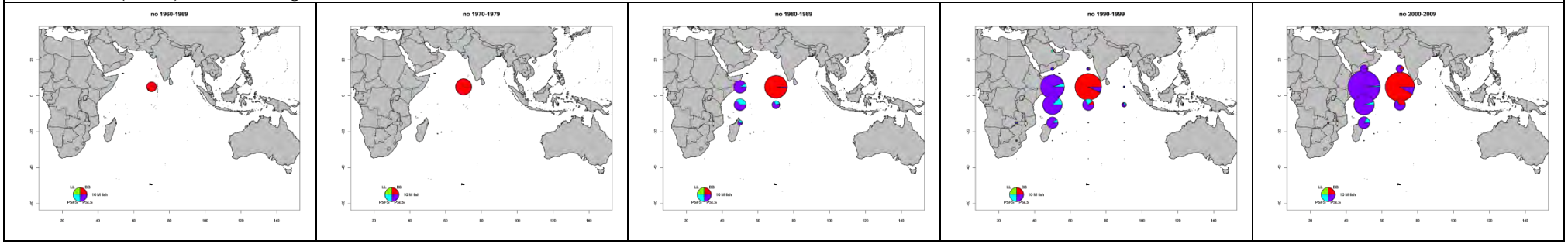
Total catches of YELLOWFIN TUNA (YFT) in weight (top) and number (bottom) derived from the catch-at-size of surface (purse seine and pole-and-line) and longline fisheries for 1960-2009. Catches are presented by decade, 10 latitude by 20 longitude area and size class, including:

- **Large size** (**Red**): Catches of YFT for which the weight estimated is 30kg or greater
- **Medium size** (**Green**): Catches of YFT for which the weight estimated is between 15kg and 30kg
- **Small size** (**Blue**): Catches of YFT for which the weight estimated is under 30kg



Total catches of yellowfin tuna (YFT) of very small size (under 5kg), in number, derived from the catch-at-size of surface (purse seine and pole-and-line) and longline fisheries for 1960-2009. Catches are presented by decade, 10 latitude by 20 longitude area and fishery, including:

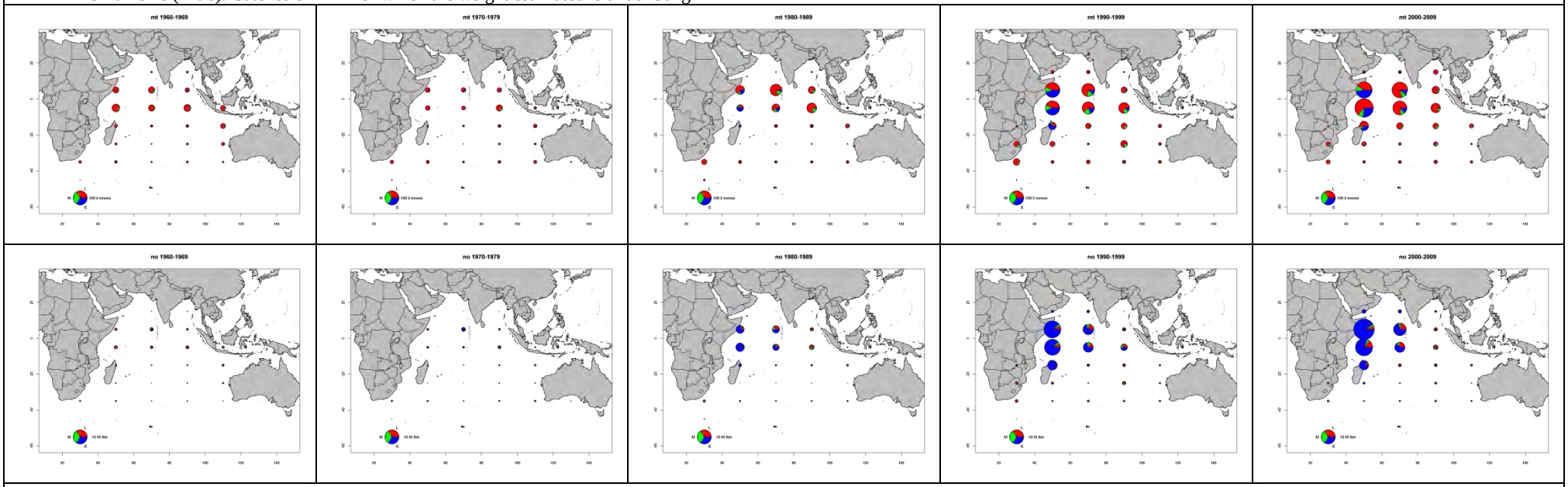
- **BB** (**Red**): Pole-and-line fisheries (Maldives and India)
- **PSLS** (**Purple**): Industrial purse seiners on associated schools (e.g. FAD)
- **PSFS** (**Light blue**): Industrial purse seiners on free-swimming schools
- **LL** (**Green**): Industrial longline fisheries



b) Bigeye

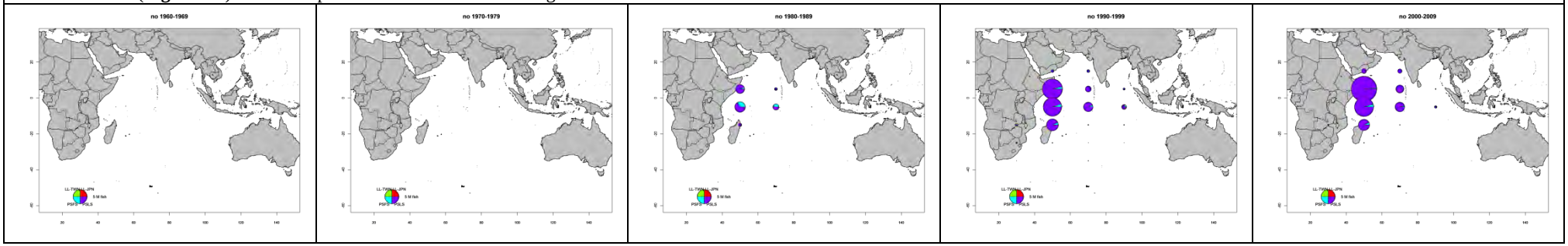
Total catches of BIGEYE TUNA (BET) in weight (top) and number (bottom) derived from the catch-at-size of surface (purse seine and pole-and-line) and longline fisheries for 1960-2009. Catches are presented by decade, 10 latitude by 20 longitude area and size class, including:

- **Large size** (**Red**): Catches of BET for which the weight estimated is 30kg or greater
- **Medium size** (**Green**): Catches of BET for which the weight estimated is between 15kg and 30kg
- **Small size** (**Blue**): Catches of BET for which the weight estimated is under 30kg



Total catches of bigeye tuna (BET) of very small size (under 5kg), in number, derived from the catch-at-size of surface (purse seine and pole-and-line) and longline fisheries for 1960-2009. Catches are presented by decade, 10 latitude by 20 longitude area and fishery, including:

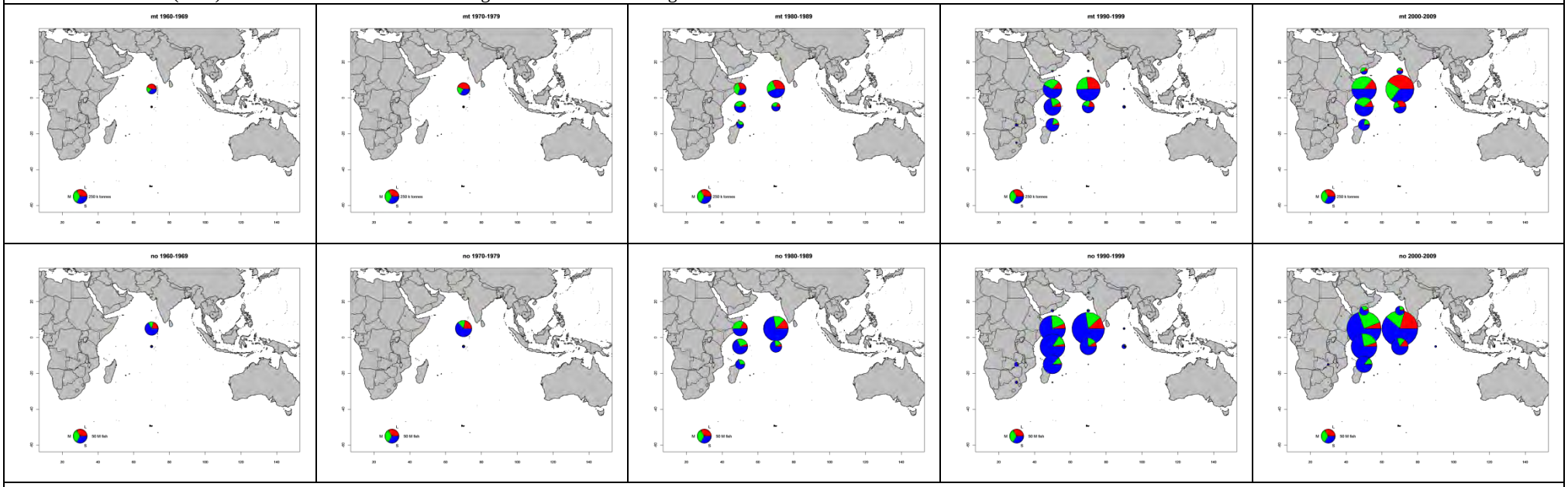
- **LL-TWN** (**Green**): Industrial longline fisheries
- **LL-JPN** (**Red**): Pole-and-line fisheries (Maldives and India)
- **PSLS** (**Purple**): Industrial purse seiners on associated schools (e.g. FAD)
- **PSFS** (**Light blue**): Industrial purse seiners on free-swimming schools



c) Skipjack

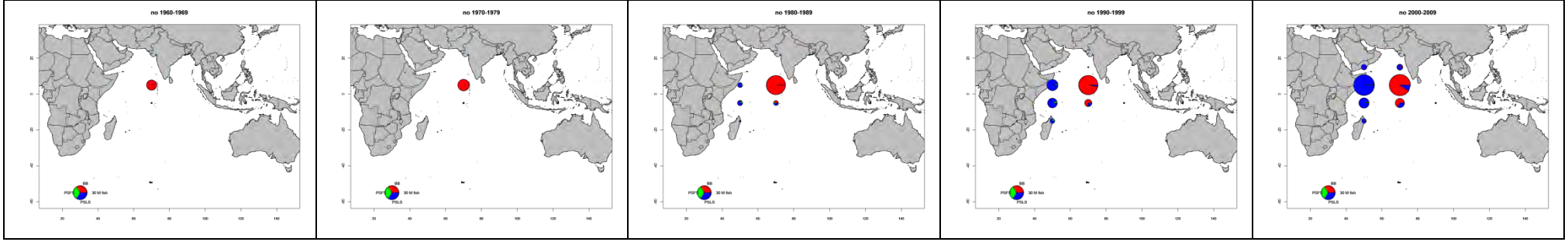
Total catches of SKIPJACK TUNA (SKJ) in weight (top) and number (bottom) derived from the catch-at-size of surface (purse seine and pole-and-line) and longline fisheries for 1960-2009. Catches are presented by decade, 10 latitude by 20 longitude area and size class, including:

- **Large size** (**Red**): Catches of SKJ for which the weight estimated is 5kg or greater
- **Medium size** (**Green**): Catches of SKJ for which the weight estimated is between 3kg and 5kg
- **Small size** (**Blue**): Catches of SKJ for which the weight estimated is under 3kg



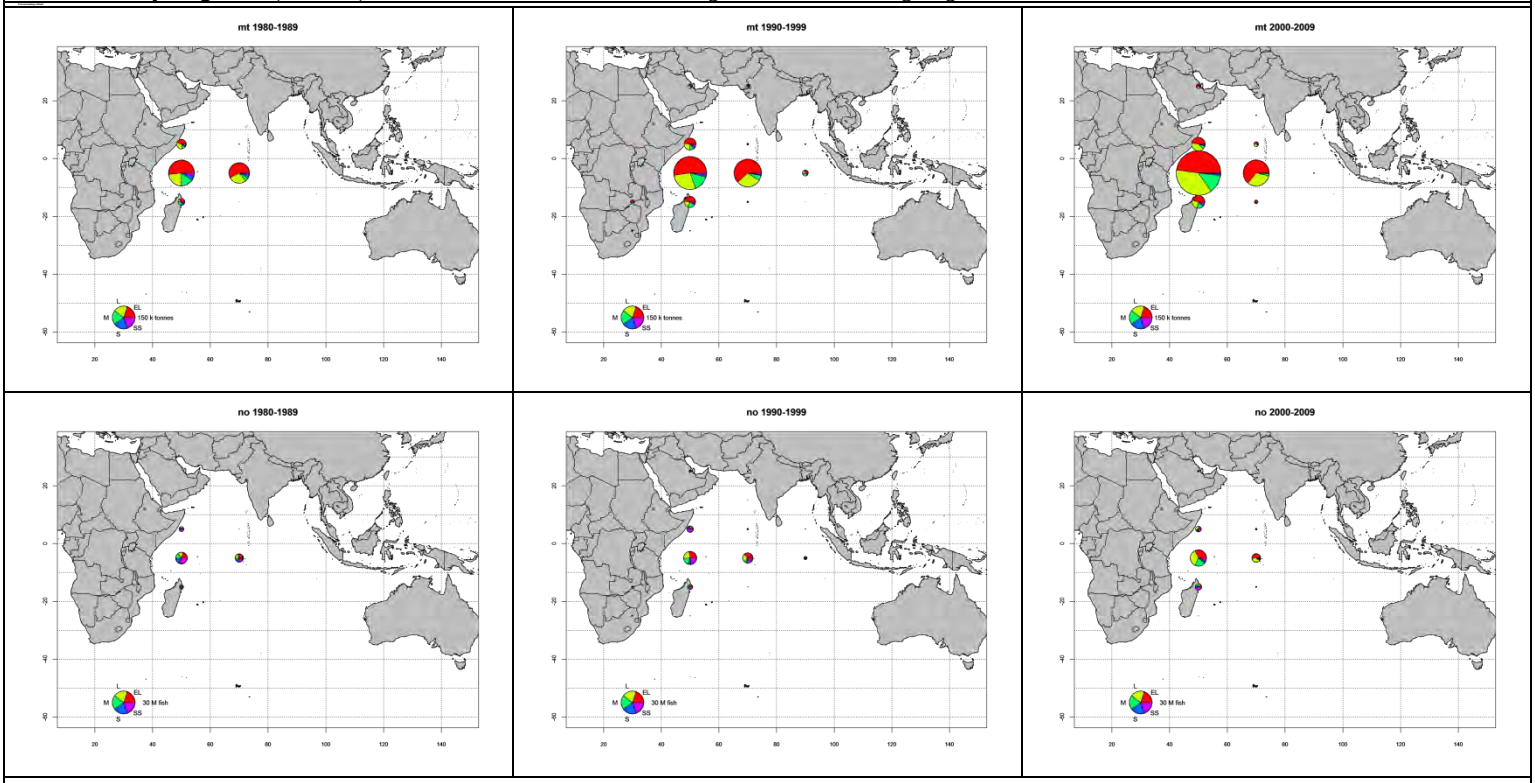
Total catches of skipjack tuna (SKJ) of very small size (under 1.5kg), in number, derived from the catch-at-size of surface (purse seine and pole-and-line) and longline fisheries for 1960-2009. Catches are presented by decade, 10 latitude by 20 longitude area and fishery, including:

- **BB** (**Red**): Pole-and-line fisheries (Maldives and India)
- **PSLS** (**Blue**): Industrial purse seiners on associated schools (e.g. FAD)
- **PSFS** (**Green**): Industrial purse seiners on free-swimming schools

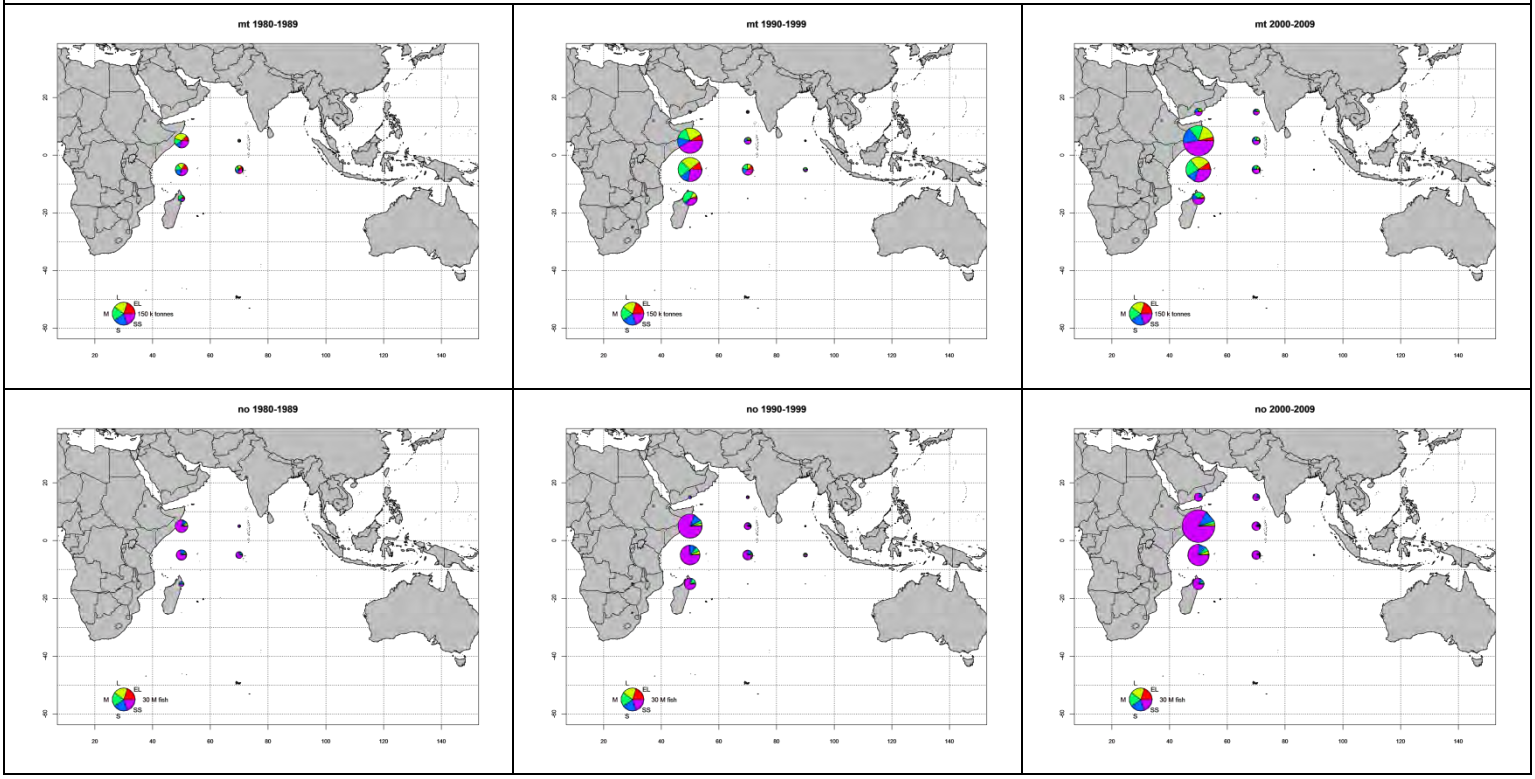


Total catches of YELLOWFIN TUNA (YFT) in weight (top) and number (bottom) derived from the catch-at-size of industrial purse seiners on free-swimming schools (top two rows; PSFS) and associated schools (bottom two rows; PSLS) for 1980-2009. Catches are presented by decade, 10 latitude by 20 longitude area and size class, including:

- **Very small size** (**SS; purple**): Catches of YFT for which the weight estimated is under 5kg
- **Small size** (**S**; **blue**): Catches of YFT for which the weight estimated is between5 and 15kg
- **Medium size** (**M**; **green**): Catches of YFT for which the weight estimated is between 15kg and 30kg
- **Large size** (**L**; **yellow**): Catches of YFT for which the weight estimated is between 30kg and 45kg
- **Very large size** (**EL**; **red**): Catches of YFT for which the weight estimated is 45kg or greater



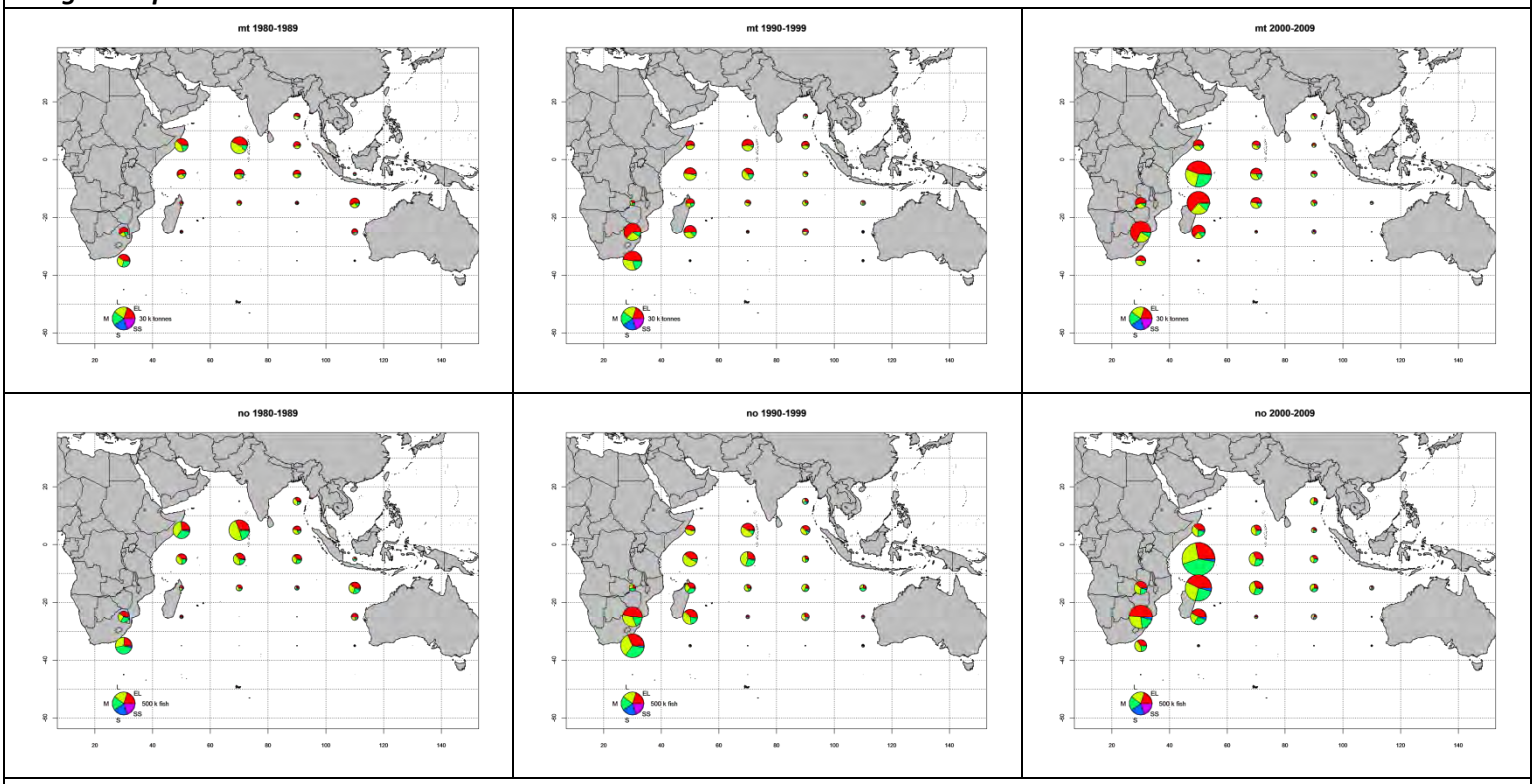
Associated schools



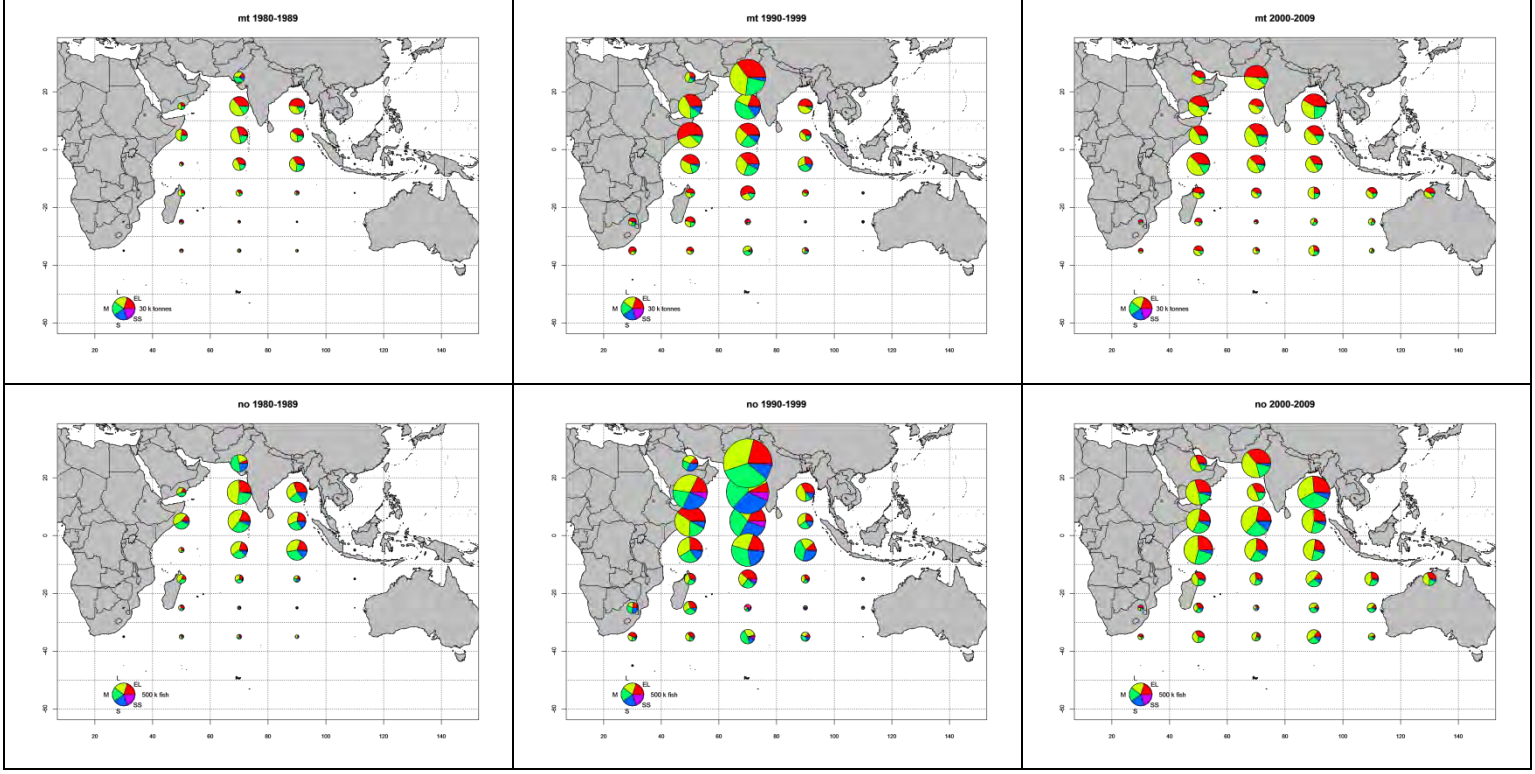
Total catches of YELLOWFIN TUNA (YFT) in weight (top) and number (bottom) derived from the catch-at-size of industrial longliners of Japan (top two rows) and Taiwan,China (bottom two rows) for 1980-2009. Catches are presented by decade, 10 latitude by 20 longitude area and size class, including:

- **Very small size** (**SS; purple**): Catches of YFT for which the weight estimated is under 5kg
- **Small size** (**S**; **blue**): Catches of YFT for which the weight estimated is between5 and 15kg
- **Medium size** (**M**; **green**): Catches of YFT for which the weight estimated is between 15kg and 30kg
- **Large size** (**L**; **yellow**): Catches of YFT for which the weight estimated is between 30kg and 45kg
- **Very large size** (**EL**; **red**): Catches of YFT for which the weight estimated is 45kg or greater

Longline Japan



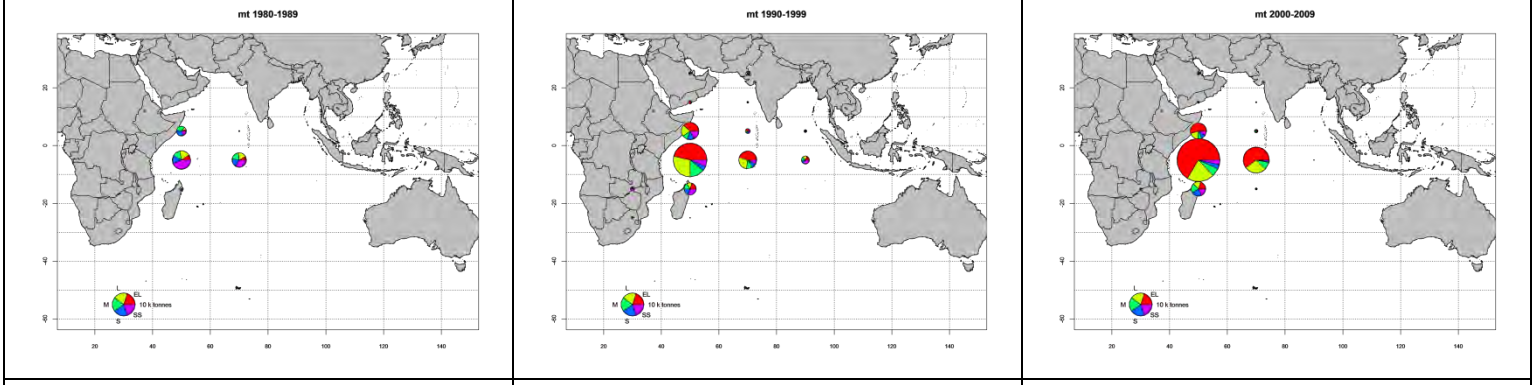
Longline Taiwan,China



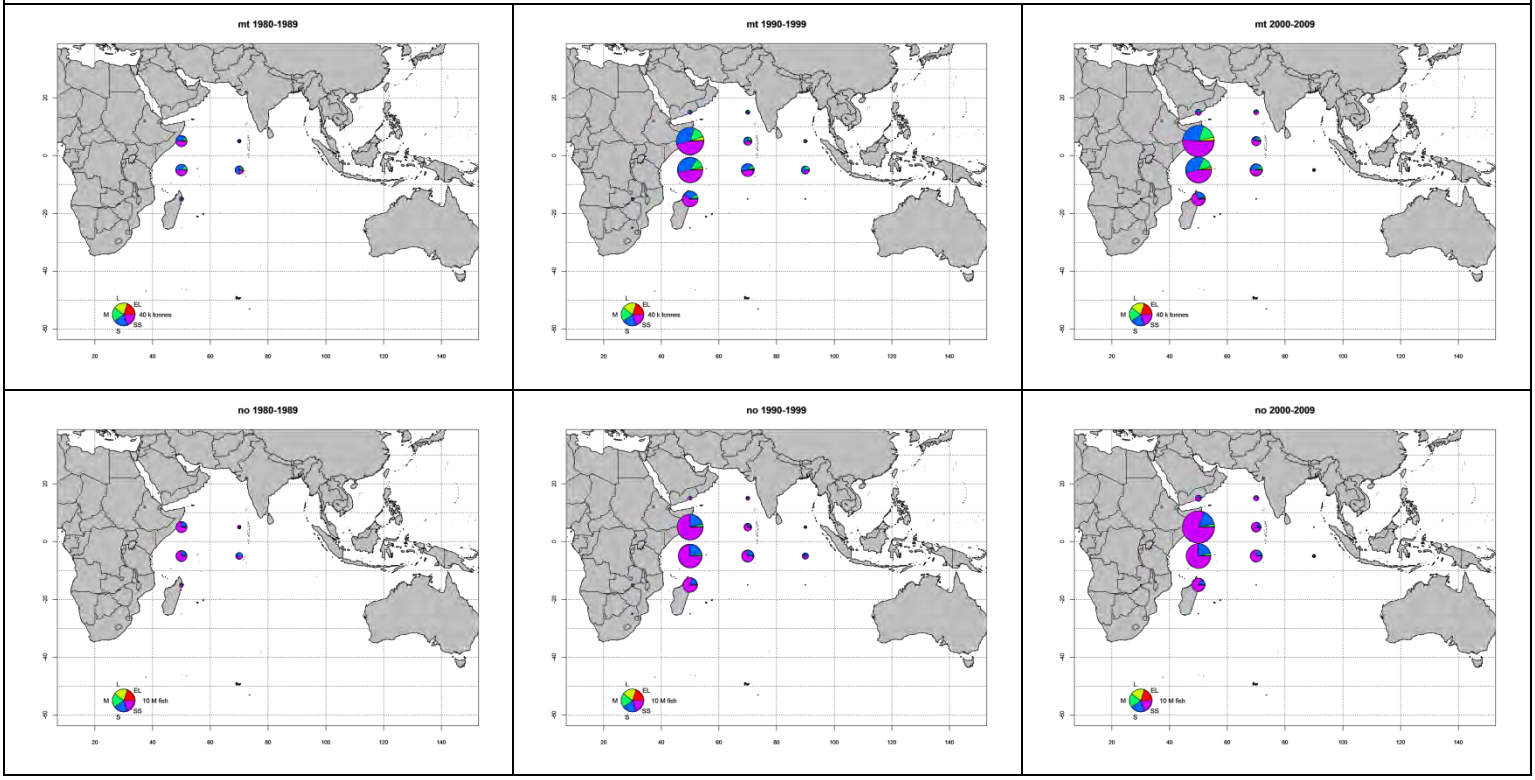
Total catches of BIGEYE TUNA (BET) in weight (top) and number (bottom) derived from the catch-at-size of industrial purse seiners on free-swimming schools (top two rows; PSFS) and associated schools (bottom two rows; PSLS) for 1980-2009. Catches are presented by decade, 10 latitude by 20 longitude area and size class, including:

- **Very small size** (**SS; purple**): Catches of BET for which the weight estimated is under 5kg
- **Small size** (**S**; **blue**): Catches of BET for which the weight estimated is between5 and 15kg
- **Medium size** (**M**; **green**): Catches of BET for which the weight estimated is between 15kg and 30kg
- **Large size** (**L**; **yellow**): Catches of BET for which the weight estimated is between 30kg and 45kg
- **Very large size** (**EL**; **red**): Catches of BET for which the weight estimated is 45kg or greater

Free-swimming schools



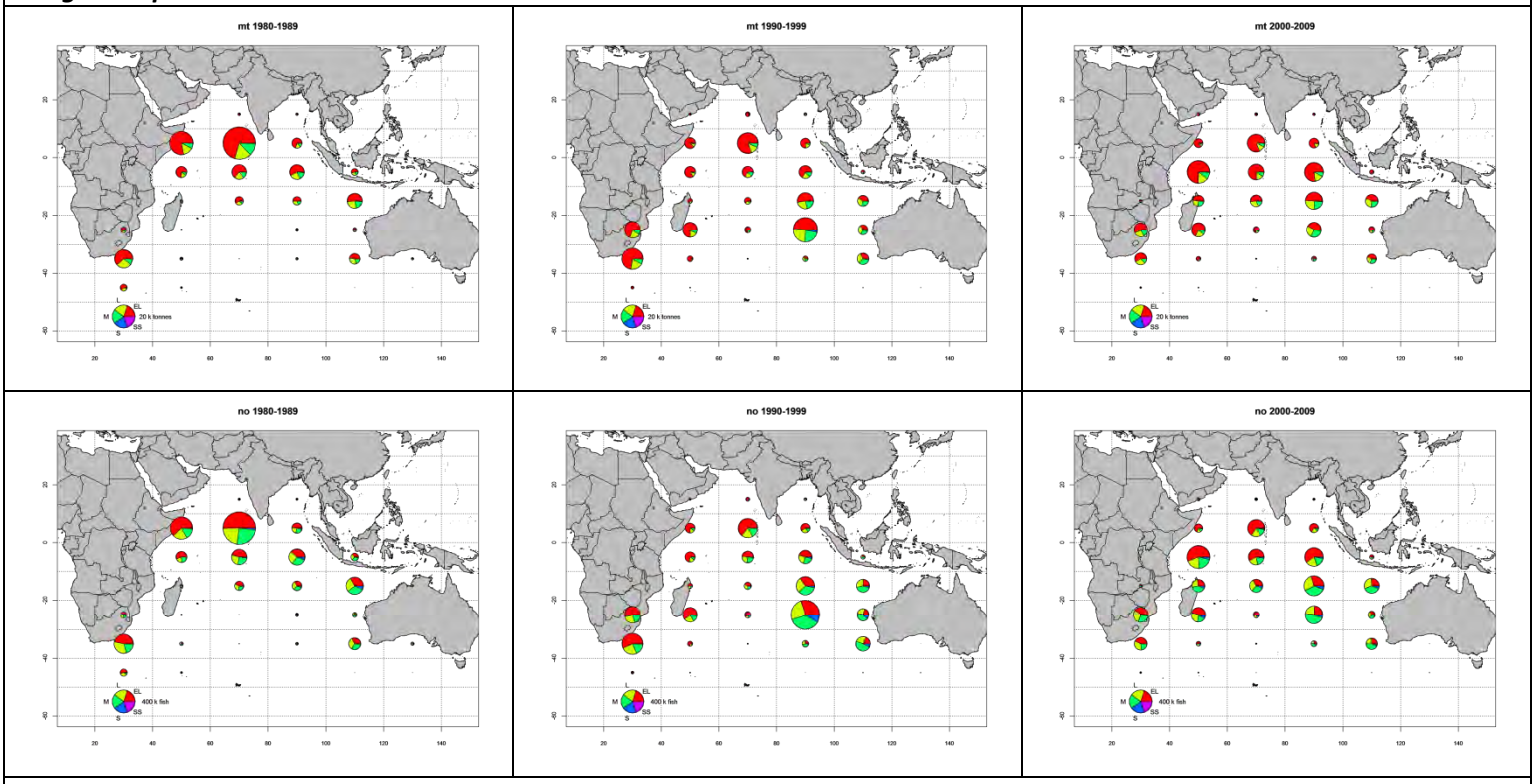
Associated schools



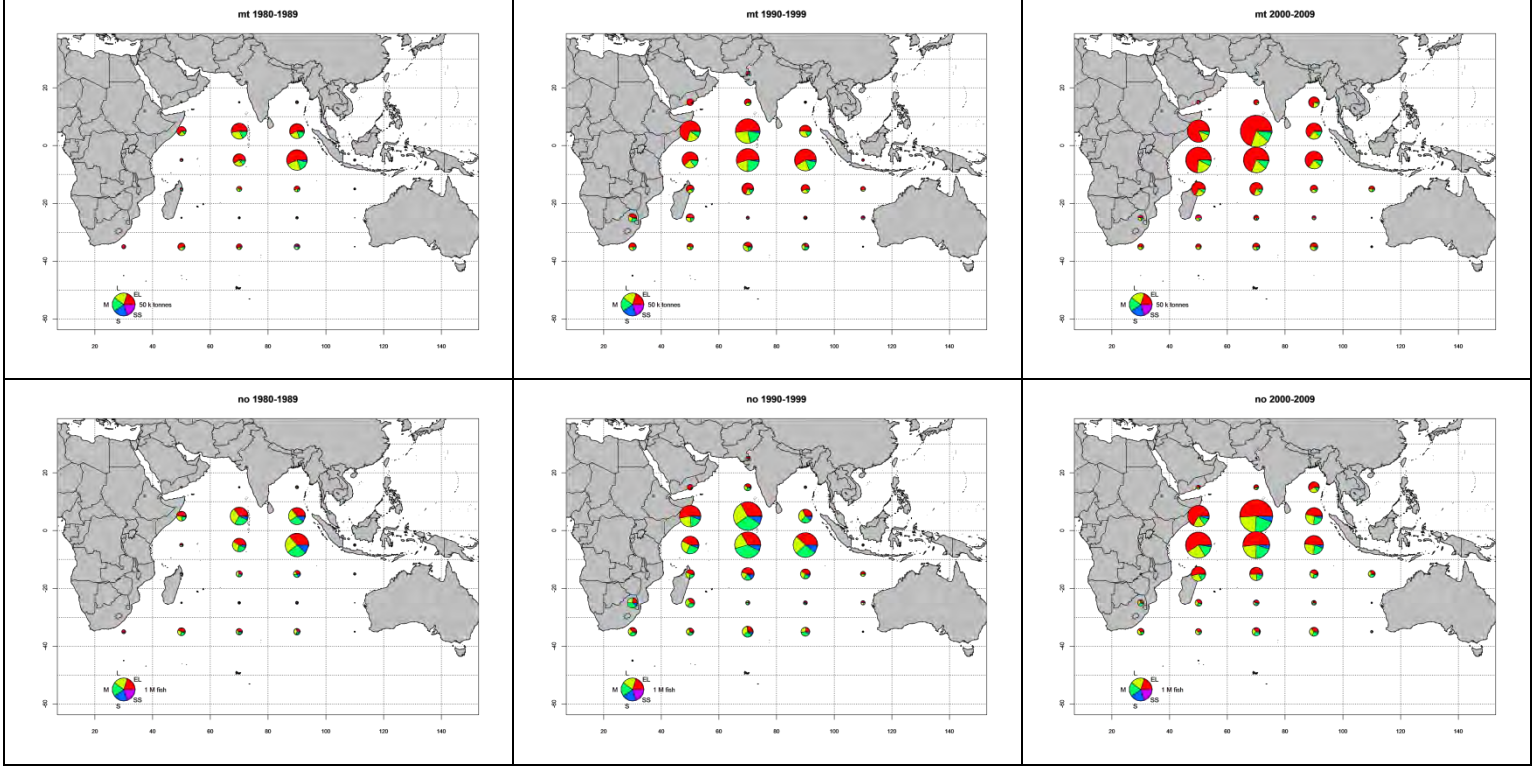
Total catches of BIGEYE TUNA (BET) in weight (top) and number (bottom) derived from the catch-at-size of industrial longliners of Japan (top two rows) and Taiwan,China (bottom two rows) for 1980-2009. Catches are presented by decade, 10 latitude by 20 longitude area and size class, including:

- **Very small size** (**SS; purple**): Catches of BET for which the weight estimated is under 5kg
- **Small size** (**S**; **blue**): Catches of BET for which the weight estimated is between5 and 15kg
- **Medium size** (**M**; **green**): Catches of BET for which the weight estimated is between 15kg and 30kg
- **Large size** (**L**; **yellow**): Catches of BET for which the weight estimated is between 30kg and 45kg
- **Very large size** (**EL**; **red**): Catches of BET for which the weight estimated is 45kg or greater

Longline Japan



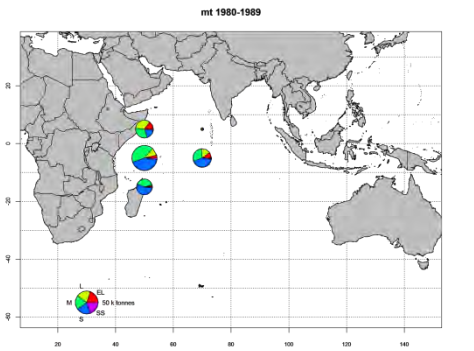
Longline Taiwan,China

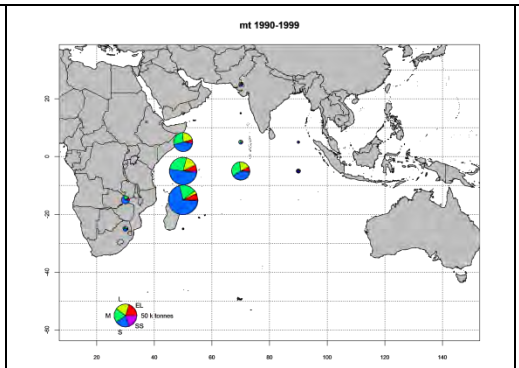


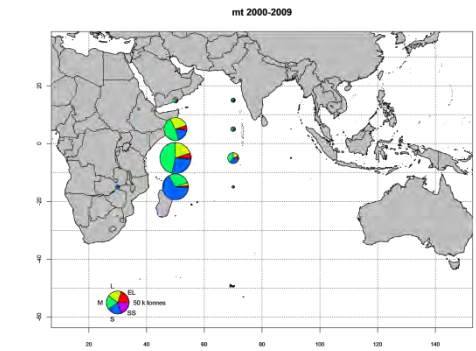
Total catches of SKIPJACK TUNA (BET) in weight (top) and number (bottom) derived from the catch-at-size of industrial purse seiners on free-swimming schools (top two rows; PSFS) and associated schools (bottom two rows; PSLS) for 1980-2009. Catches are presented by decade, 10 latitude by 20 longitude area and size class, including:

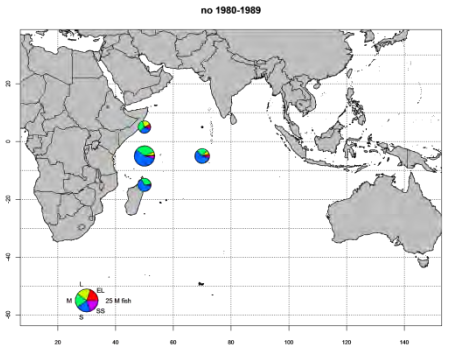
- **Very small size** (**SS; purple**): Catches of SKJ for which the weight estimated is under 1.5kg
- **Small size** (**S**; **blue**): Catches of SKJ for which the weight estimated is between 1.5 and 3kg
- **Medium size** (**M**; **green**): Catches of SKJ for which the weight estimated is between 3kg and 5kg
- **Large size** (**L**; **yellow**): Catches of SKJ for which the weight estimated is between 5kg and 7kg
- **Very large size** (**EL**; **red**): Catches of SKJ for which the weight estimated is 7kg or greater

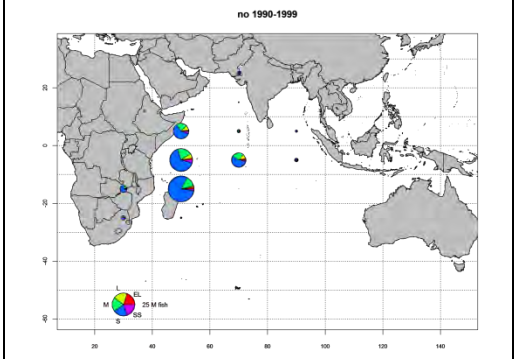
Free-swimming schools

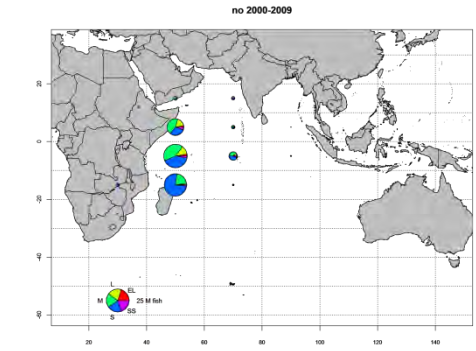




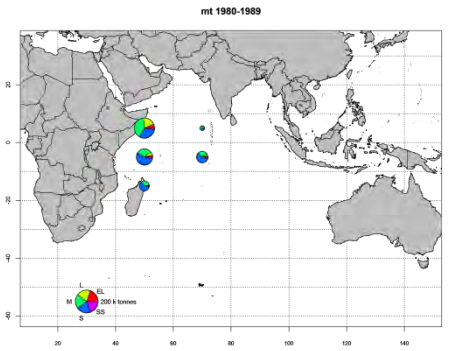


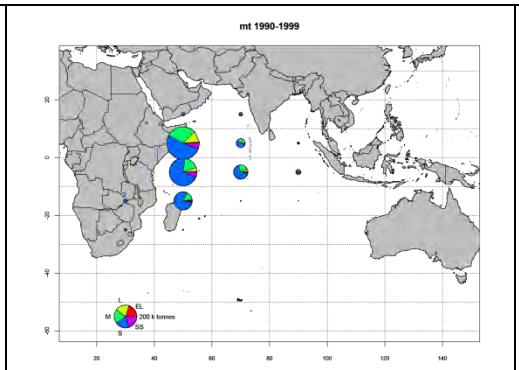


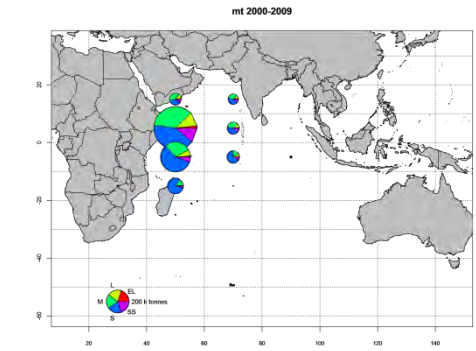


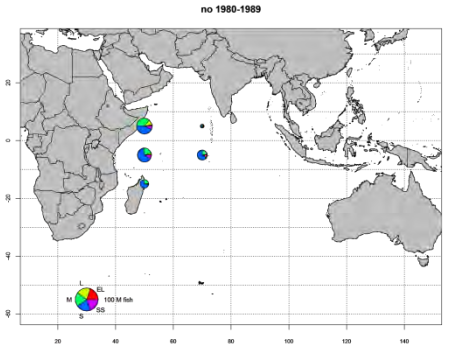


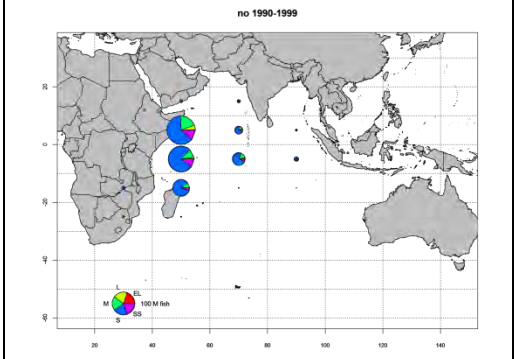
Associated schools

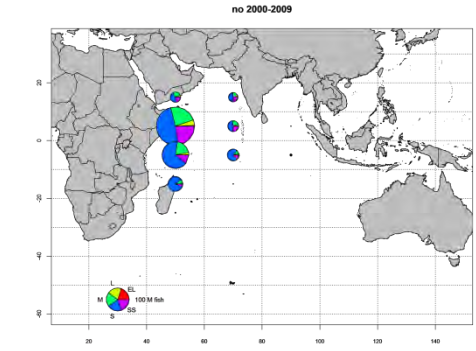






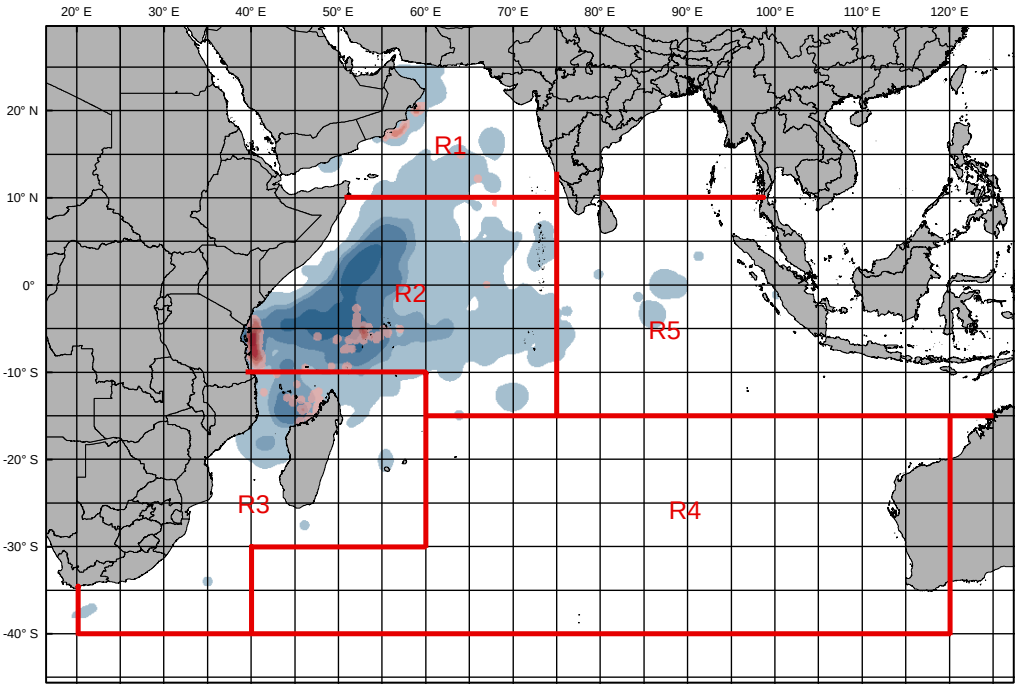






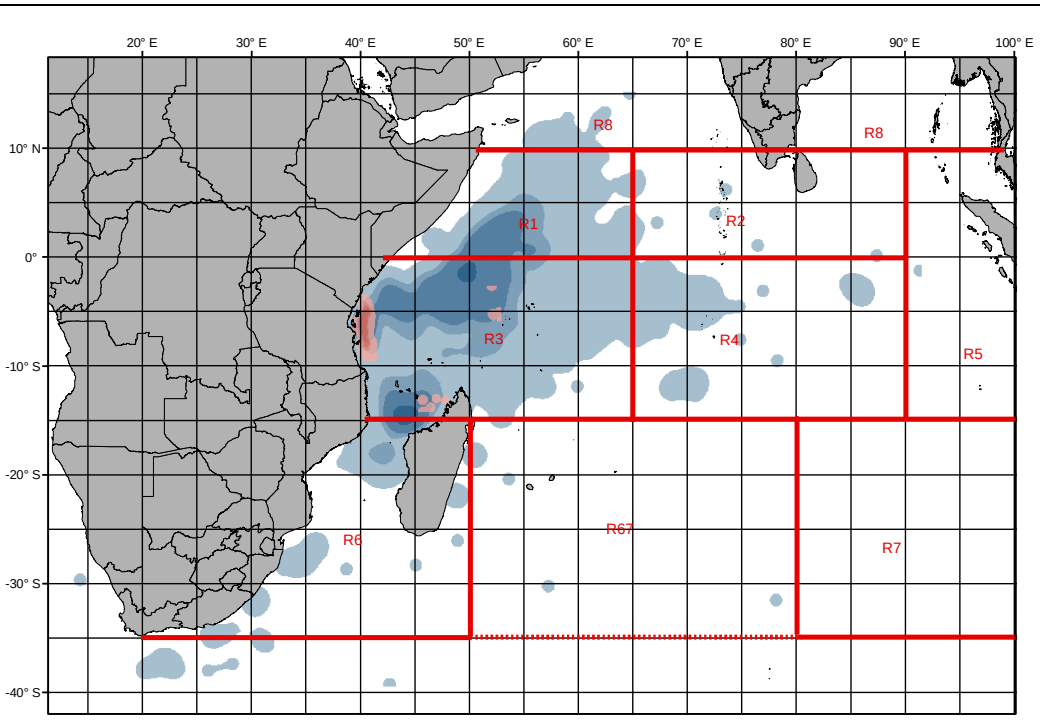
5. Tagging data

a) Yellowfin



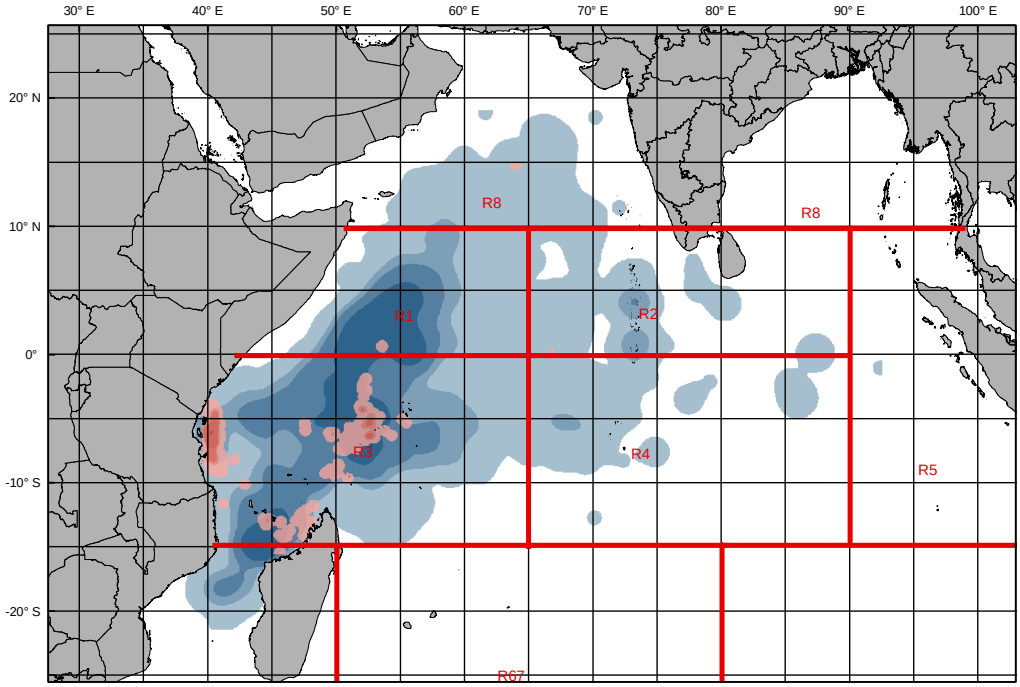
Densities of release (red) and recoveries (blue) of yellowfin tuna tagged during the RTTP-IO

b) Bigeye



Densities of release (red) and recoveries (blue) of bigeye tuna tagged during the RTTP-IO

c) Skipjack



Densities of release (red) and recoveries (blue) of skipjack tuna tagged during the RTTP-IO