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IOTC CEdata – Exploratory Analysis – Longline
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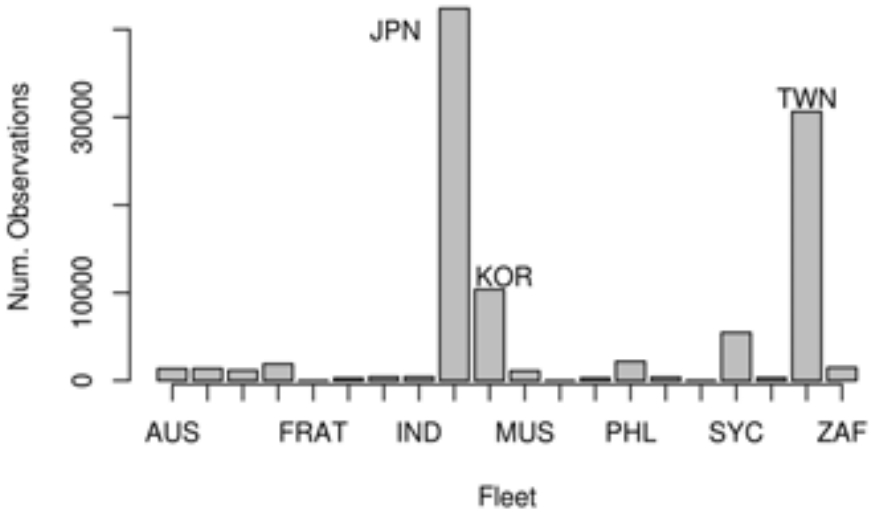
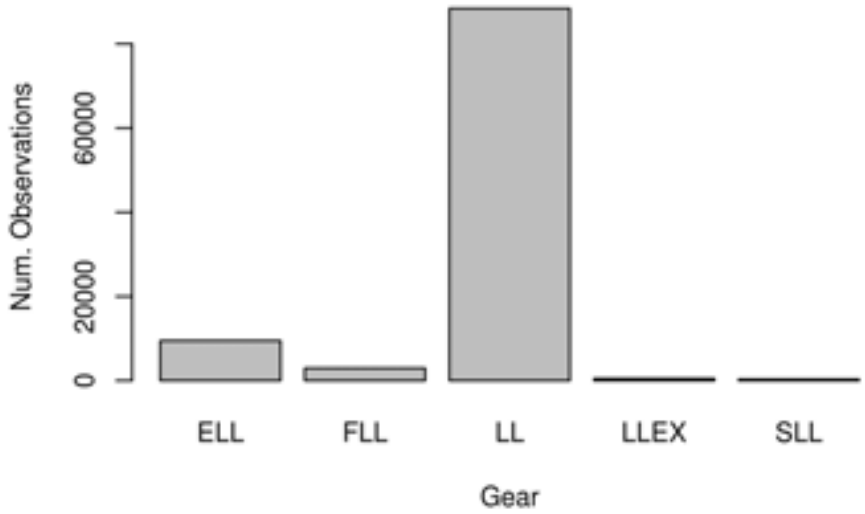
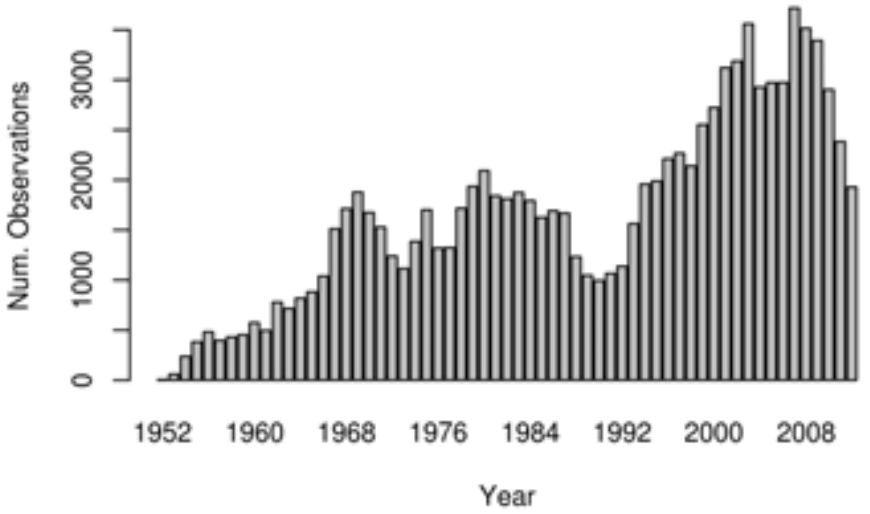
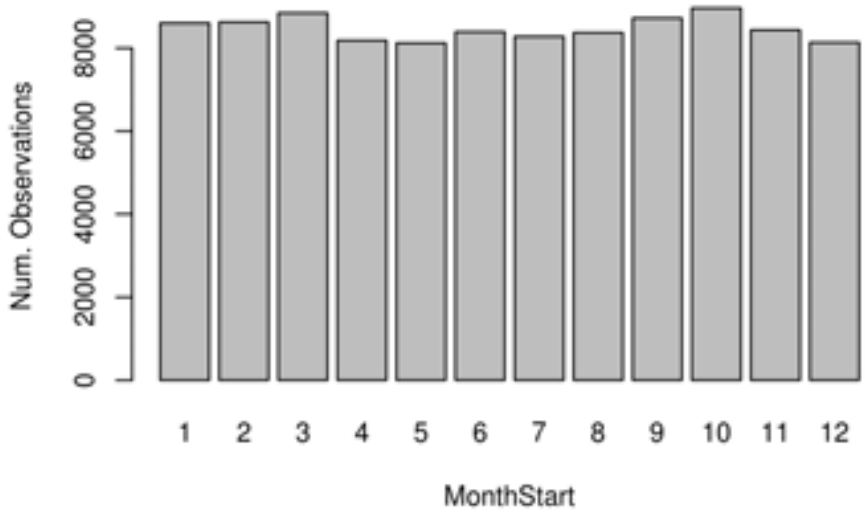
Summary

Number of Observations

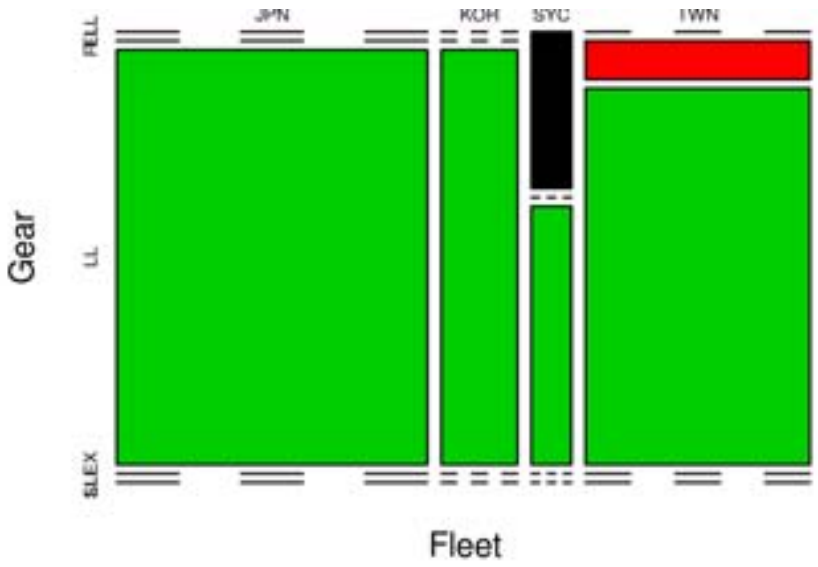


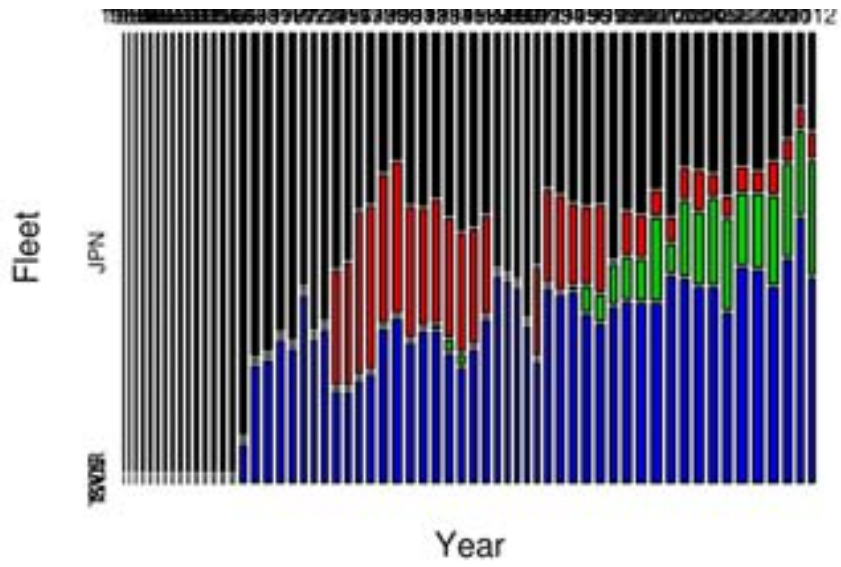


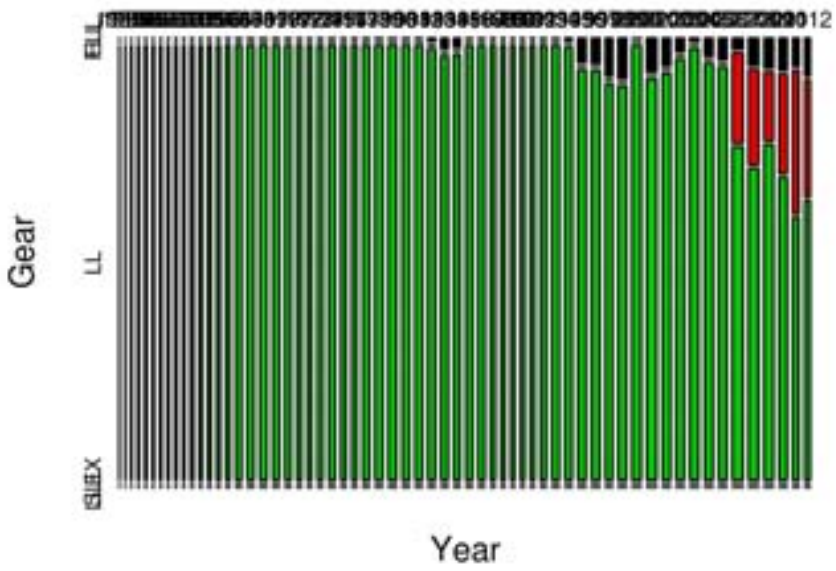


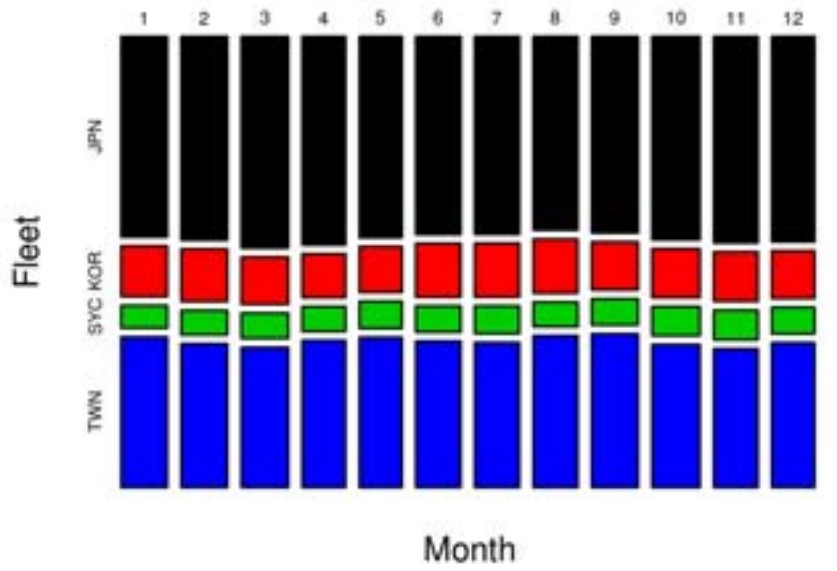


Balance


JPN
KOR
SYC
TWN
FILL
LL
SLEX
Gear
Fleet


Fleet
JPN
SYC
Year

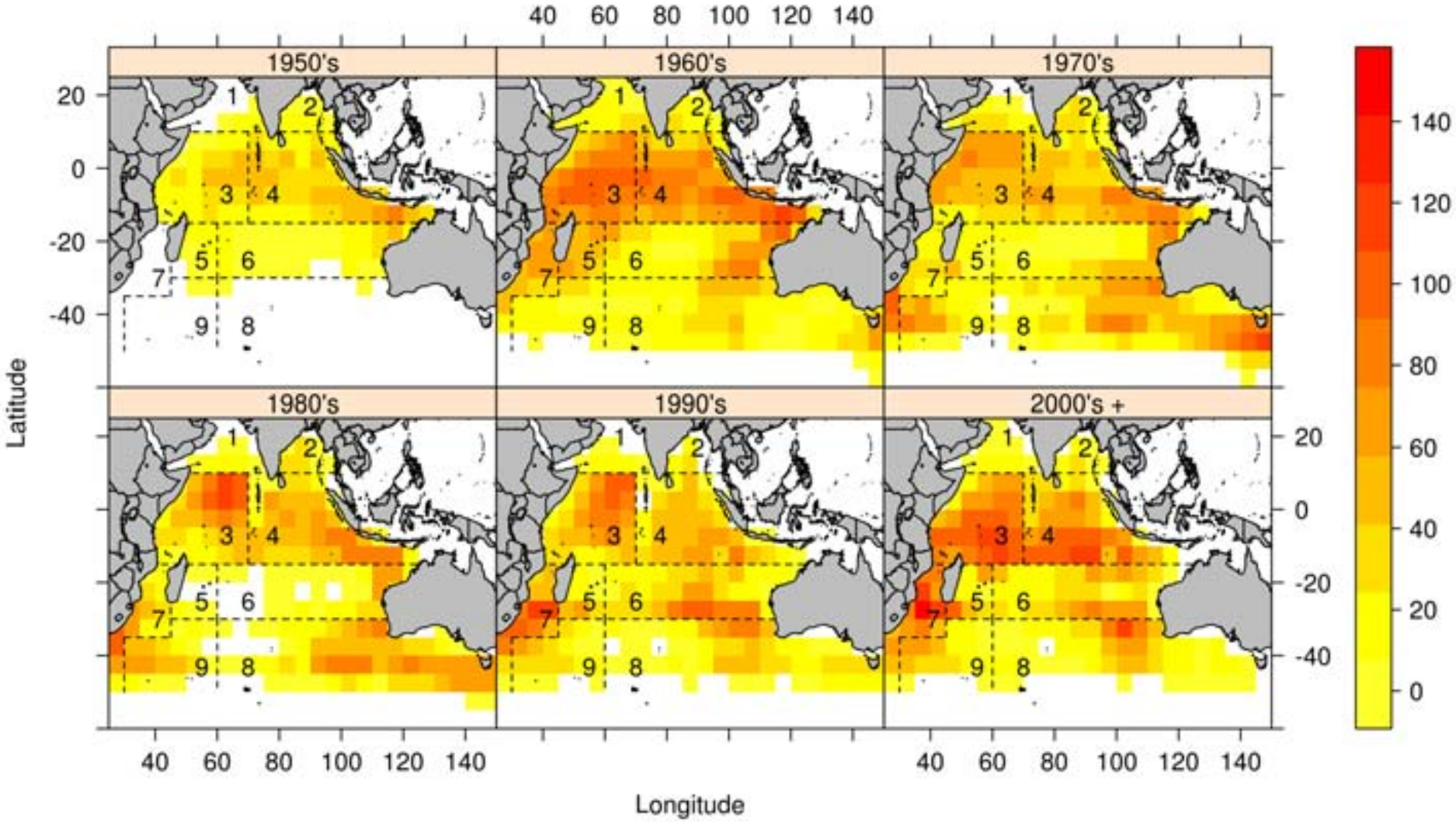

FILL
LL
SLEX
Gear
Year


1
2
3
4
5
6
7
8
9
10
11
12
JPN
SYC KOR
TWN
Fleet
Month

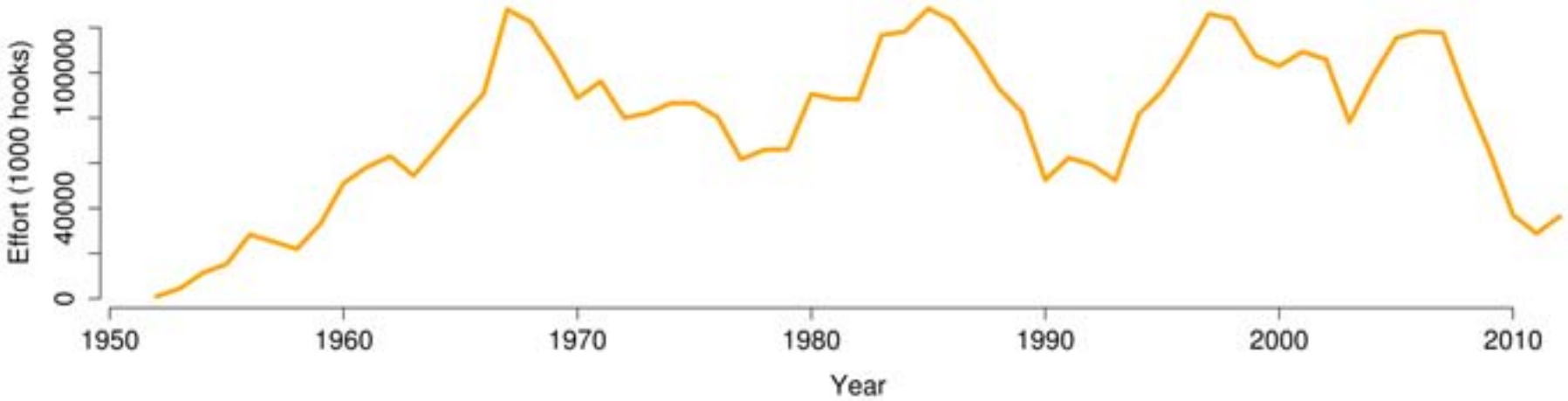
Remarks/Questions

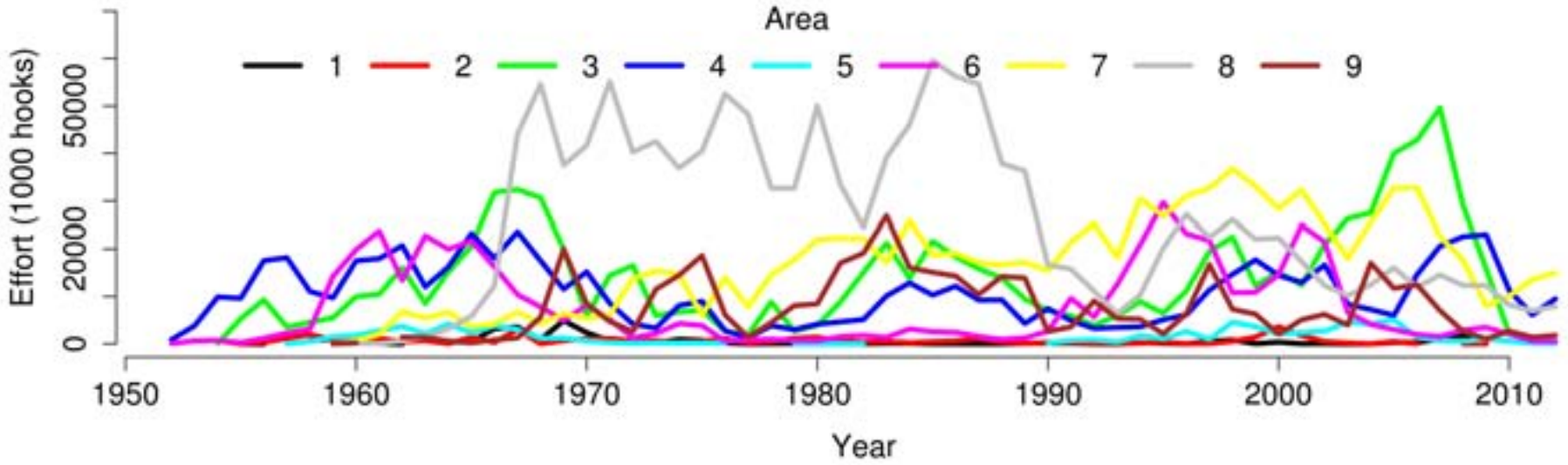
1. Sample size is large for LL Korea, Japan, Seychelles and Taiwan
2. Continuous series for long period (LL – Japan and Taiwan)
3. LL + ELL + LL ?

Japan Dataset - Sample Size

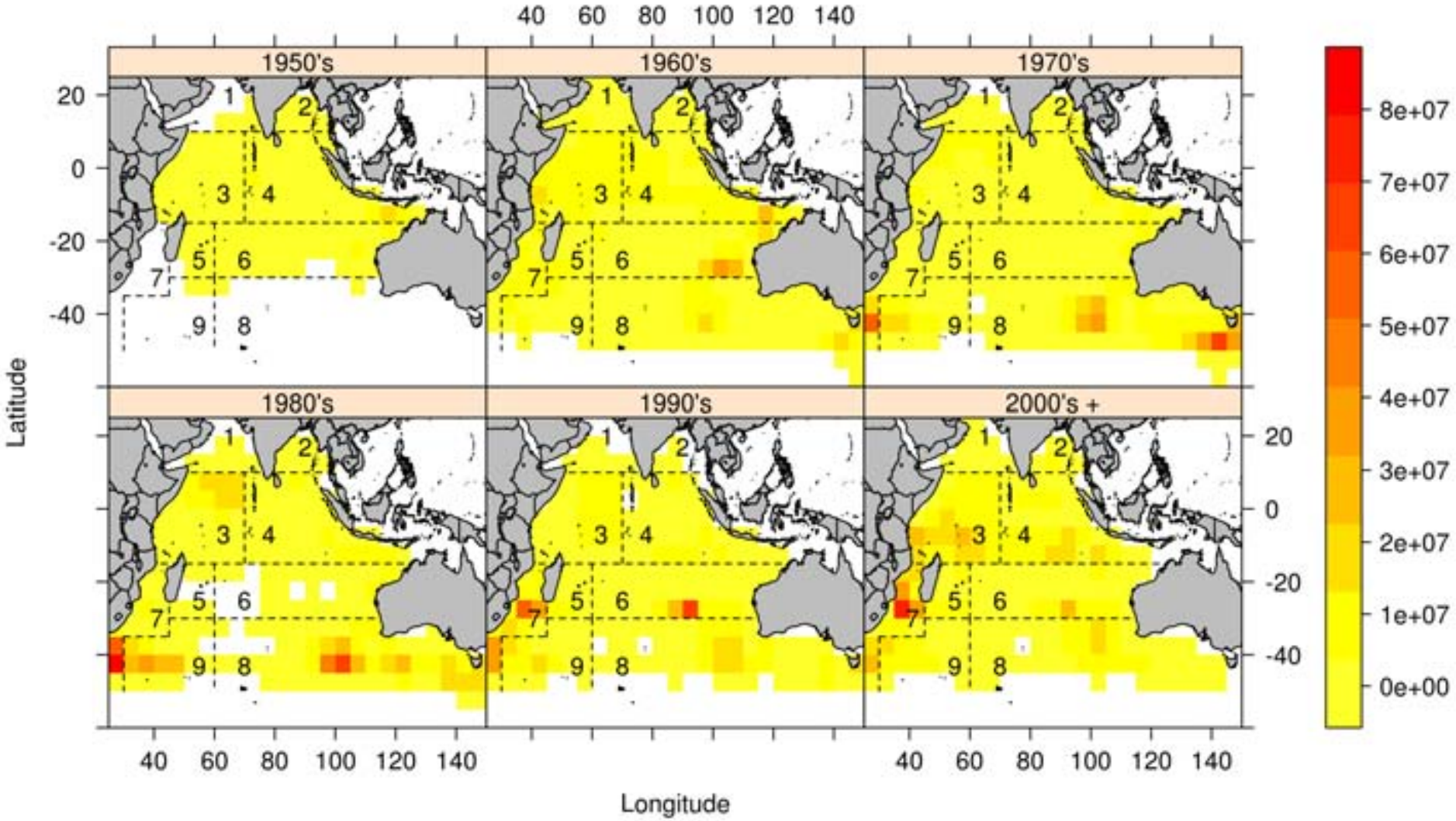


Effort

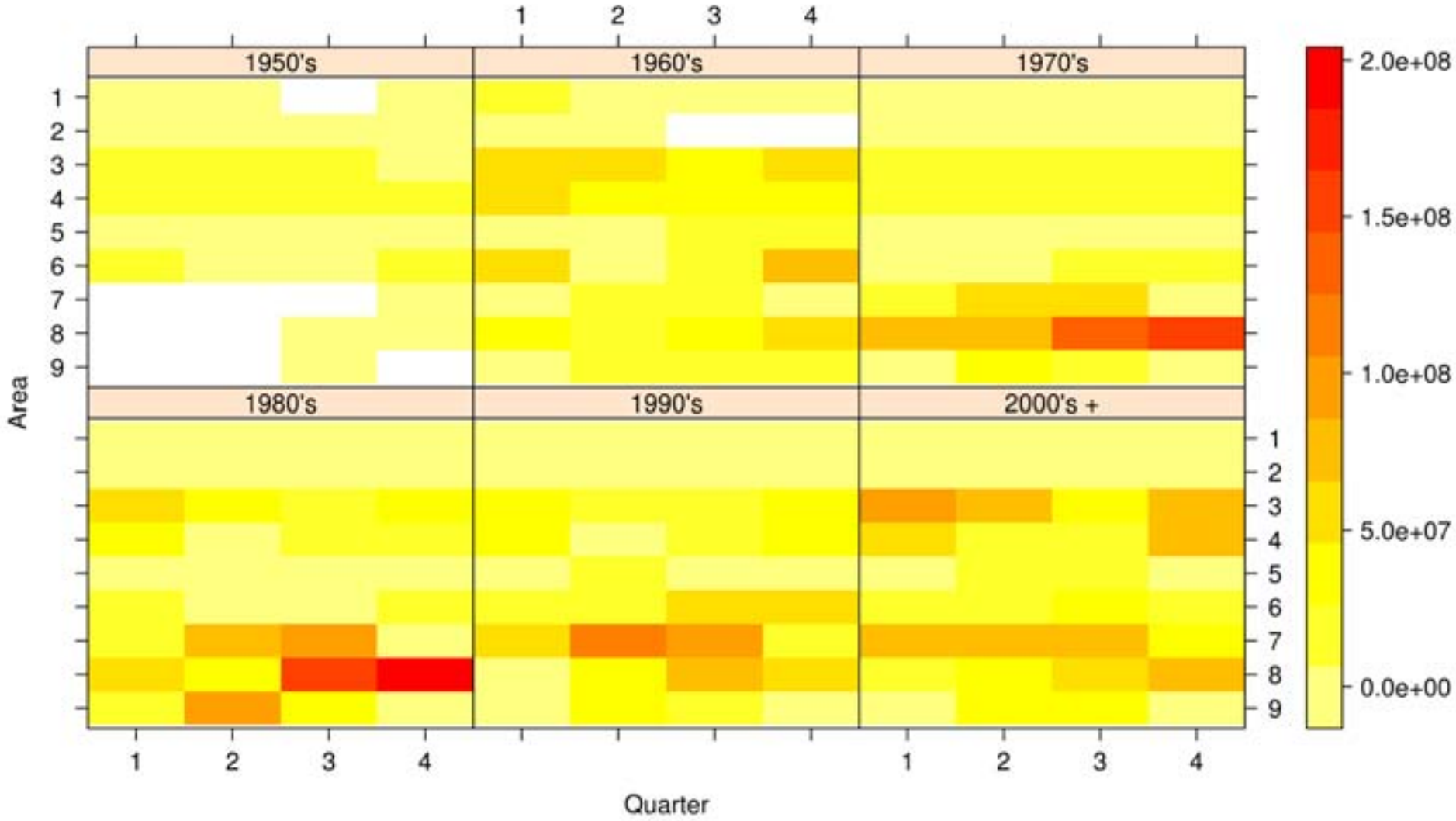

Effort (1000 hooks)
0
40000
100000
1950
1960
1970
1980
1990
2000
2010
Year


Area
1
2
3
4
5
6
7
8
9
Effort (1000 hooks)
0
20000
50000
1950
1960
1970
1980
1990
2000
2010
Year

Effort - number of hooks - Decade x Lat x Lon



Effort - number of hooks - Decade x Quarter x Area

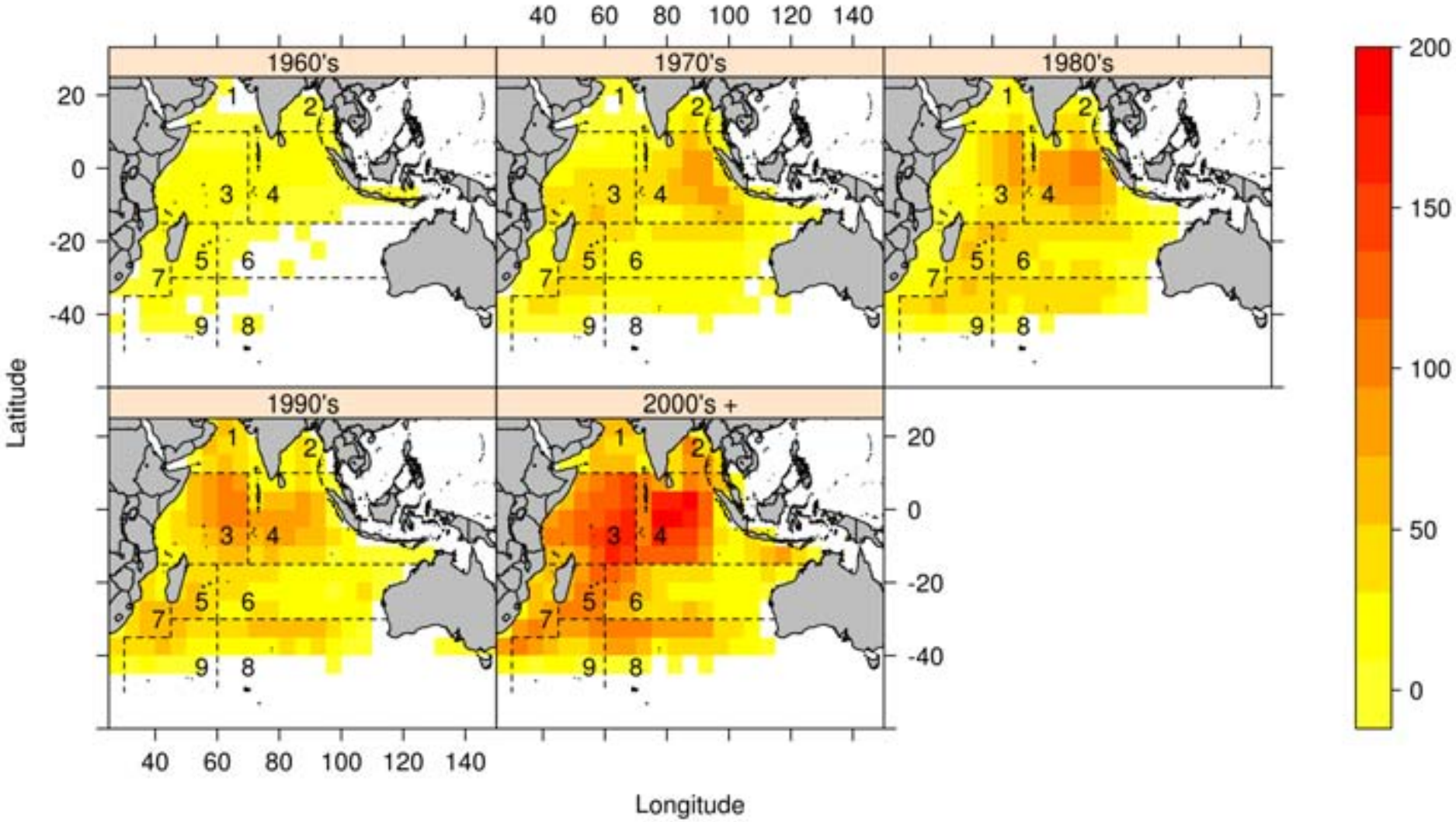


Remarks – LL Japan Dataset

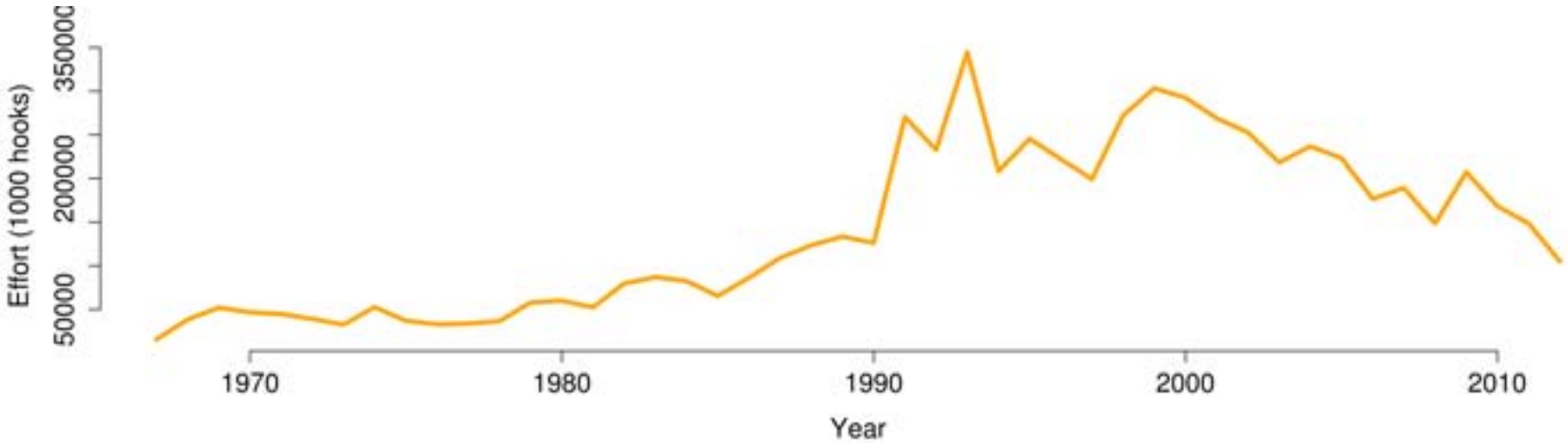
1. Consistent time series in the sense the sample size is large for all areas, quarters and decades

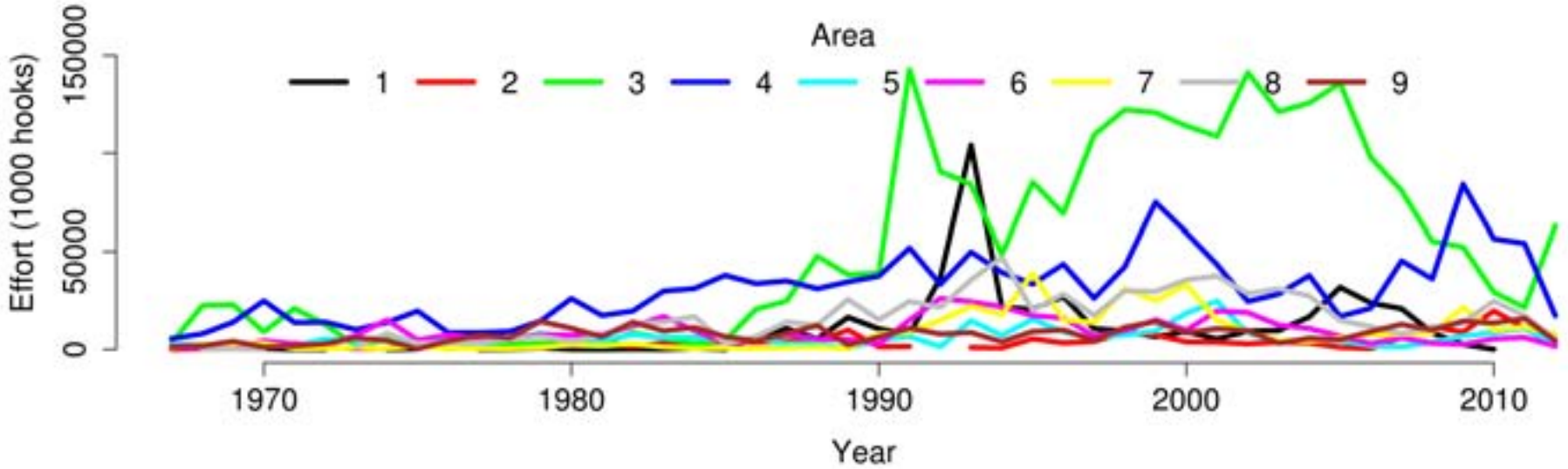
2. High efforts appear in areas 3, 4, 7 and 8. Effort was especially high in area 8 during 1970's and 1980's (3^{rd} and 4^{th})

Taiwan Dataset - Sample Size

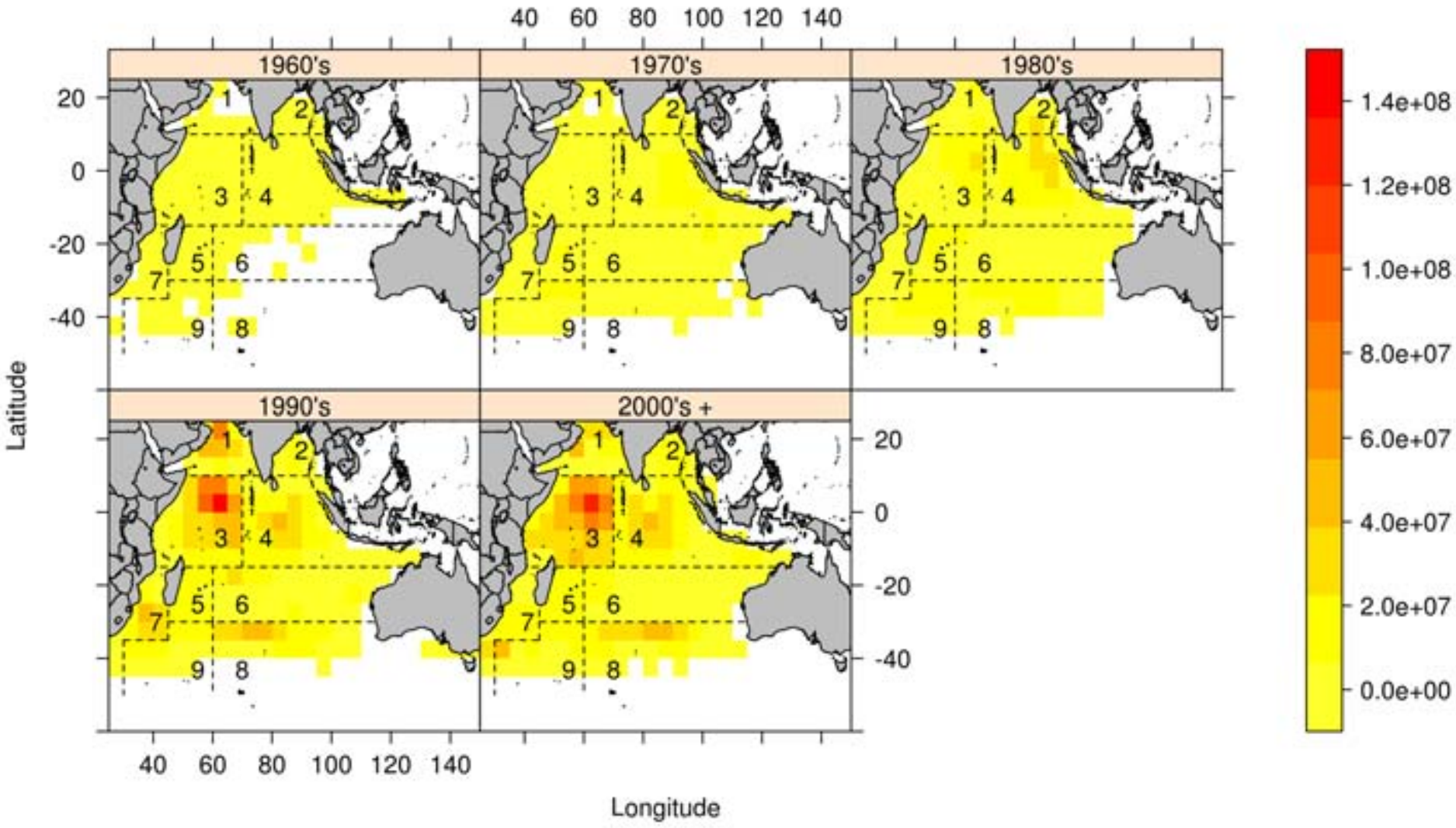


Effort

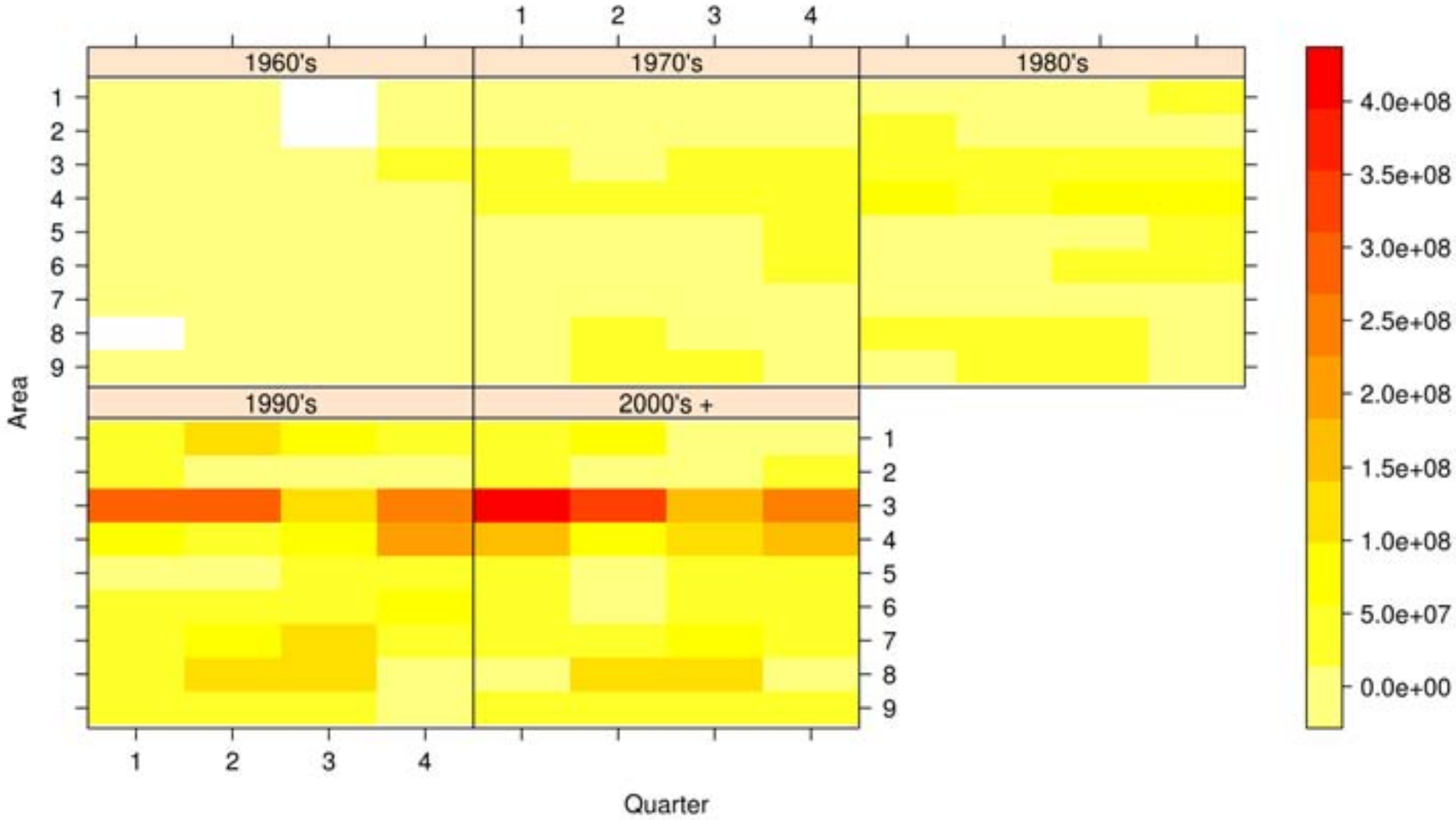

Effort (1000 hooks)
50000
200000
350000
1970
1980
1990
2000
2010
Year


Area
1
2
3
4
5
6
7
8
9
Effort (1000 hooks)
0
50000
150000
1970
1980
1990
2000
2010
Year

Effort - number of hooks - Decade x Lat x Lon



Effort - number of hooks - Decade x Quarter x Area

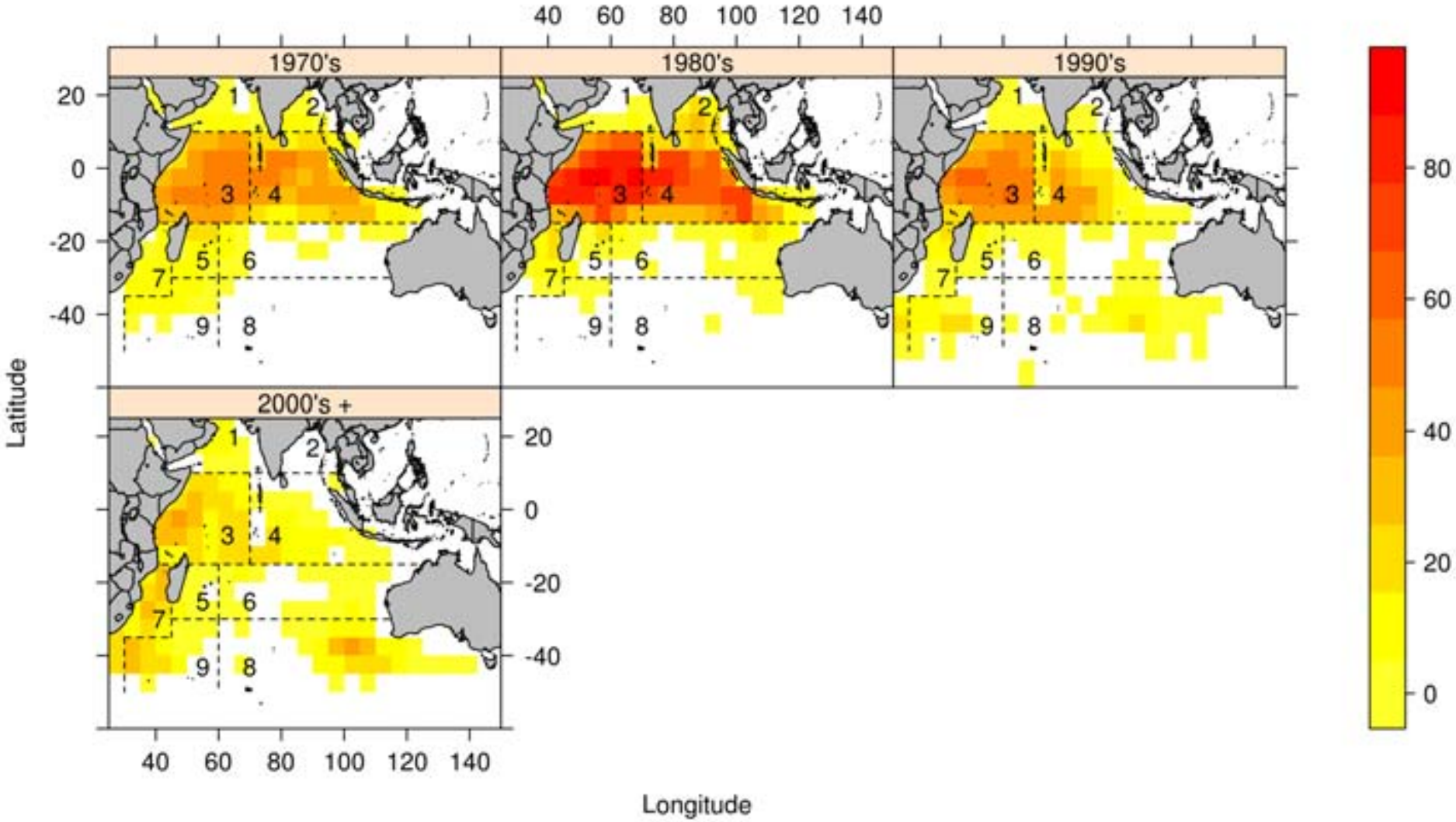


Remarks – LL Taiwan Dataset

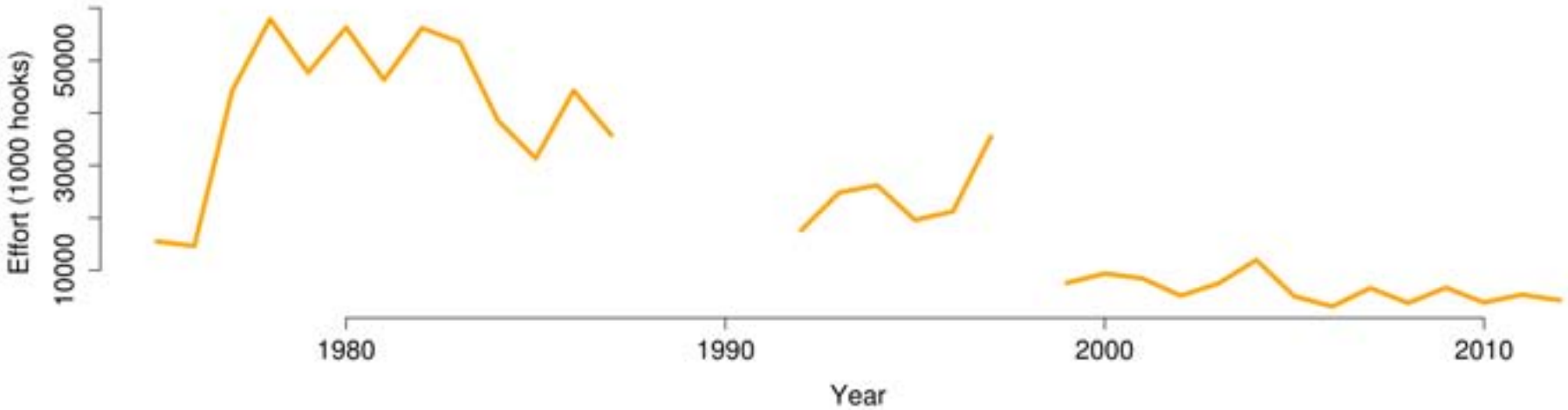
1. Sample size is especially large in area 3 though time series for area 4 is also large

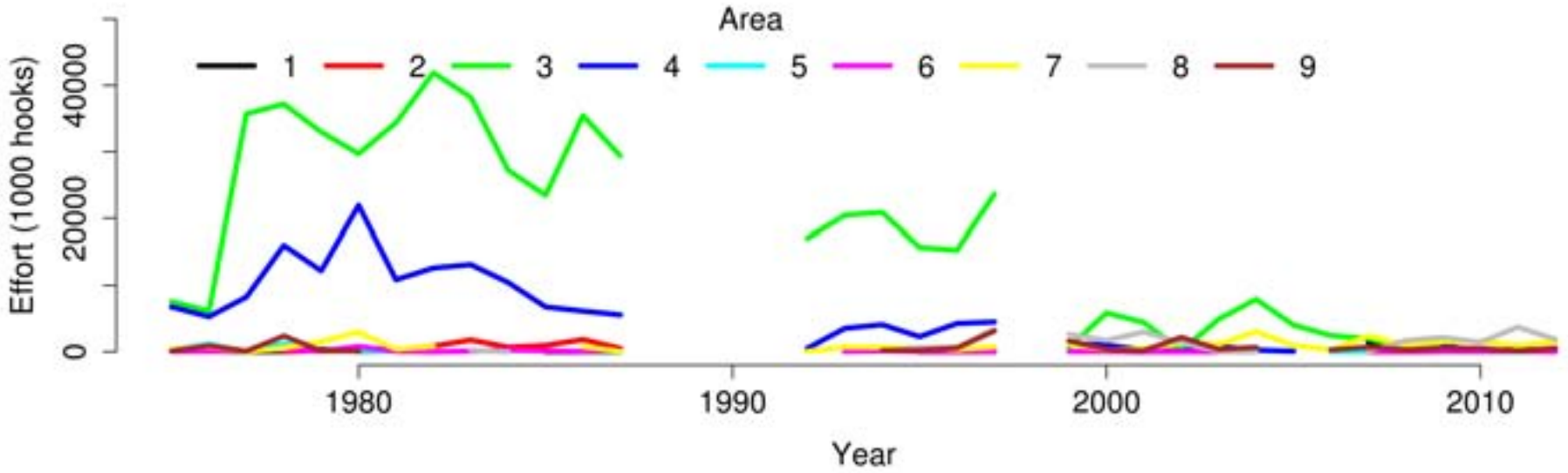
2. Effort in 3^{rd} quarter is smaller than in other quarters in the main fishing ground (area 3)

Korea Dataset - Sample Size

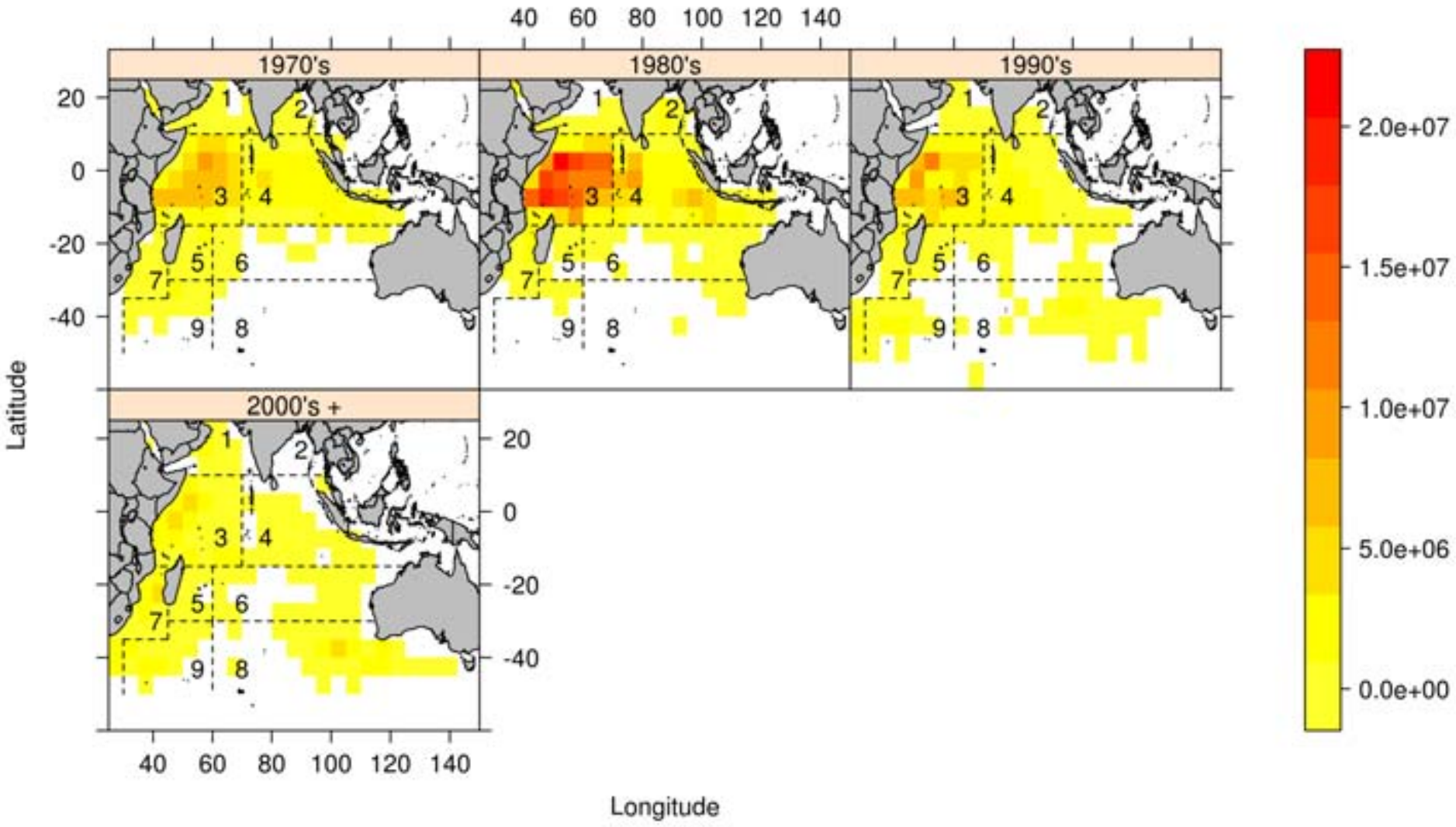


Effort

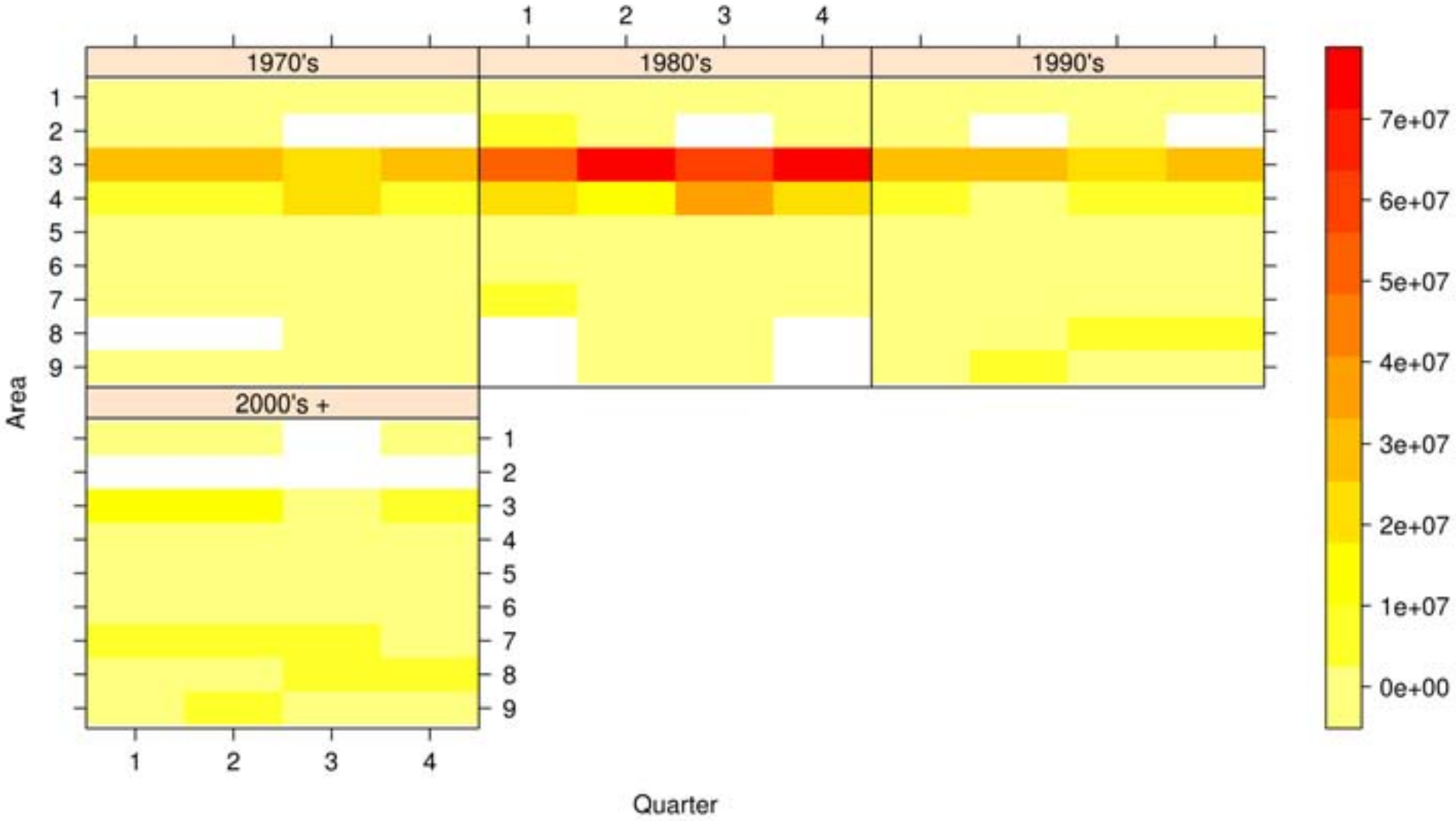

Effort (1000 hooks)
10000
30000
50000
1980
1990
2000
2010
Year


Area
1
2
3
4
5
6
7
8
9
Effort (1000 hooks)
0
20000
40000
1980
1990
2000
2010
Year

Effort - number of hooks - Decade x Lat x Lon



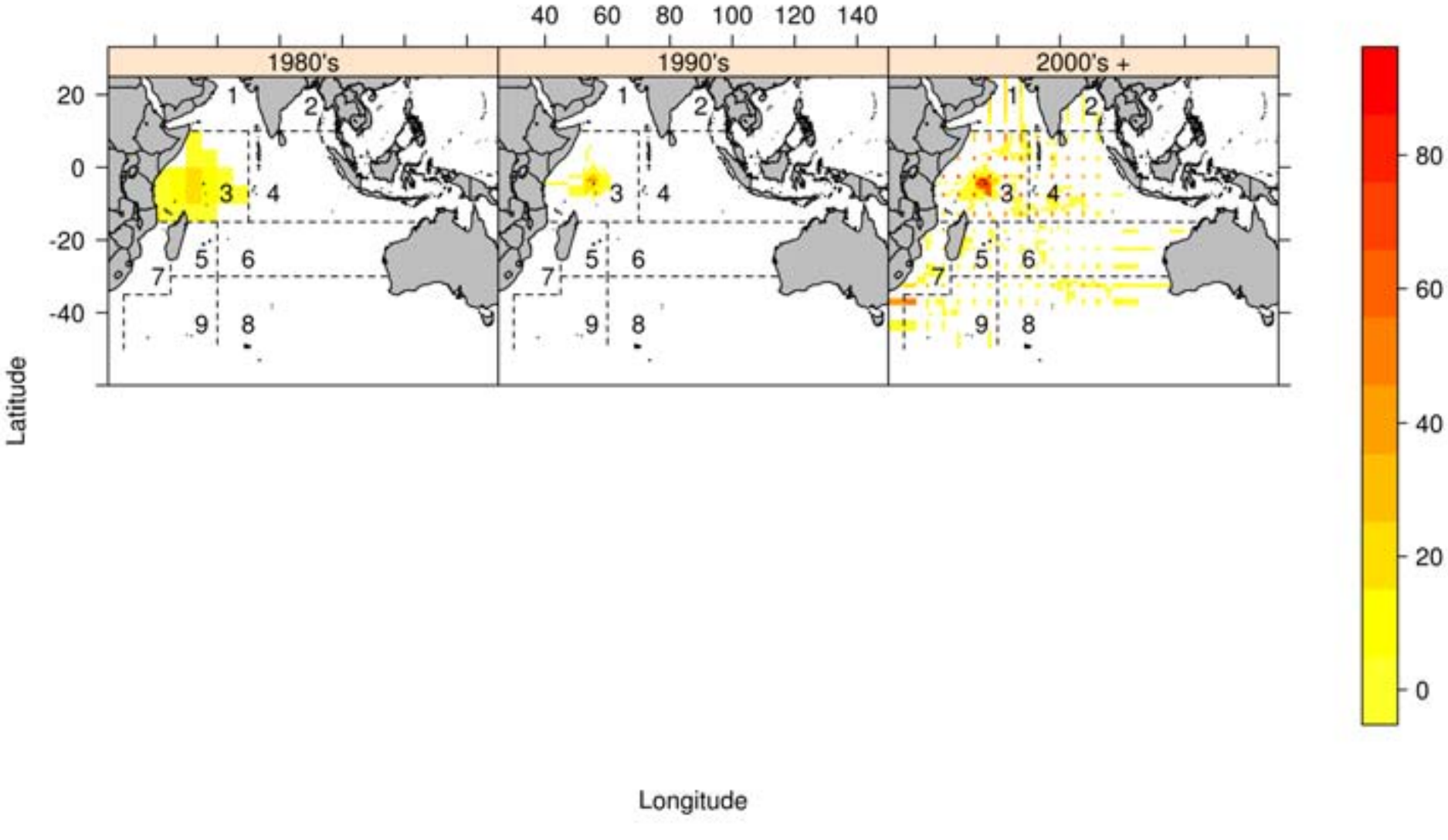
Effort - number of hooks - Decade x Quarter x Area



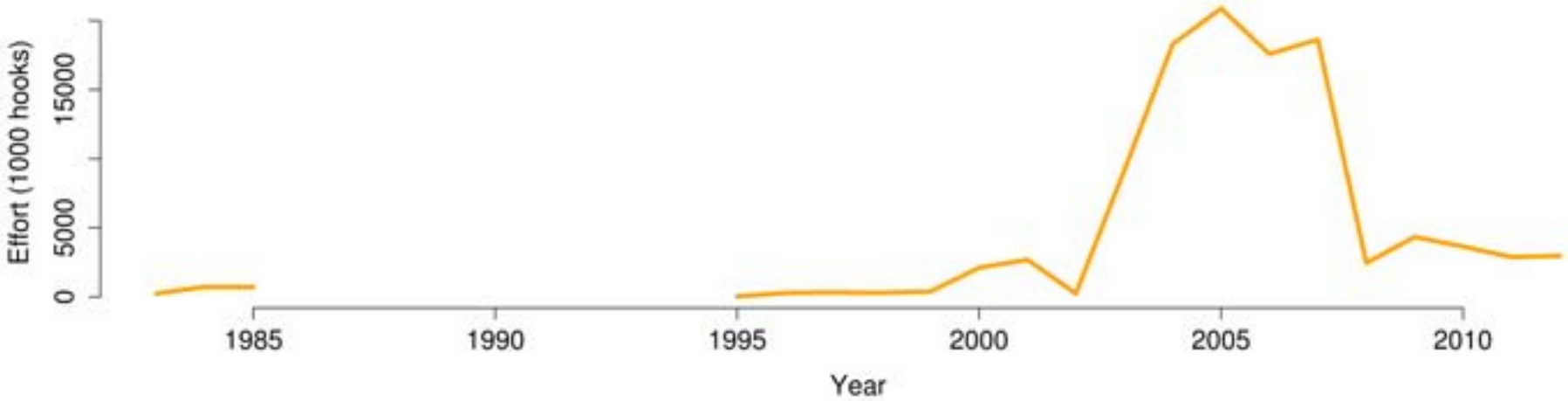
Remarks – LL Korea Dataset

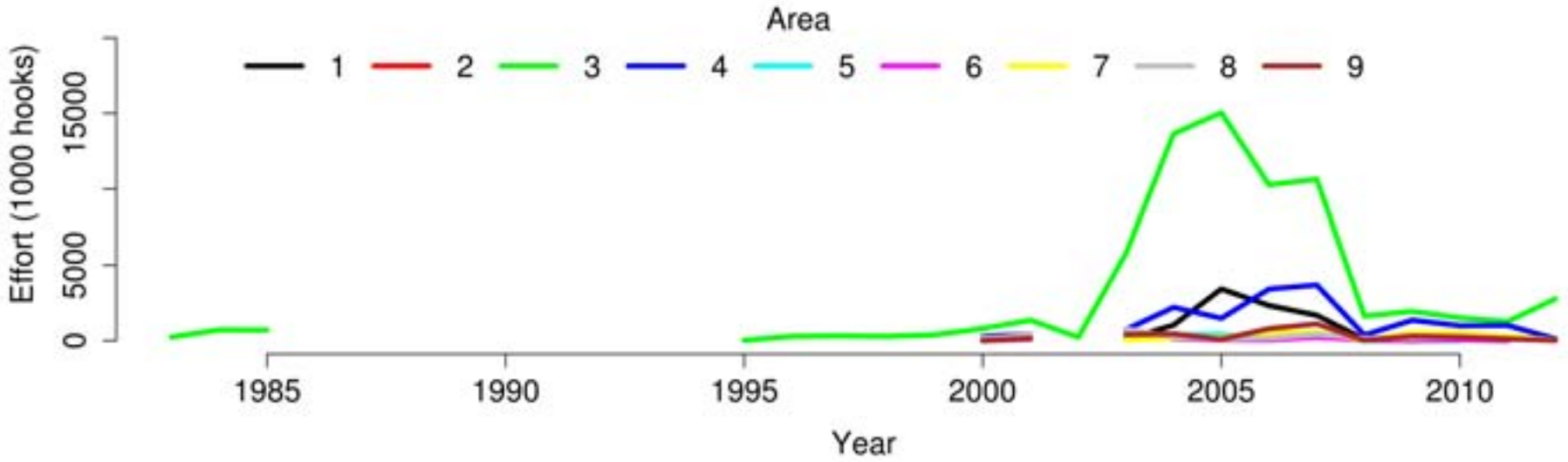
1. Sample size is especially large in area 3 in 1980's
2. There are no data for several years

Seychelles Dataset - Sample Size

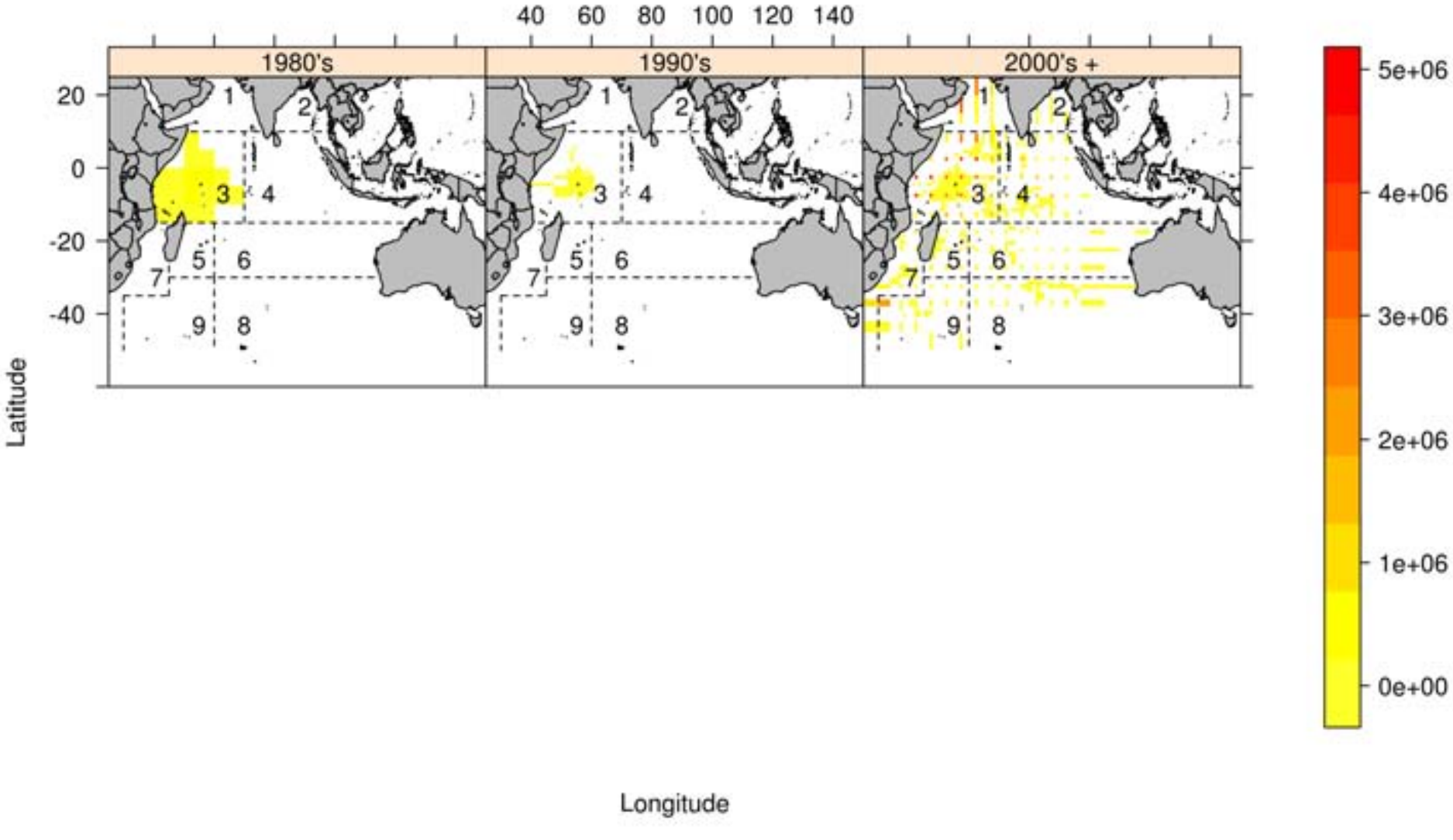


Effort

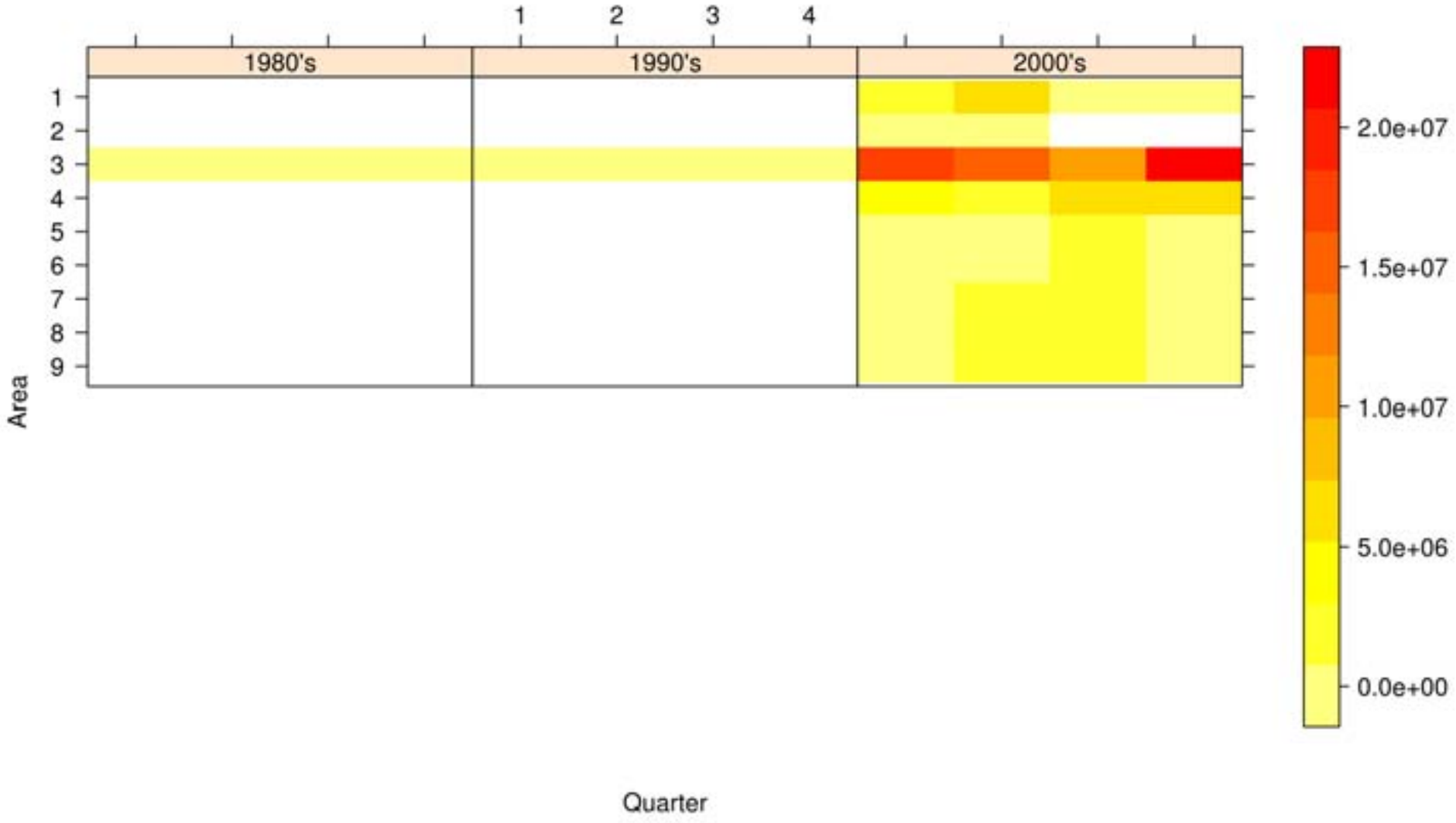

Effort (1000 hooks)
0
5000
15000
1985
1990
1995
2000
2005
2010
Year


Area
1
2
3
4
5
6
7
8
9
Effort (1000 hooks)
0
5000
15000
1985
1990
1995
2000
2005
2010
Year

Effort - number of hooks - Decade x Lat x Lon



Effort - number of hooks - Decade x Quarter x Area

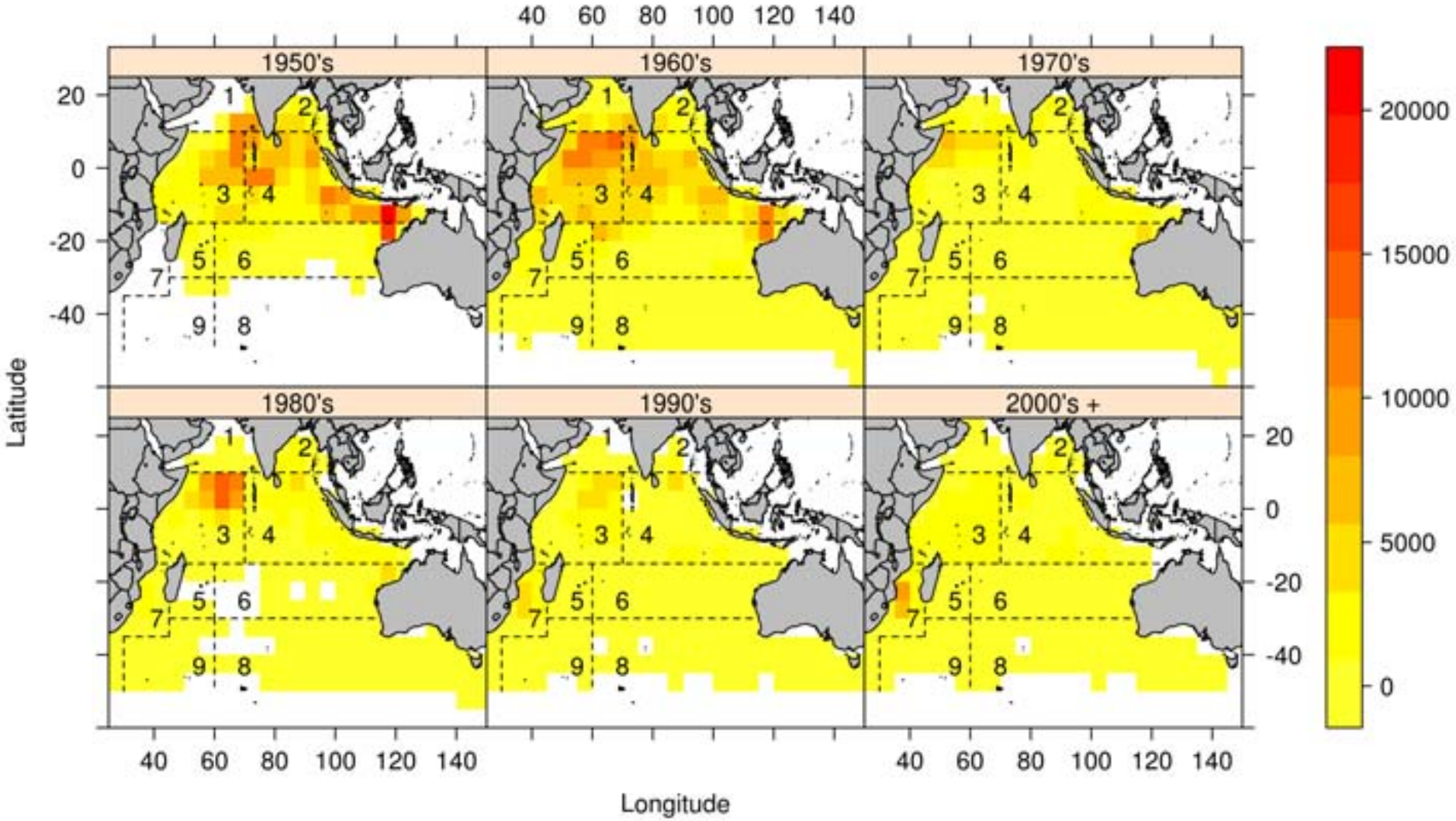


Remarks – LL Seychelles Dataset

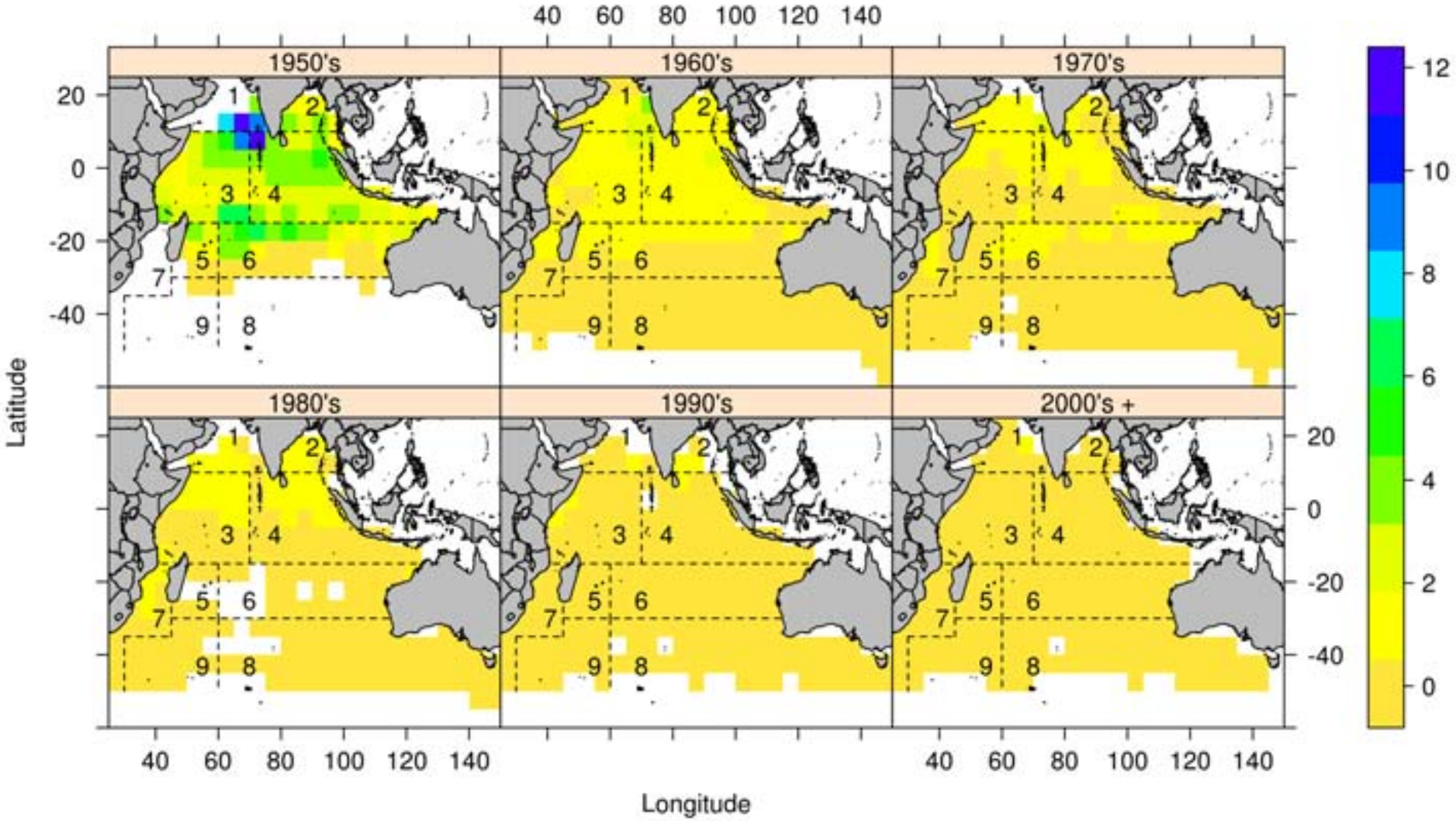
1. Sample size is especially large in area 3 in 2000's
2. There are no data for several years

Blue Marlin (BUM)

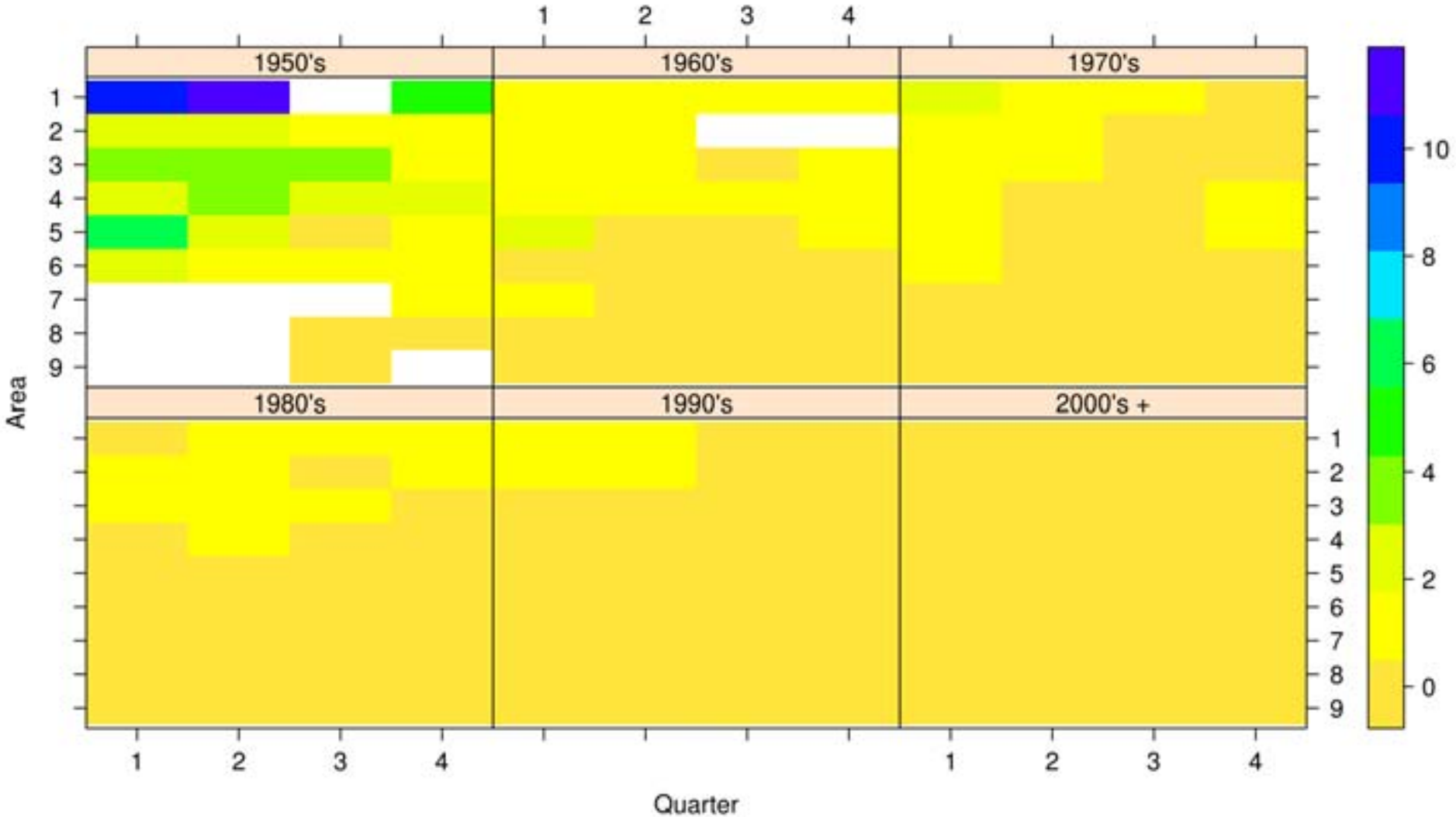
BUM - number of fish - Japan Dataset



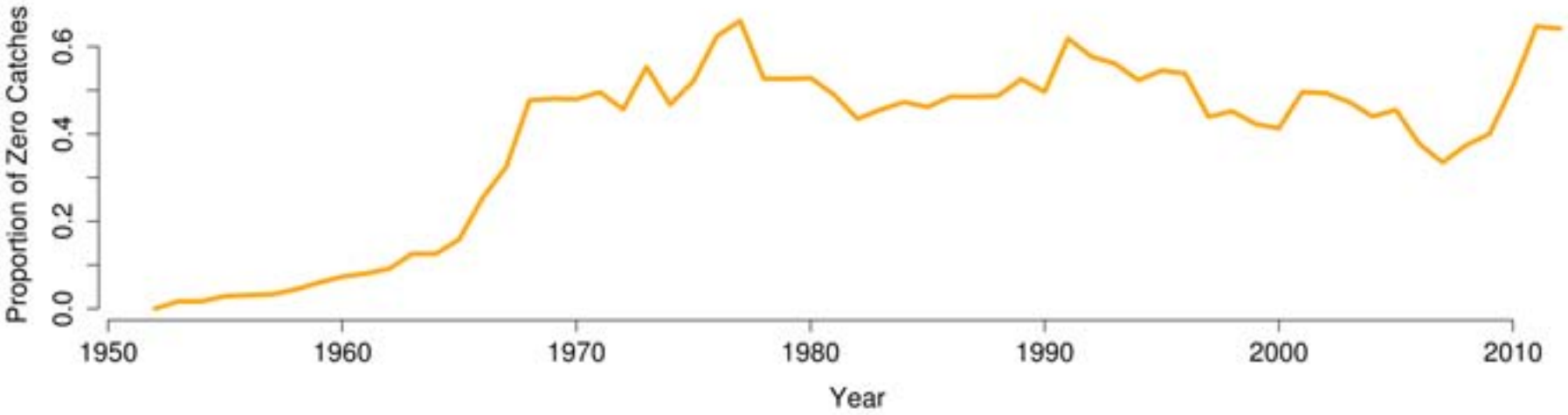
BUM - number of fish/1000 hooks - Decade x Lat x Lon

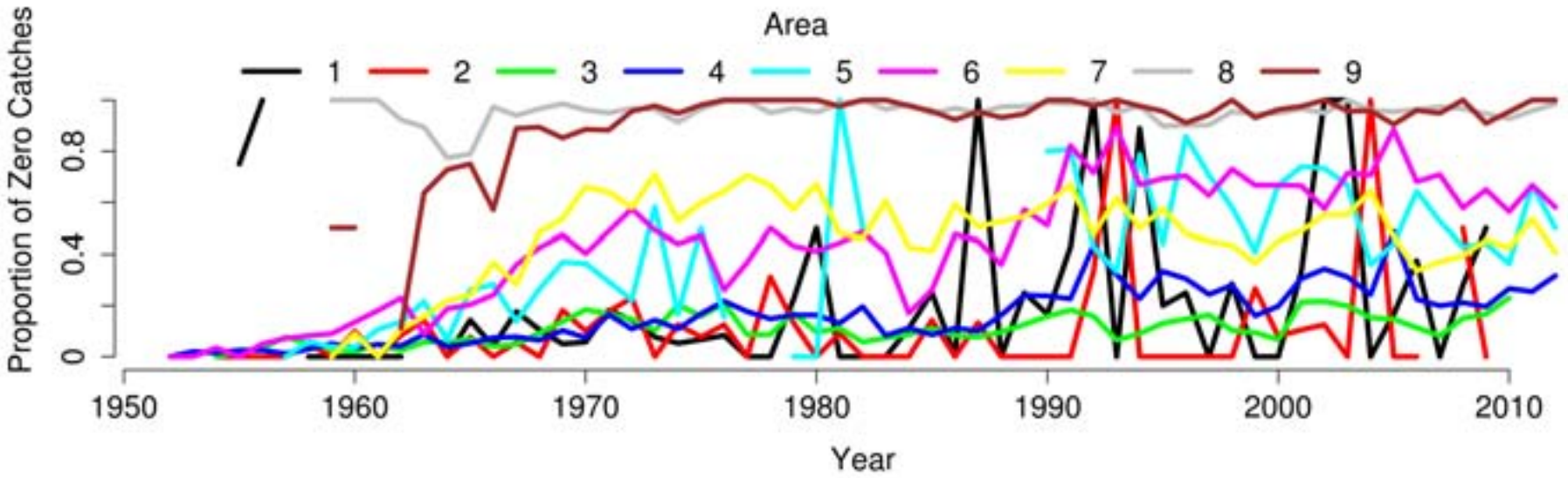


BUM - number of fish/1000 hooks - Decade x Quarter x Area

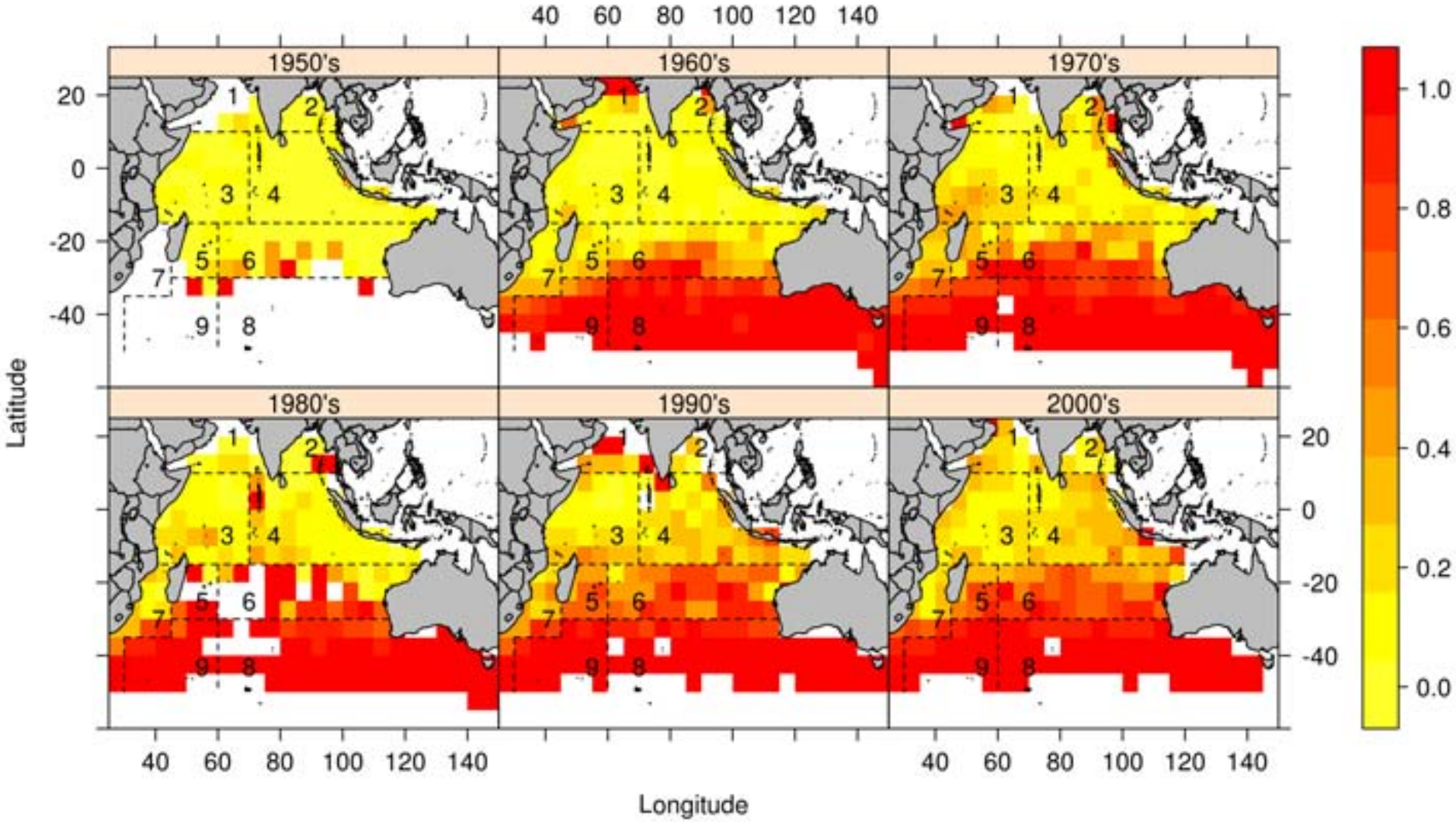


Proportion of Zero Catches

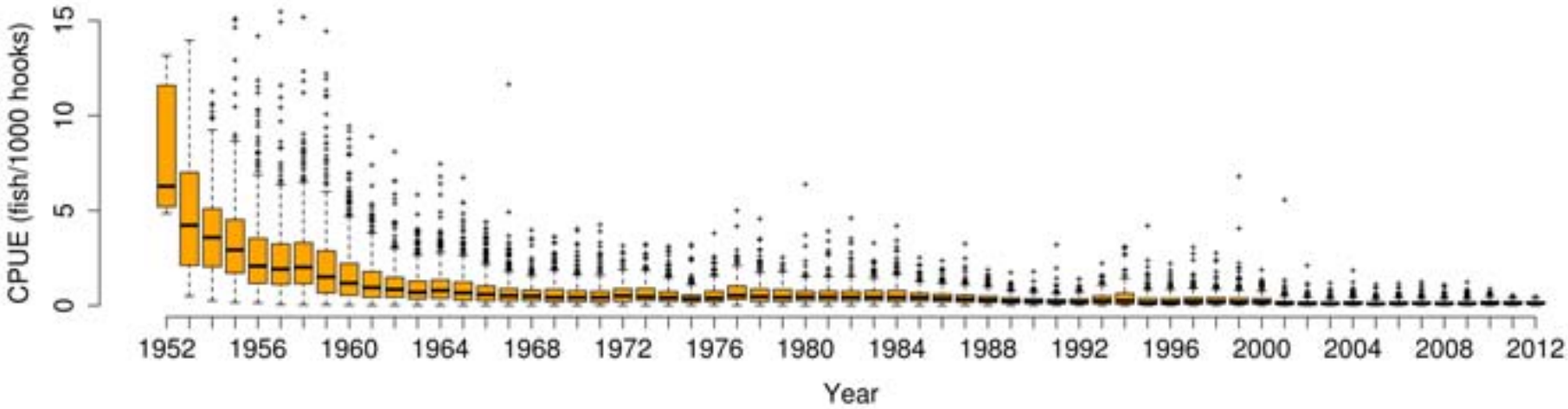


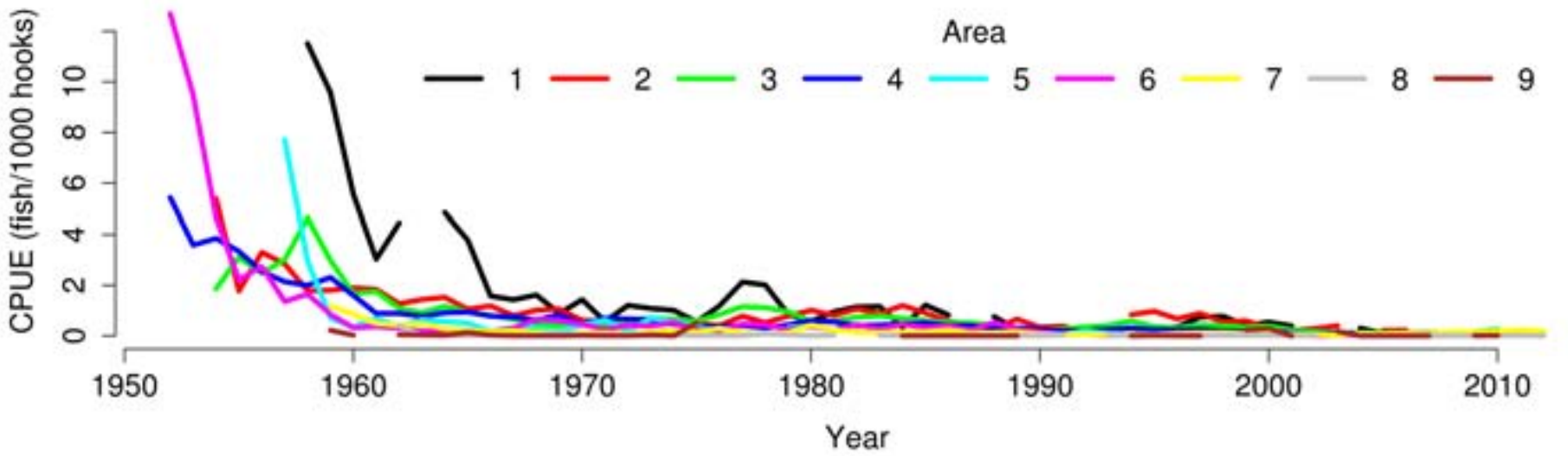


Proportion of Zero Catches

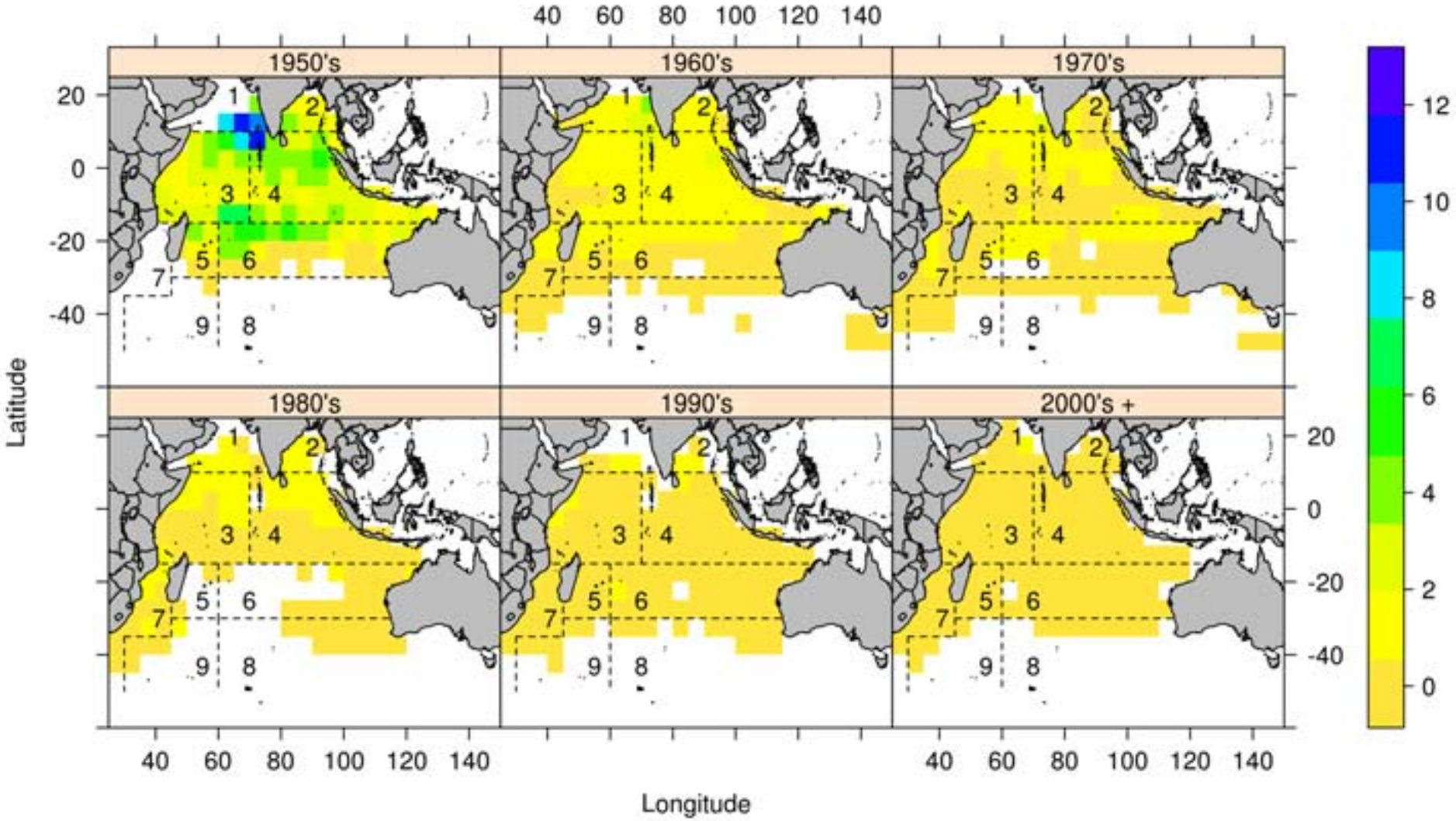


CPUE – Positive Catches





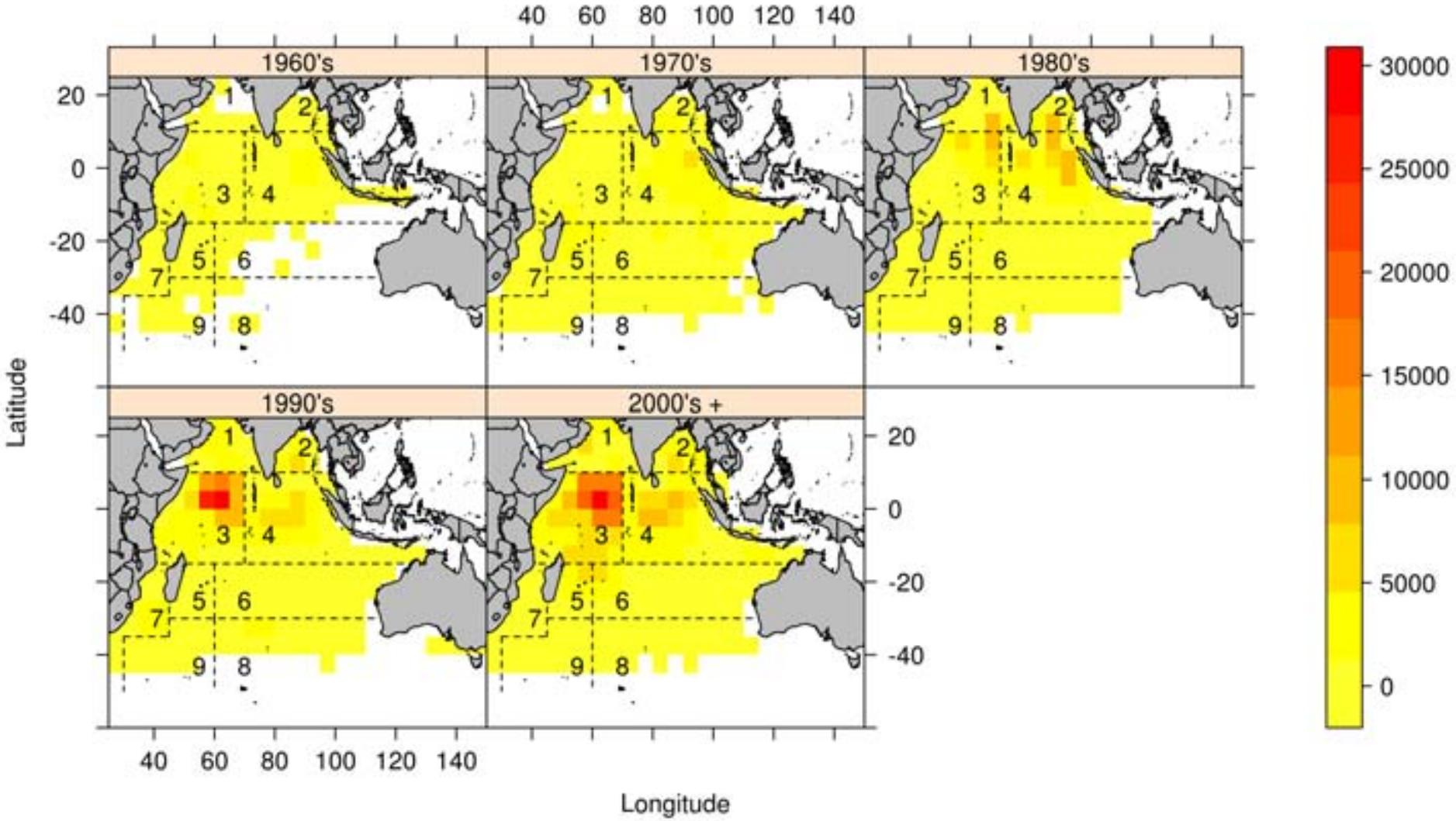
CPUE – Positive Catches



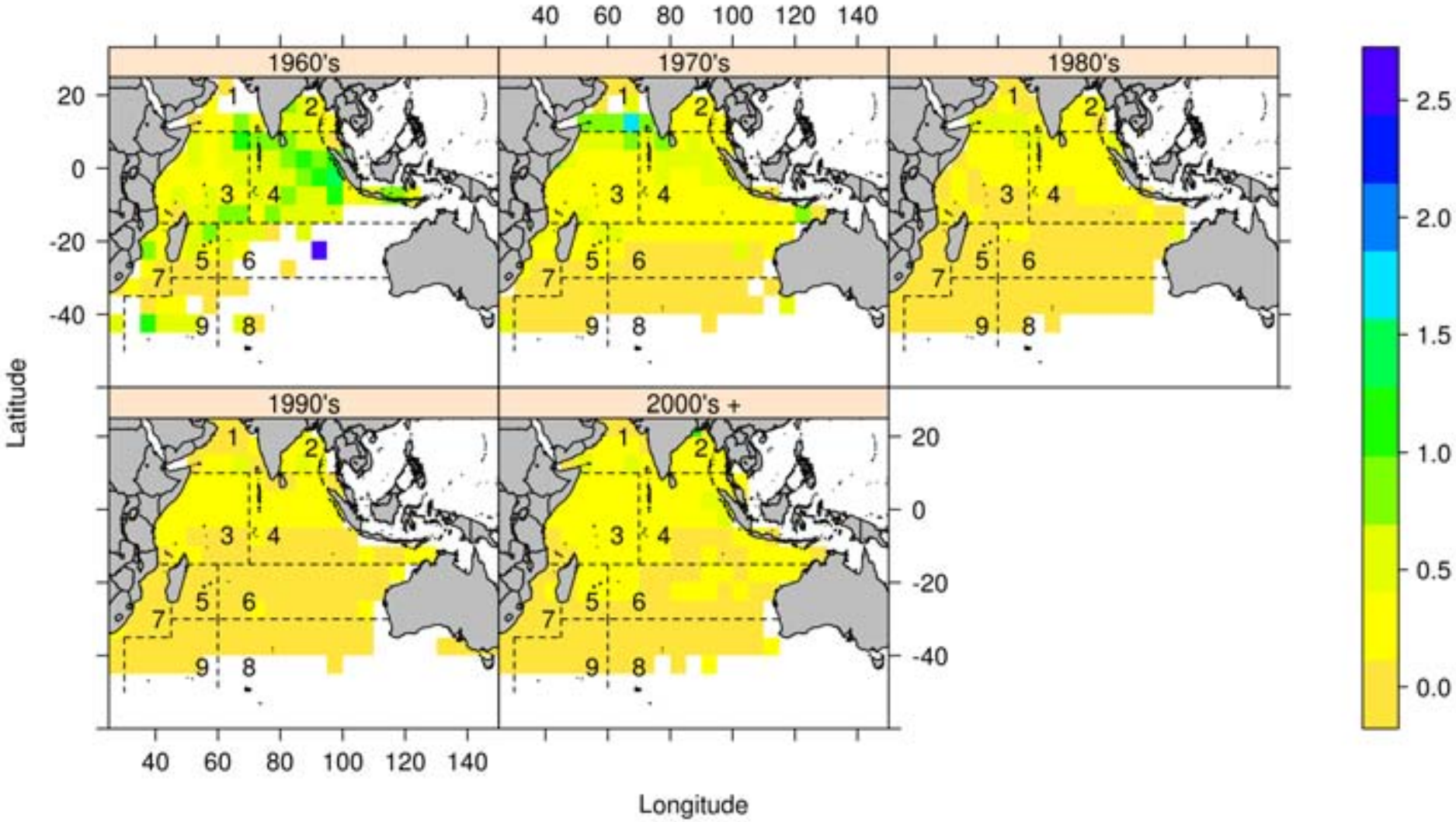
Remarks – BUM Japan Dataset

1. Catches and catch rates were high in equatorial and tropical oceanic areas (1, 2, 3 and 4) especially in 1950's and 1960's;
2. Catch rates were high in the first half of the year (1^{st} and 2^{nd} quarters) close to equator;
3. Overall proportion of zero catches is not very high except in south areas (8 and 9);
4. Proportion of zero catches increase over the years;
5. Area 3 stands as the kernel of positive catch in 2000's;
6. Catch rates as calculated for positive dataset decreases quickly in 1950's and 1960's in all areas. They are especially low in 2000's.

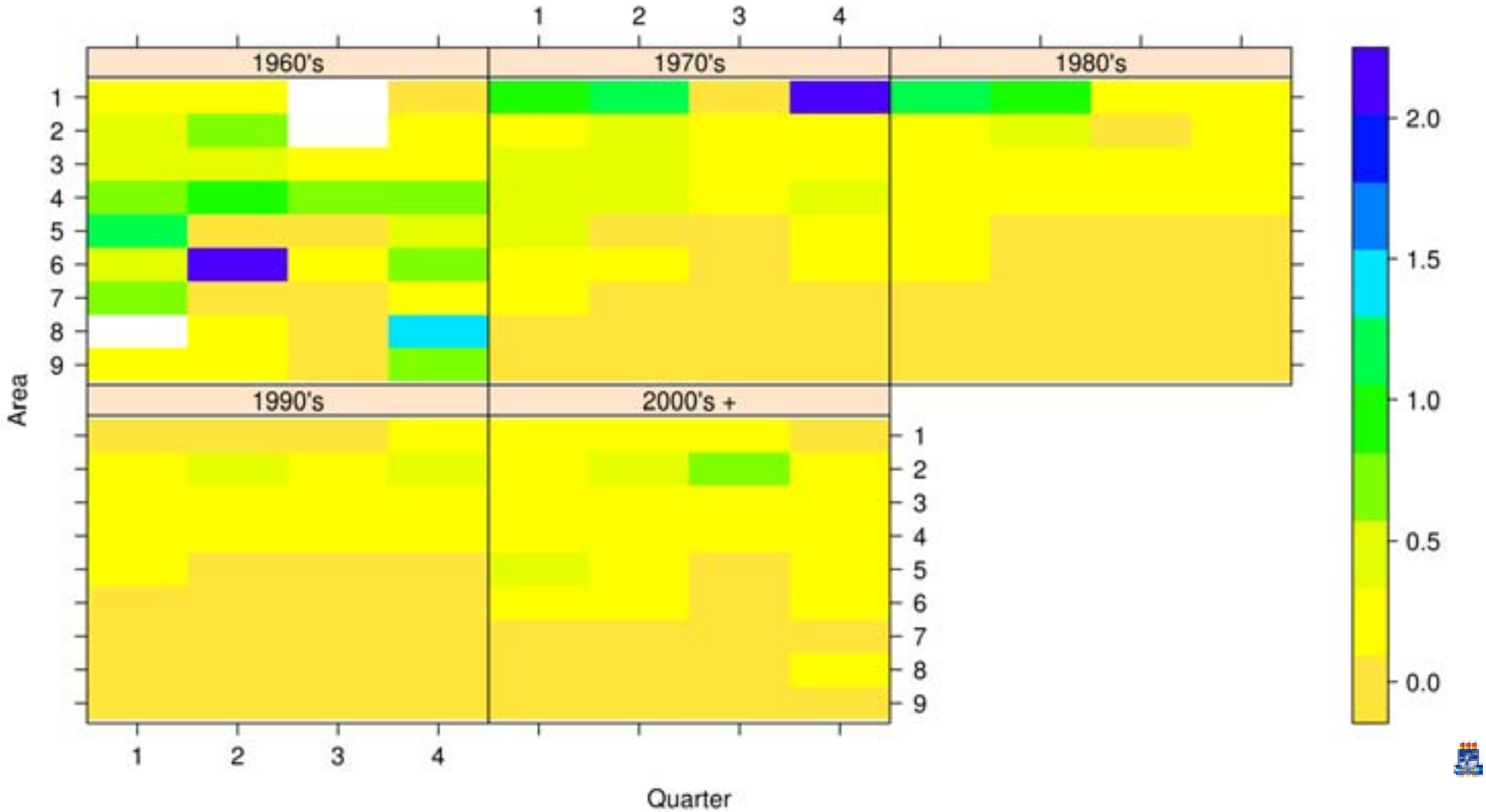
BUM - number of fish - Taiwan Dataset



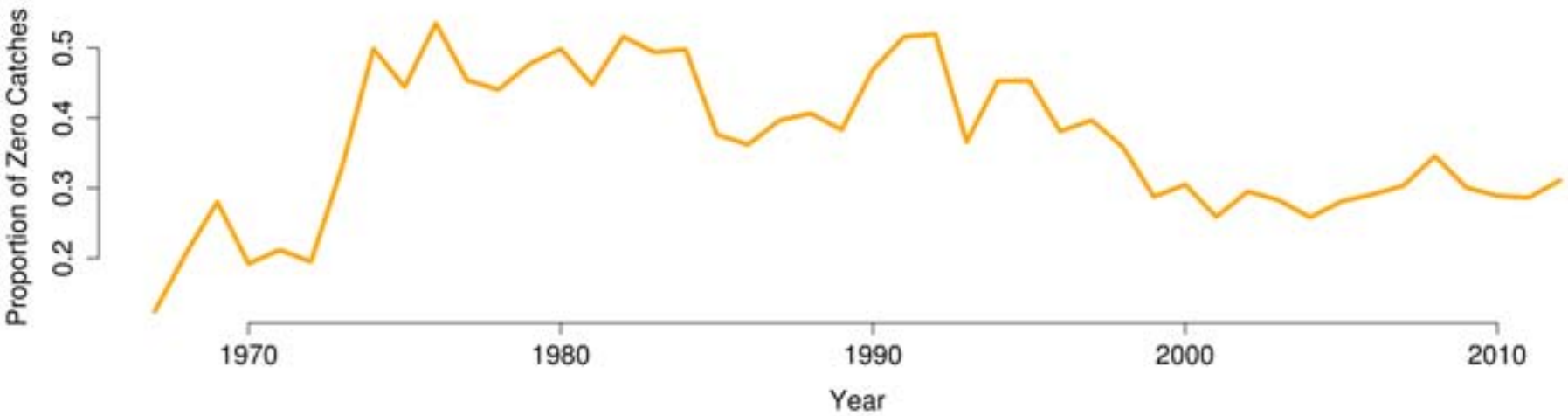
BUM - number of fish/1000 hooks - Decade x Lat x Lon

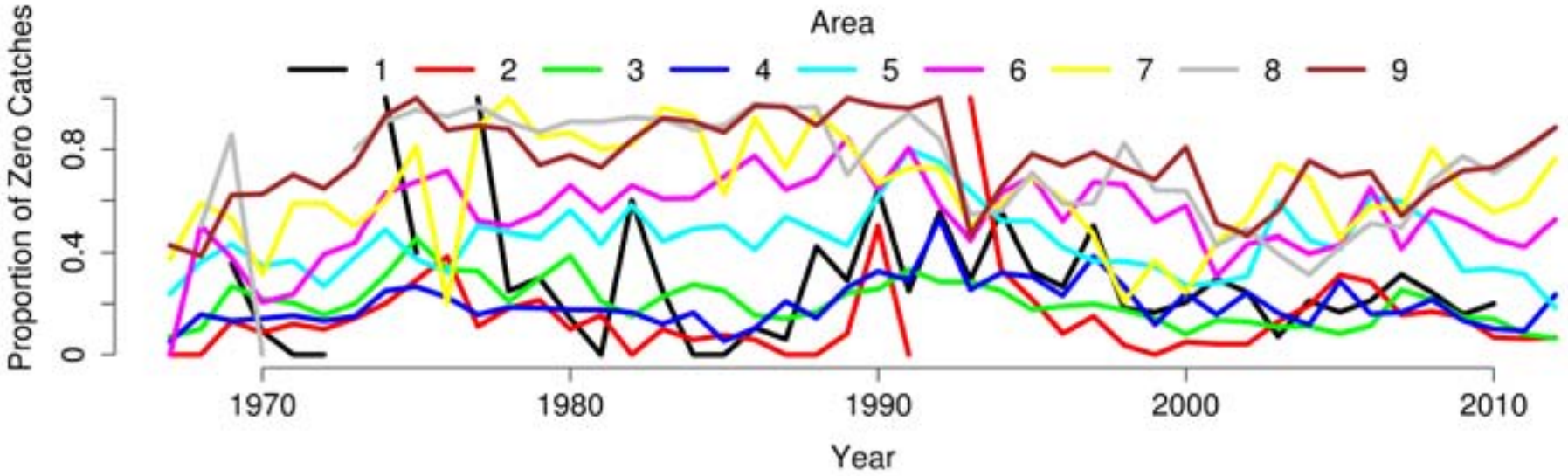


BUM - number of fish/1000 hooks - Decade x Quarter x Area

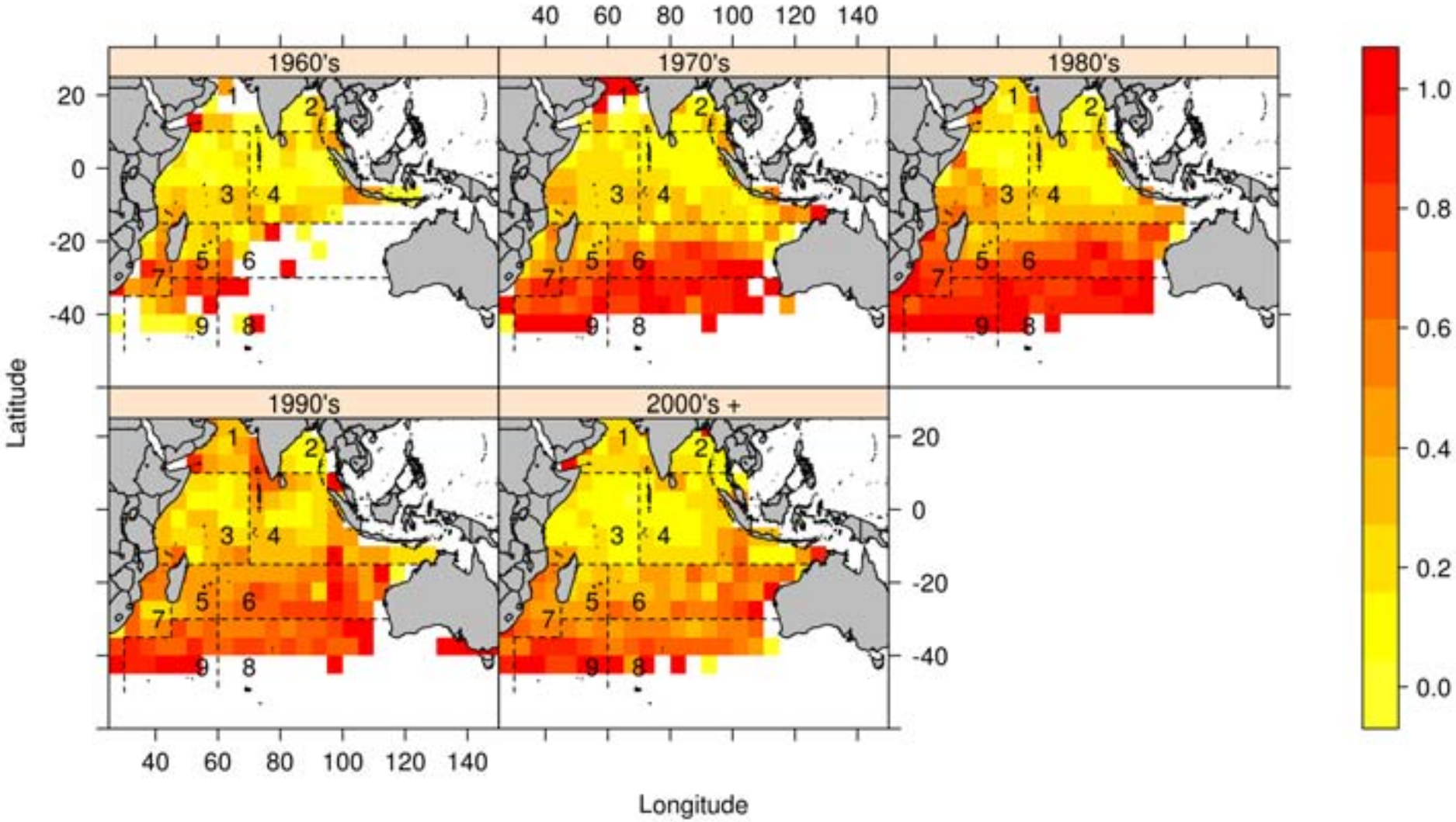


Proportion of Zero Catches

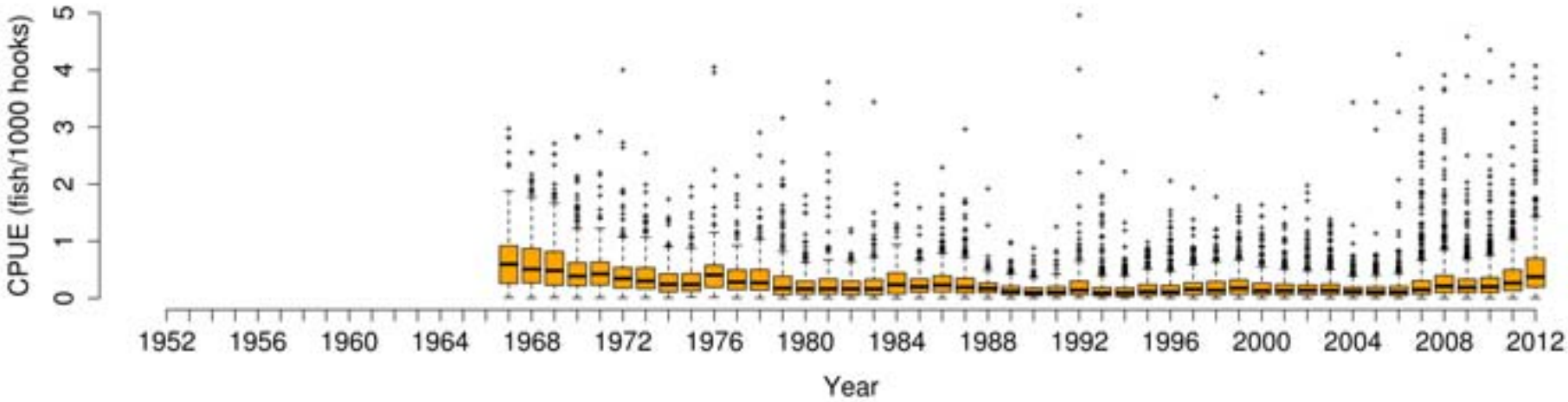


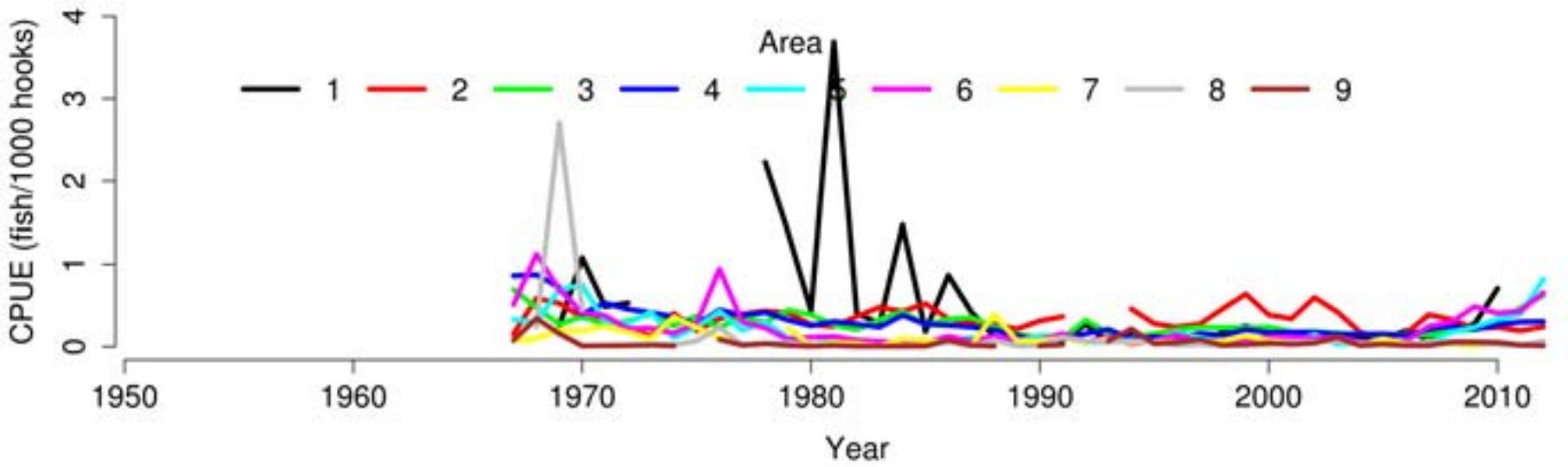


Proportion of Zero Catches

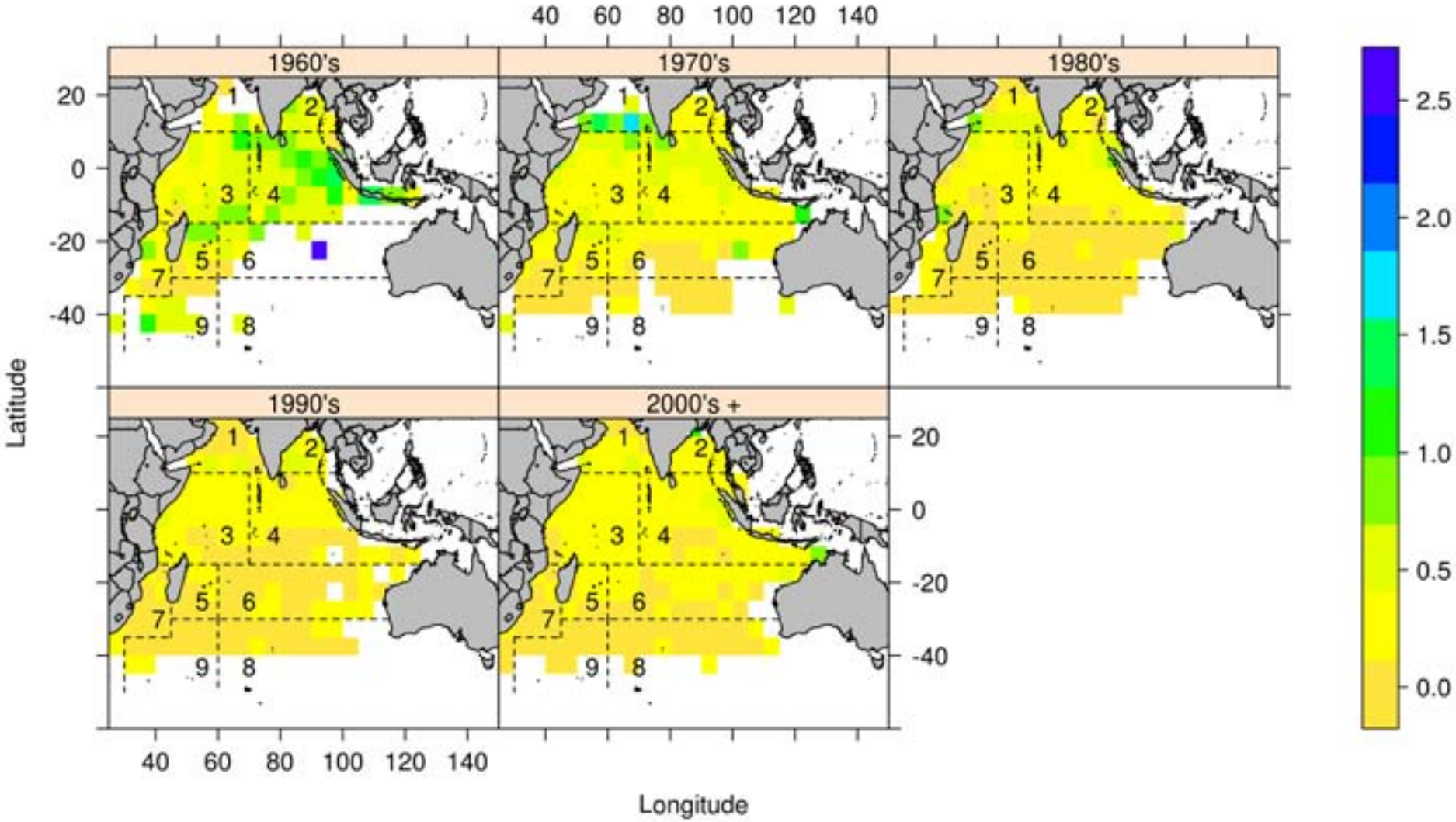


CPUE – Positive Catches





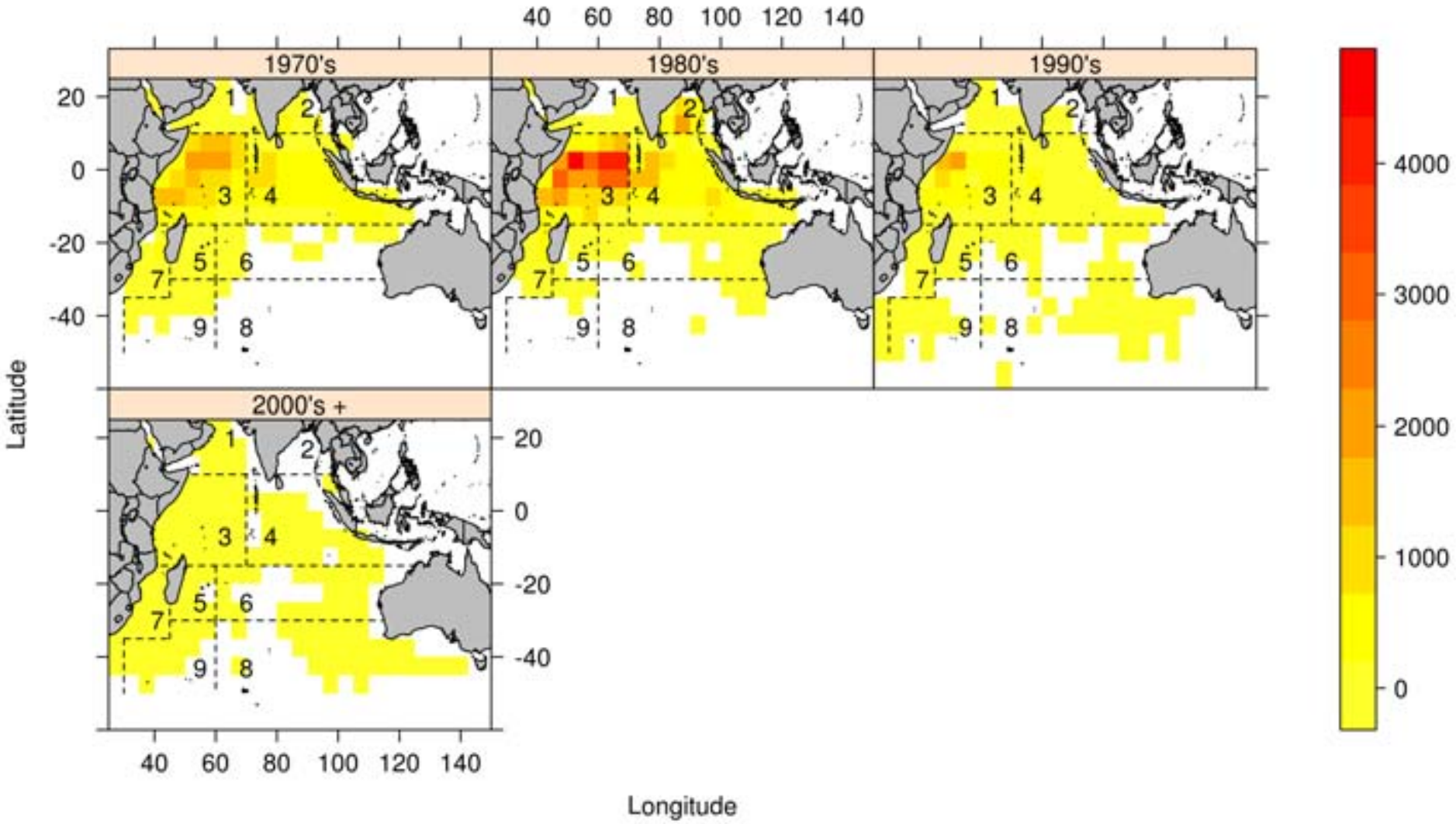
CPUE – Positive Catches



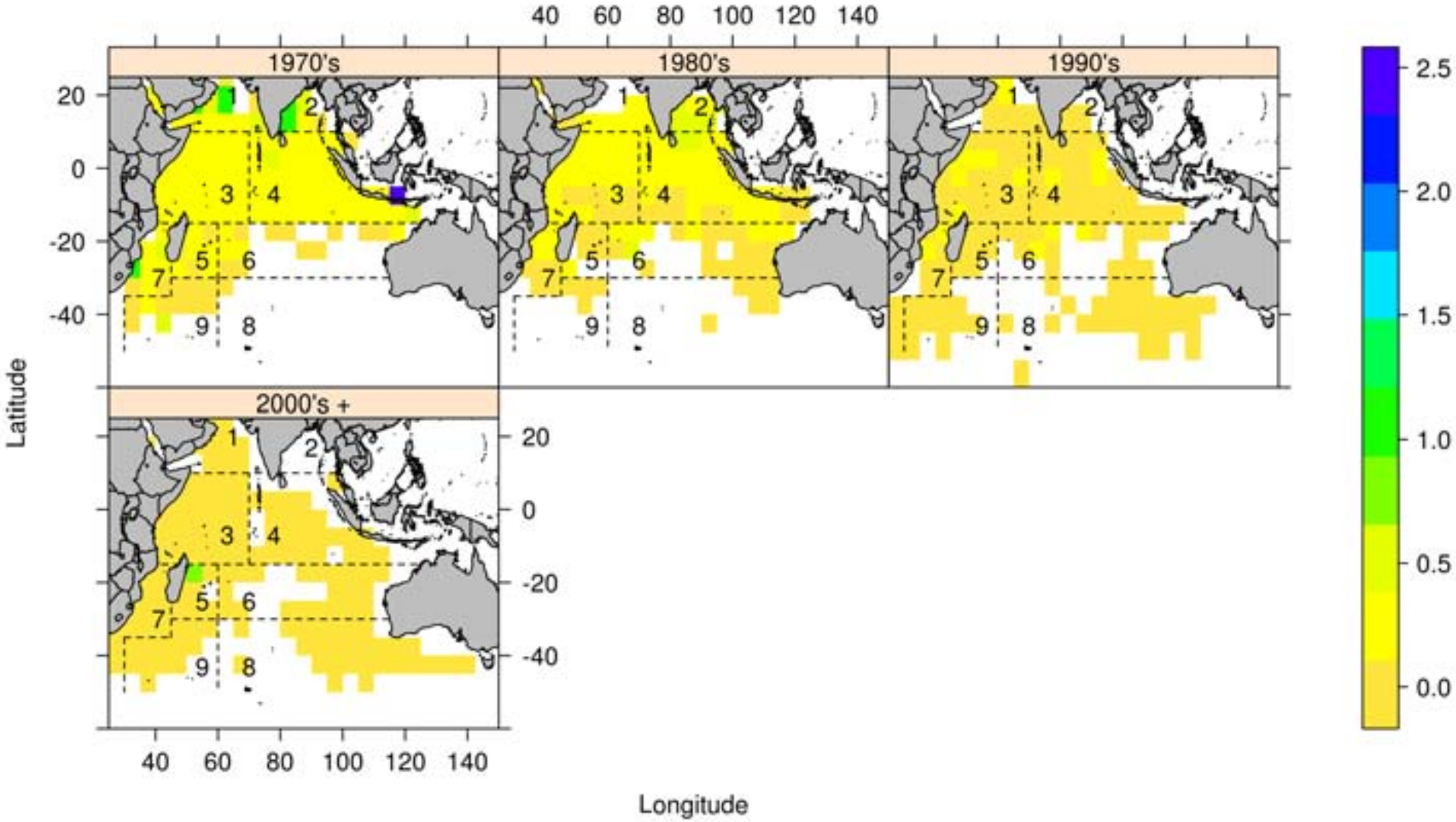
Remarks – BUM Taiwan Dataset

1. Catches were high in 2000's in area 3 and in areas 2 and 4 along the east margin of the Indic Ocean
2. Similarly catch rates were high in 2000's in areas 2 and 4 along the Vietnan, Indonesia and Australia. Catch rates in area 1 are also noticeable
3. Catch rates were especially high in areas 1 and 2 in the 3^{rd} quarter
4. The size of the area with high proportion of zero catches increase until 1980's and them decrease until 2000's;
5. Catch rates as calculated for positive dataset decreases slightly in 1960's and 1970's but increase in the end of 2000's. Data for 2007 might be revised.

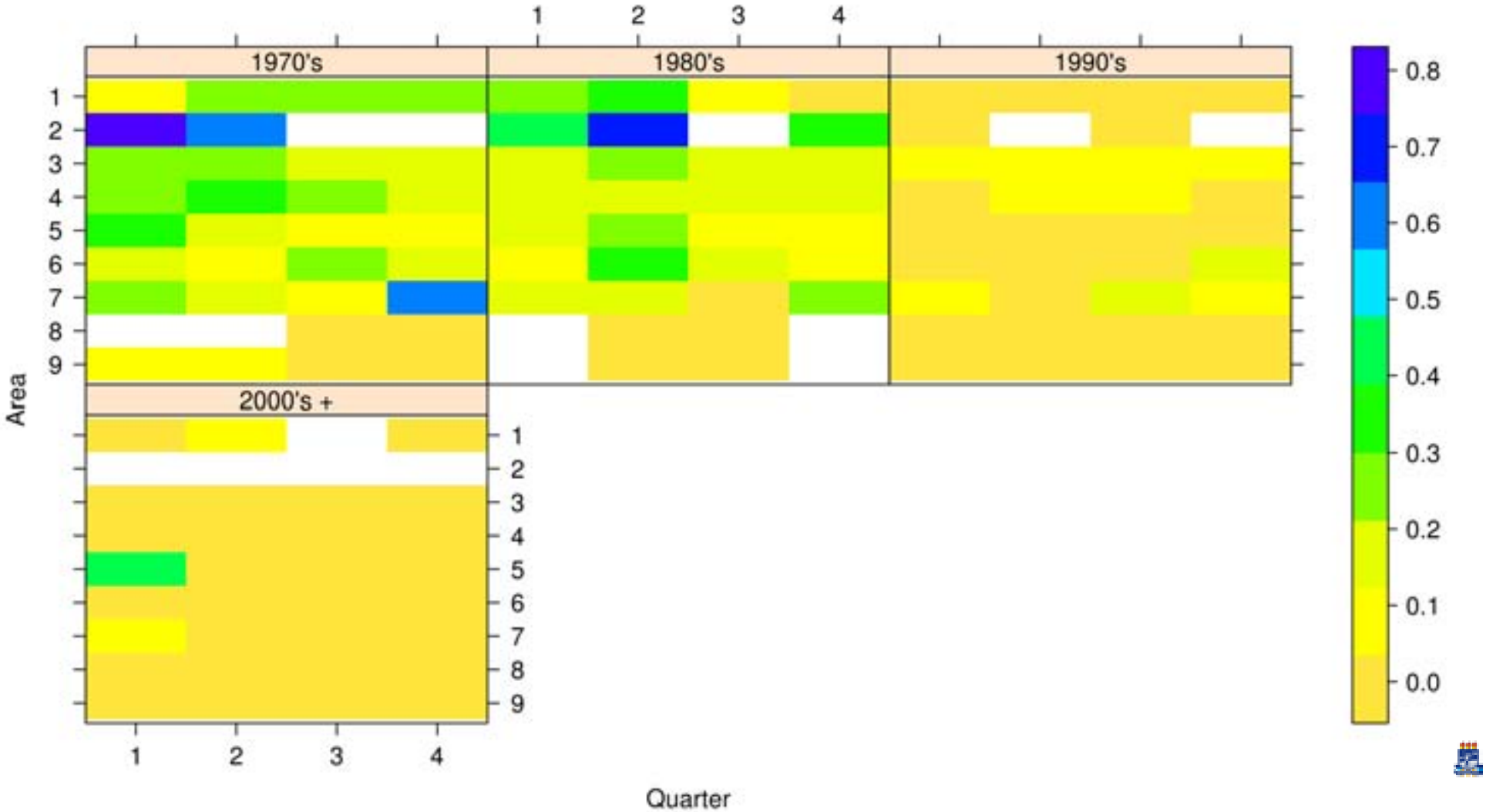
BUM - number of fish - Korea Dataset



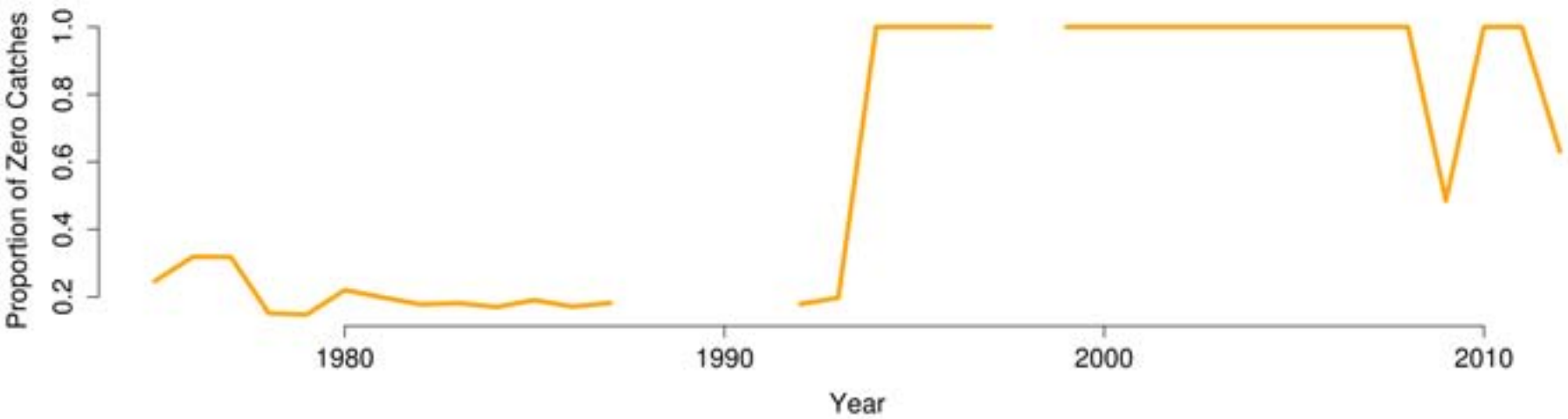
BUM - number of fish/1000 hooks - Decade x Lat x Lon

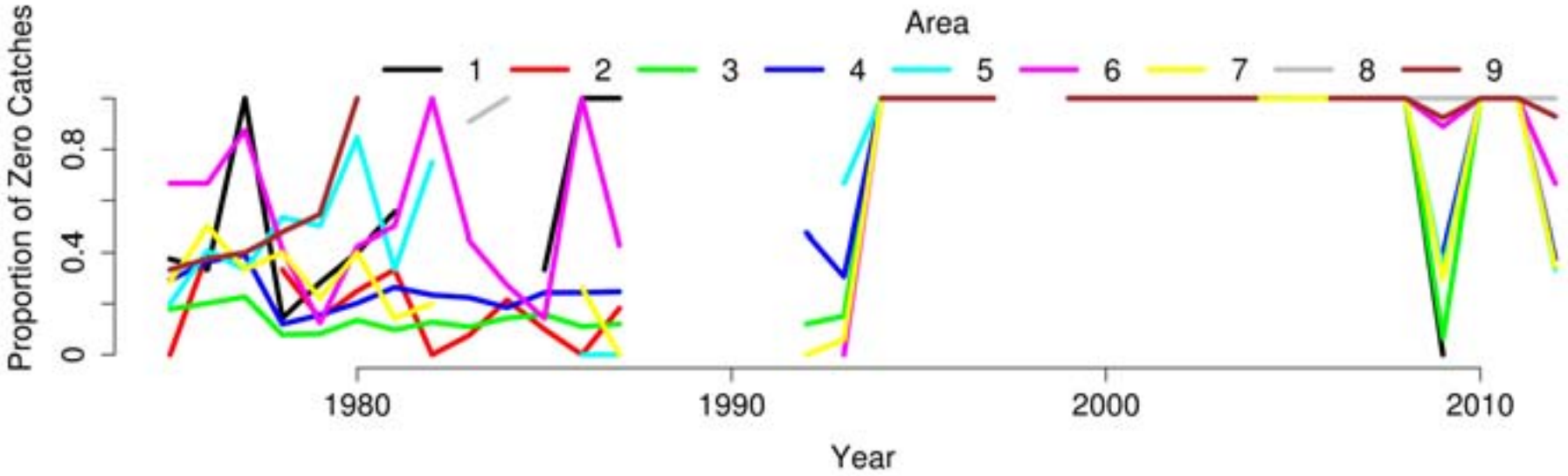


BUM - number of fish/1000 hooks - Decade x Quarter x Area

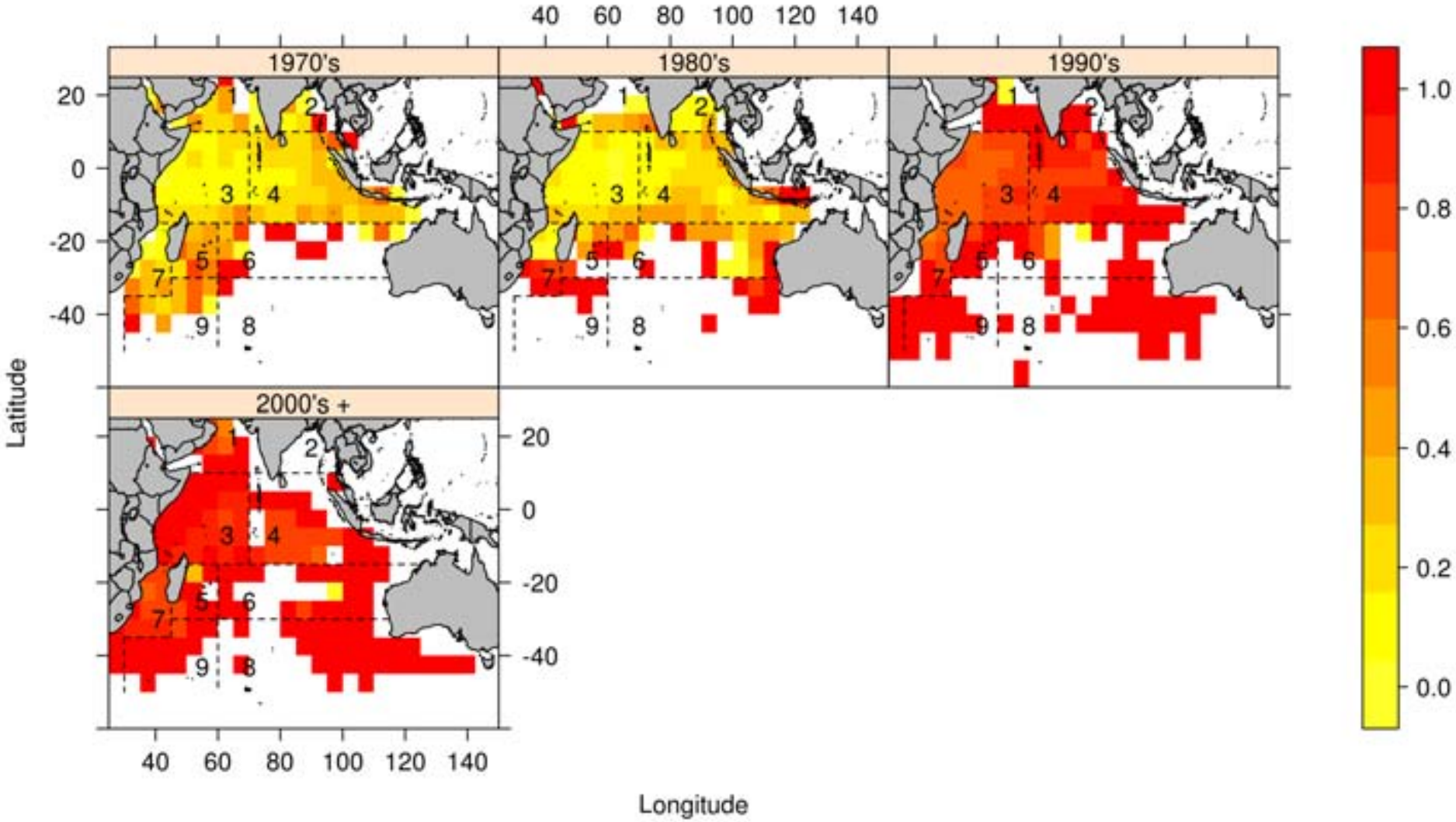


Proportion of Zero Catches

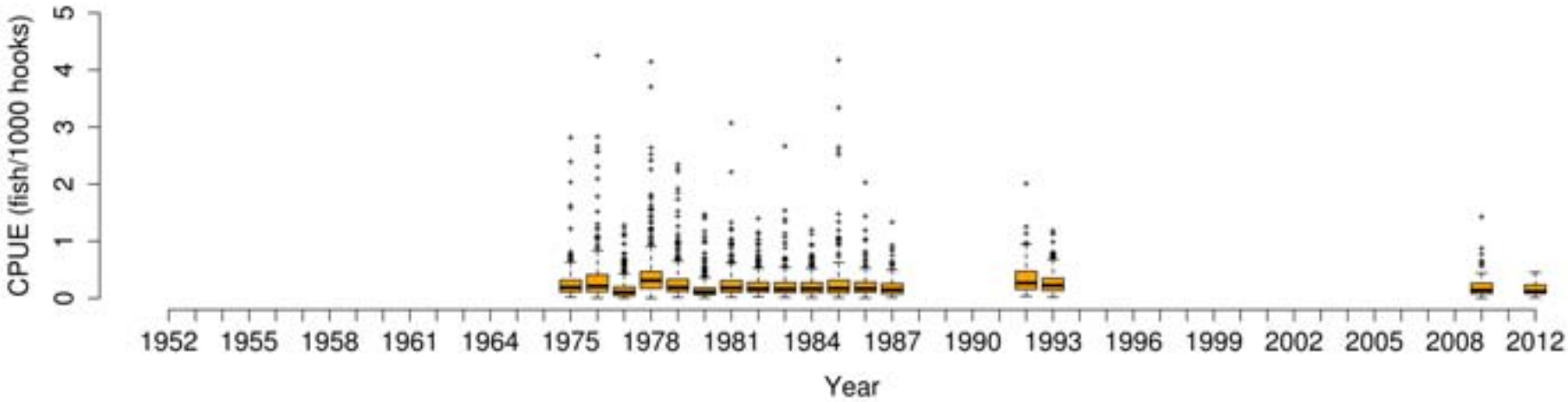


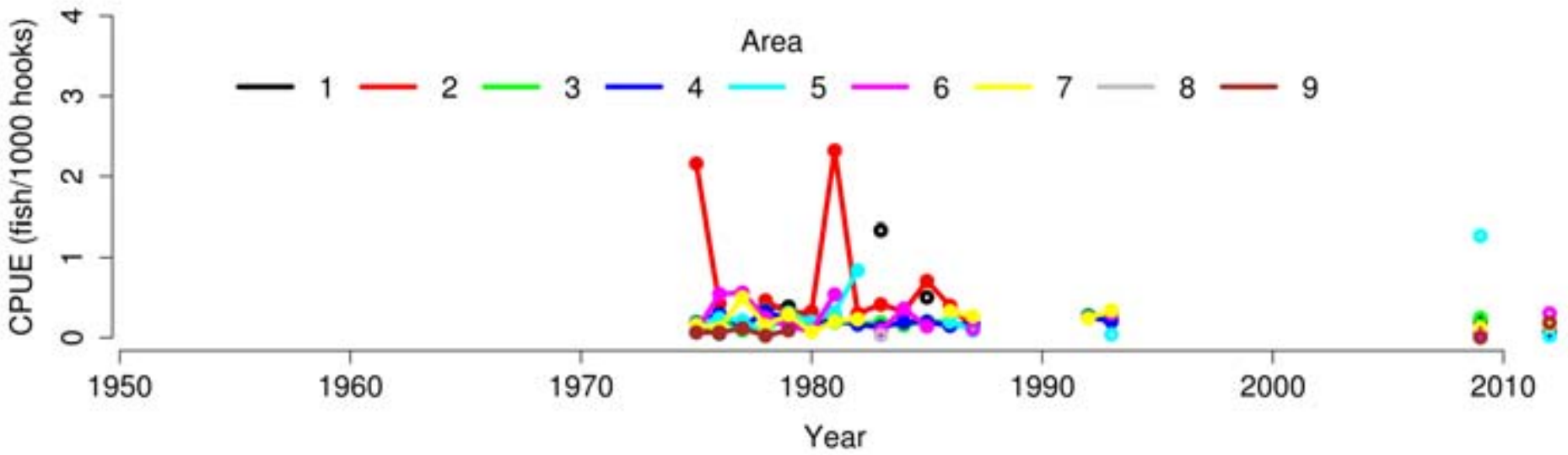


Proportion of Zero Catches

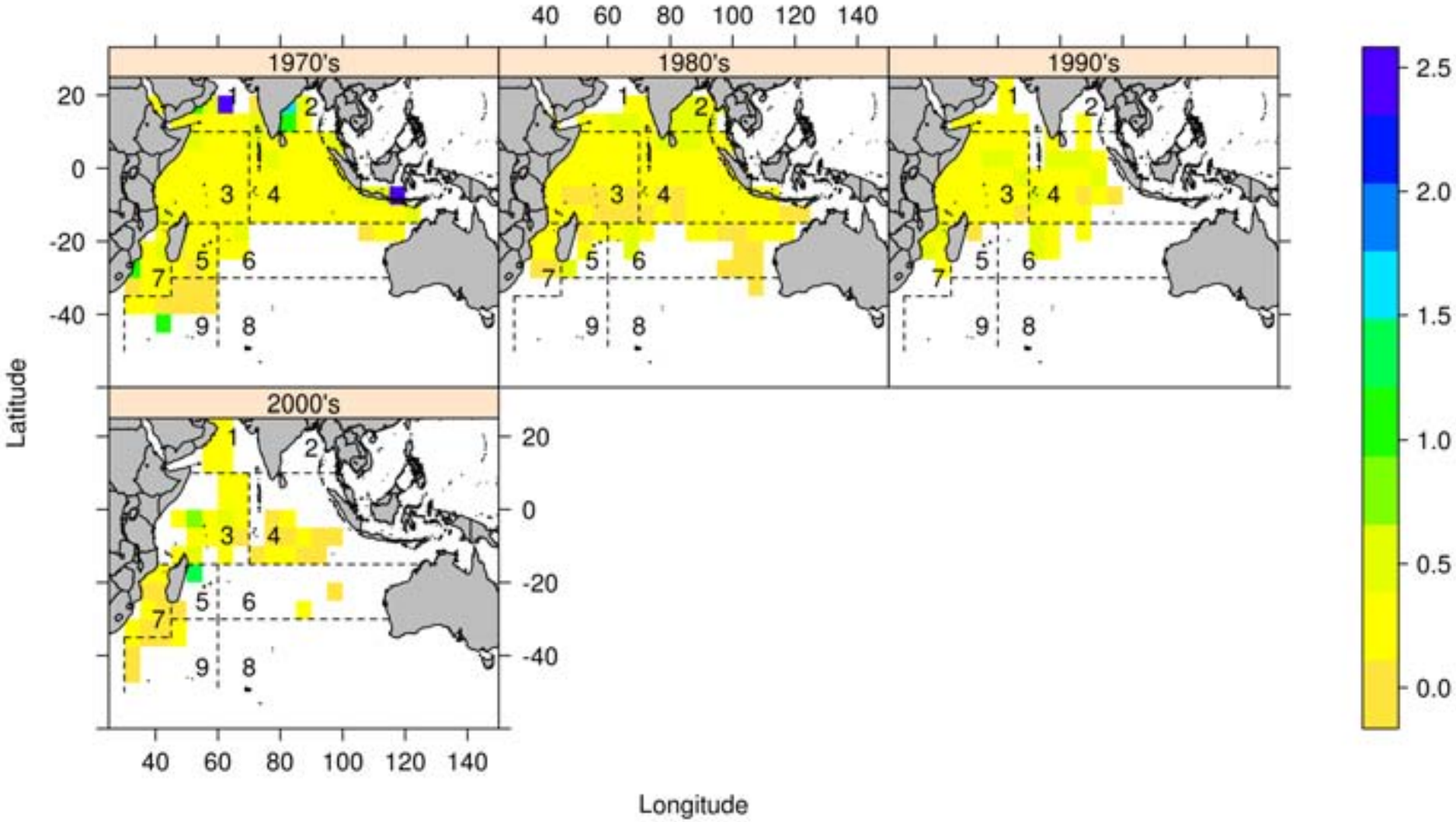


CPUE – Positive Catches





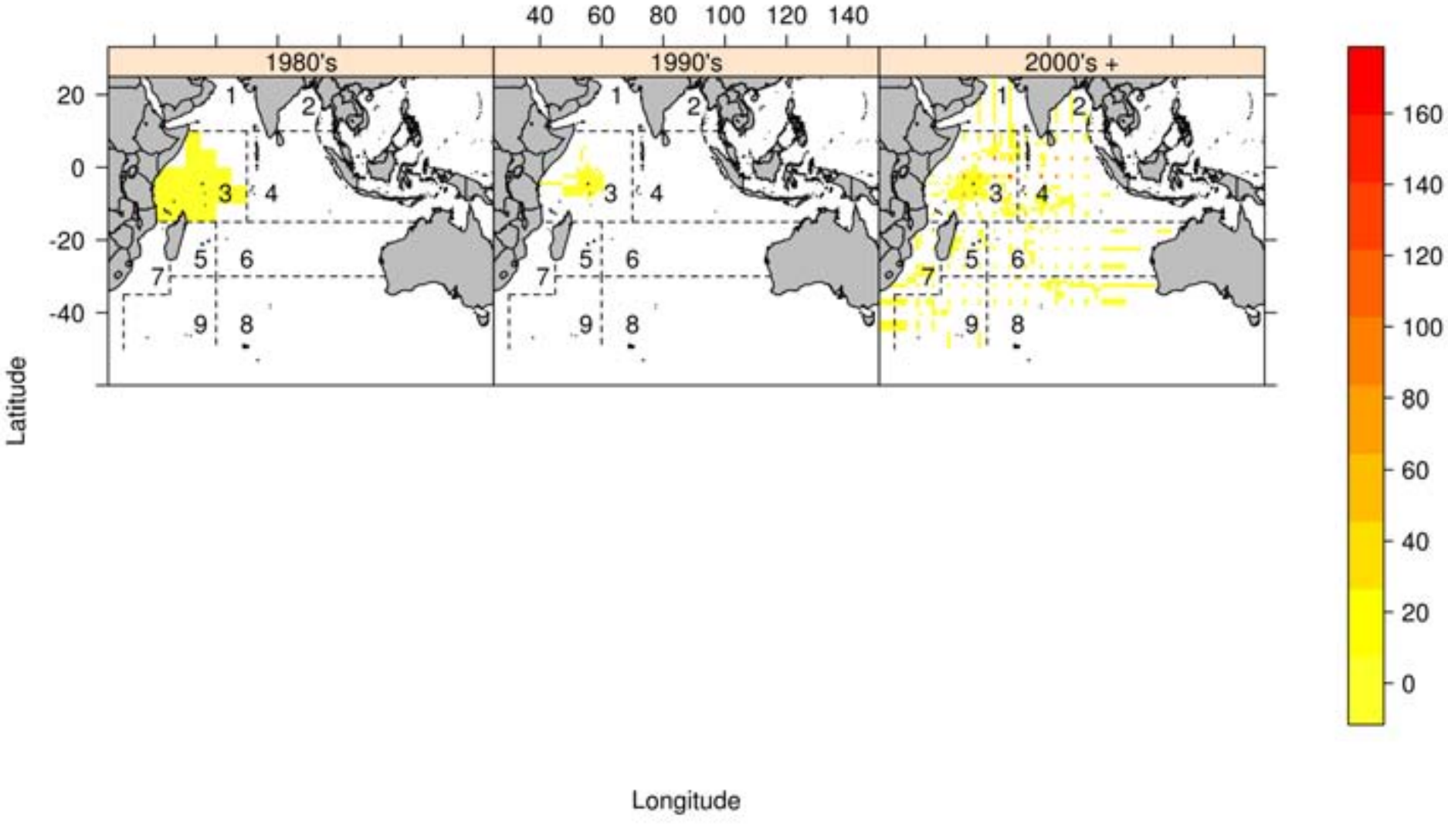
CPUE – Positive Catches



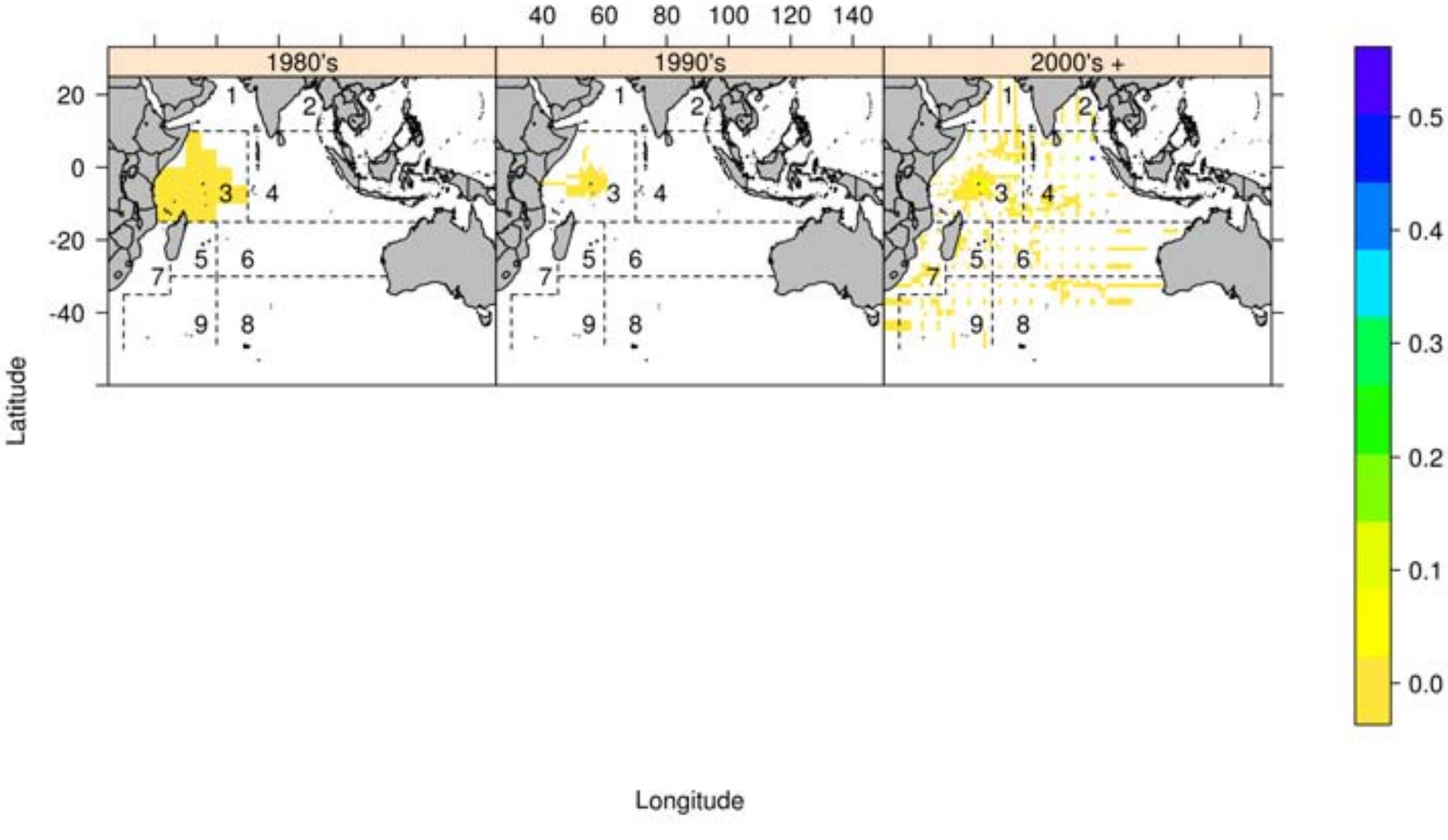
Remarks – BUM Korea Dataset

1. Catches in 1990's and 2000's were reported in metric tons but in number of fish in the other years;
2. Catches were high in 1970's and 1980's in area 3;
3. Catch rates were high in 1970's and 1980's in areas 1, 2, 3, 4 and 7 especially in the Indic Ocean margins;
4. Catches seem to be higher in the first half of the year in areas 1 to 5 while in the south of Africa (area 7) catch rates were high in the 4^{th} quarter;
5. Proportions of zero catches are not high in areas 2, 3 and 4 in 1970's and 1980's. Data are not informative for other areas and years;
6. Catch rates as calculated for positive dataset were high in 1970's in the margins of Indic Ocean.

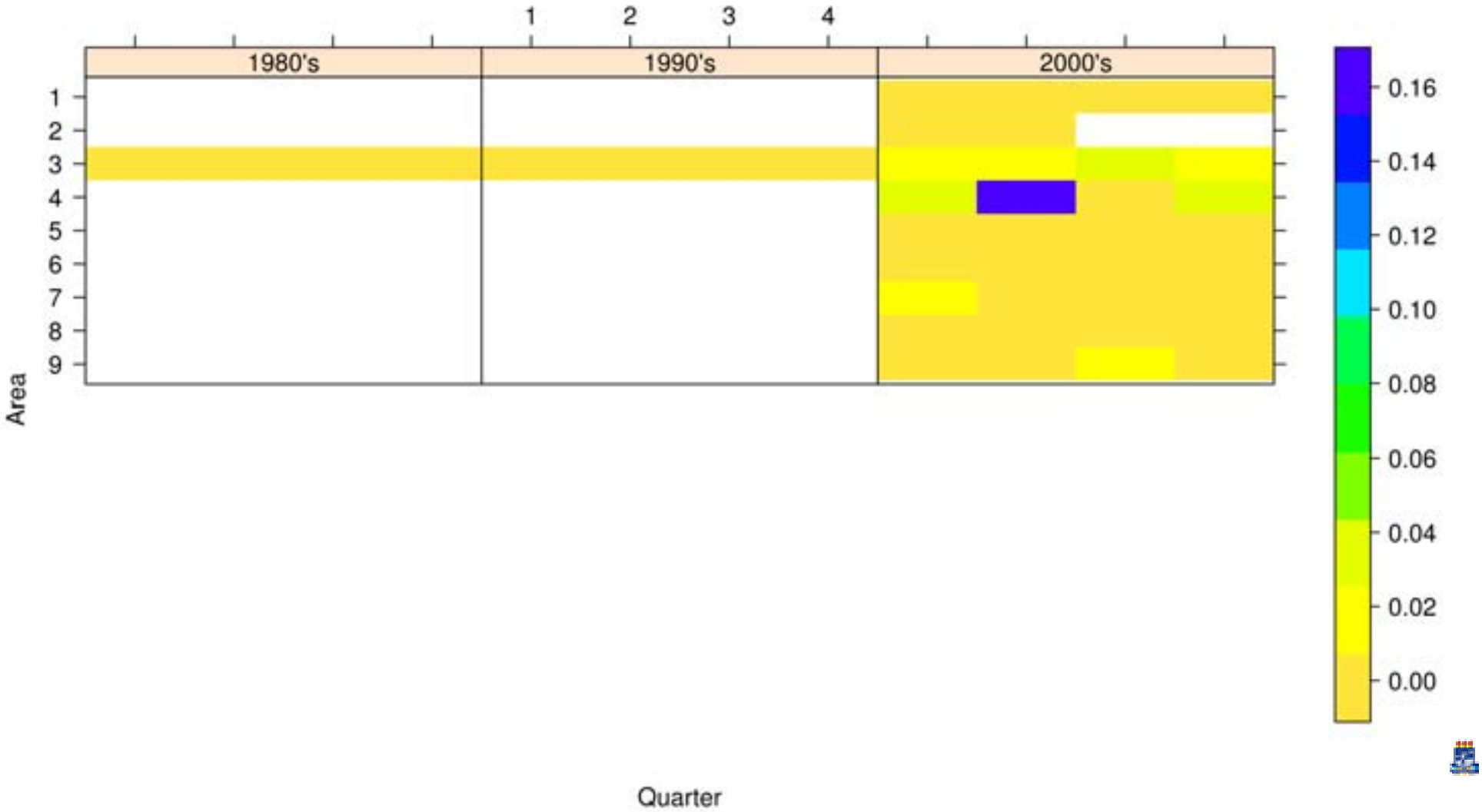
BUM - number of fish - Seychelles Dataset



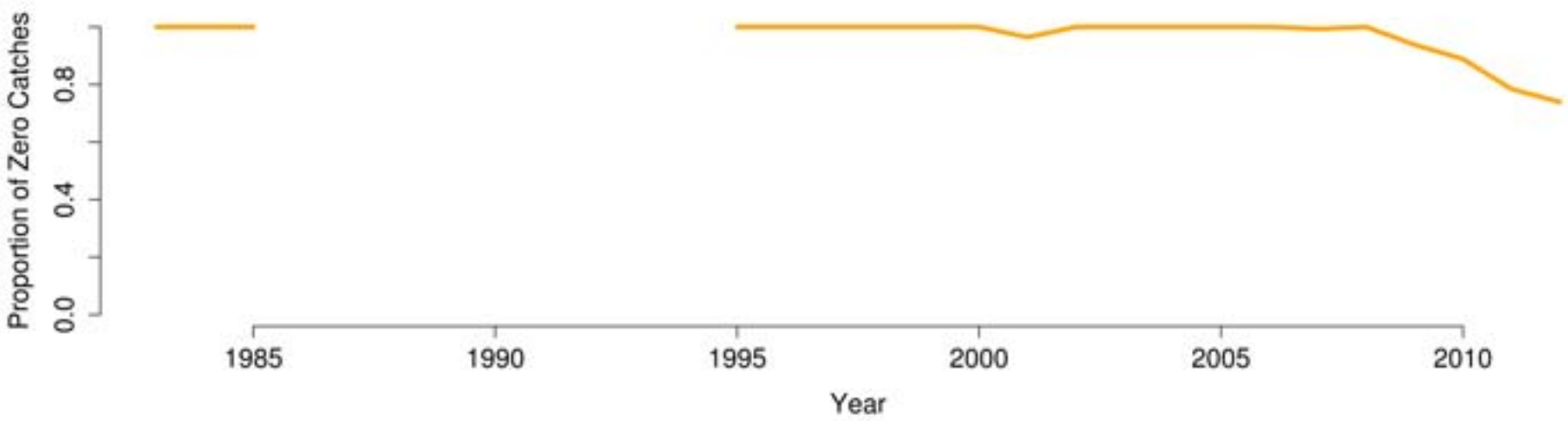
BUM - number of fish/1000 hooks - Decade x Lat x Lon

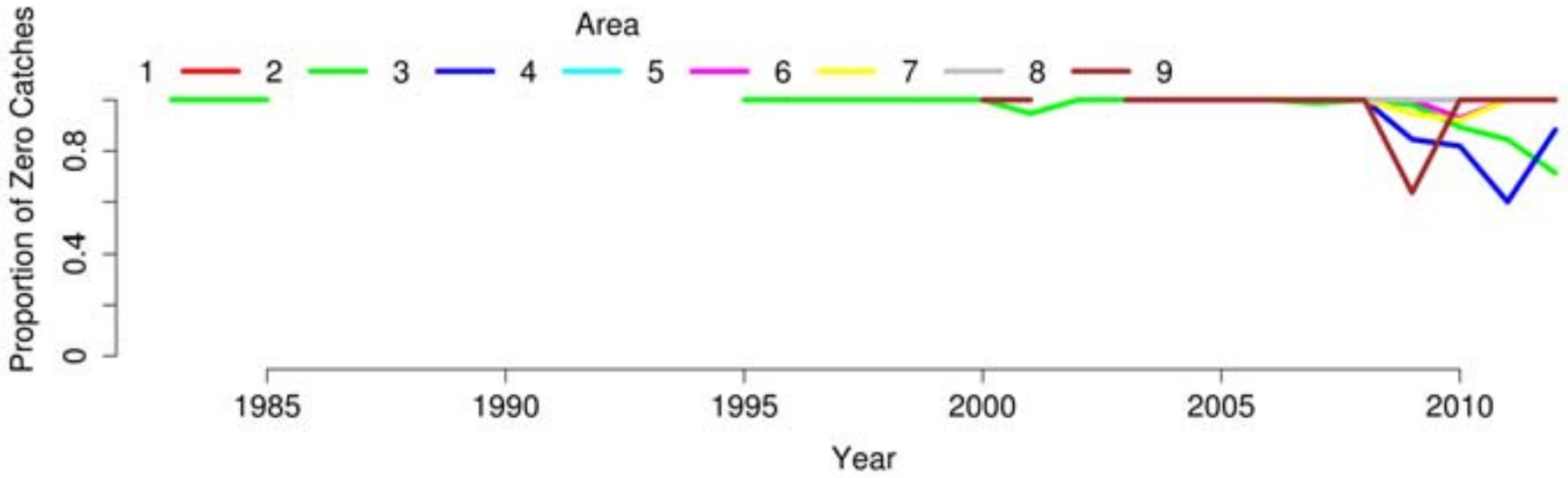


BUM - number of fish/1000 hooks - Decade x Quarter x Area

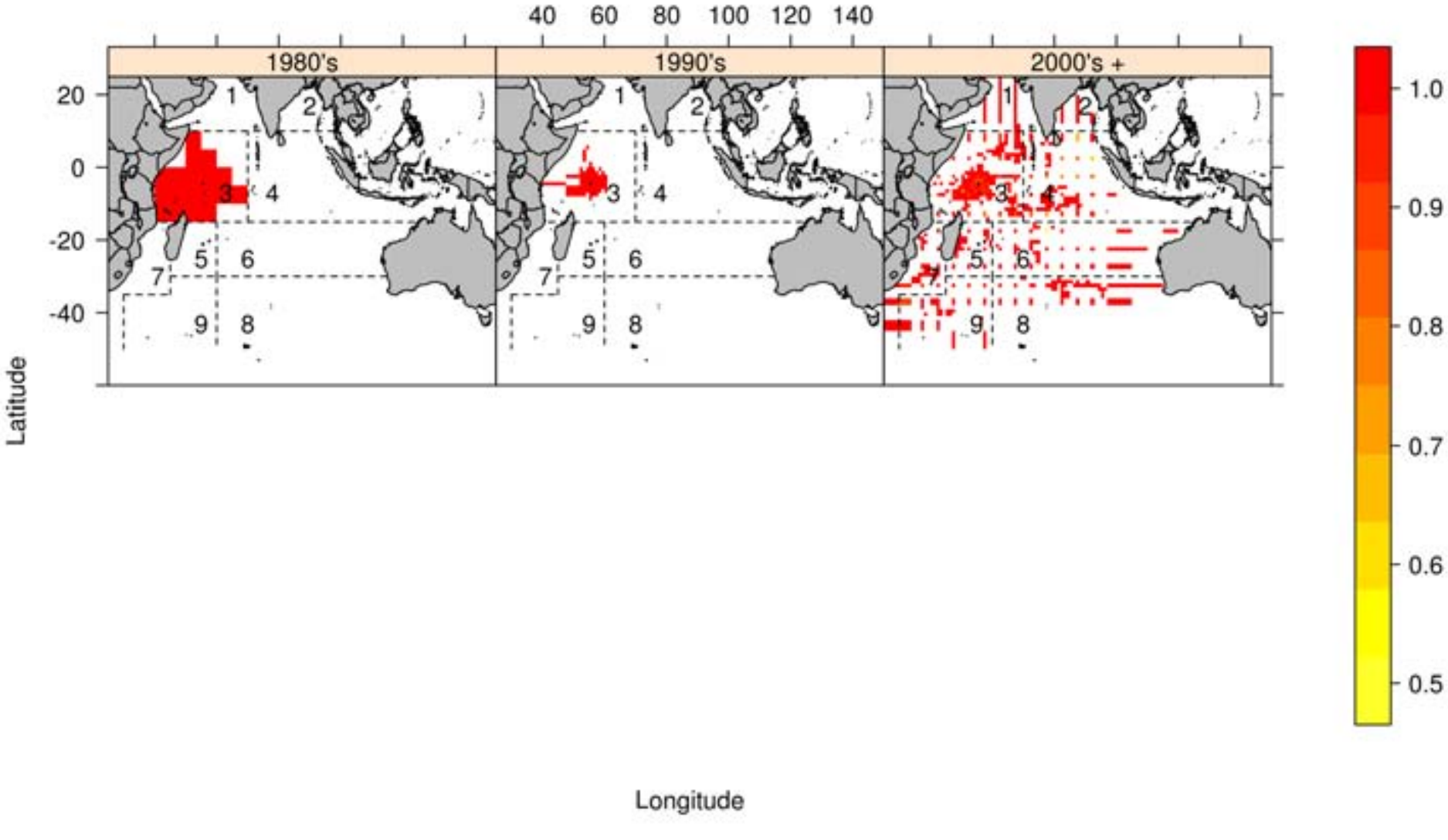


Proportion of Zero Catches

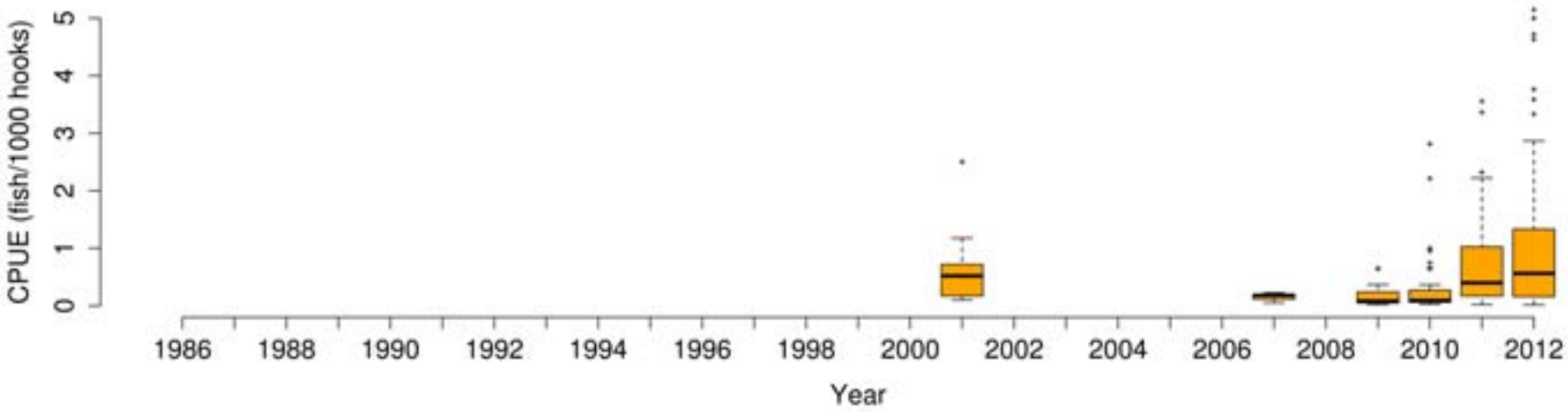


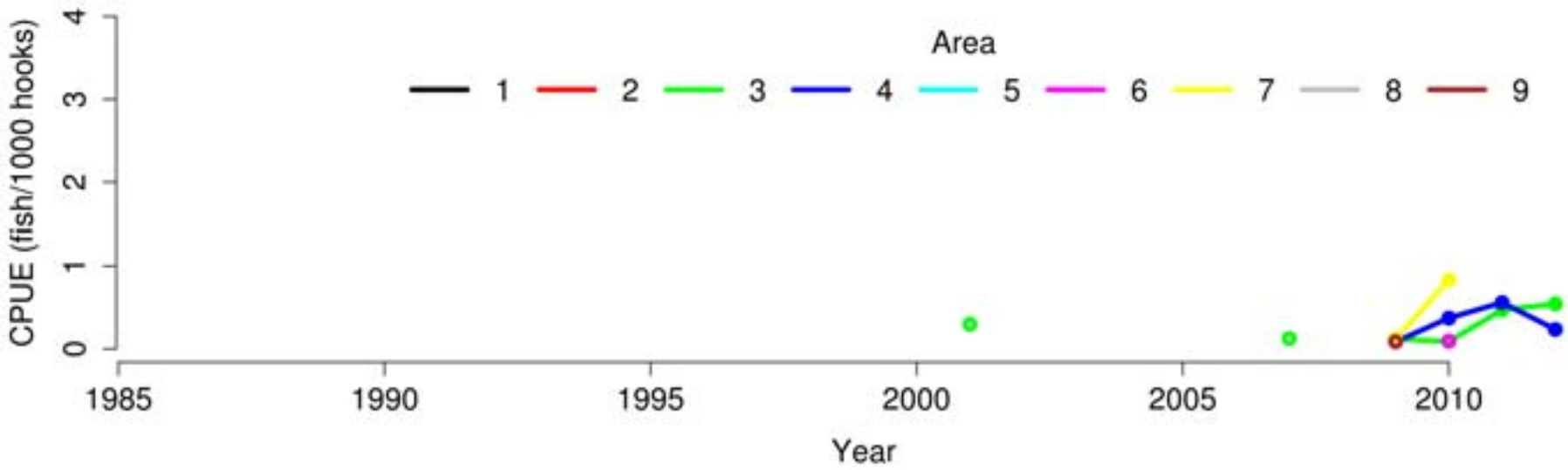


Proportion of Zero Catches

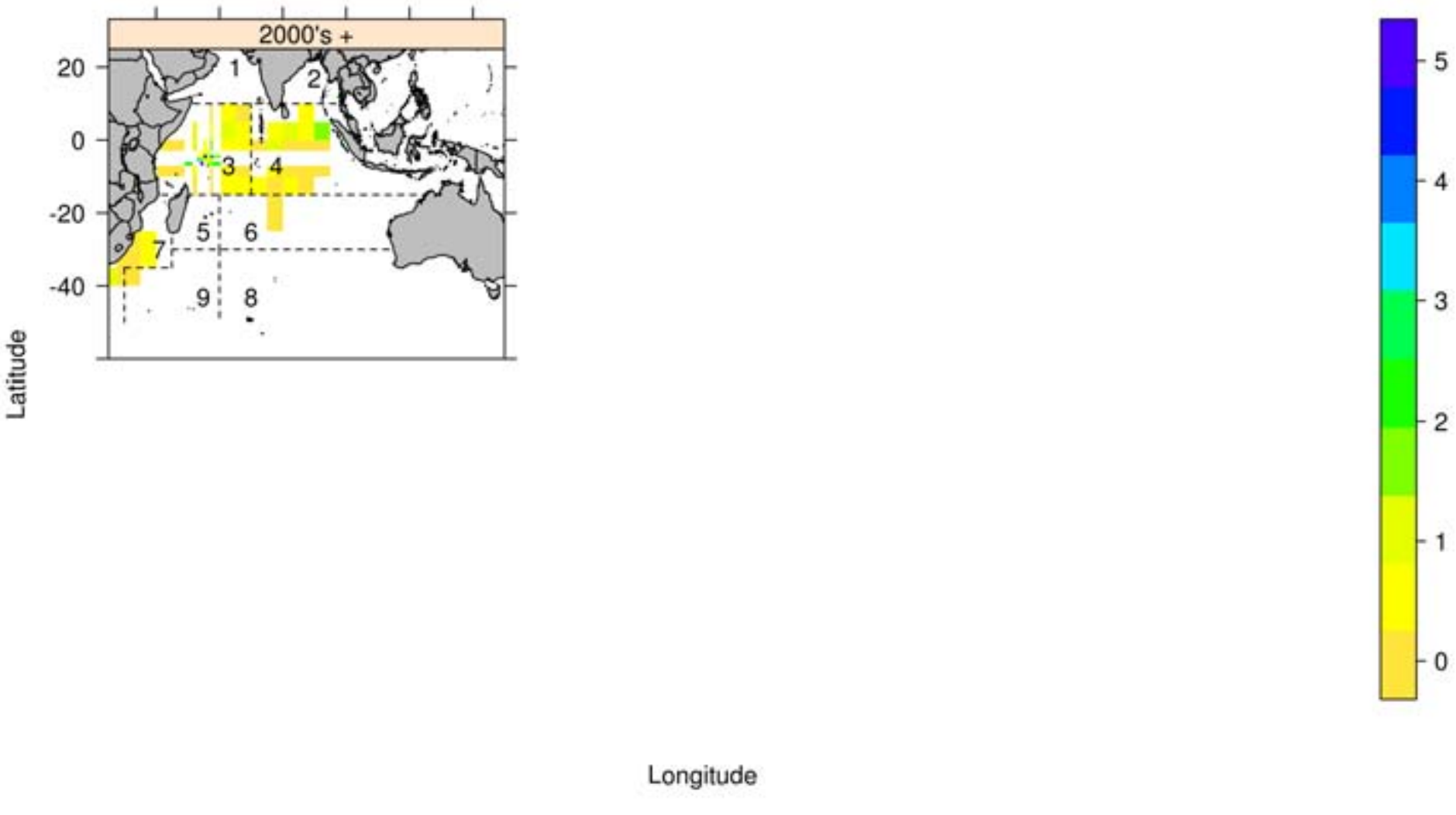


CPUE – Positive Catches





CPUE – Positive Catches

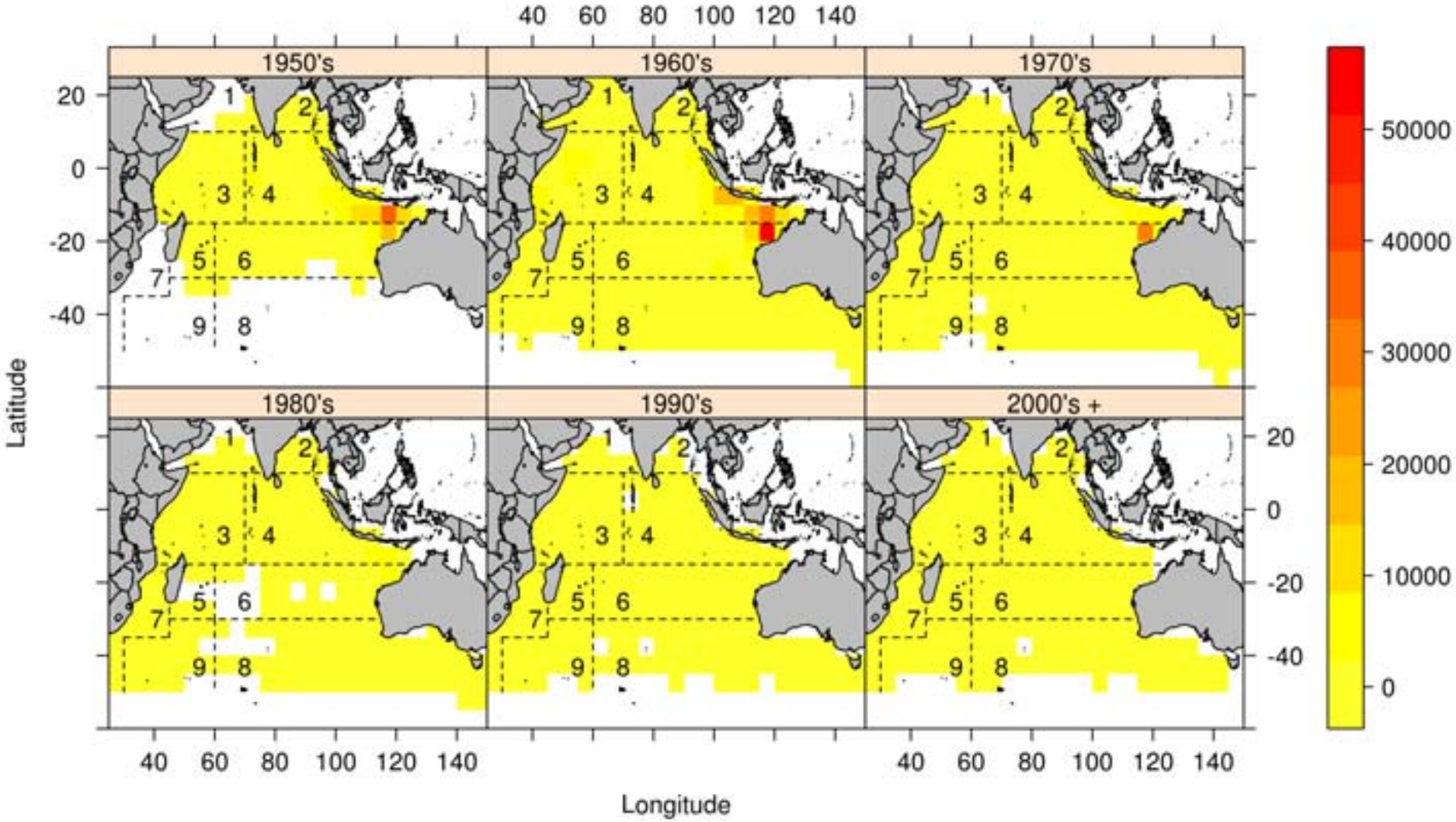


Remarks – BUM Seychelles Dataset

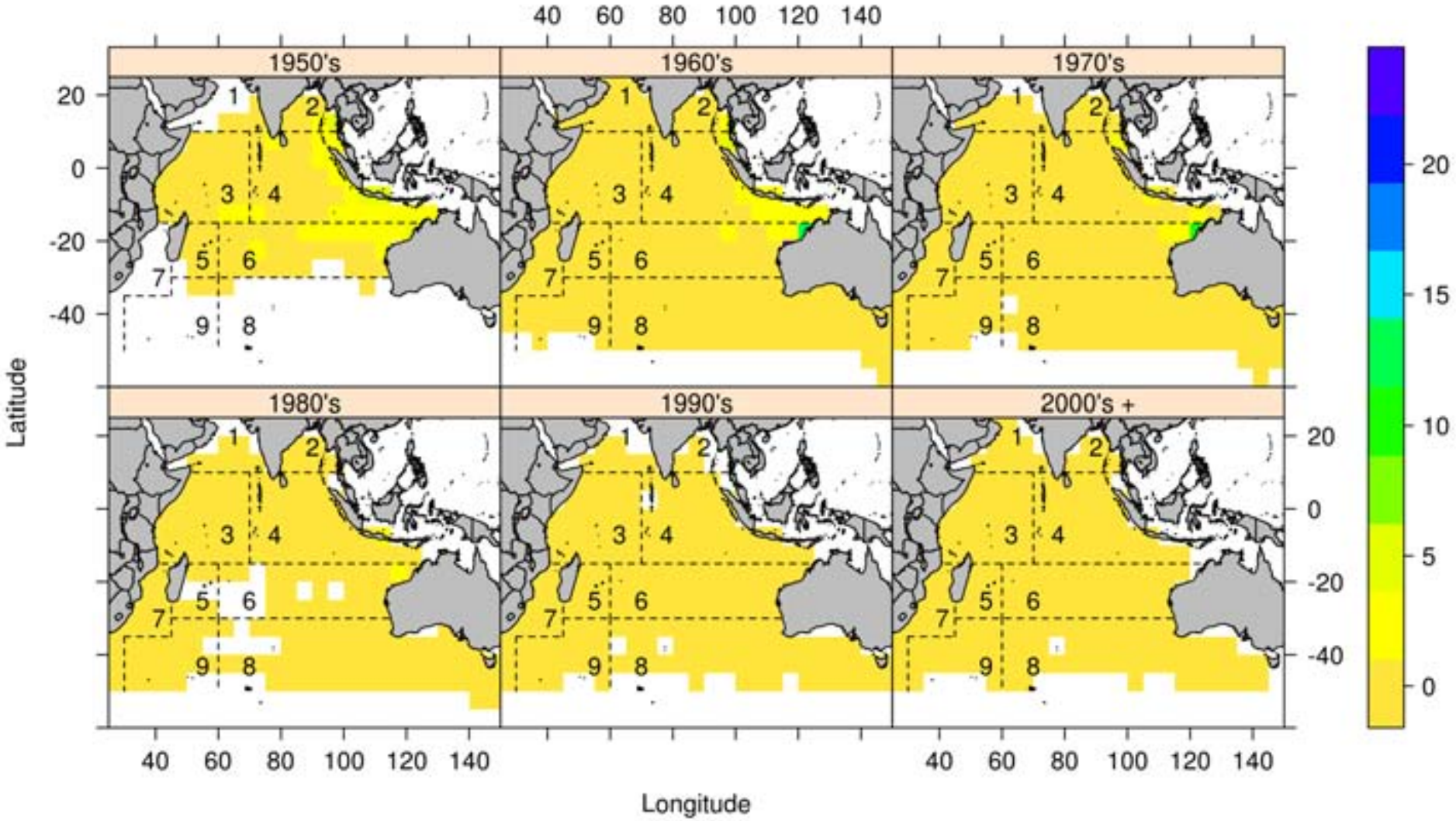
1. Time series is not consistent;

Black Marlin (BLM)

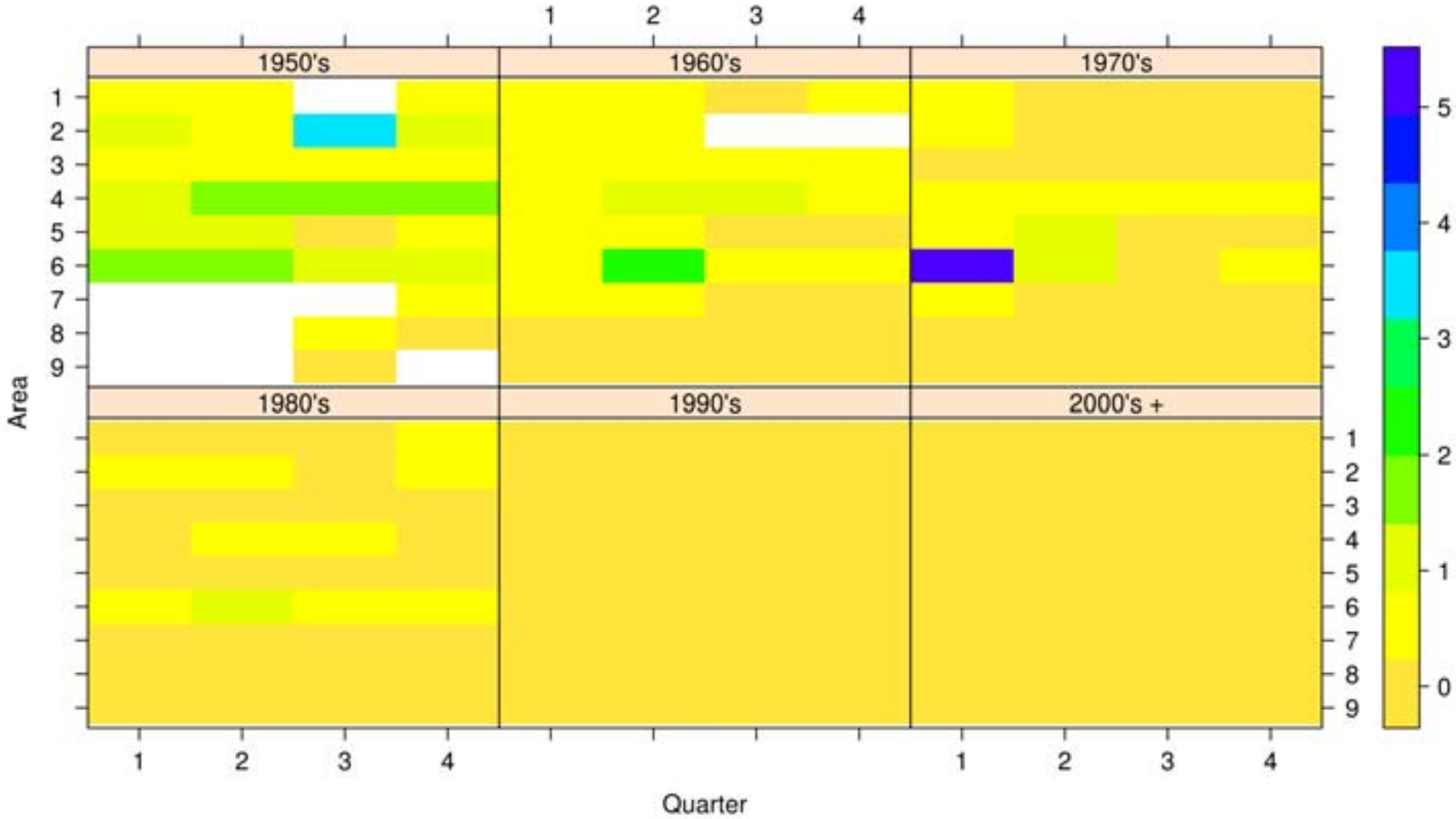
BLM - number of fish - Japan Dataset



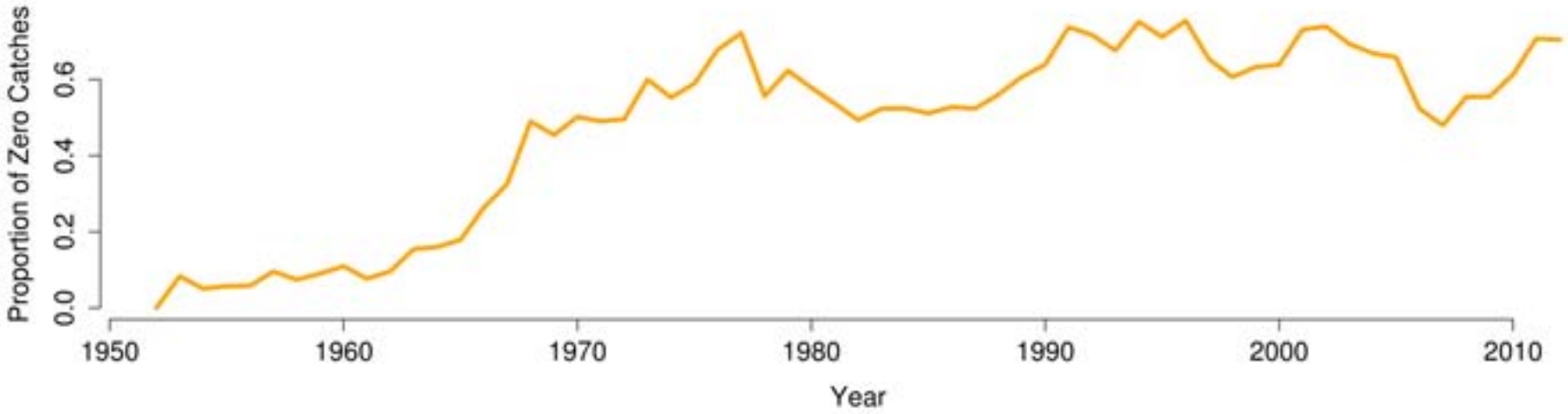
BLM - number of fish/1000 hooks - Decade x Lat x Lon

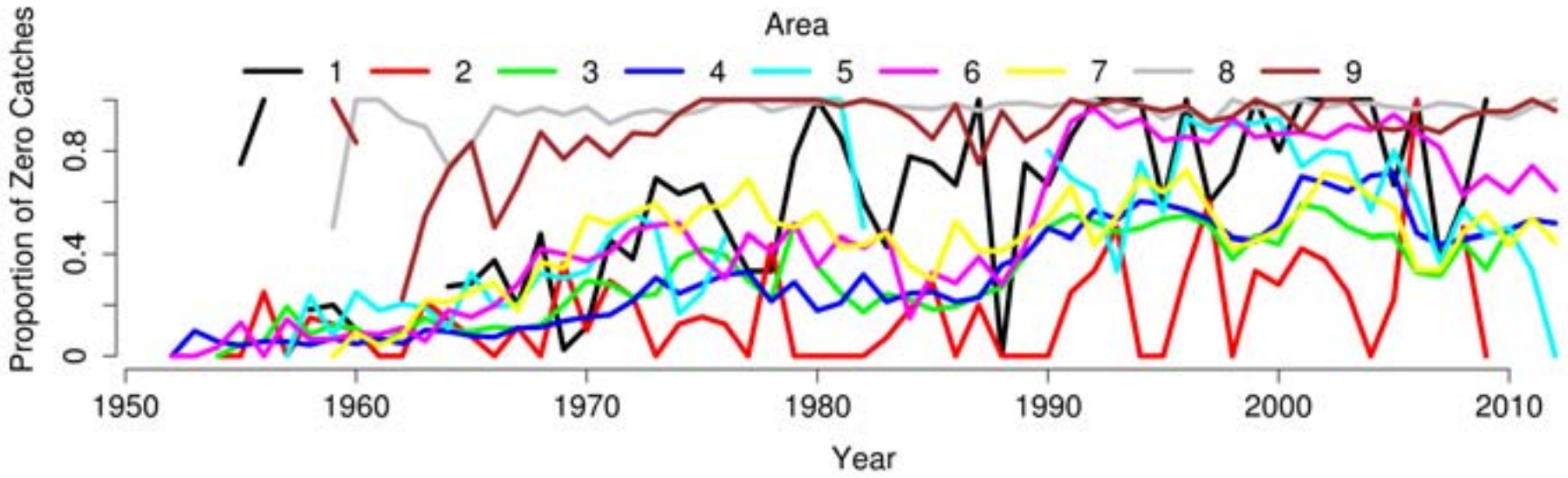


BLM - number of fish/1000 hooks - Decade x Quarter x Area

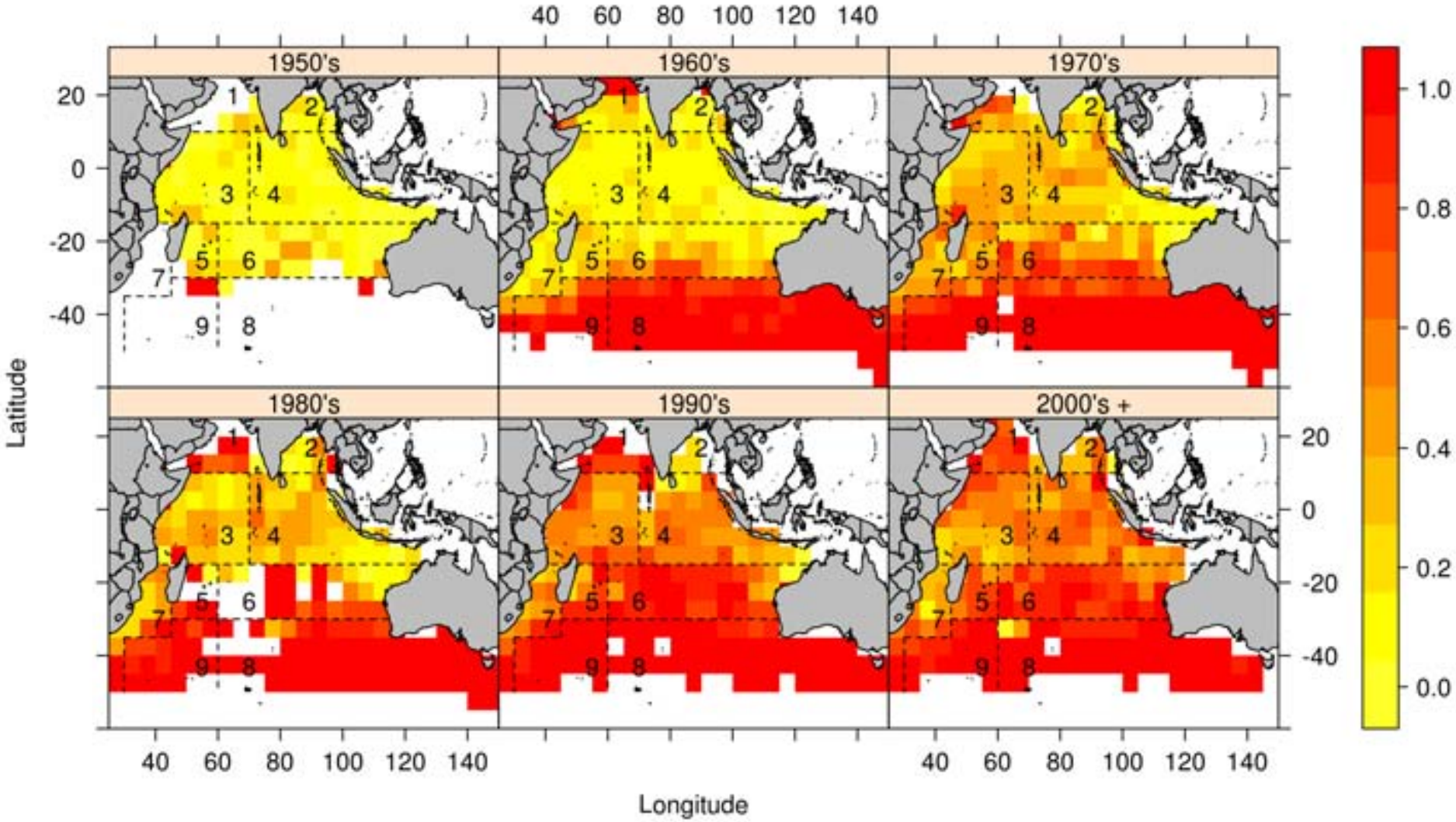


Proportion of Zero Catches

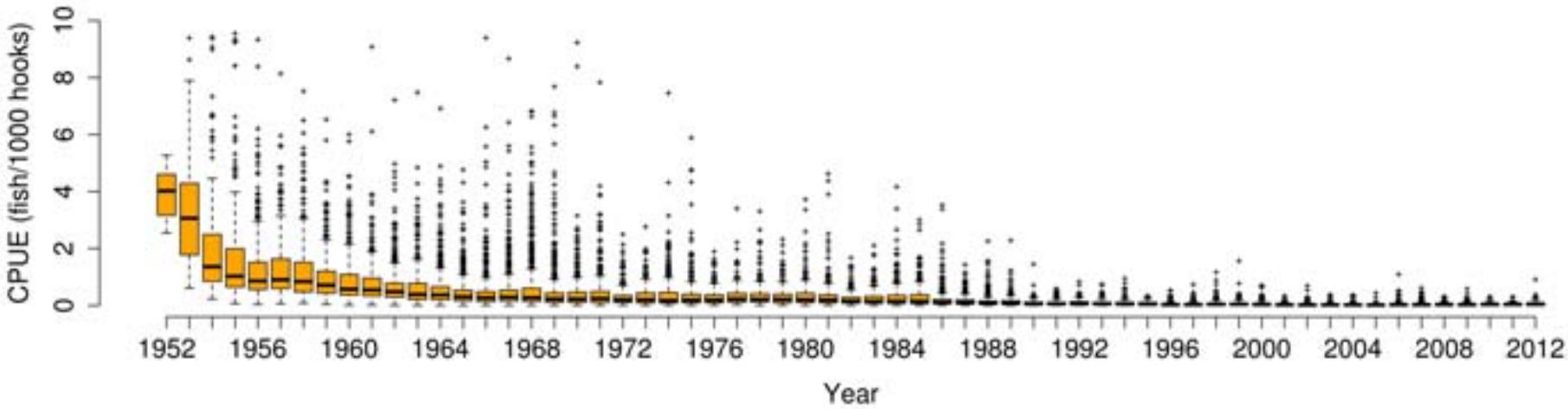


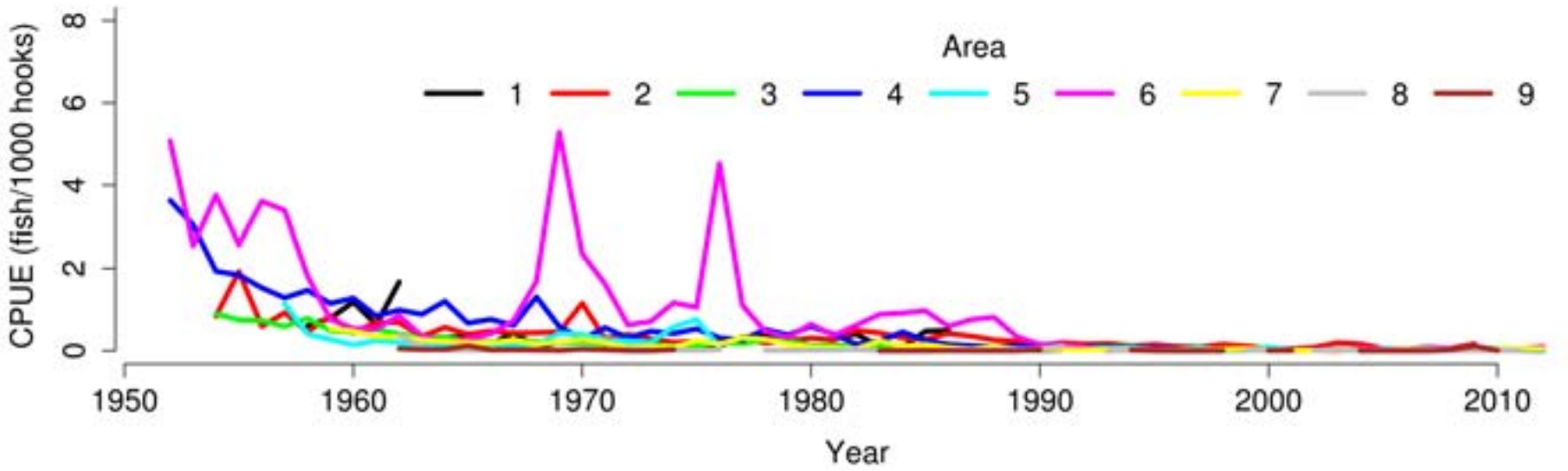


Proportion of Zero Catches

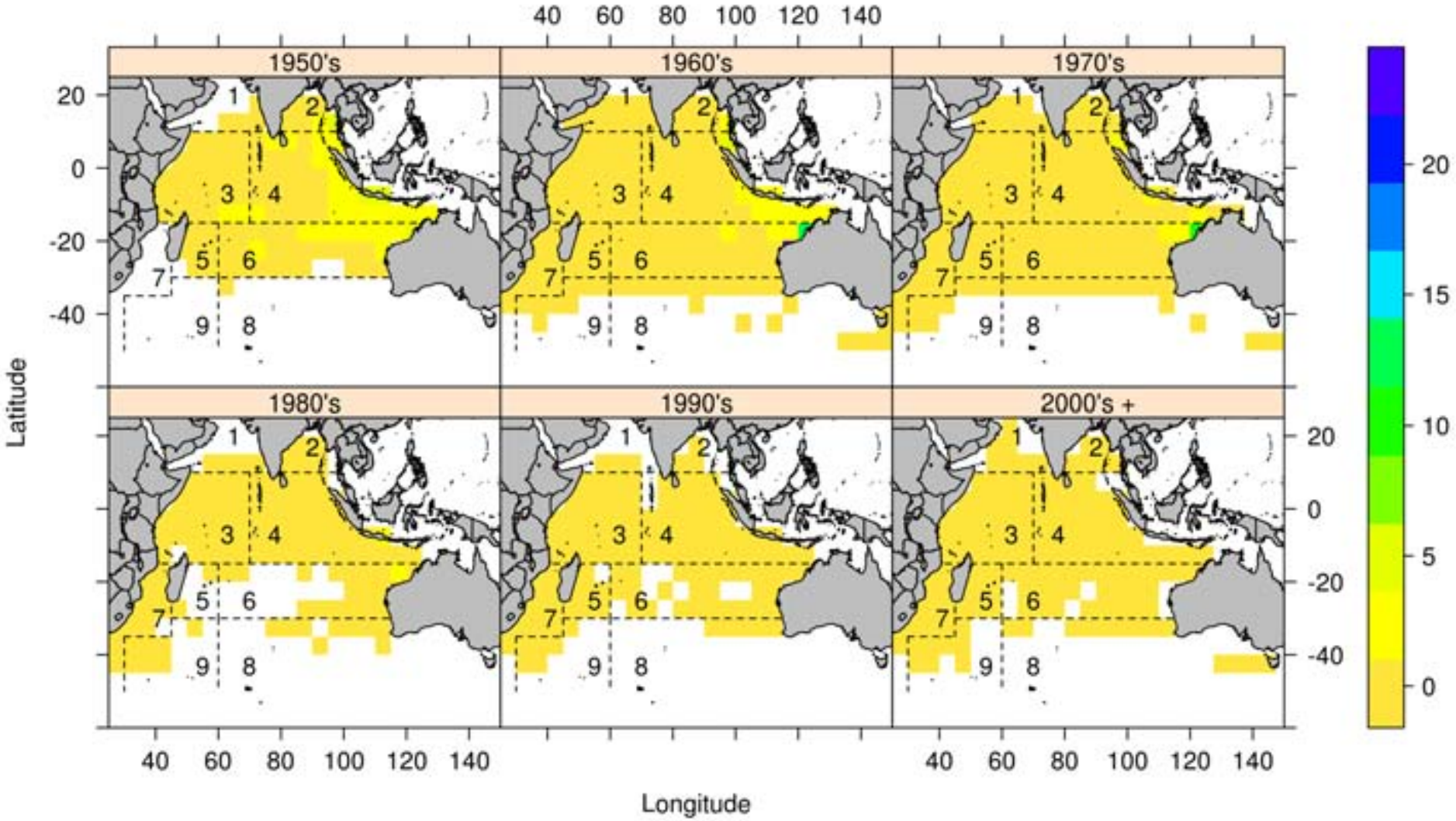


CPUE – Positive Catches





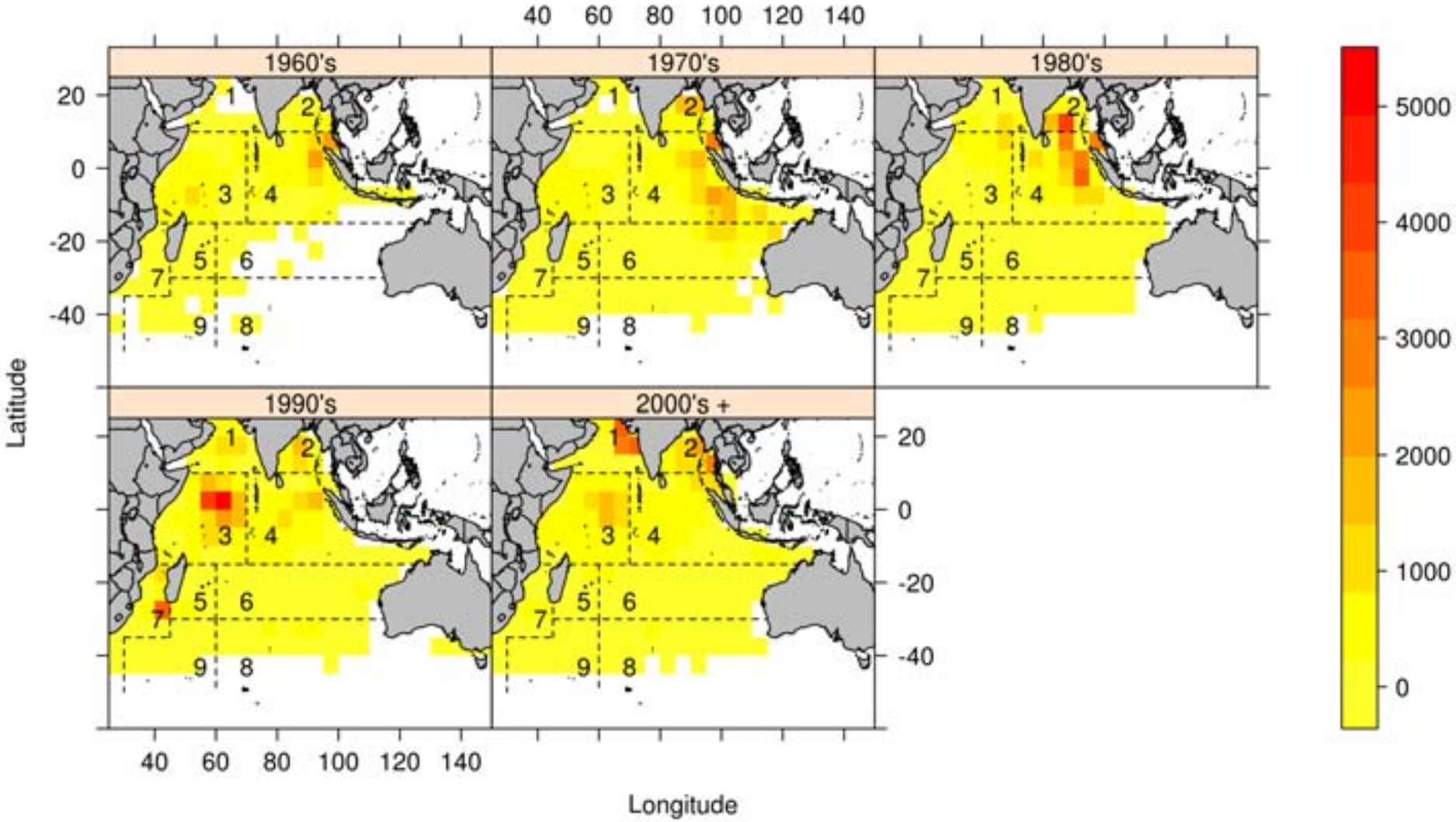
CPUE – Positive Catches



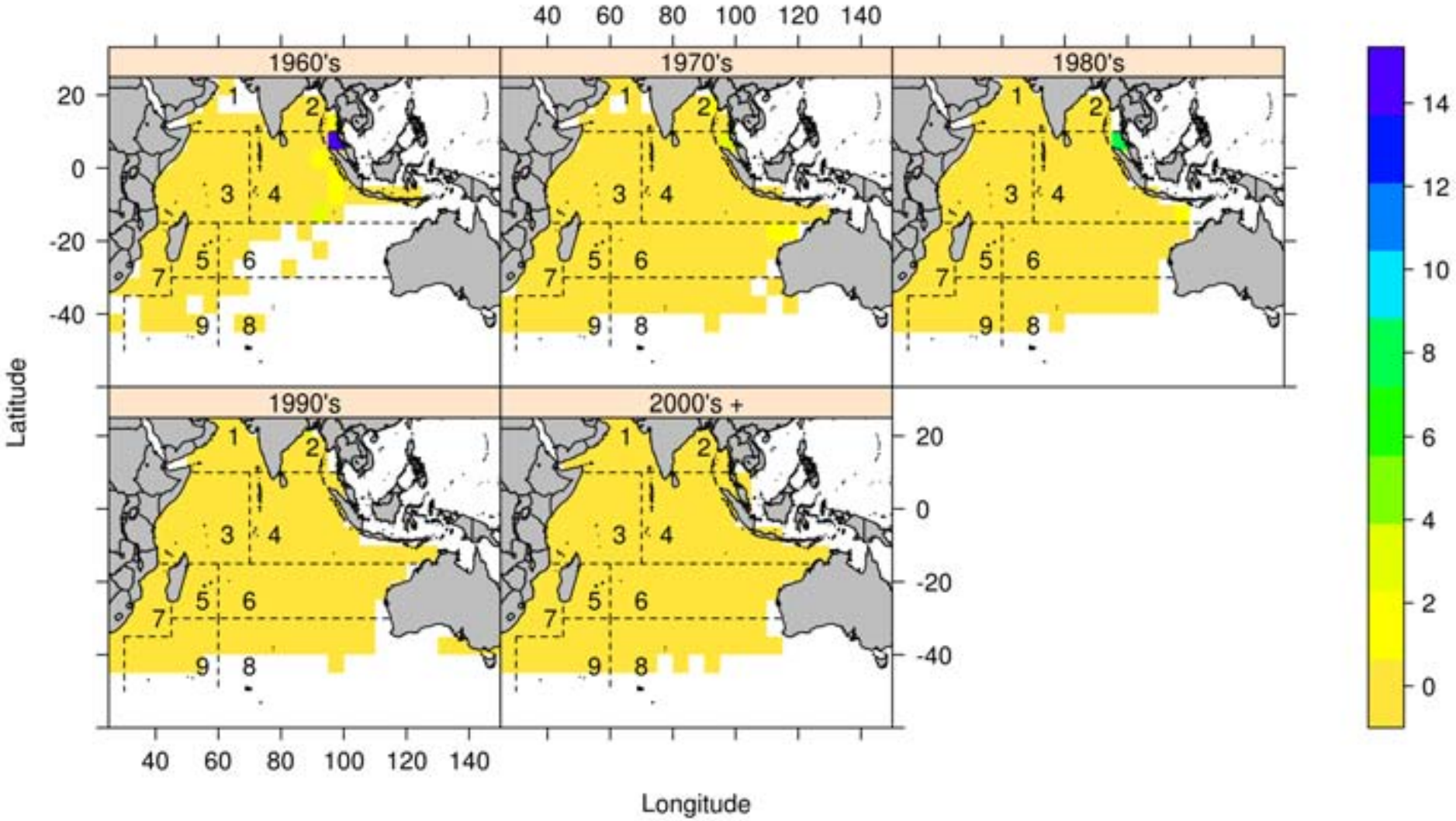
Remarks – BLM Japan Dataset

1. Catches and catch rates were high in areas 2, 4 and 6 in the east margin of the Indic Ocean in 1950's, 1960's and 1970's;
2. Clear seasonal pattern was not apparent in this preliminary analysis;
3. Overall proportions of zero catches are very high in areas 8 and 9 and, it has been increasing over the year in areas 3 to 7;
4. Area 3 stands as the kernel of positive catch in 2000's;
5. Catch rates as calculated for positive dataset decreases quickly in 1950's in all areas. They are especially low in 2000's;
6. There are outstanding peaks of mean catch rates in the end of 1960's and the mid of 1970's.

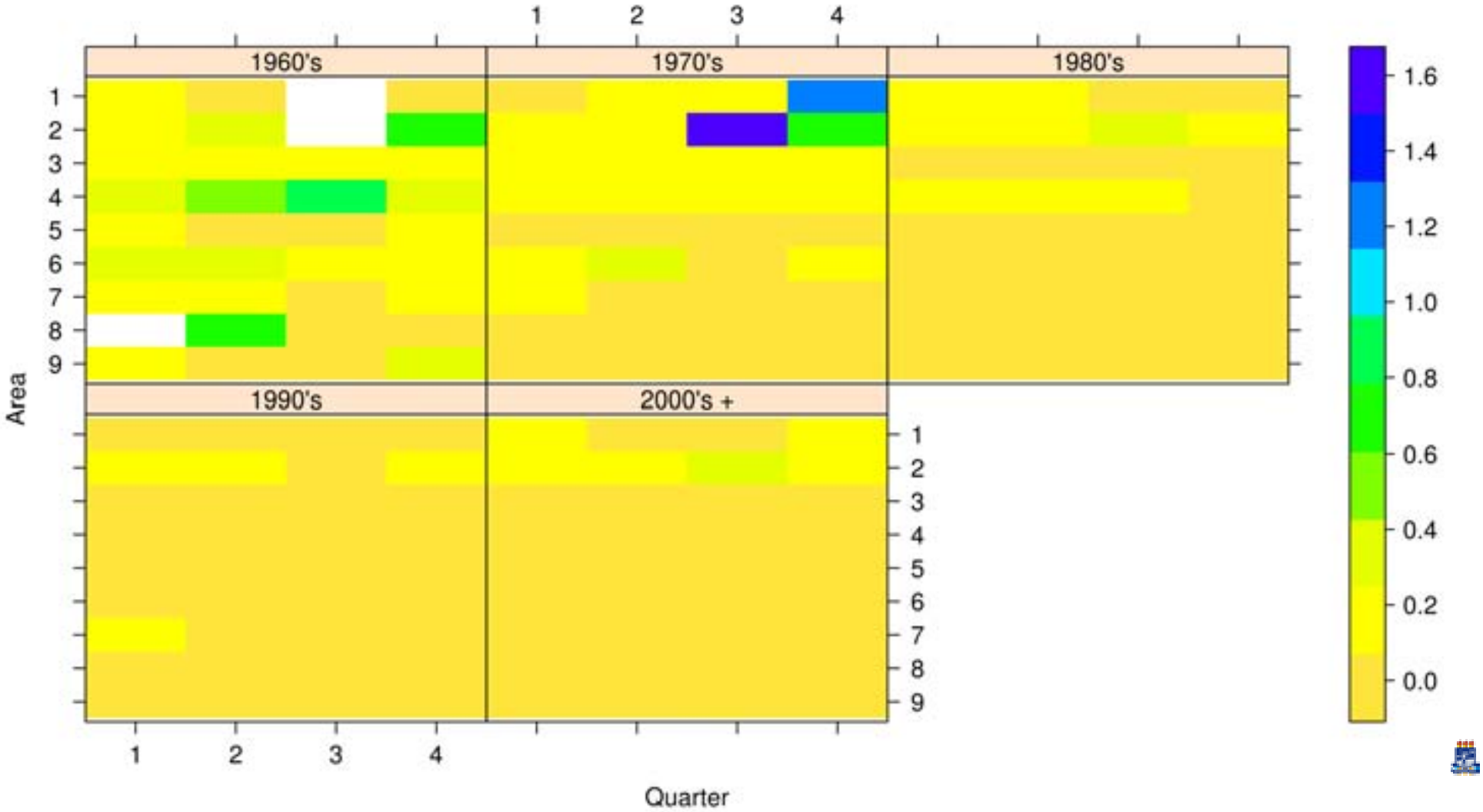
BLM - number of fish - Taiwan dataset



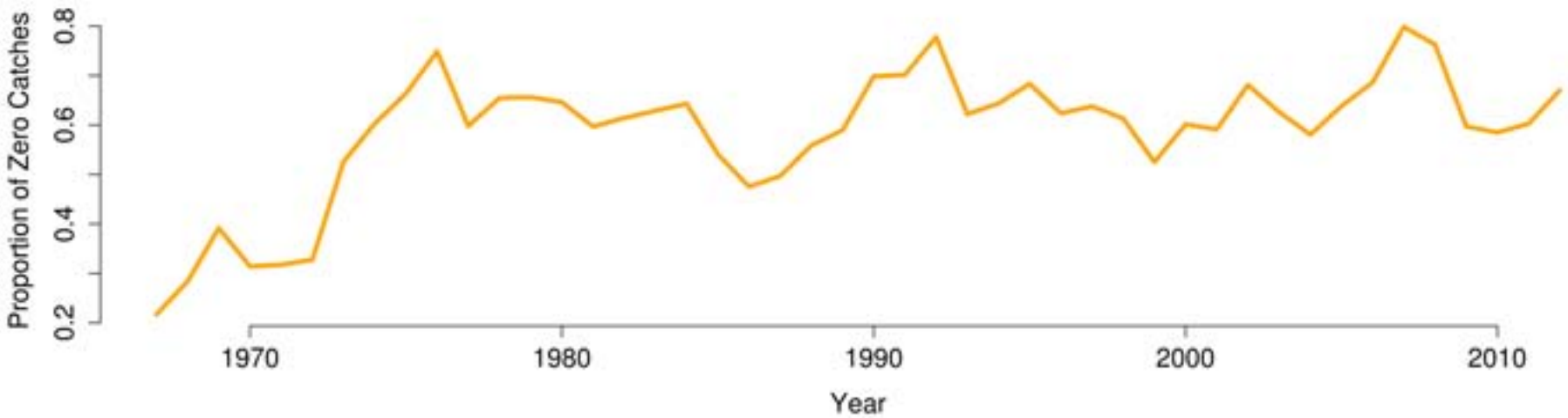
BLM - number of fish/1000 hooks - Decade x Lat x Lon

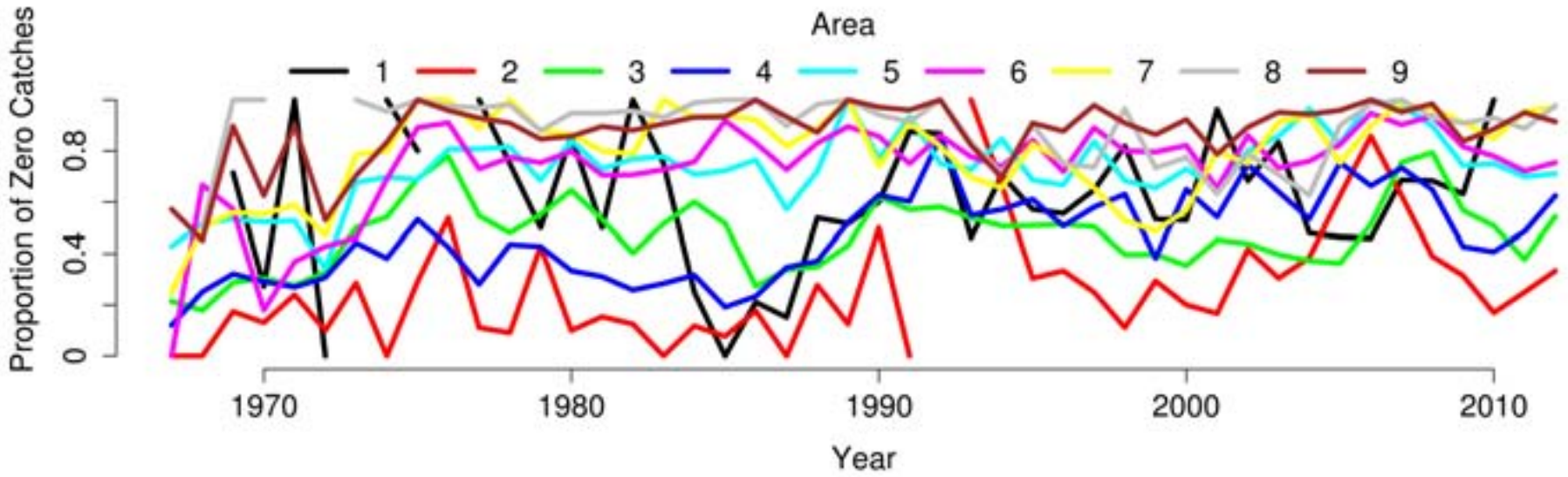


BLM - number of fish/1000 hooks - Decade x Quarter x Area

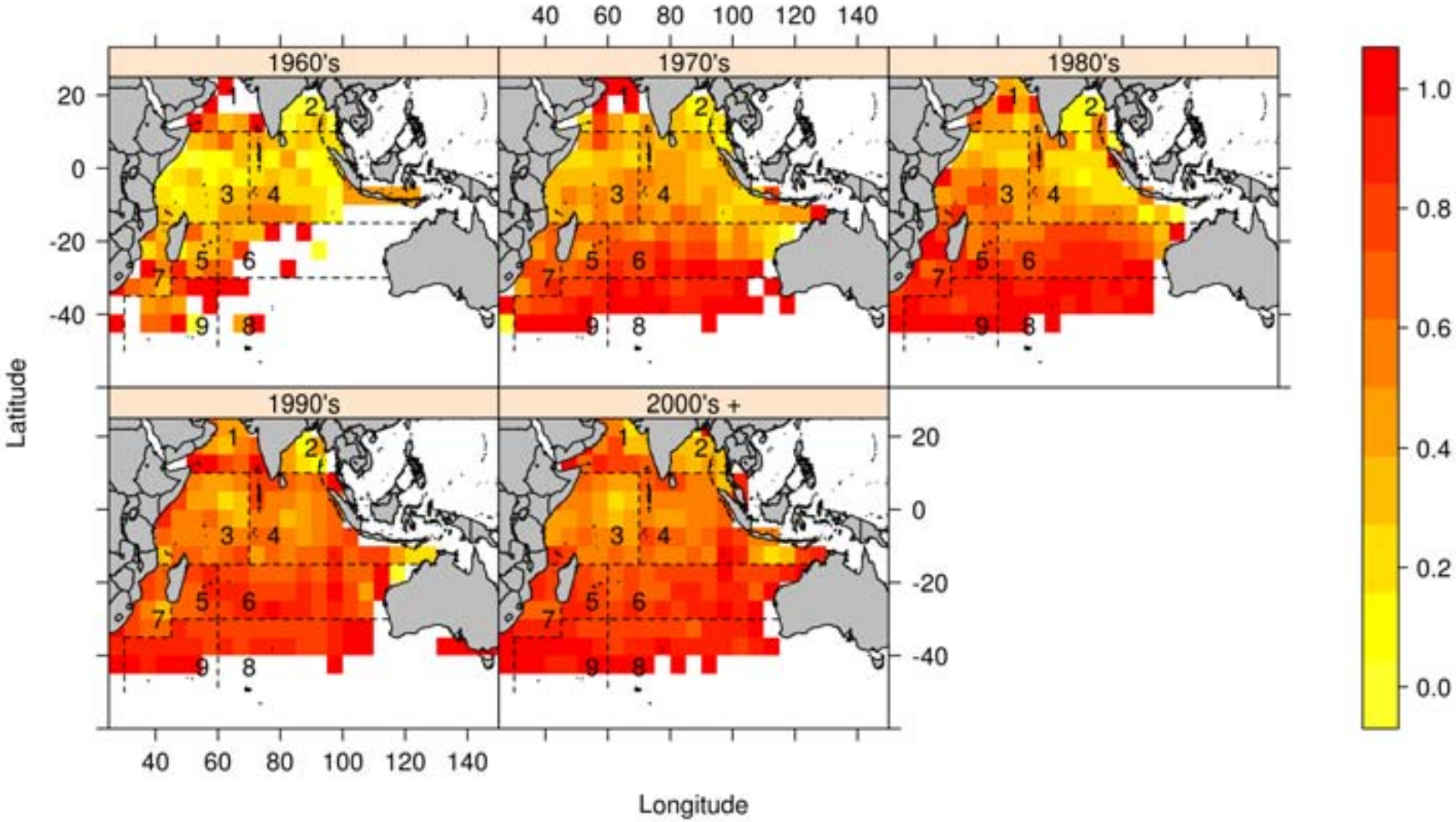


Proportion of Zero Catches

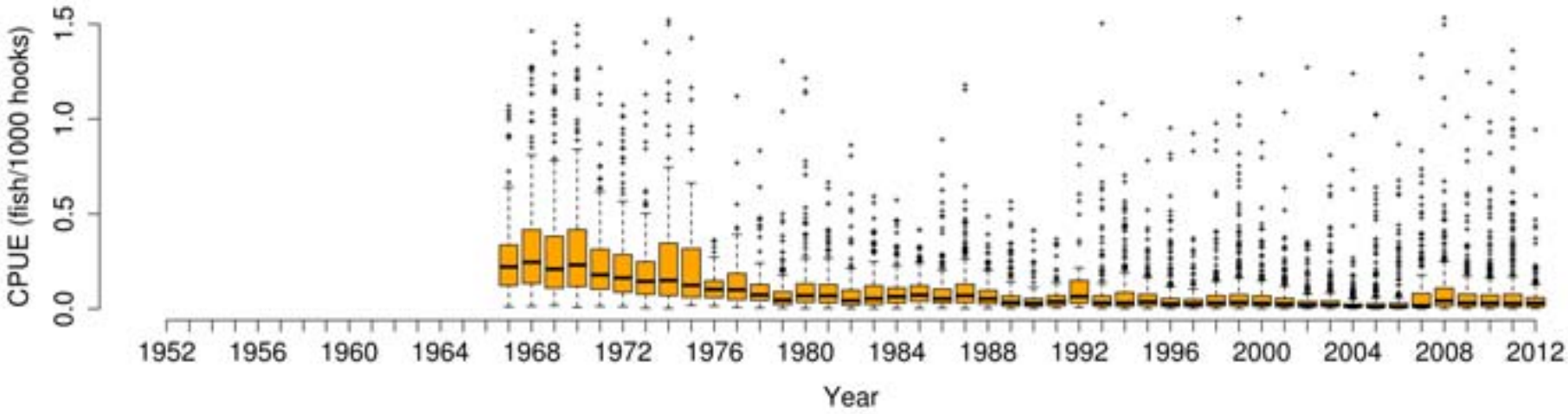


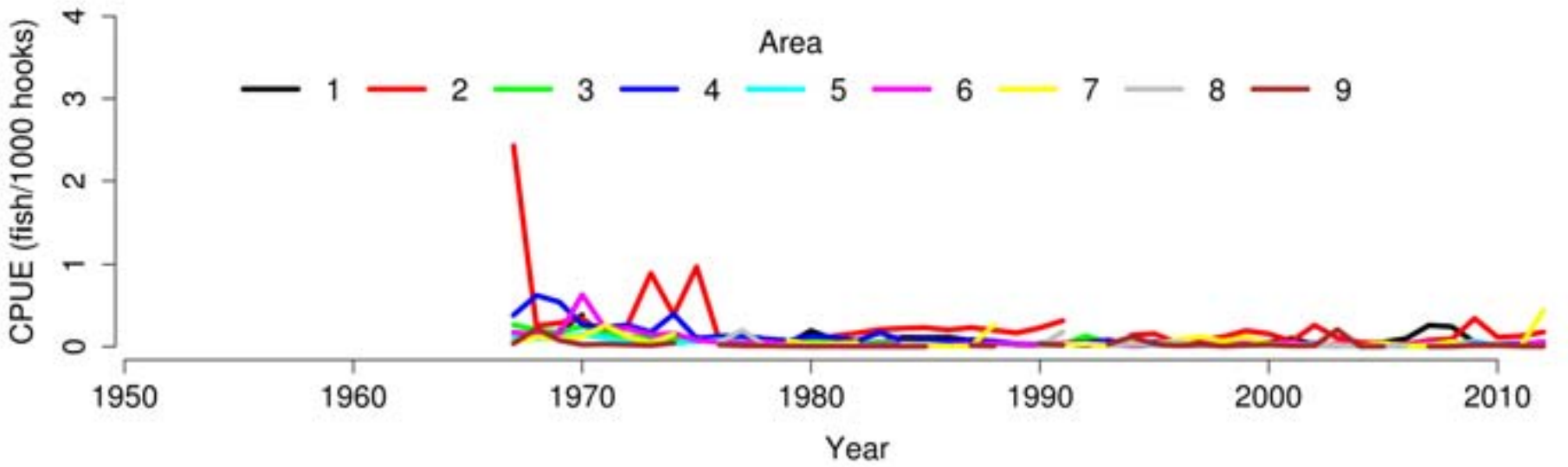


Proportion of Zero Catches

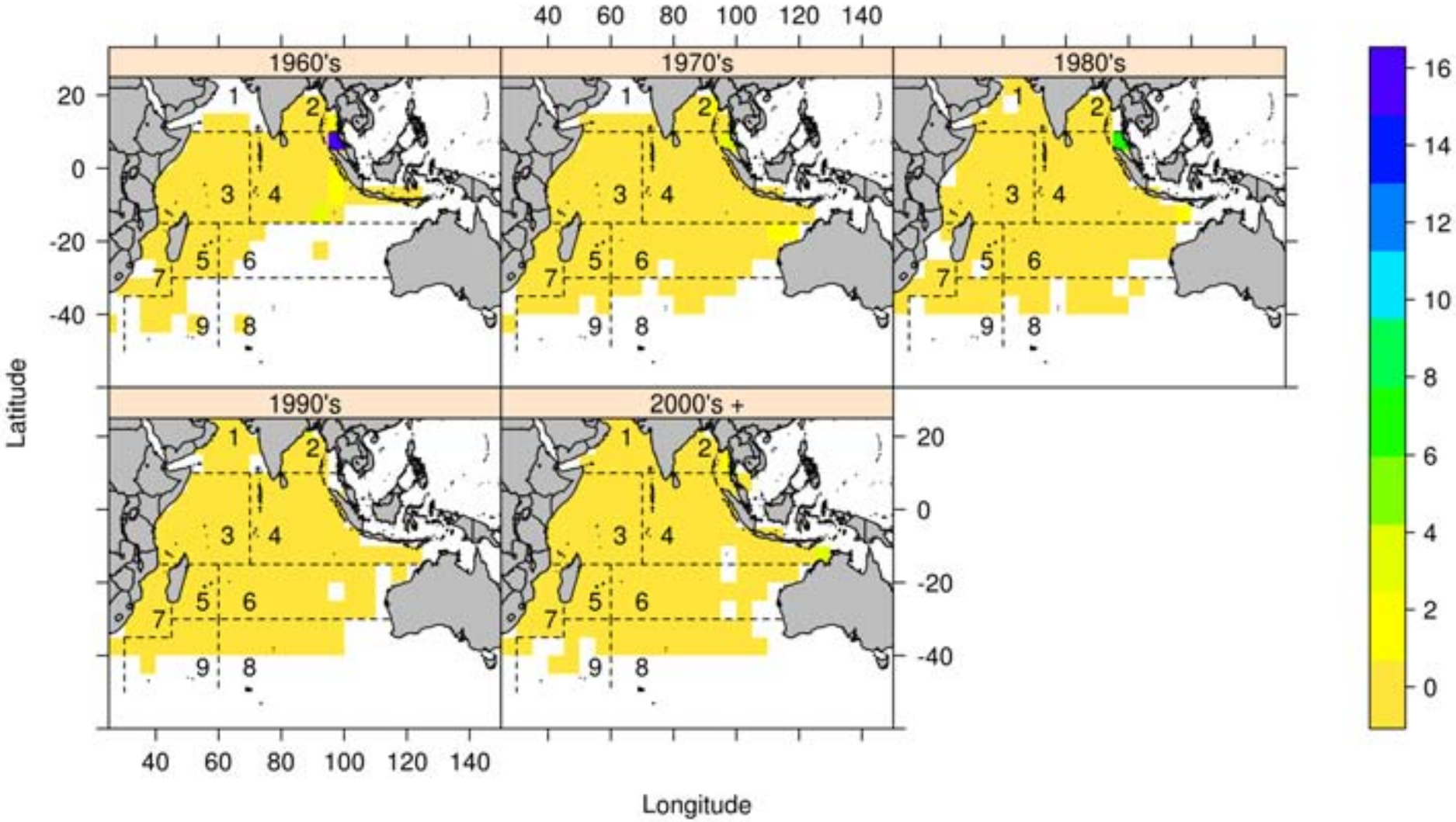


CPUE – Positive Catches





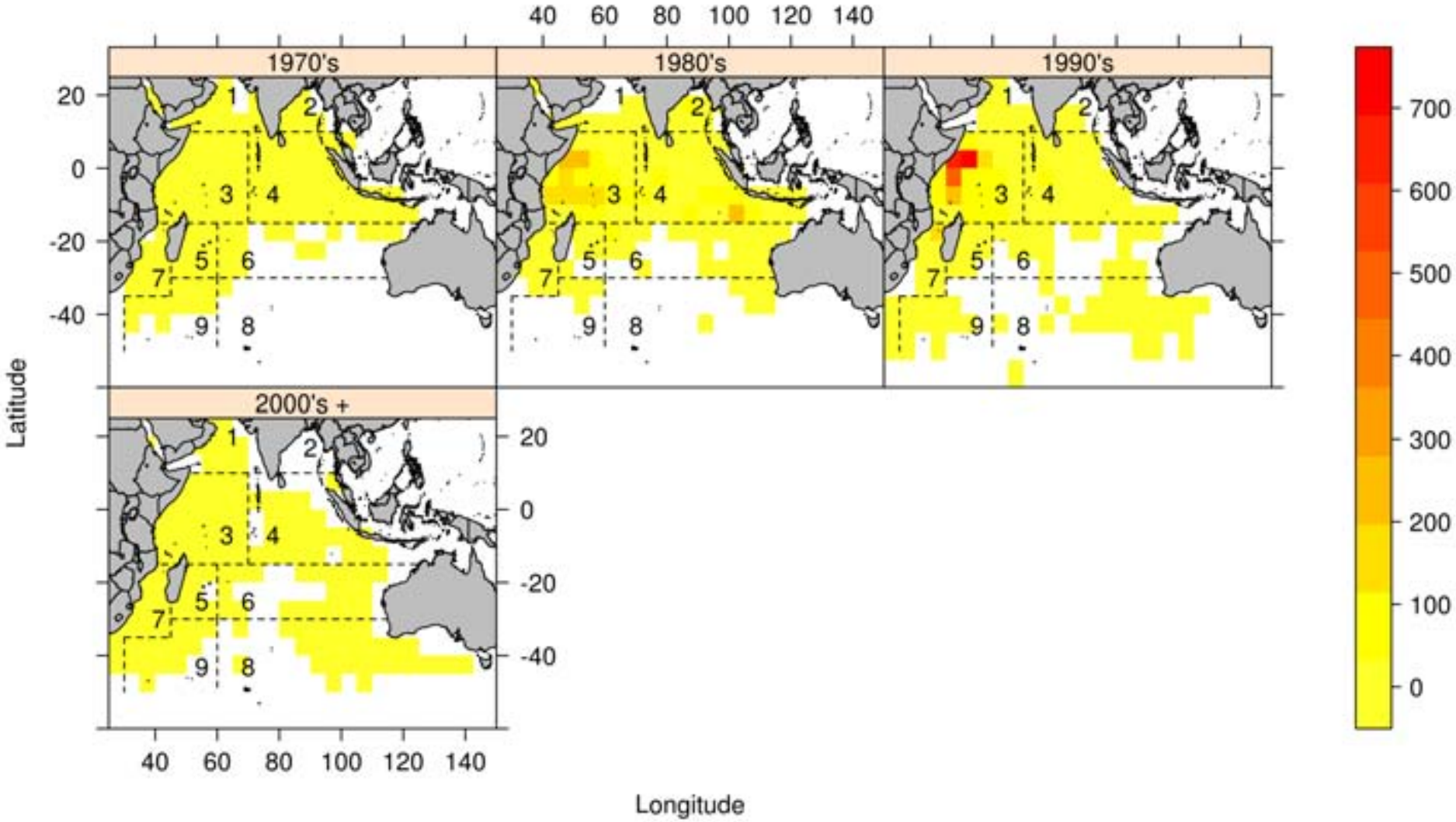
CPUE – Positive Catches



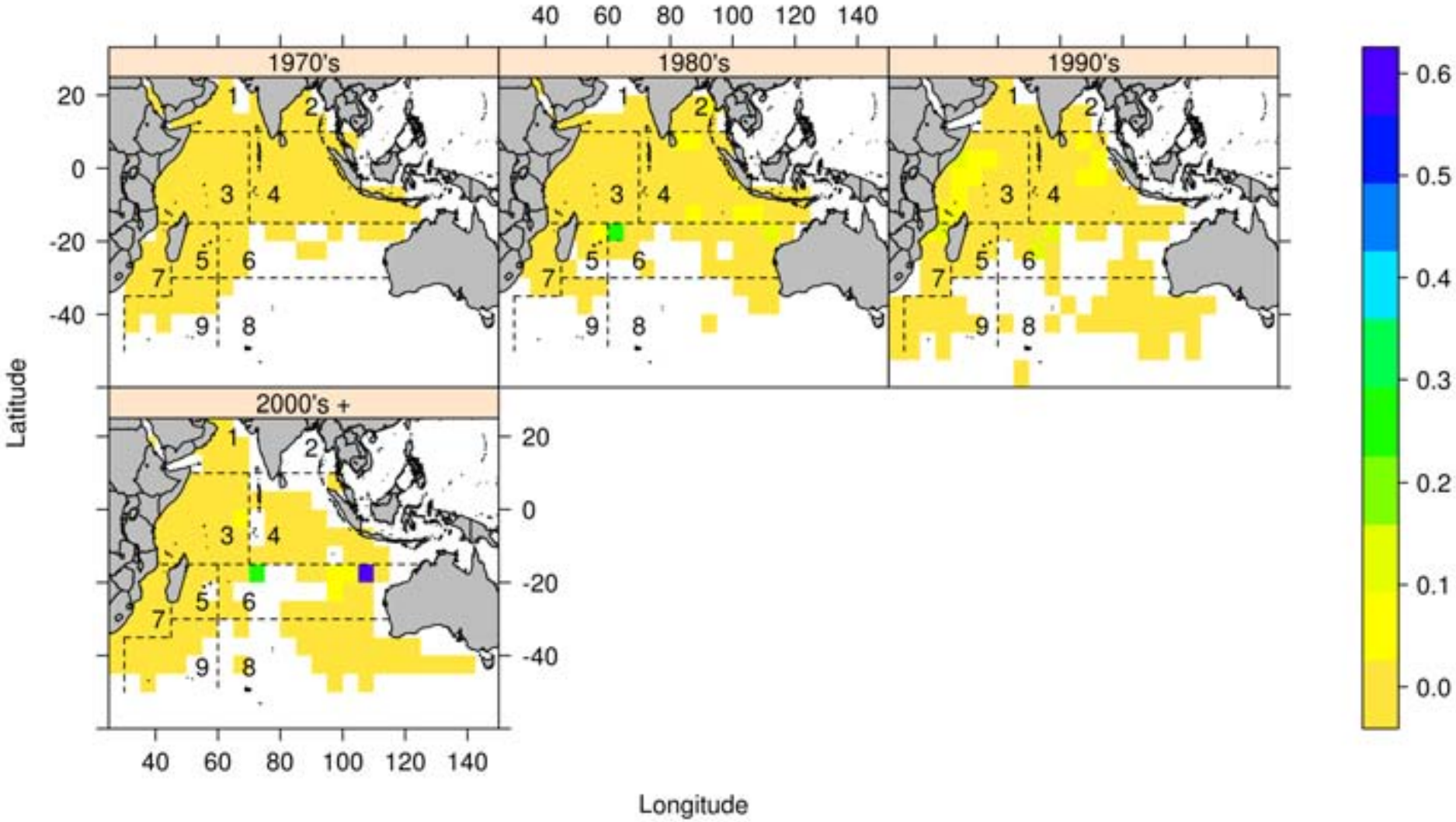
Remarks – BLM Taiwan Dataset

1. Catches and catch rates were high in areas 1, 2 and 4 in the margins of Indic Ocean especially in 2000's;
2. Catch rates were high in 3^{rd} and 4^{th} quarters in north areas (1 and 2);
3. Overall proportions of zero catches increase quickly in 1970's especially in areas 3 and 5. Proportion of zero catches also increase in area 4 in 1980's;
4. Catch rates for positive dataset of 2007 should be revised;
5. Catch rates as calculated for positive dataset decreases in 1960's and 1970's but they are not too low in the end of 2000's;

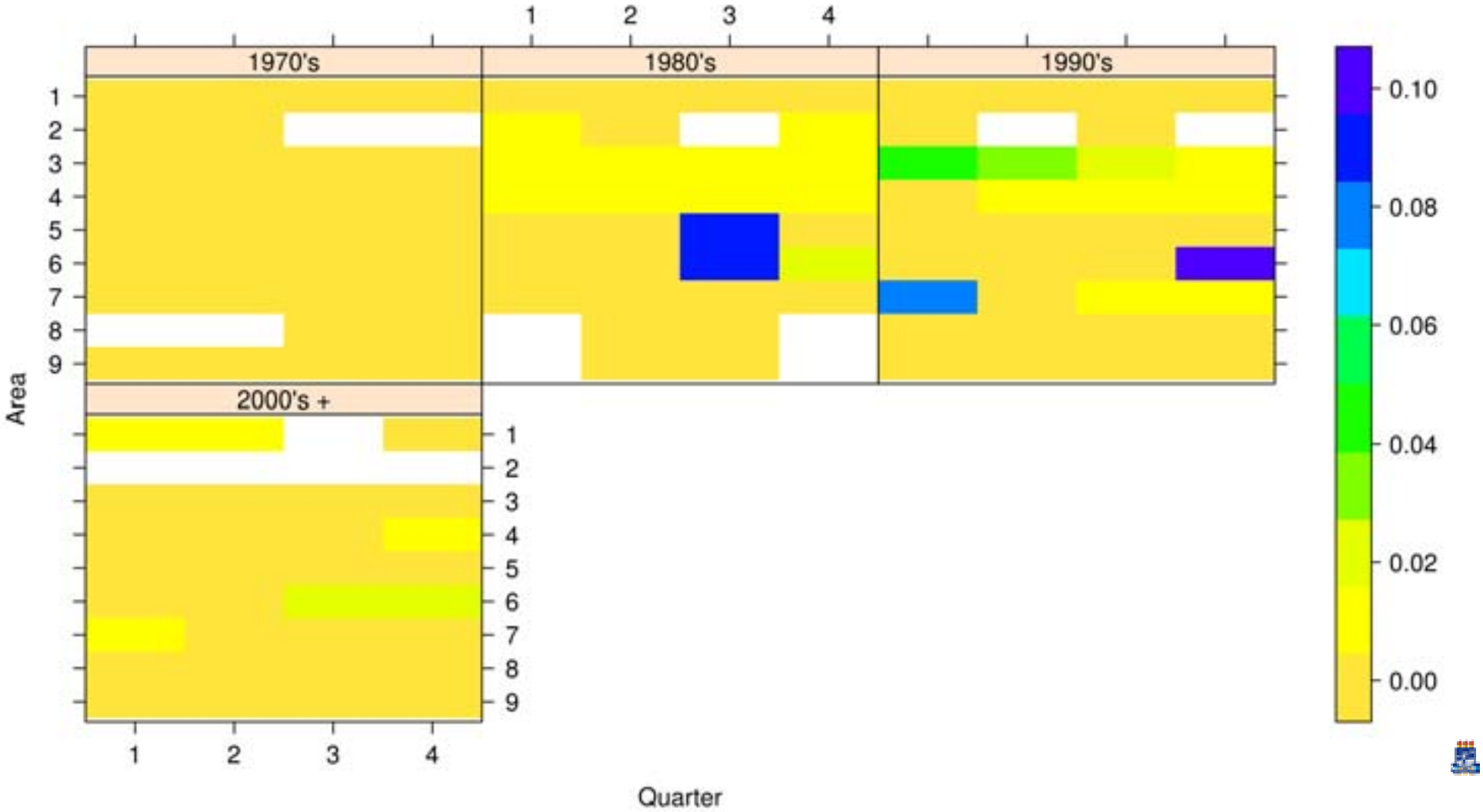
BLM - number of fish - Korea dataset



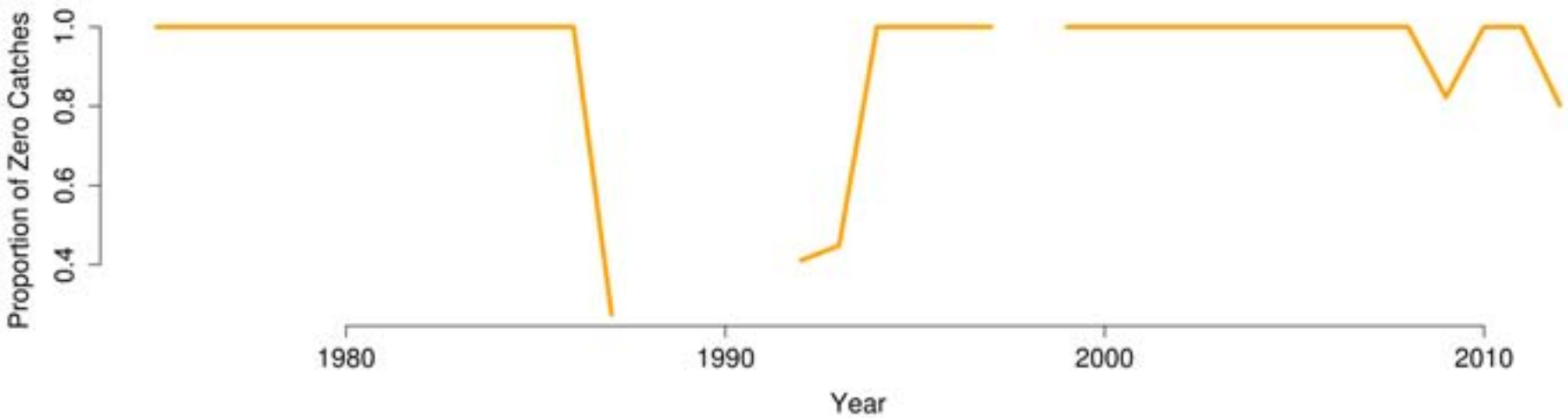
BLM - number of fish/1000 hooks - Decade x Lat x Lon

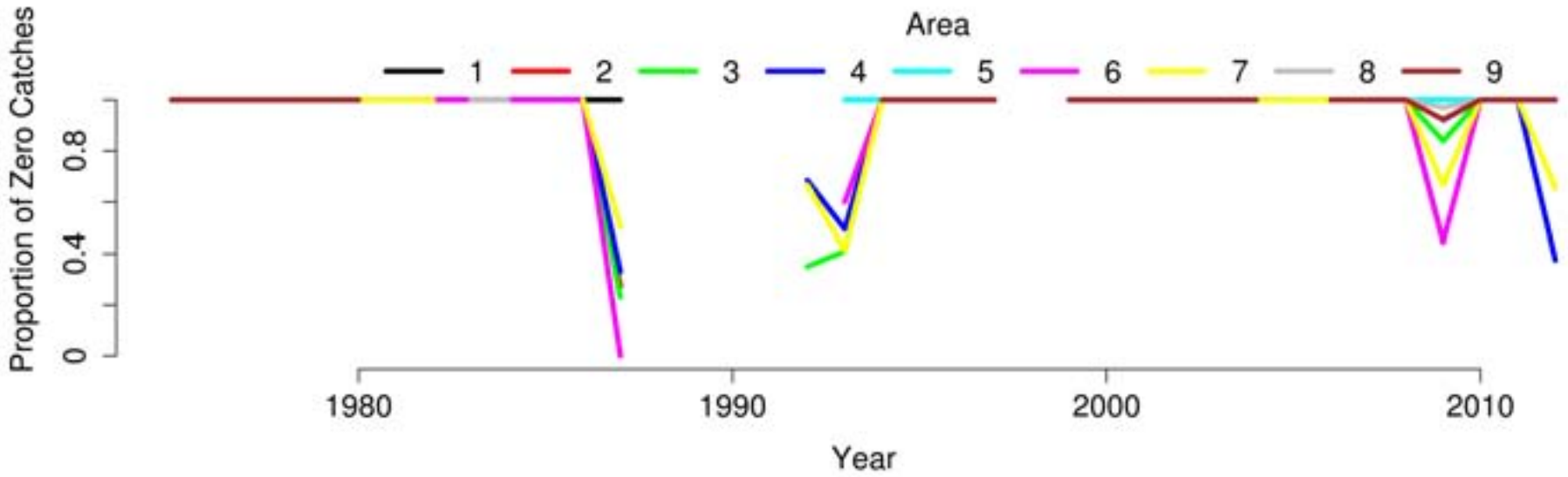


BLM - number of fish/1000 hooks - Decade x Quarter x Area

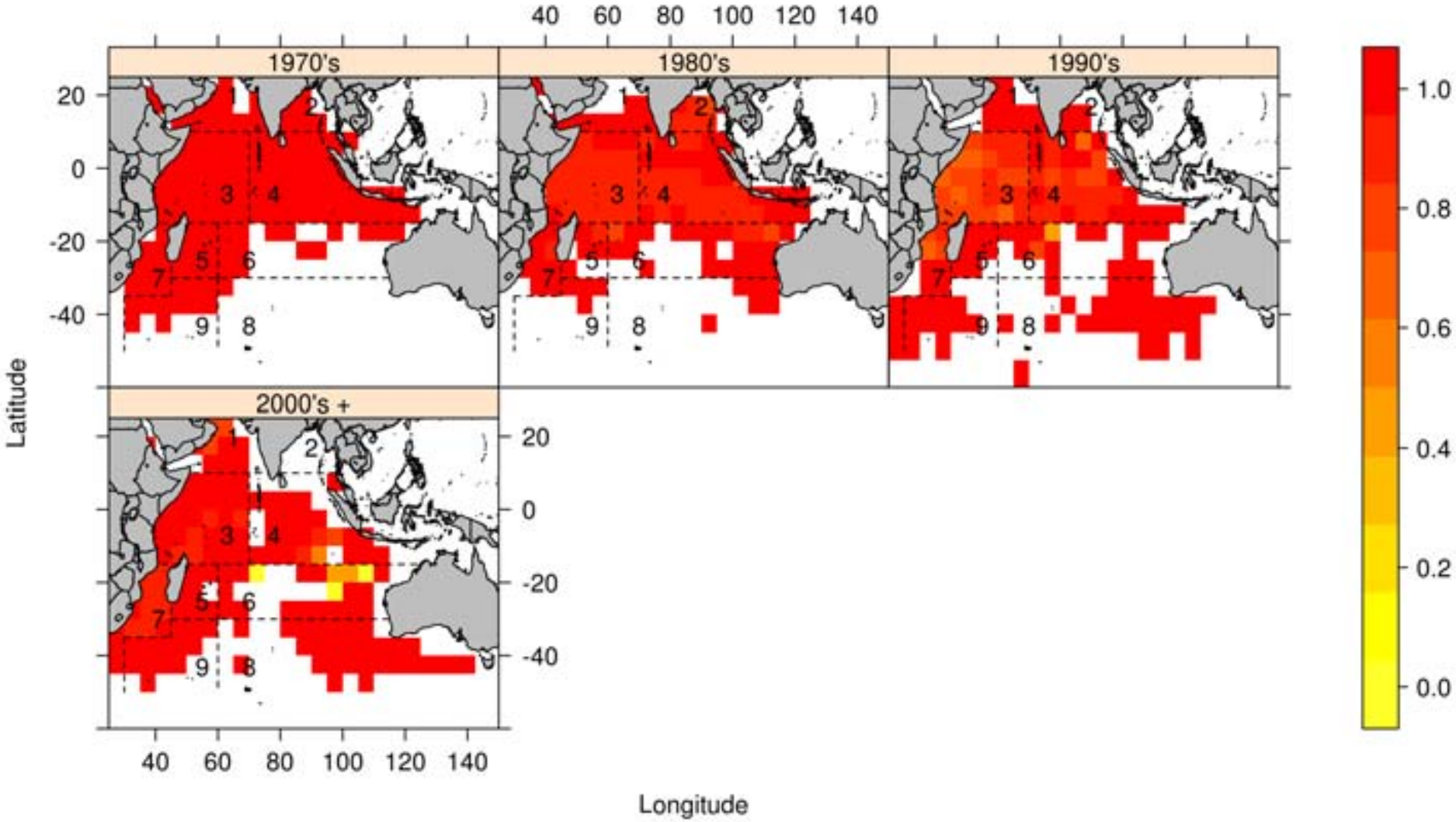


Proportion of Zero Catches

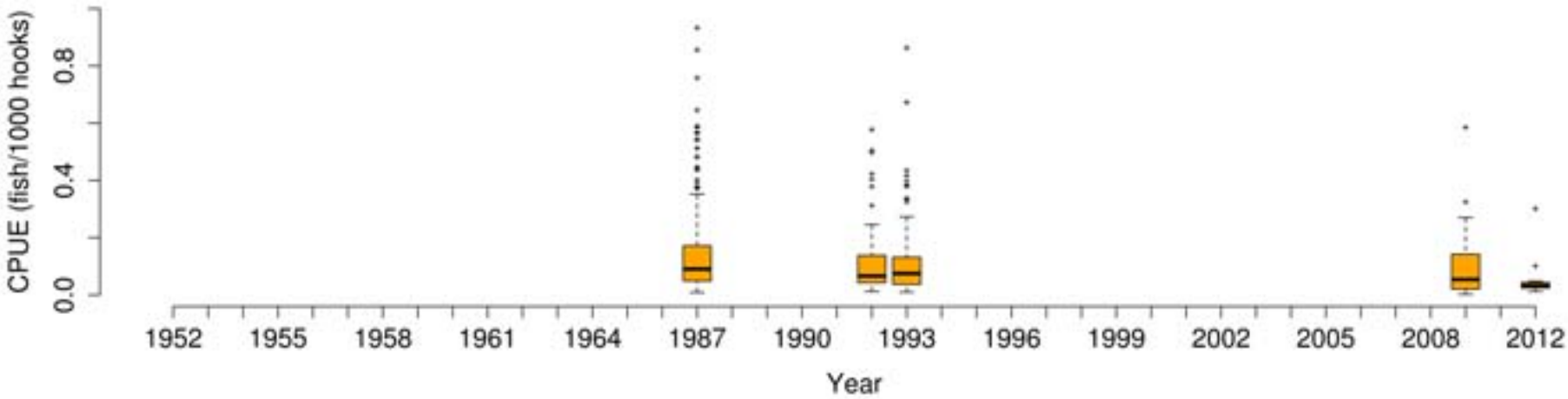


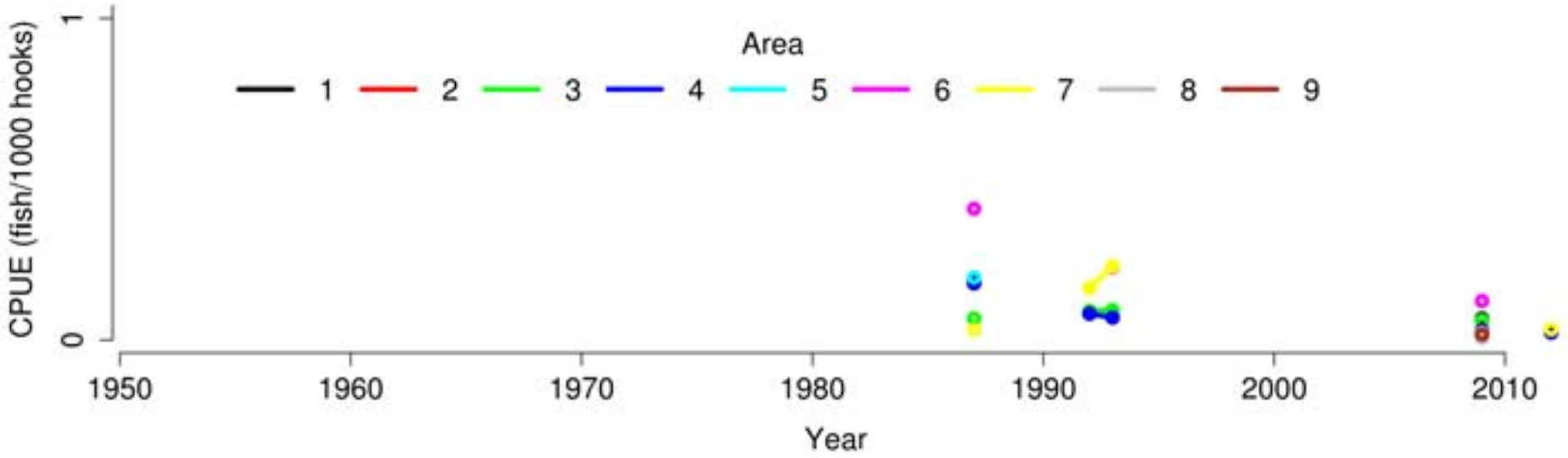


Proportion of Zero Catches

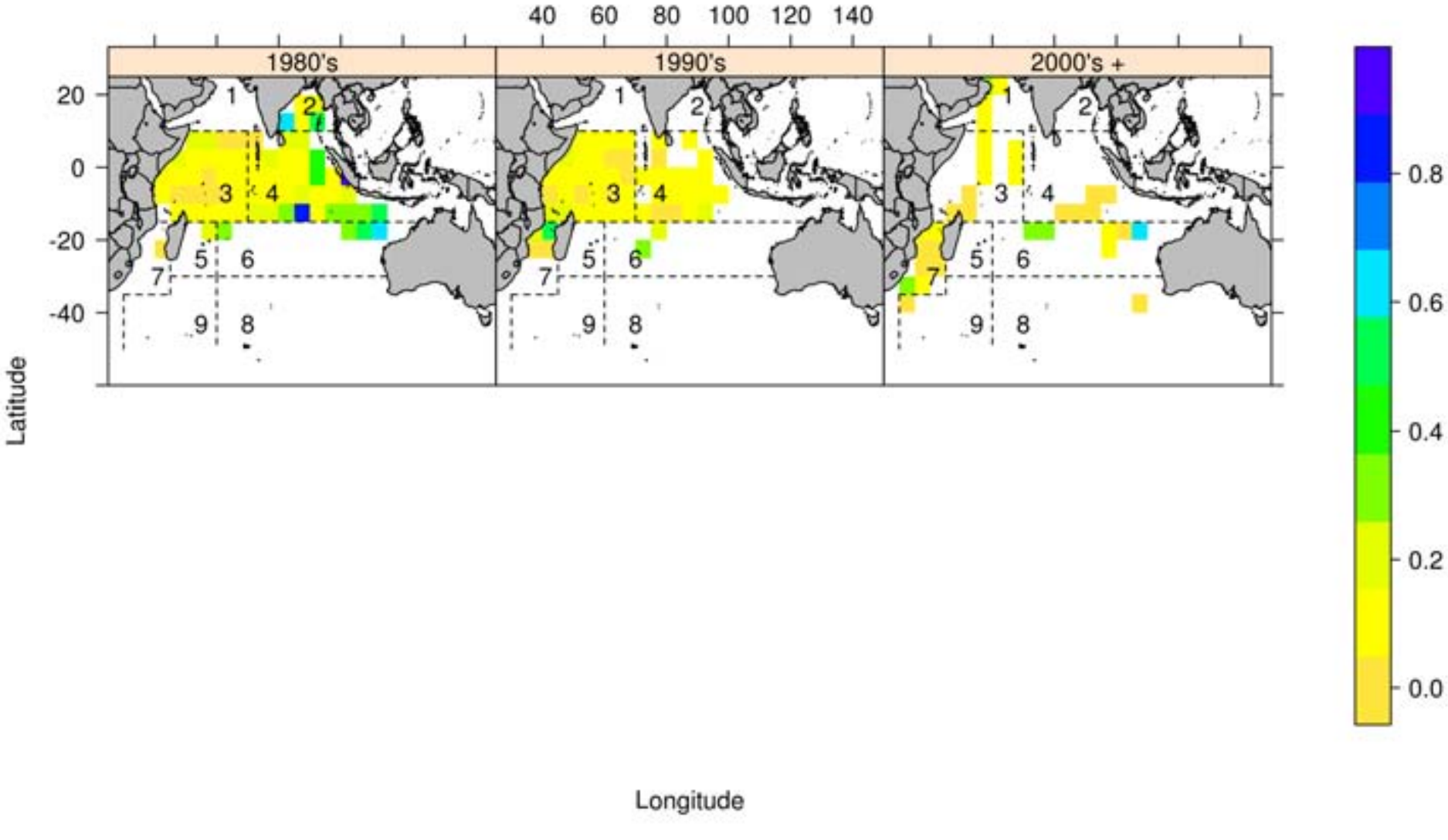


CPUE – Positive Catches





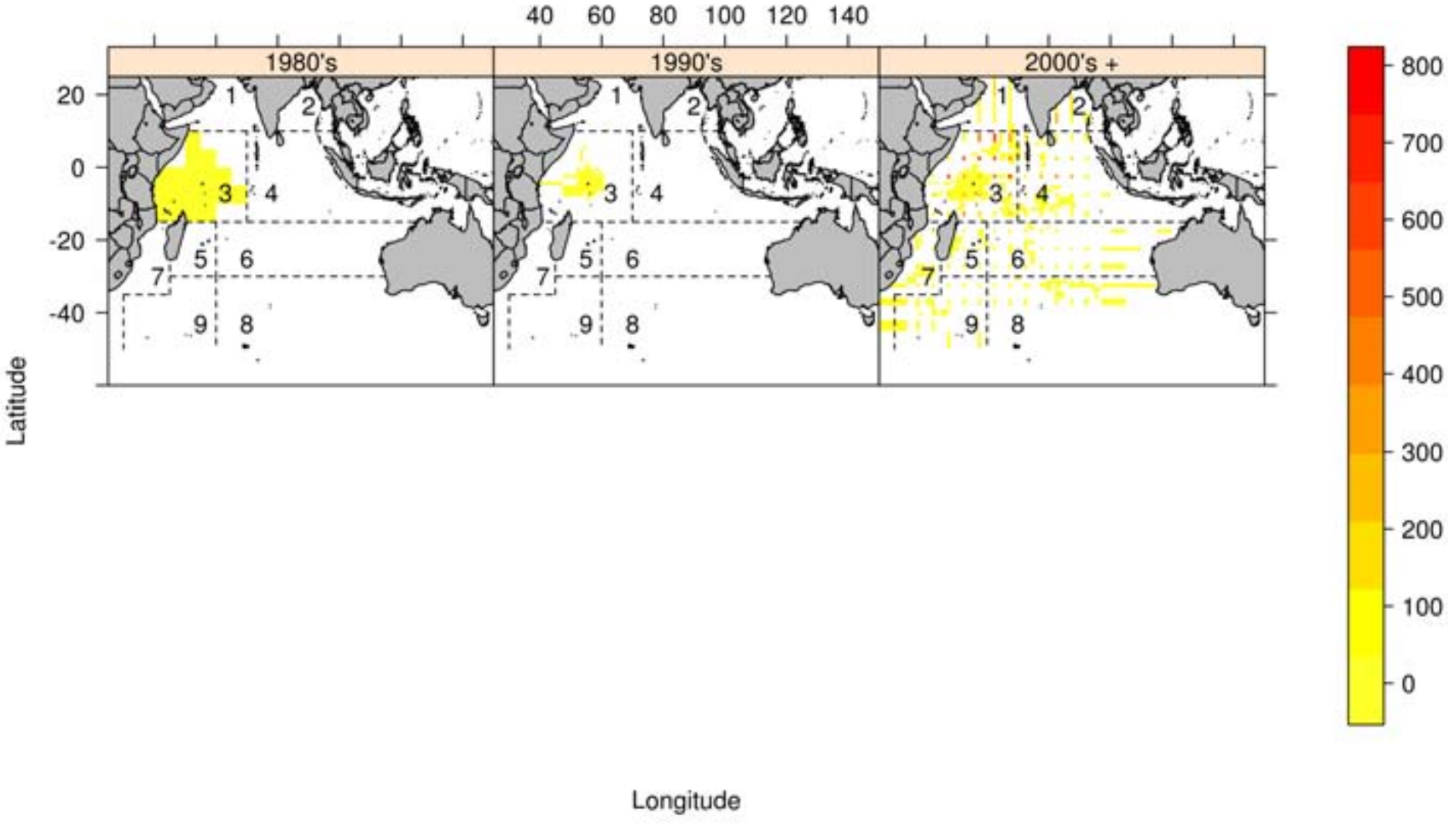
CPUE – Positive Catches



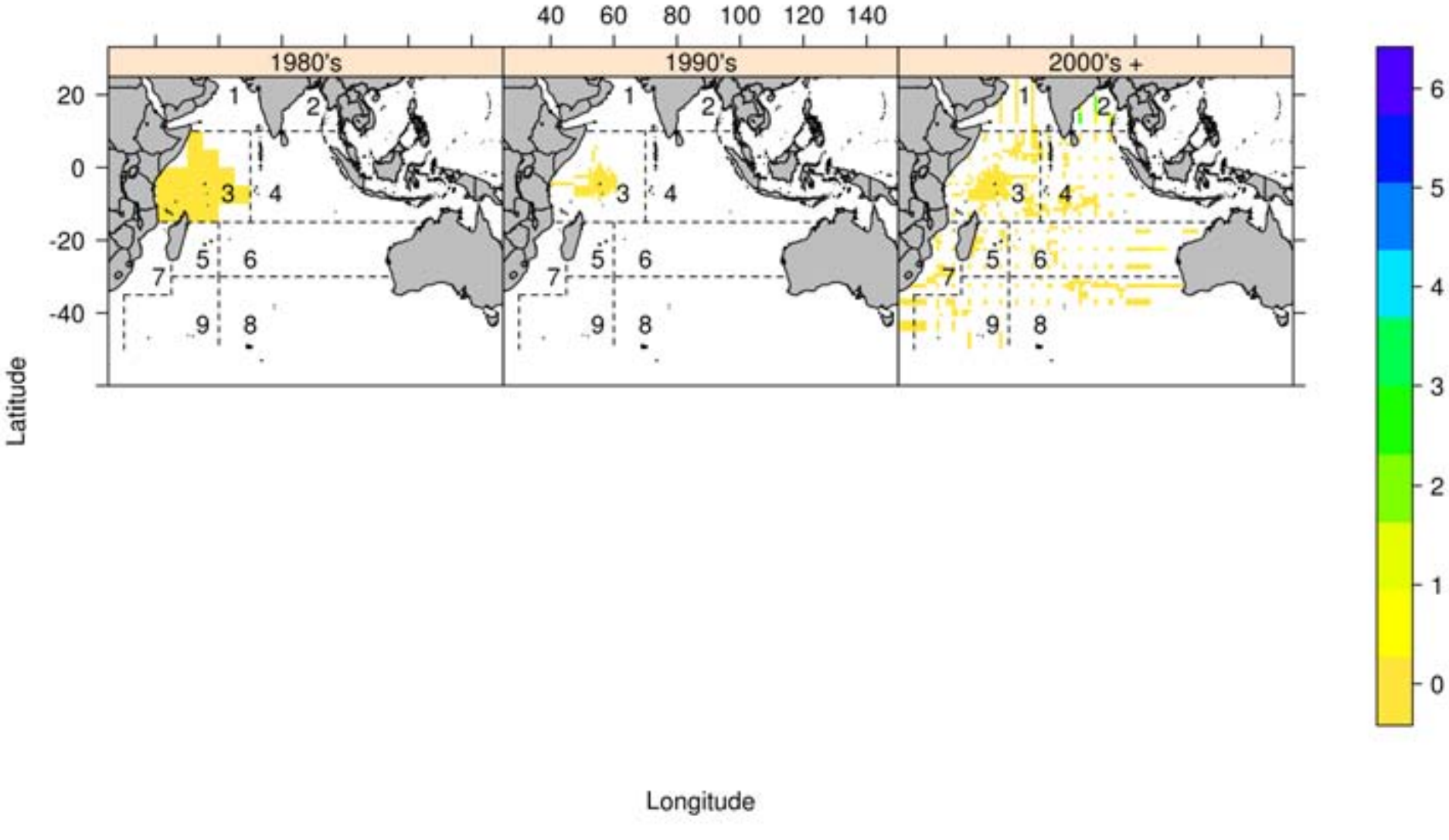
Remarks – BLM Korea Dataset

1. Catches were high in area 3 in 1980's and 1990's;
2. Catch ratres were high in areas 3 (1990's) and 6 (1980's and 1990's);
3. Catch rates were high in 3^{rd} and 4^{th} quarters in area 6;
4. Data are not informative about the proportion of zero catches and the positive catches.

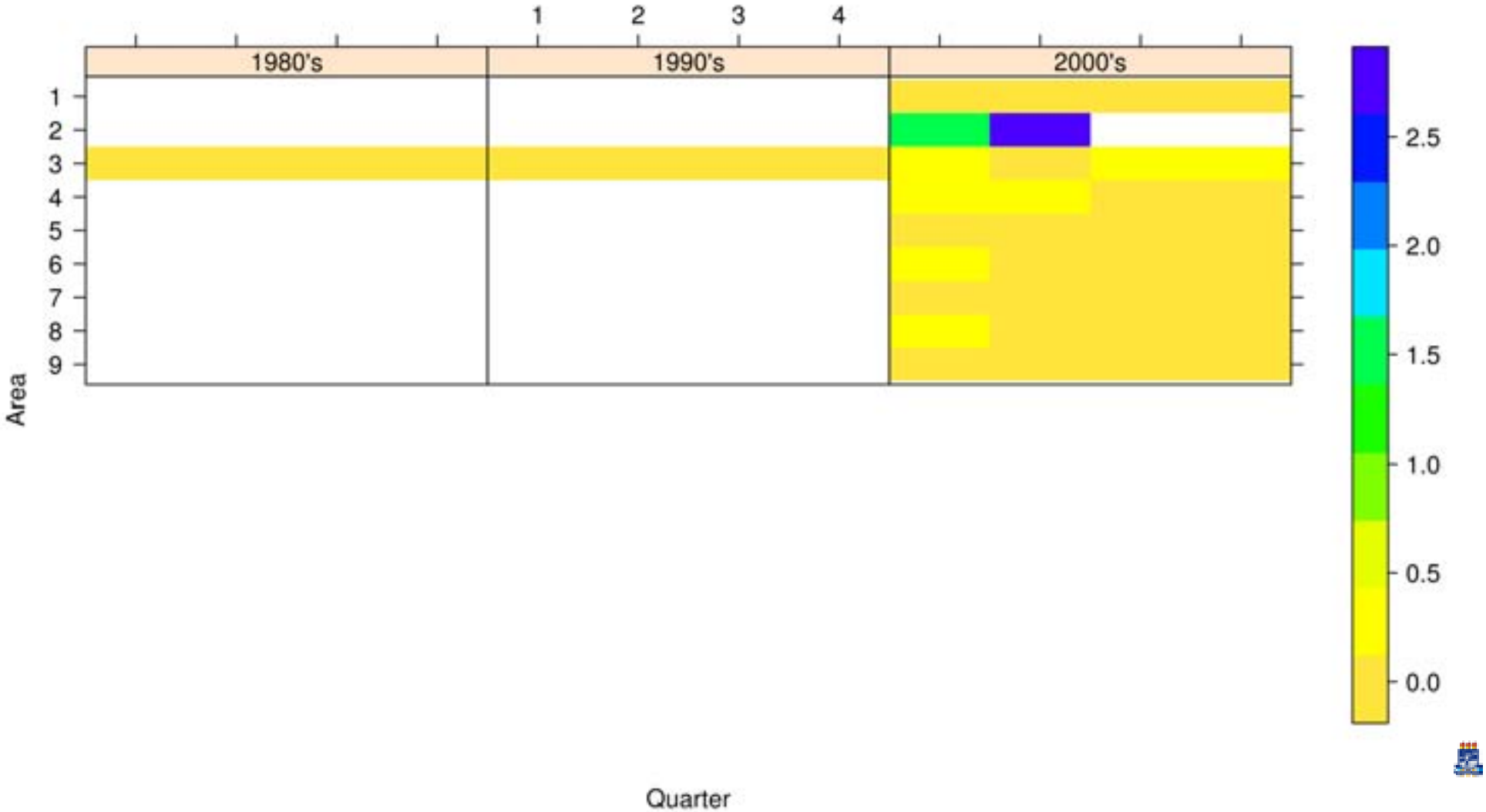
BLM - number of fish - Seychelles dataset



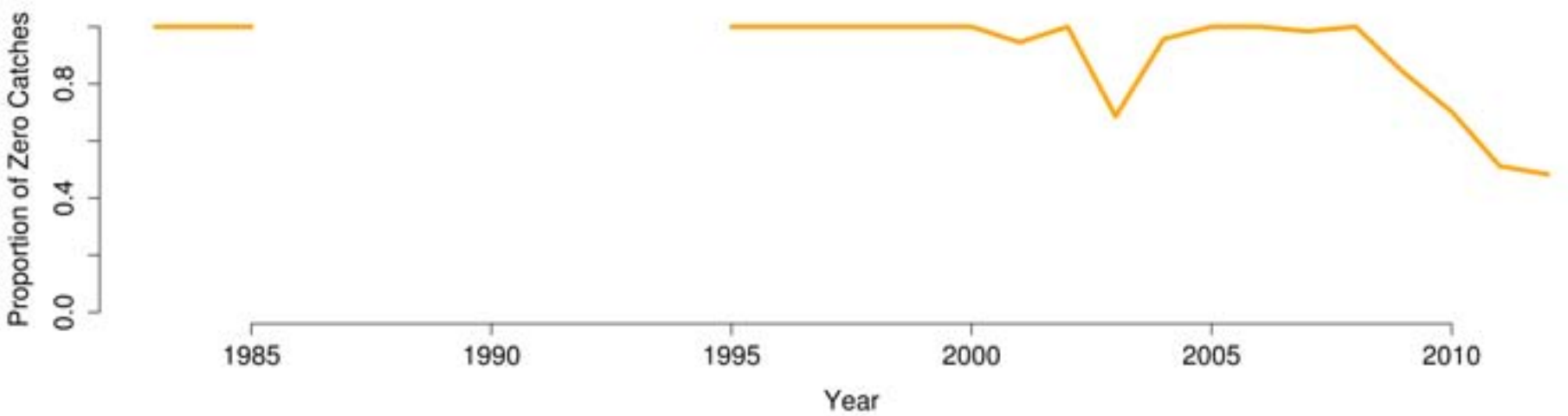
BLM - number of fish/1000 hooks - Decade x Lat x Lon

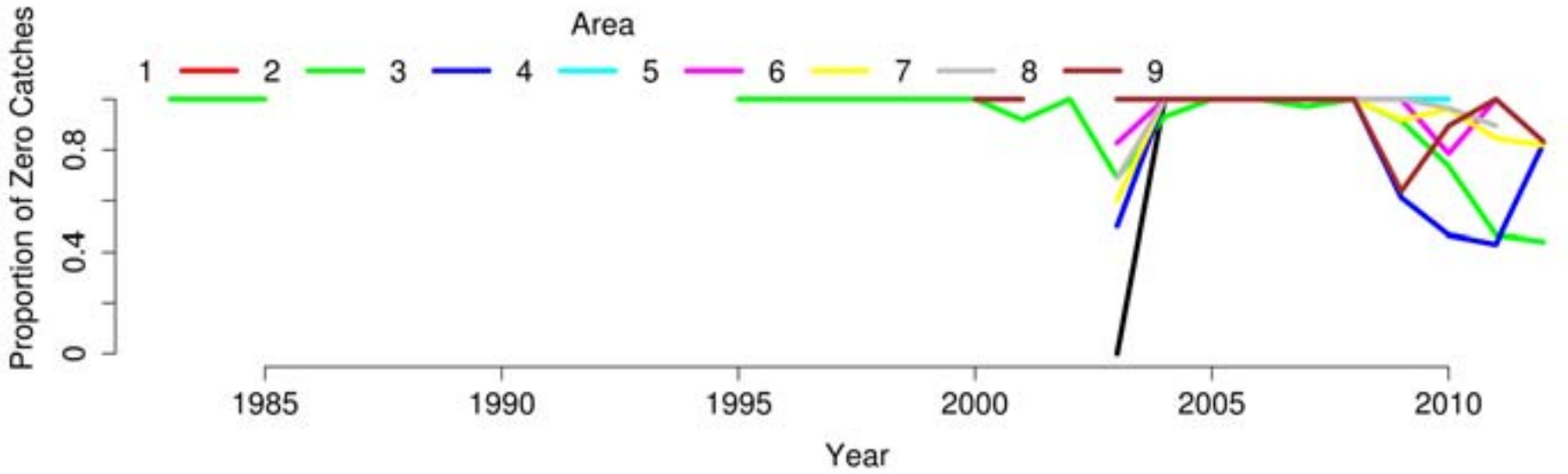


BLM - number of fish/1000 hooks - Decade x Quarter x Area

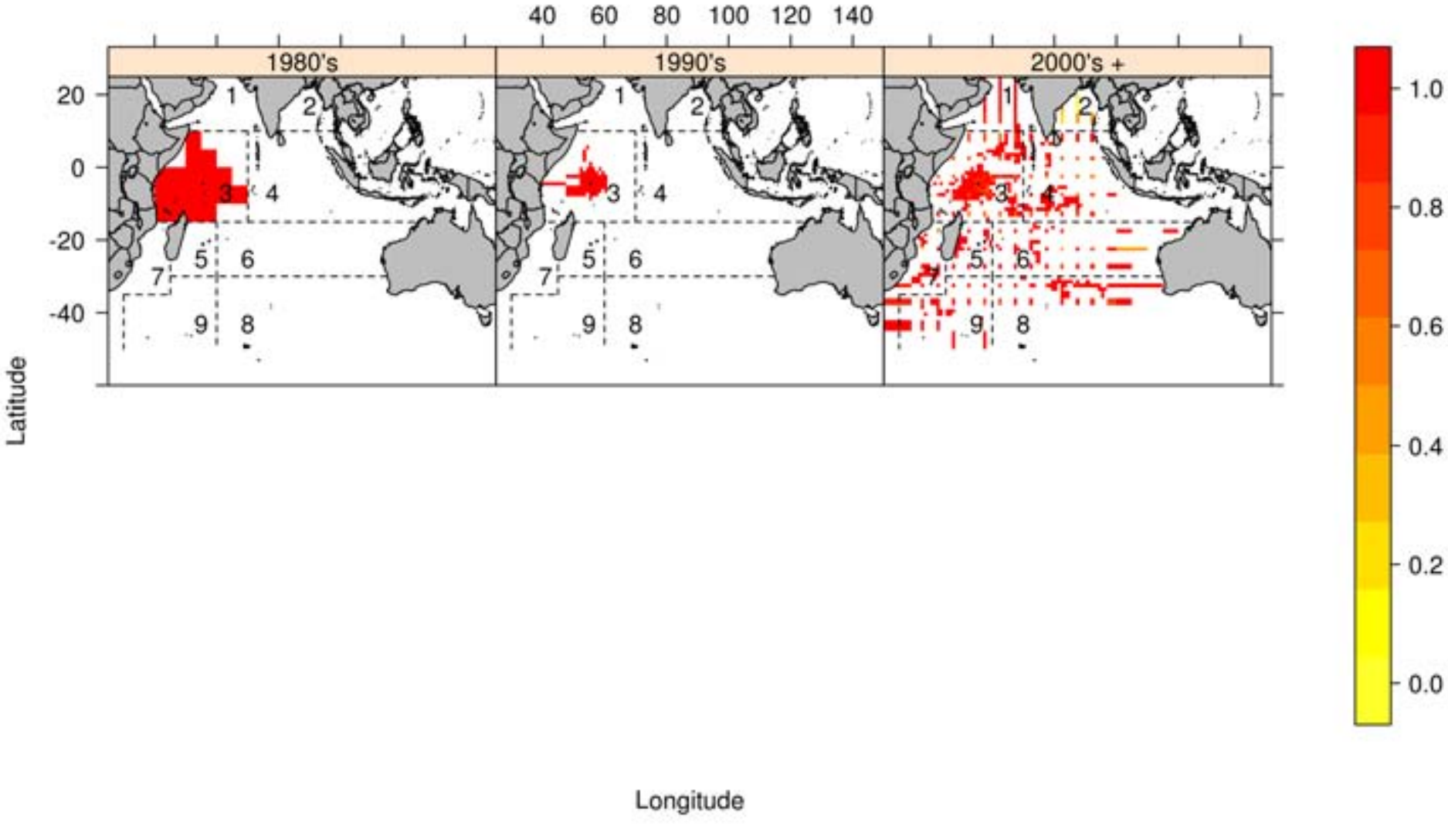


Proportion of Zero Catches

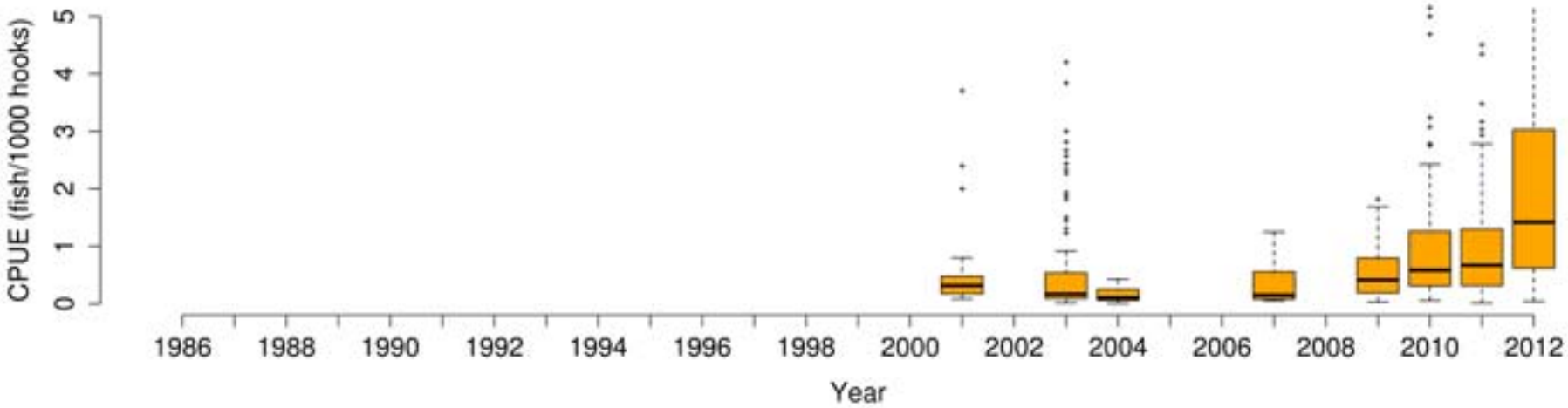


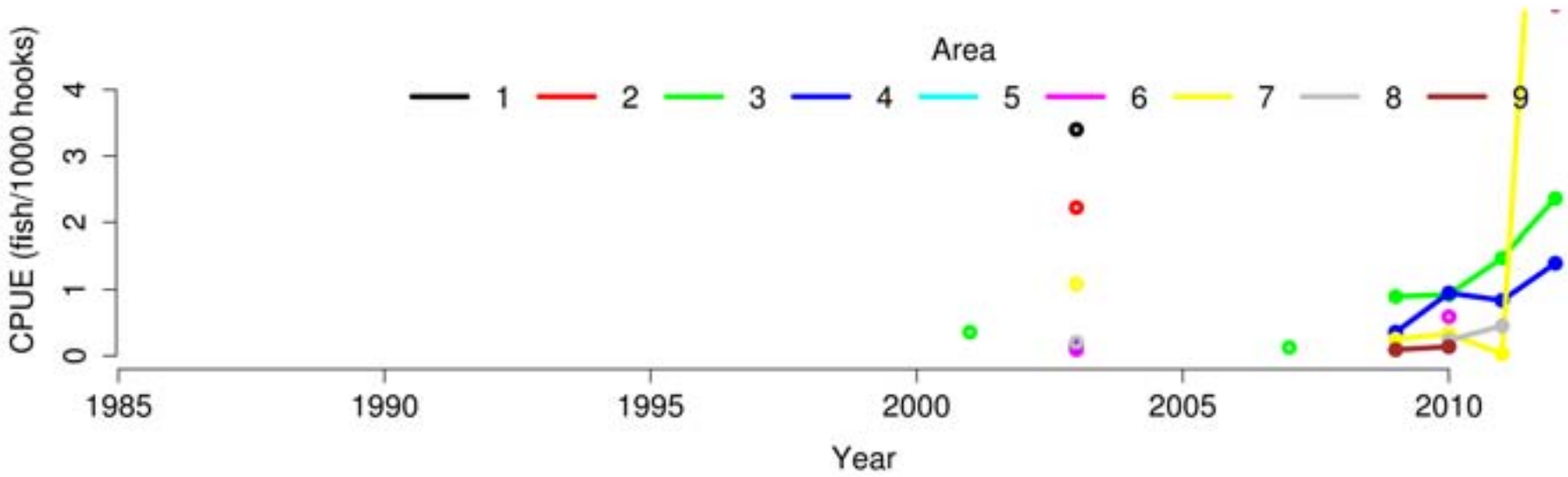


Proportion of Zero Catches



CPUE – Positive Catches





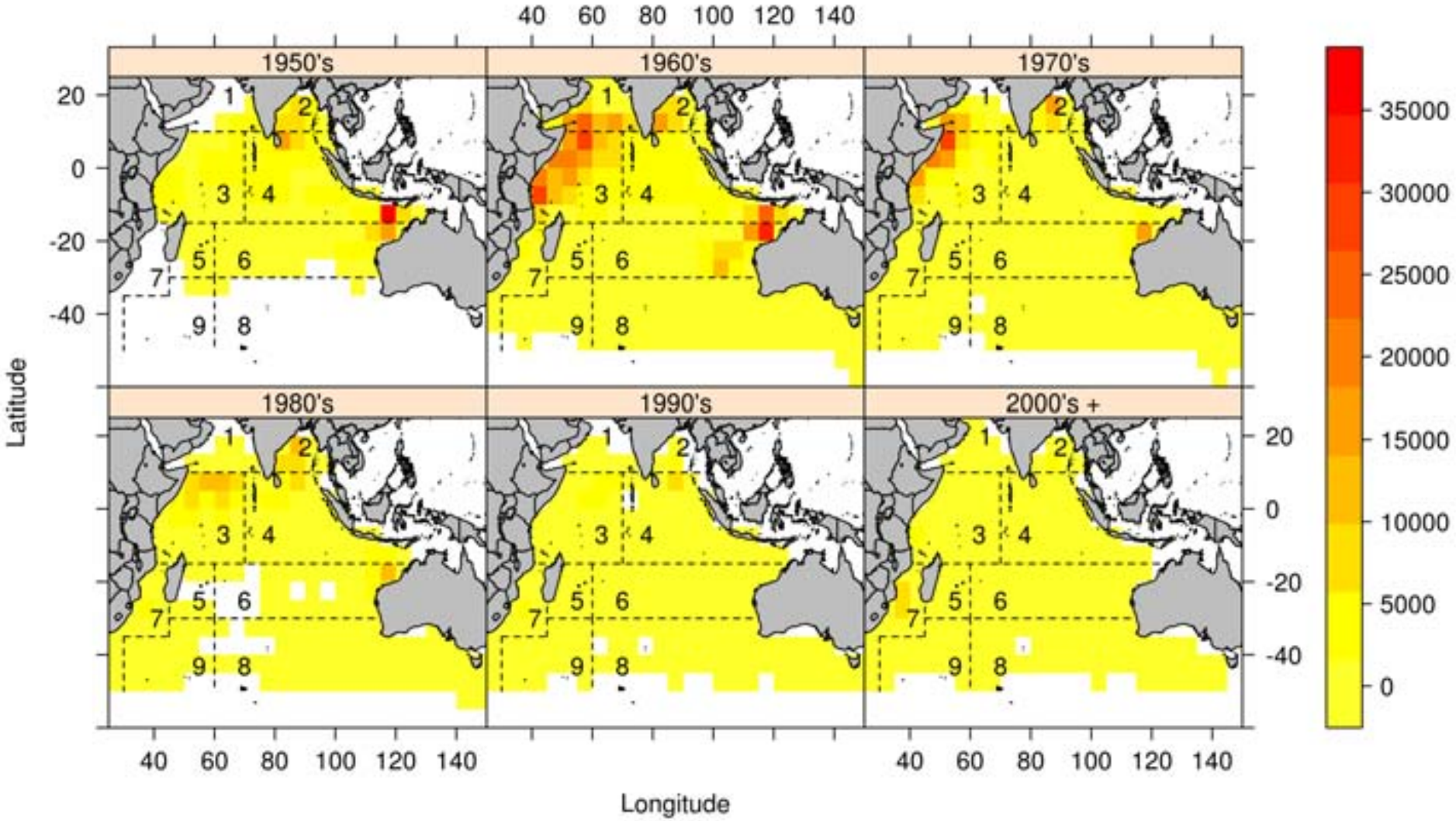
CPUE – Positive Catches

Remarks – BLM Seychelles Dataset

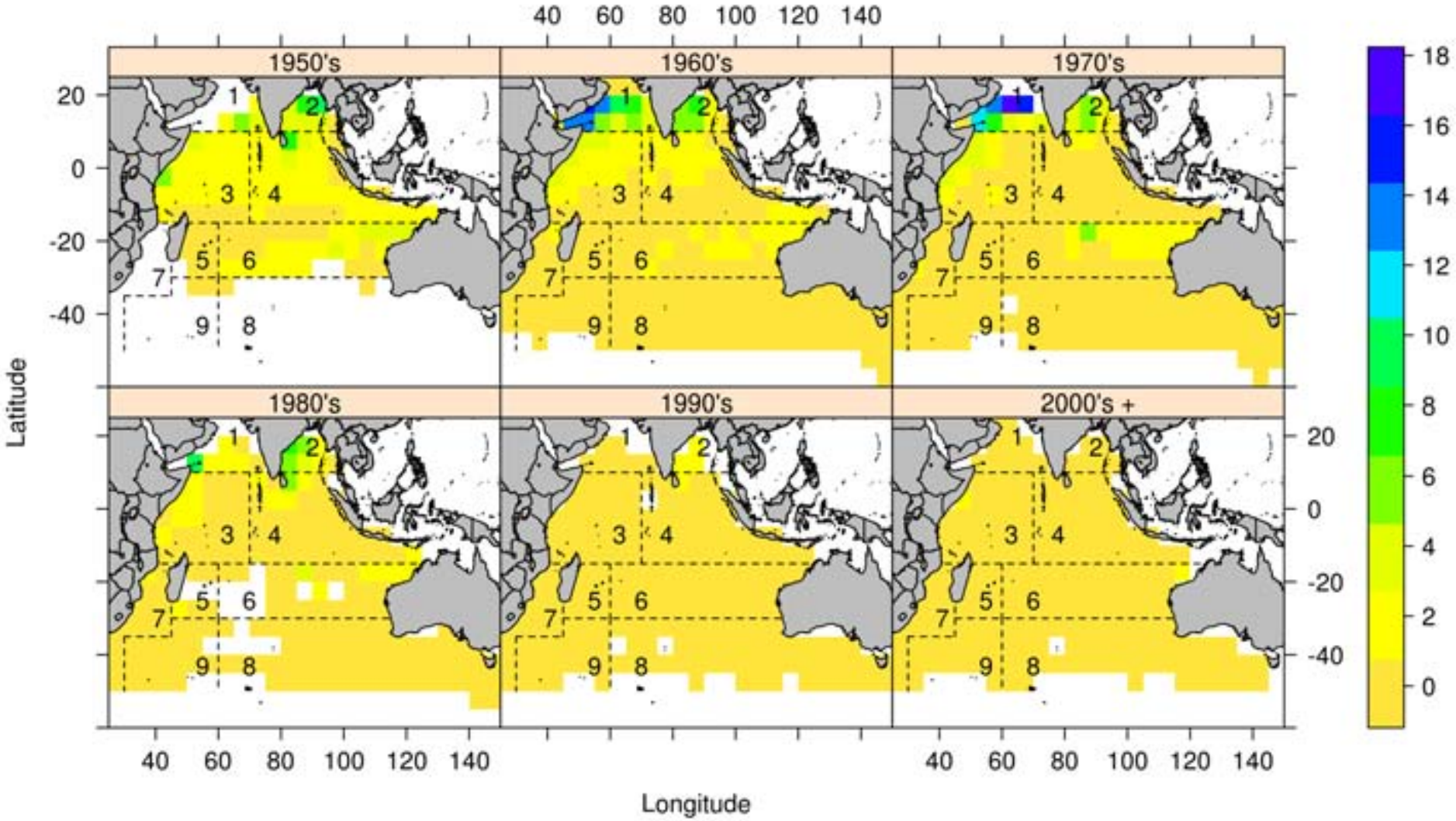
1. Catches were high in areas 1 and 2 and in 2000's;
2. Catch rates were high in area 2 in the first half of the year;
3. Data are not informative about the proportion of zero catches and the positive catches.

Striped Marlin (MLS)

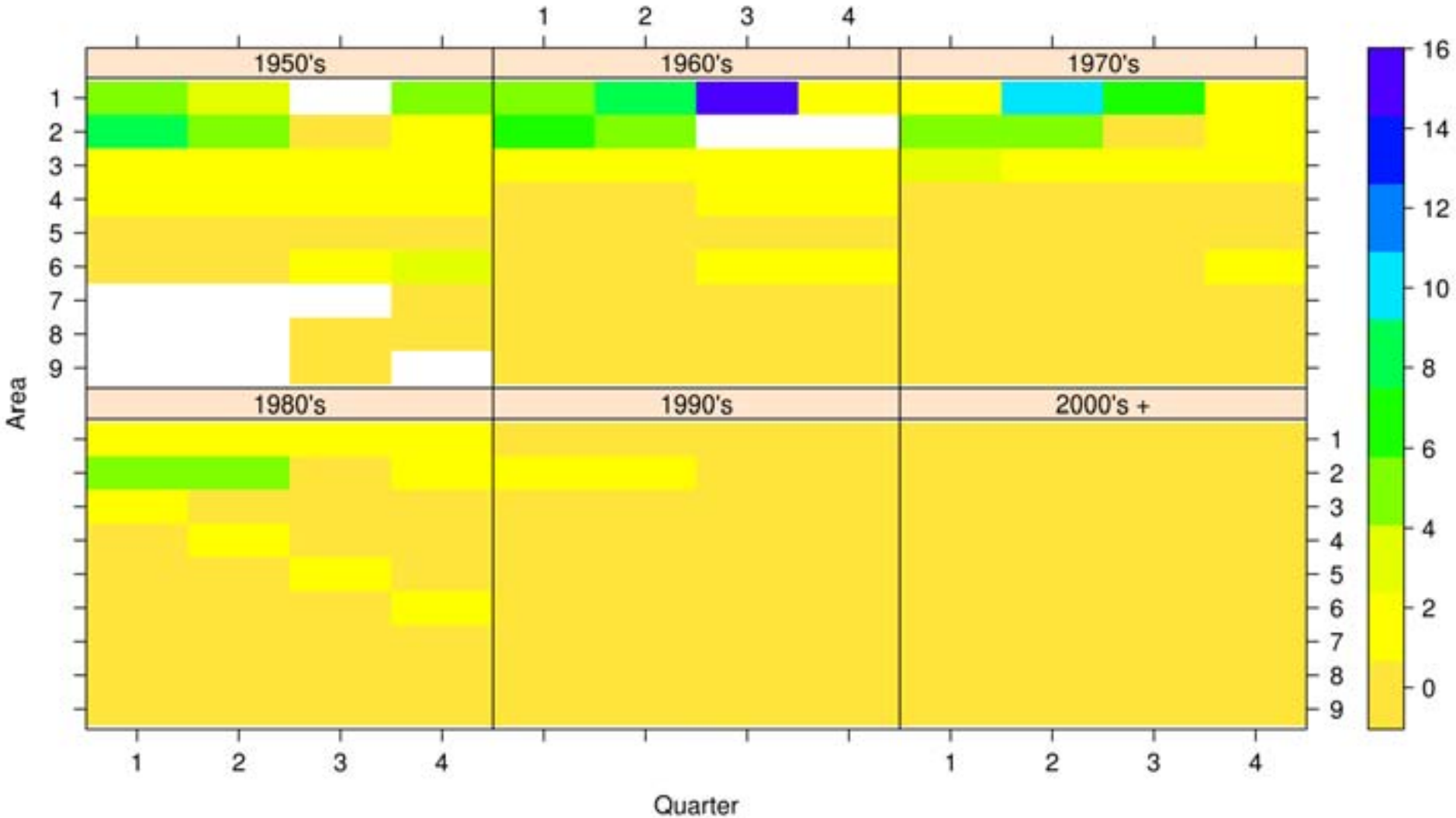
MLS - number of fish - Japan Dataset



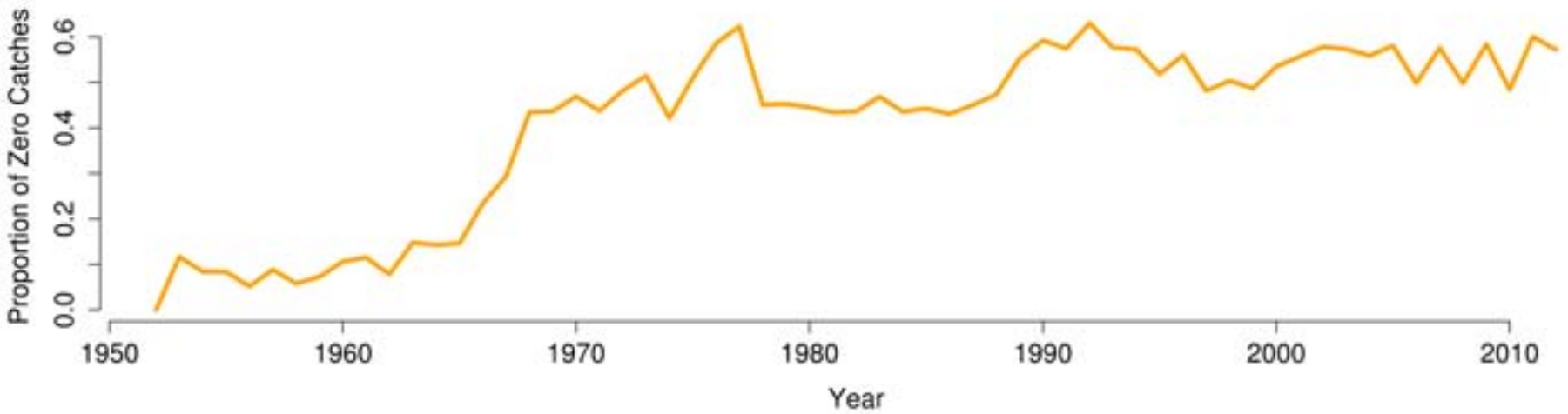
MLS - number of fish/1000 hooks - Decade x Lat x Lon

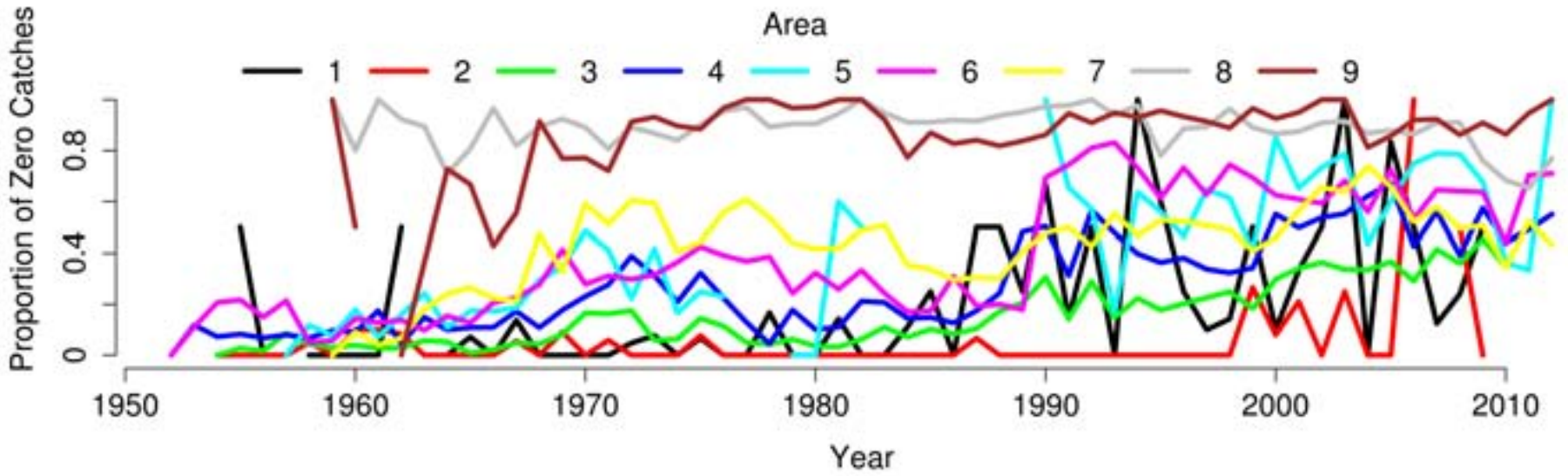


MLS - number of fish/1000 hooks - Decade x Quarter x Area

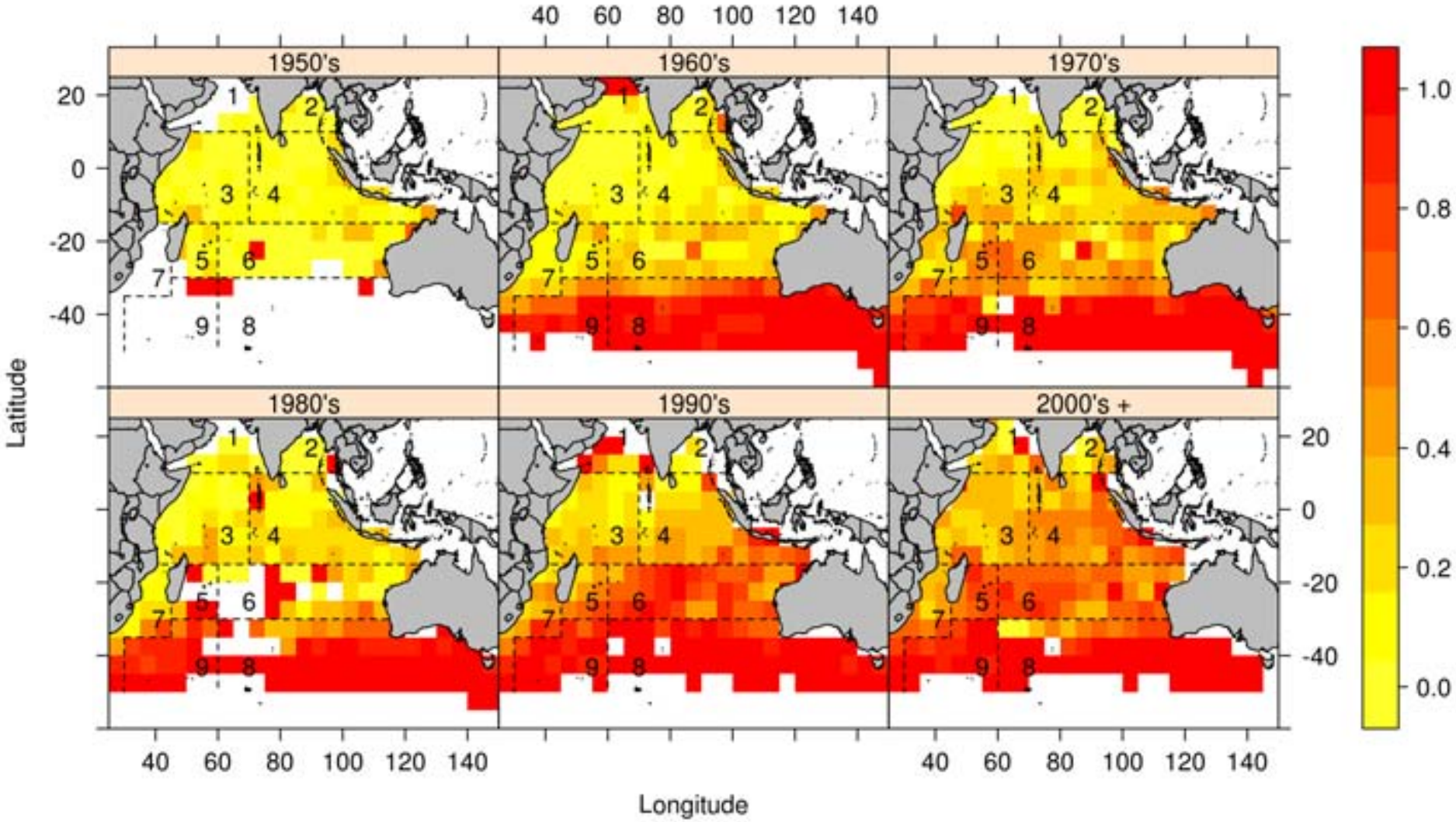


Proportion of Zero Catches

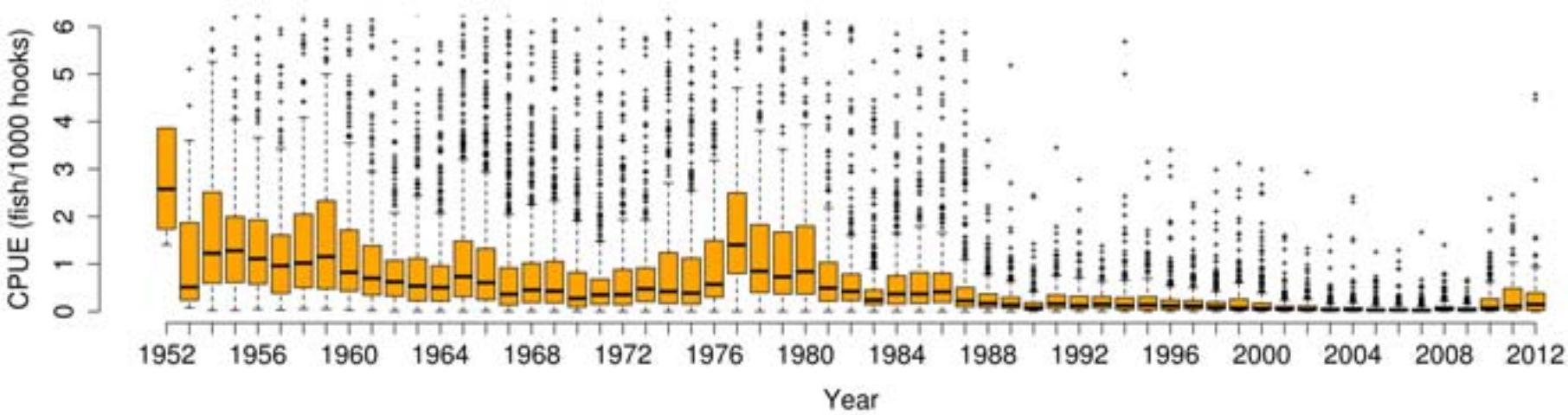


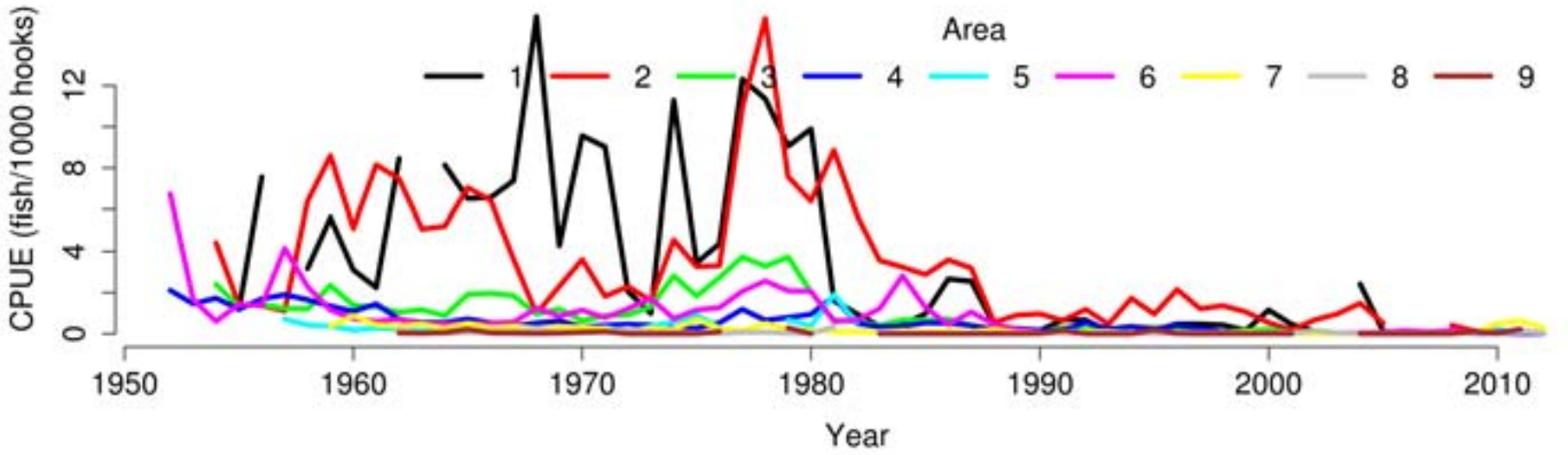


Proportion of Zero Catches

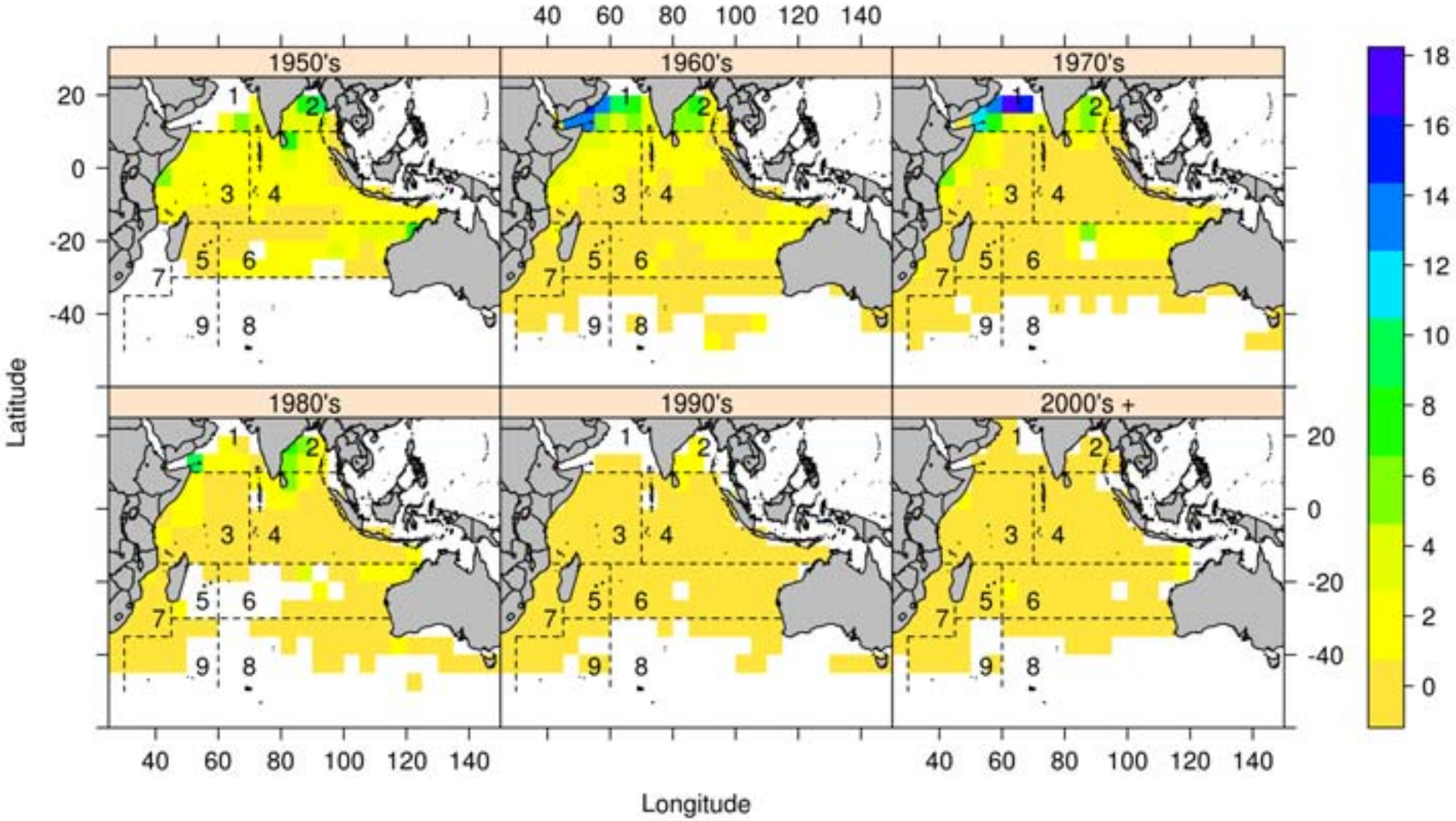


CPUE – Positive Catches





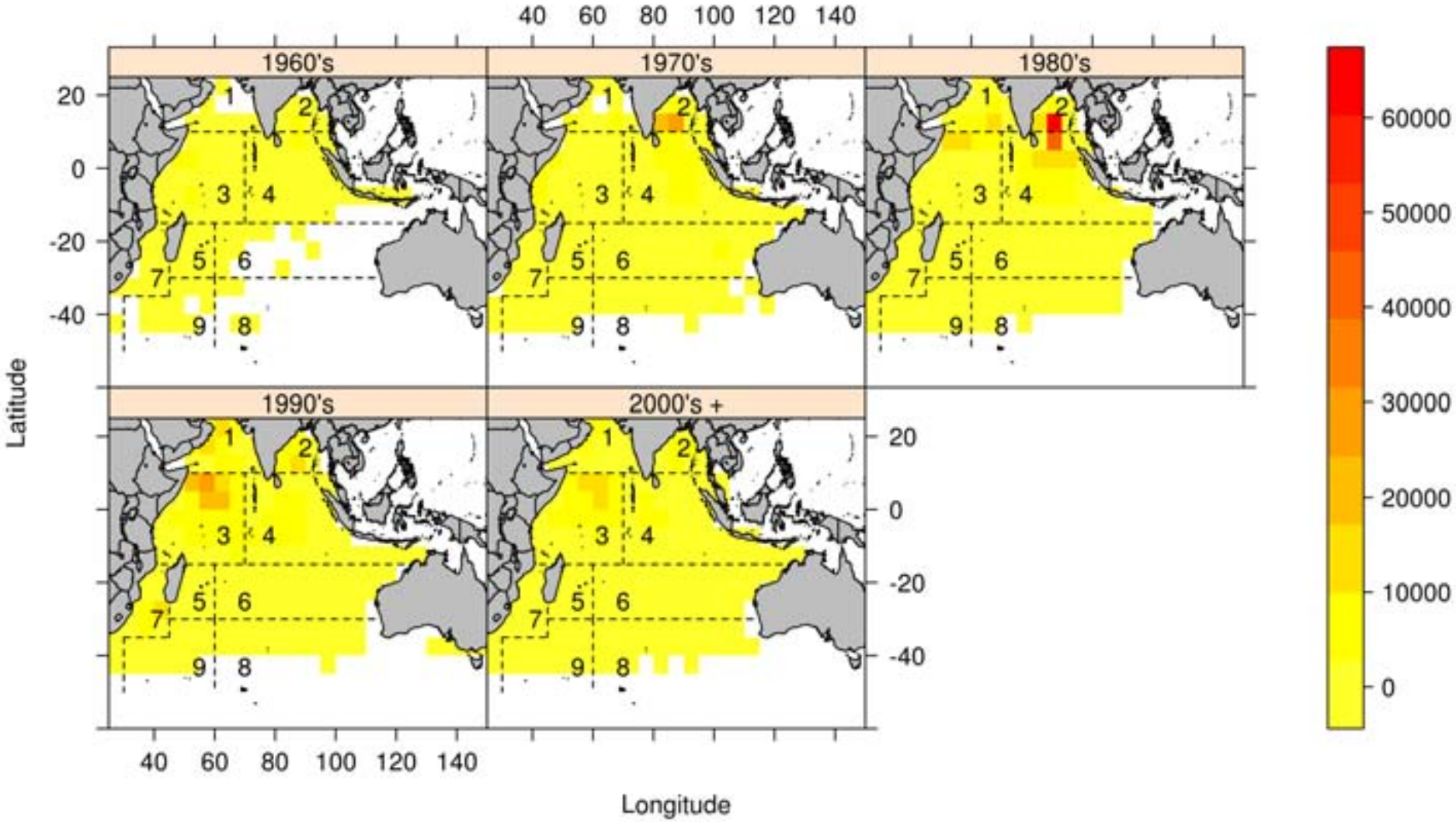
CPUE – Positive Catches



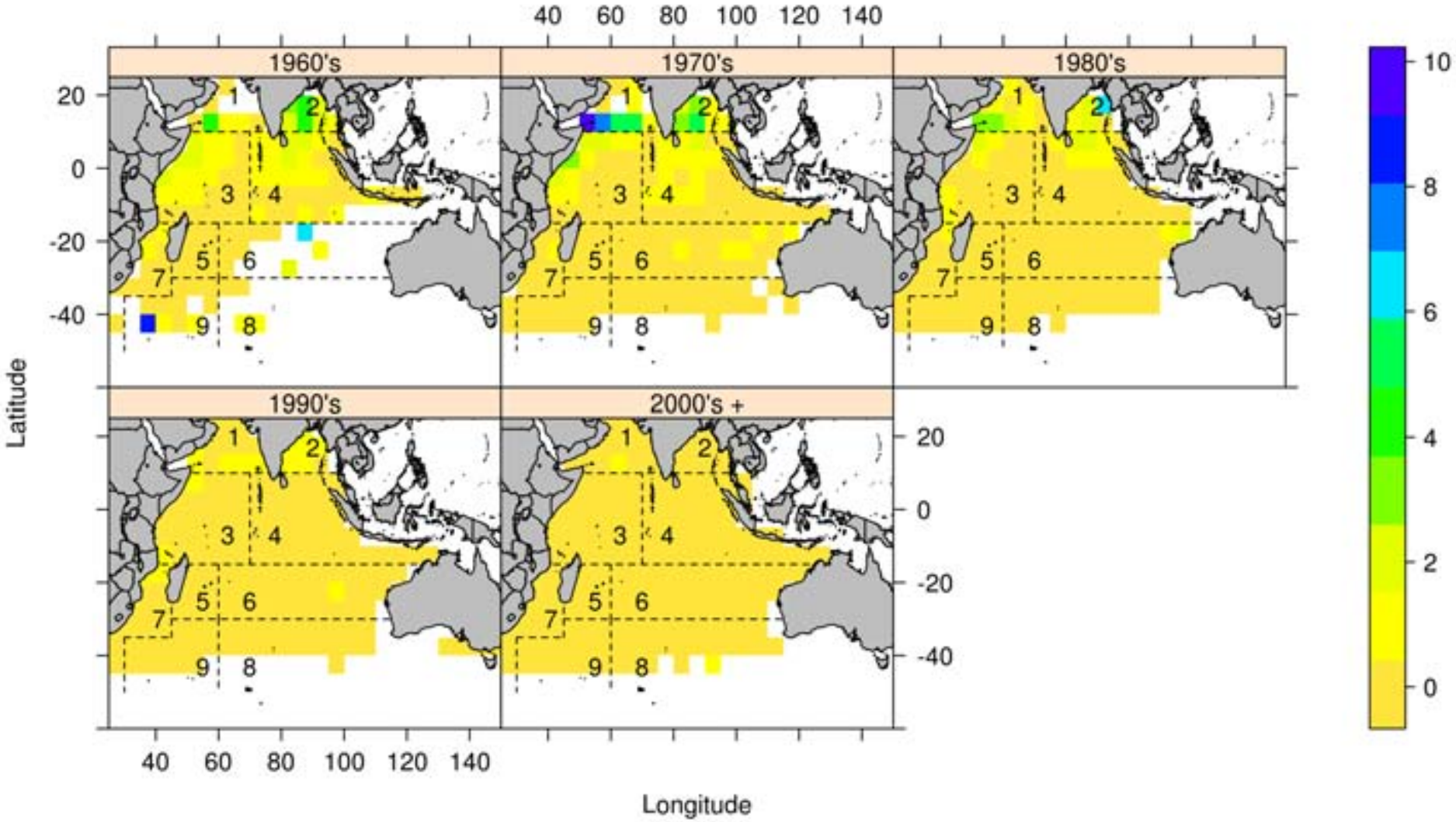
Remarks – MLS Japan Dataset

1. Catches were high in areas 2, 3, 4 and 6 in 1960's and 1970's especially in the margin of the Indic Ocean;
2. Overall catch rates were high in areas 1, 2 and 3 in 1950's, 1960's and 1970's;
3. Clear seasonal pattern was not apparent in this preliminary analysis;
4. Overall proportions proportions of zero catches are not high except in areas 8 and 9;
5. Proportions zero catches increase in 1960's especially in areas 4, 5, 6 and 7. Proportions of zeros also increase quickly in area 6 in the end of 1980's;
6. Catch rates as calculated for positive dataset show a slight decreasing trend until the end of 1960's then, there is a peak in the end of 1970's. Finally there is another decreasing trend until the end of 2000's;
7. The peak of catch rates calculated for positive dataset is noticeable in areas 1 and 2;
8. Catch rates for positive dataset were high in some locations inside areas 1, 2 and 3 in 1950's, 1960's and 1970's.

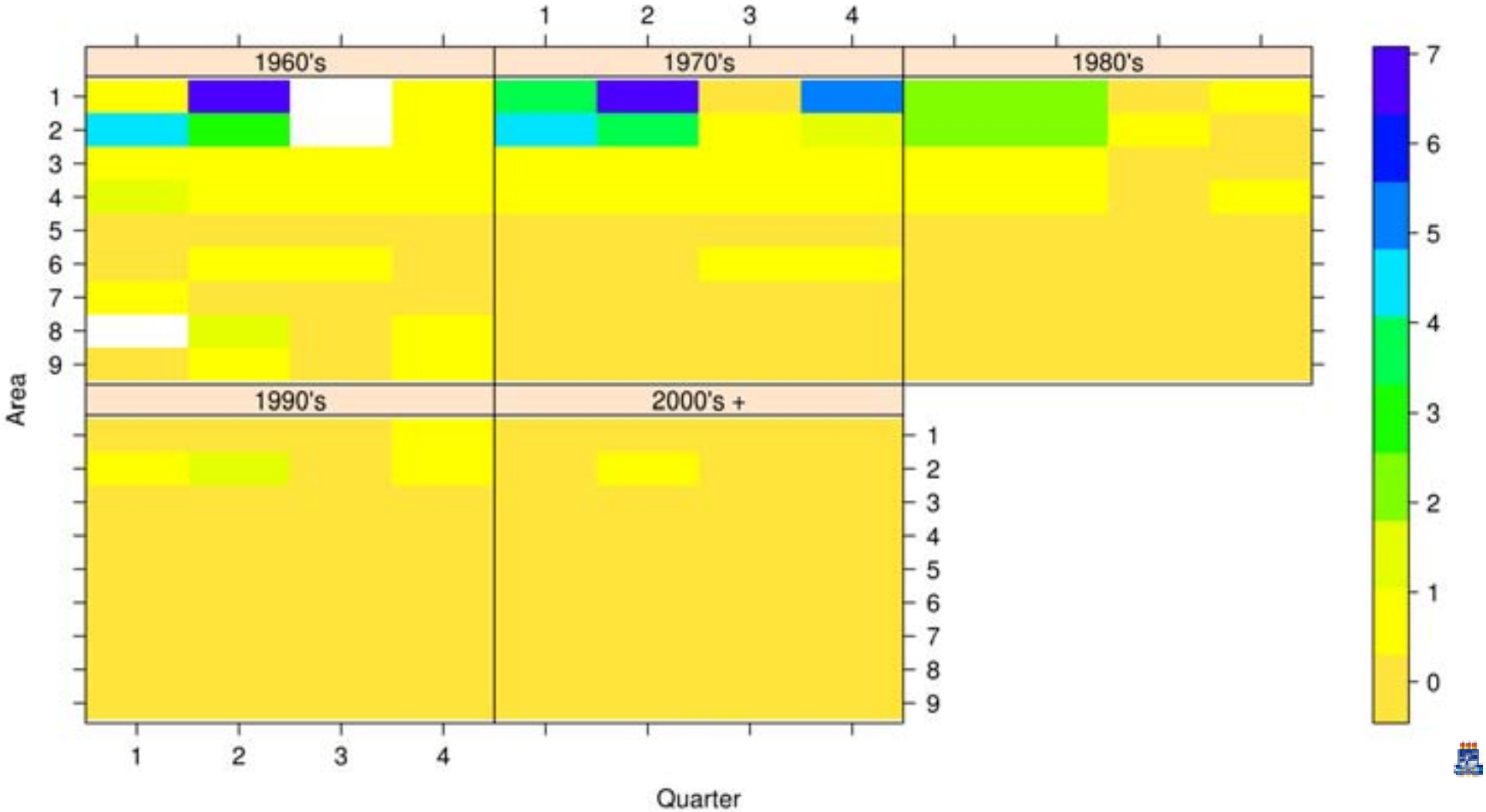
MLS - number of fish - Taiwan dataset



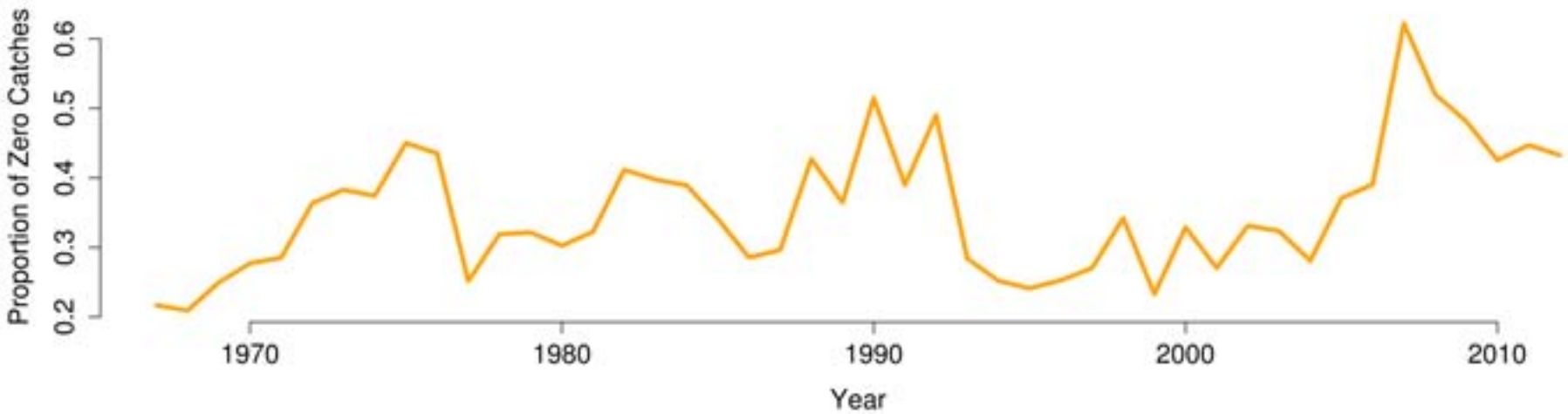
MLS - number of fish/1000 hooks - Decade x Lat x Lon

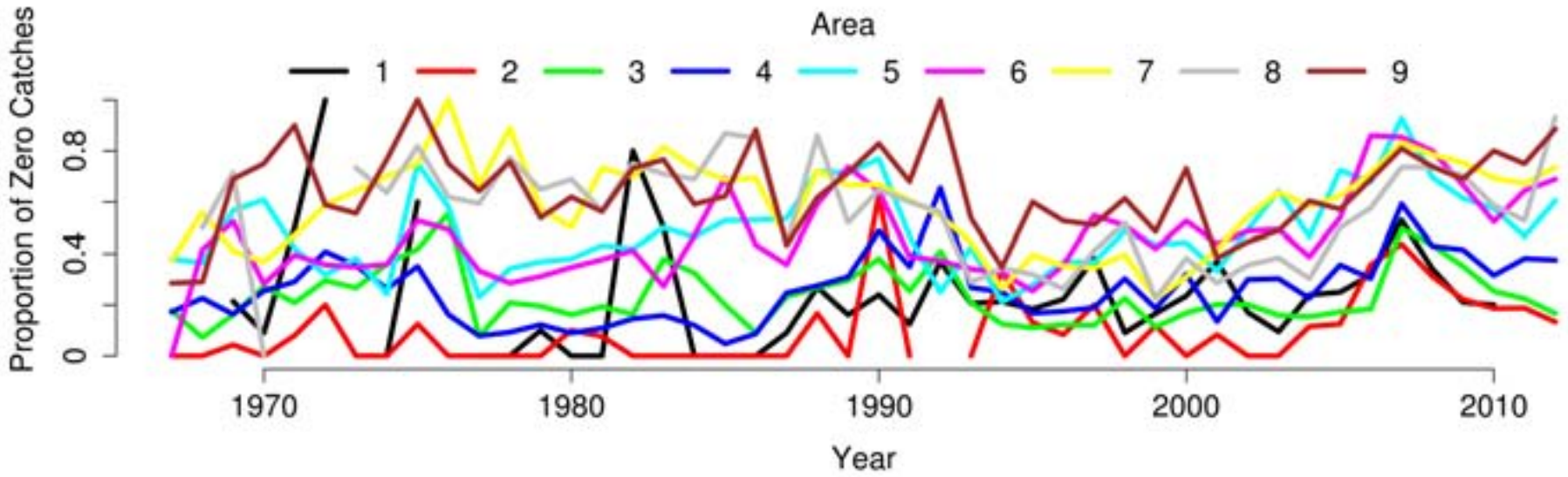


MLS - number of fish/1000 hooks - Decade x Quarter x Area

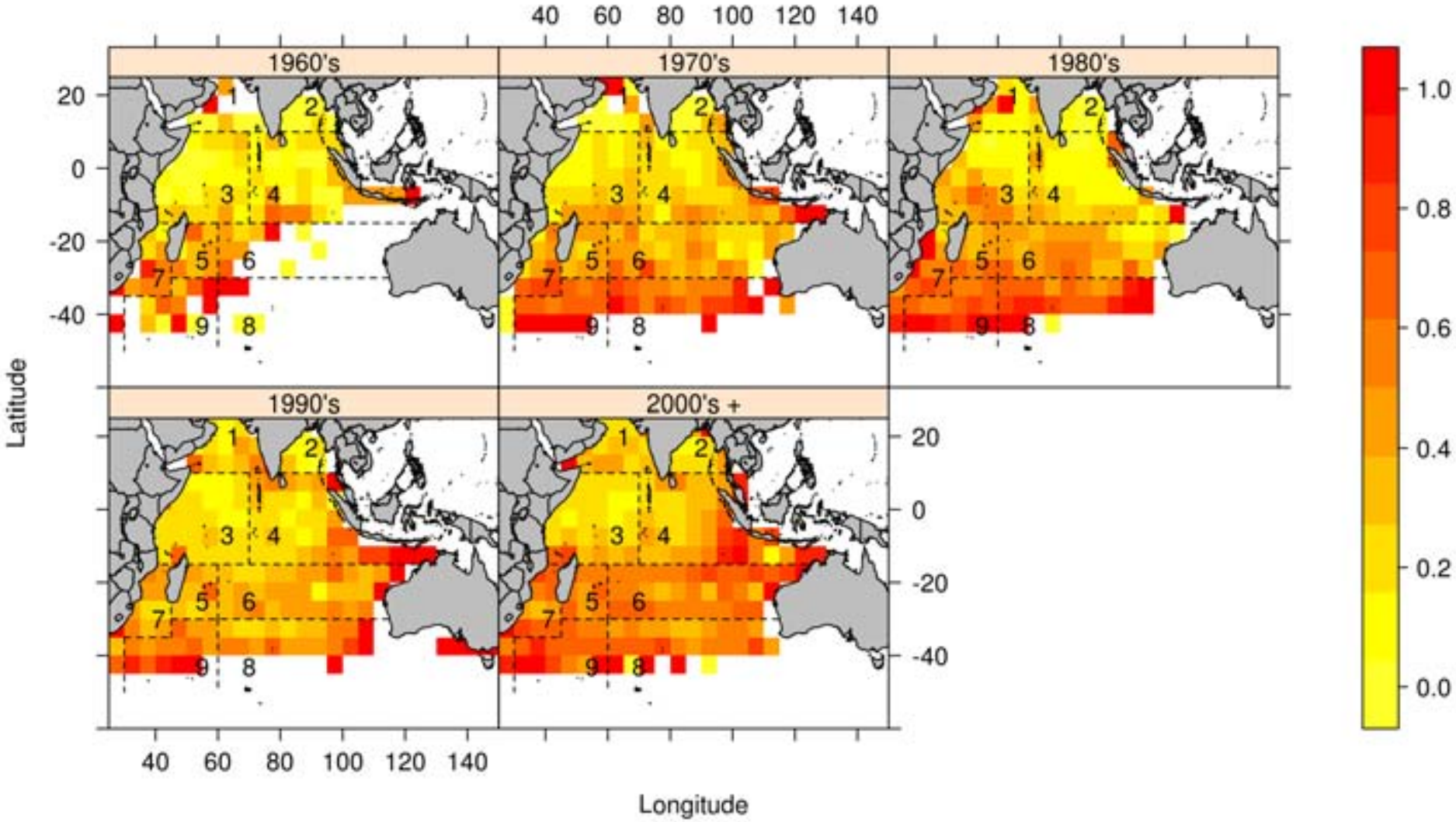


Proportion of Zero Catches

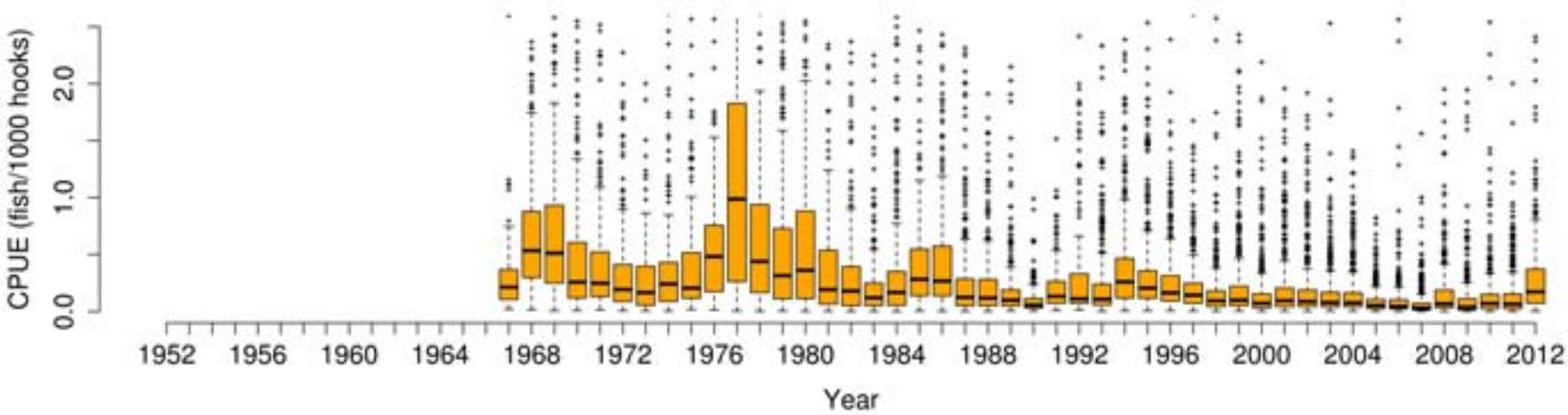


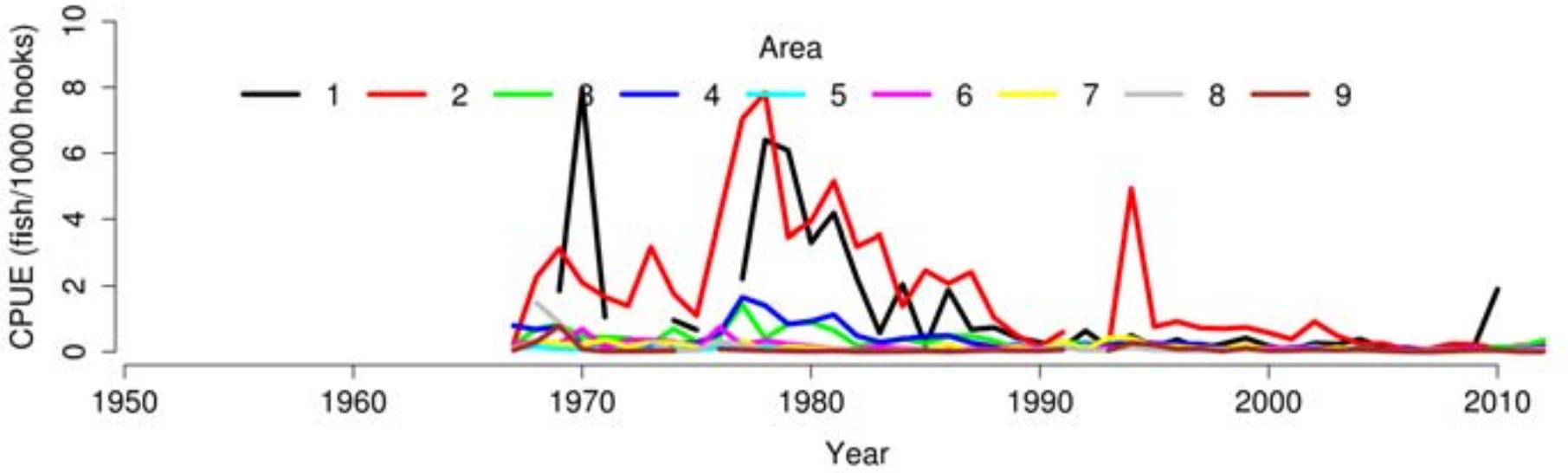


Proportion of Zero Catches

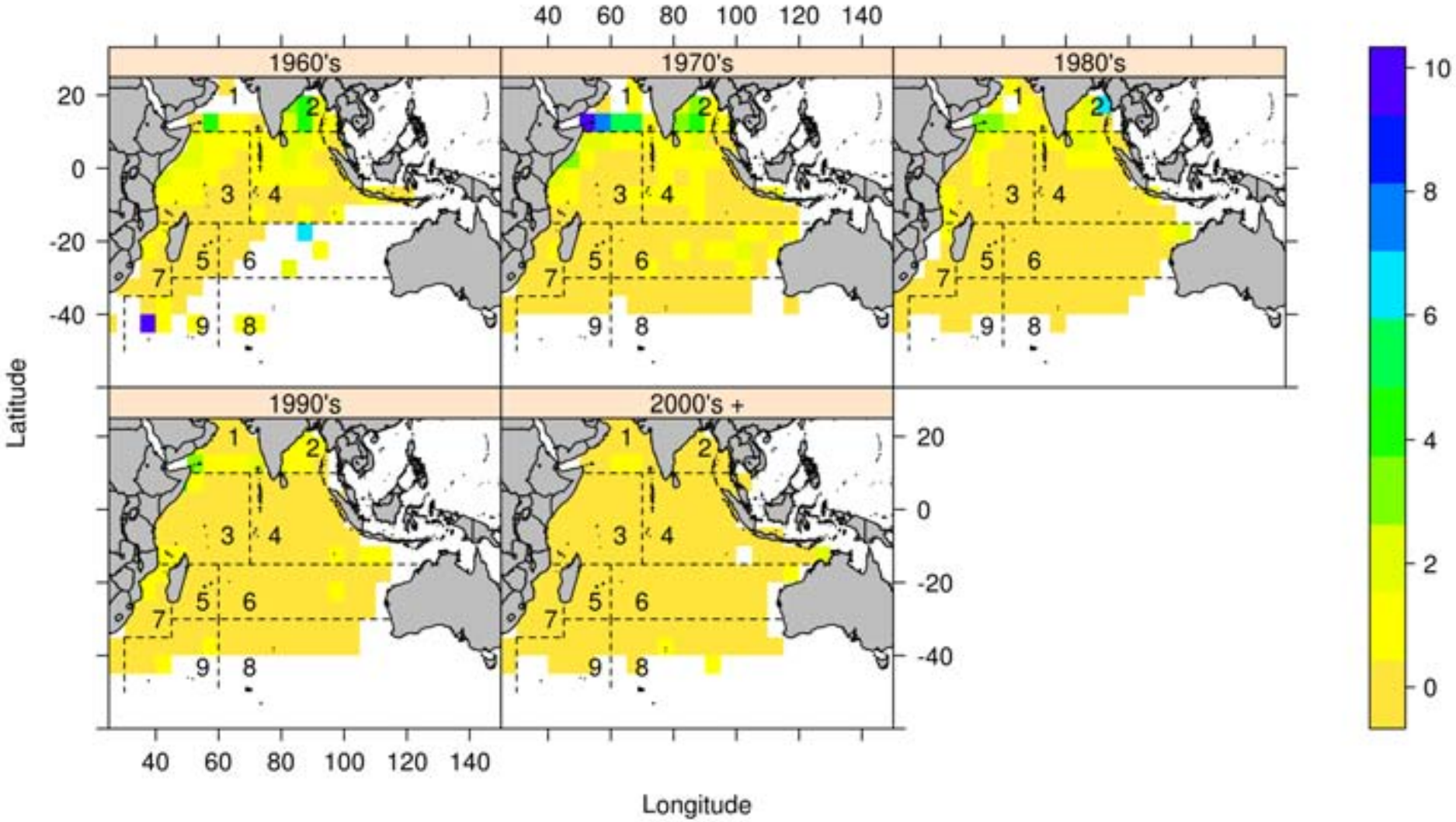


CPUE – Positive Catches





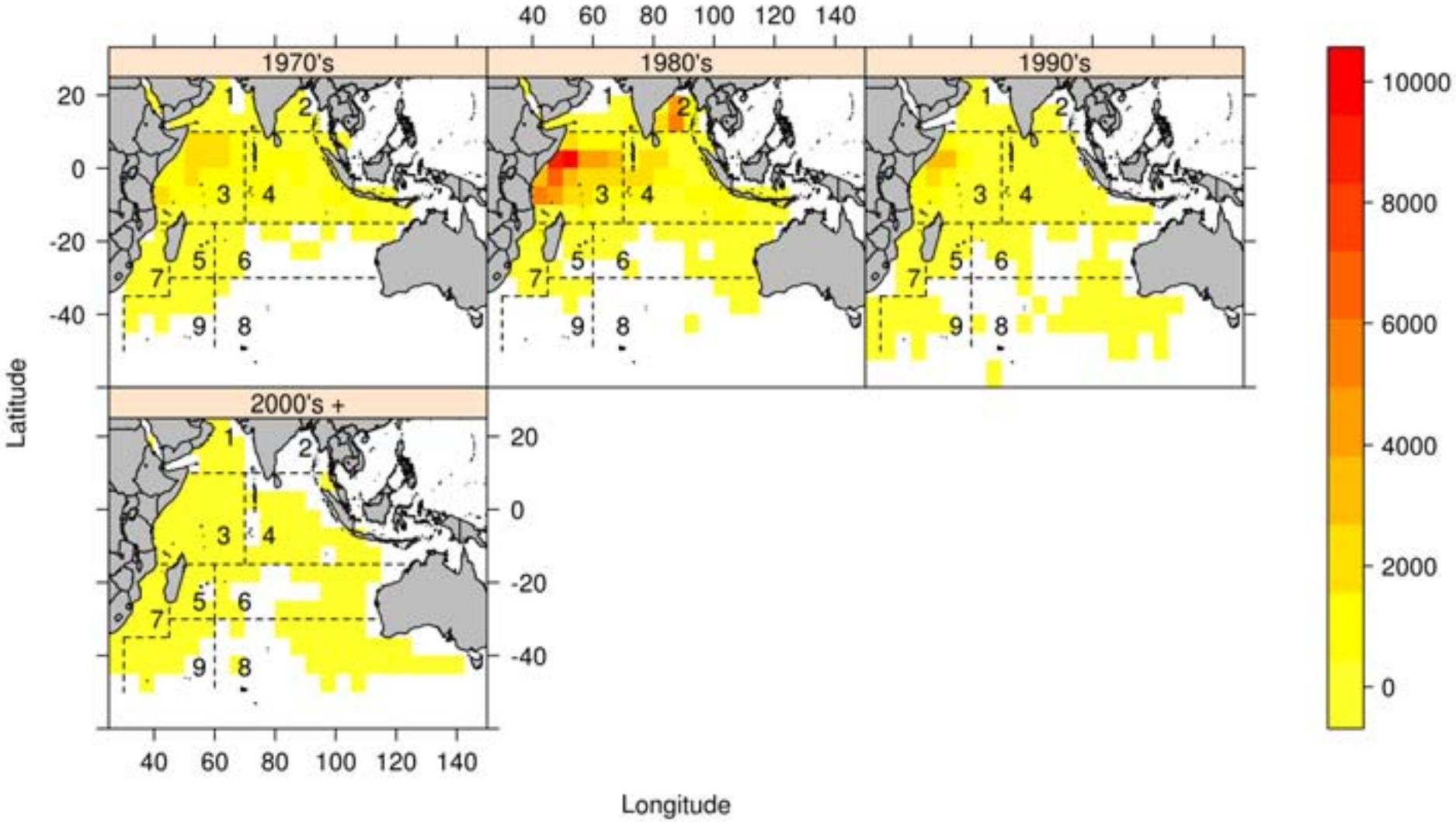
CPUE – Positive Catches



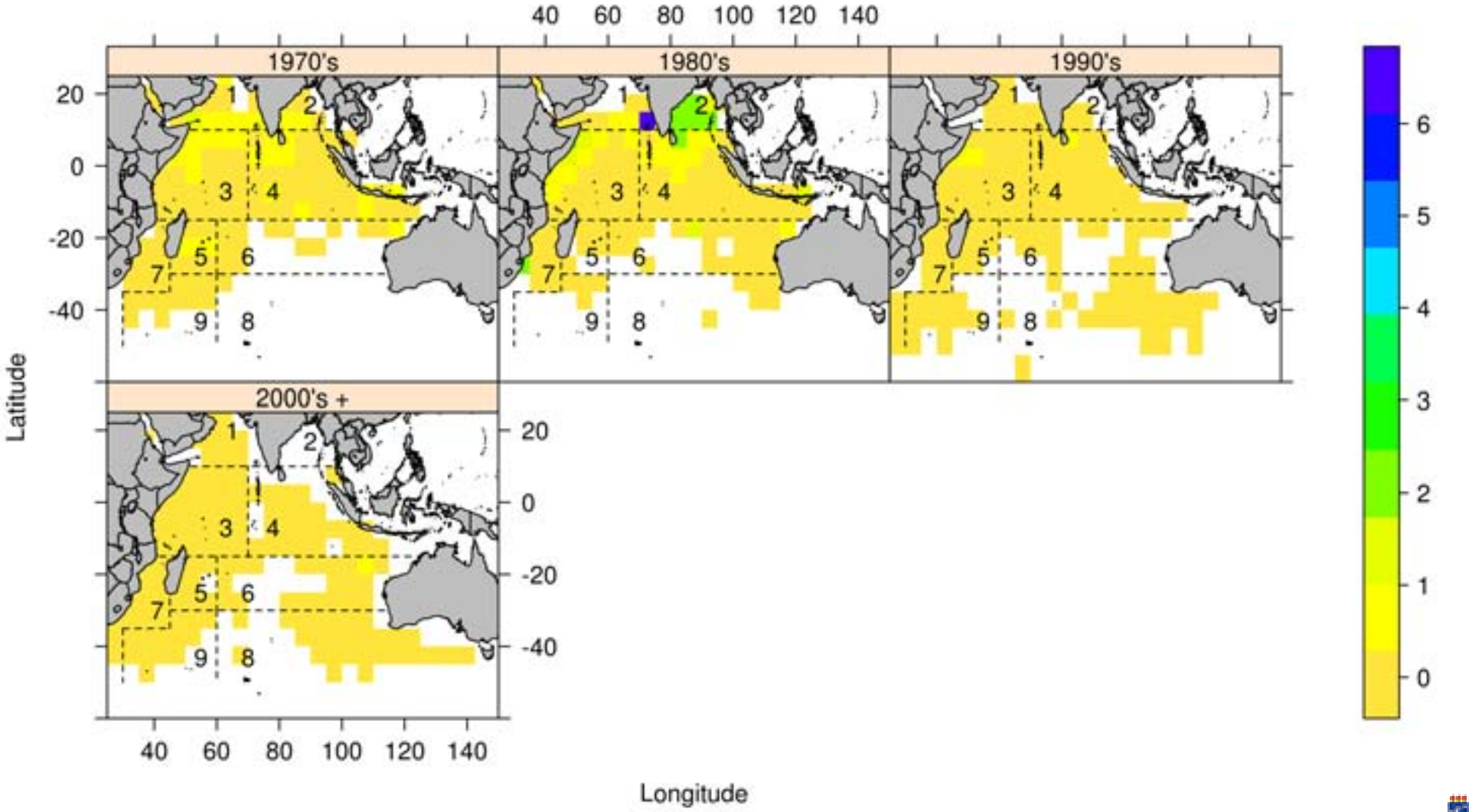
Remarks – MLS Taiwan Dataset

1. Catches were high in areas 1, 2, 3 and 4;
2. Overall catch rates were also high in areas close to equator but there are a couple of squares with high catch rate in area 6 (2000's);
3. Proportions of zero catches increase in 1970's, oscillates around 0.3 until mid 1990's and the increase again in the end of 2000's;
4. Catch rates as calculated for positive dataset in 2007 should be revised;
5. Overall catch rates for positive dataset decrease until the begin of 1970's, peak in 1977 and then remain close to low values until the end of the time series;
6. The peak of catch rates for positive dataset in the ende of 1970's is noticeable in areas 1 and 2.

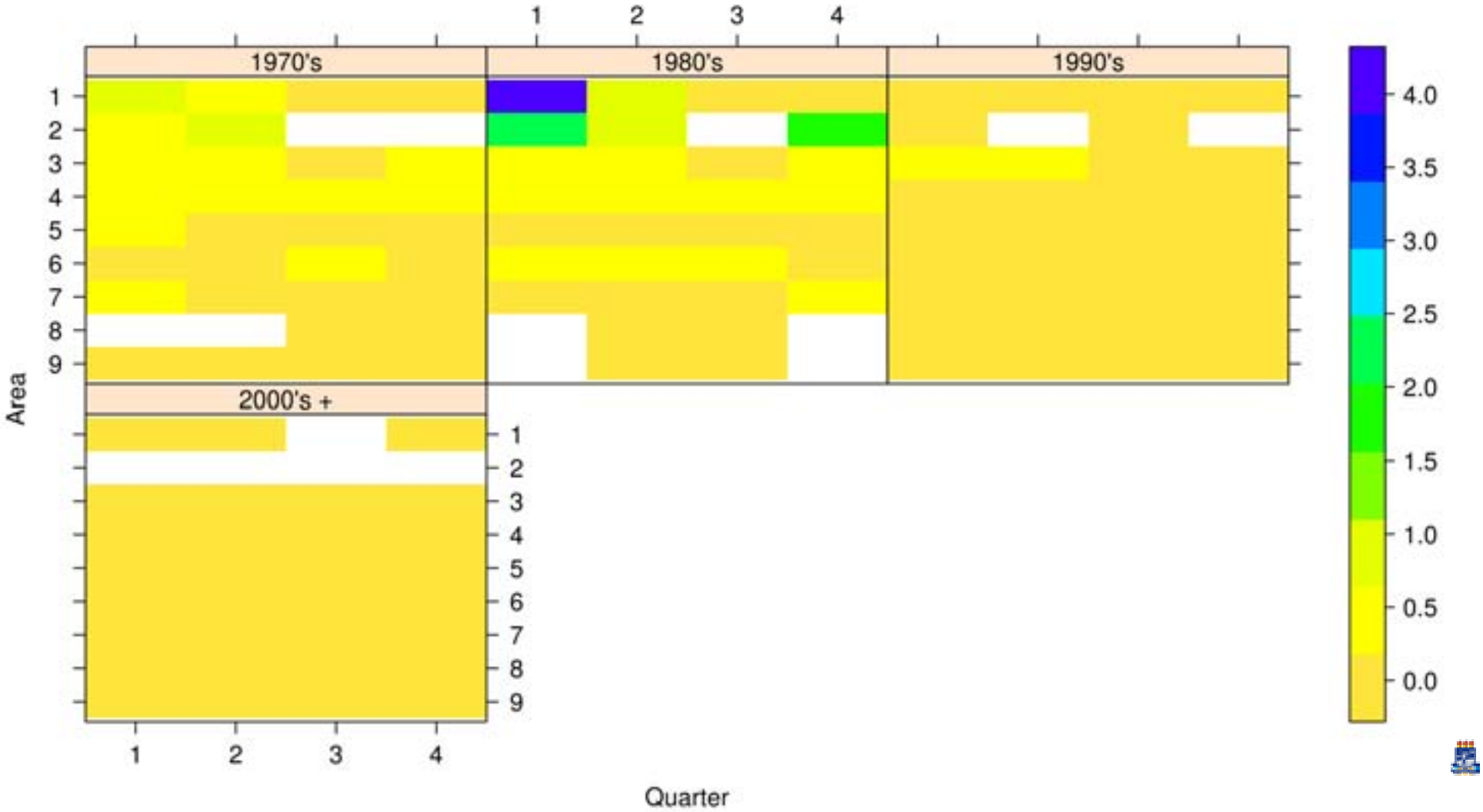
MLS - number of fish - Korea dataset



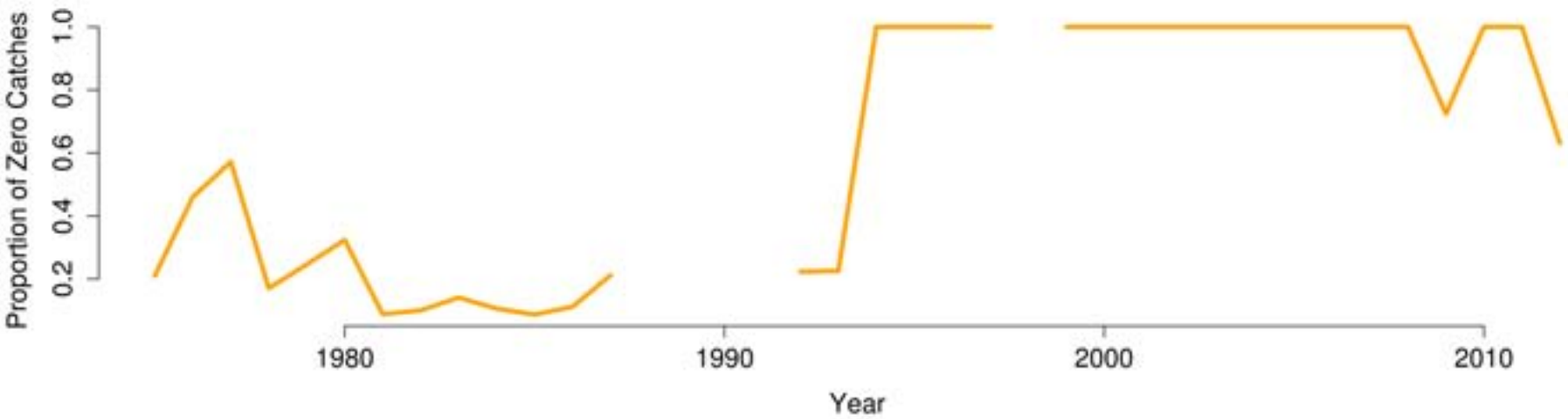
MLS - number of fish/1000 hooks - Decade x Lat x Lon

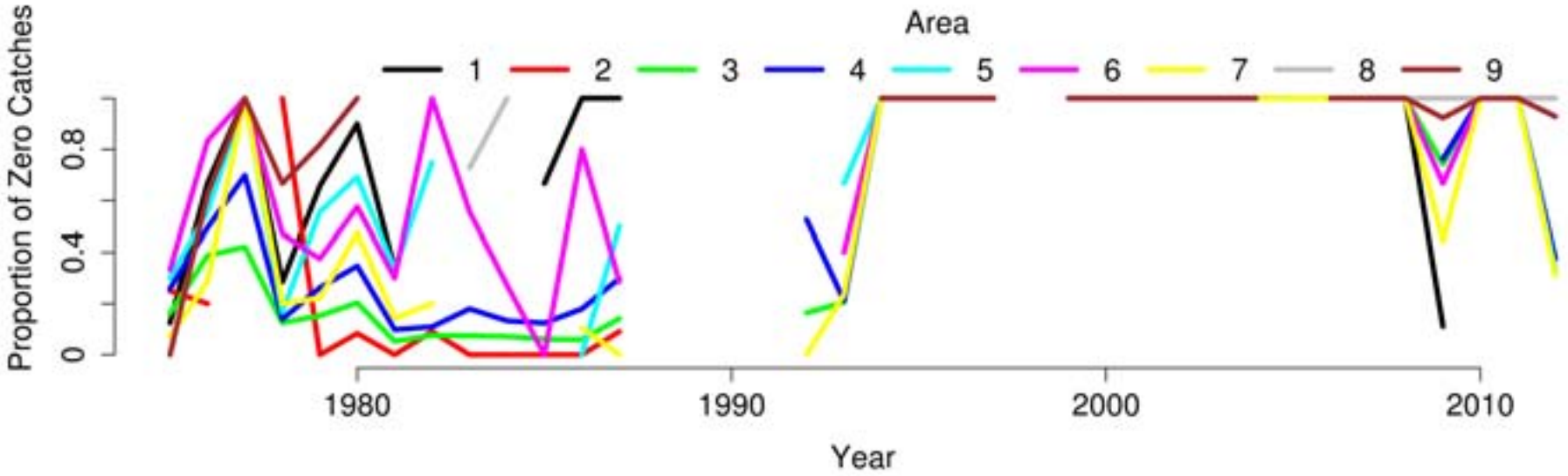


MLS - number of fish/1000 hooks - Decade x Quarter x Area

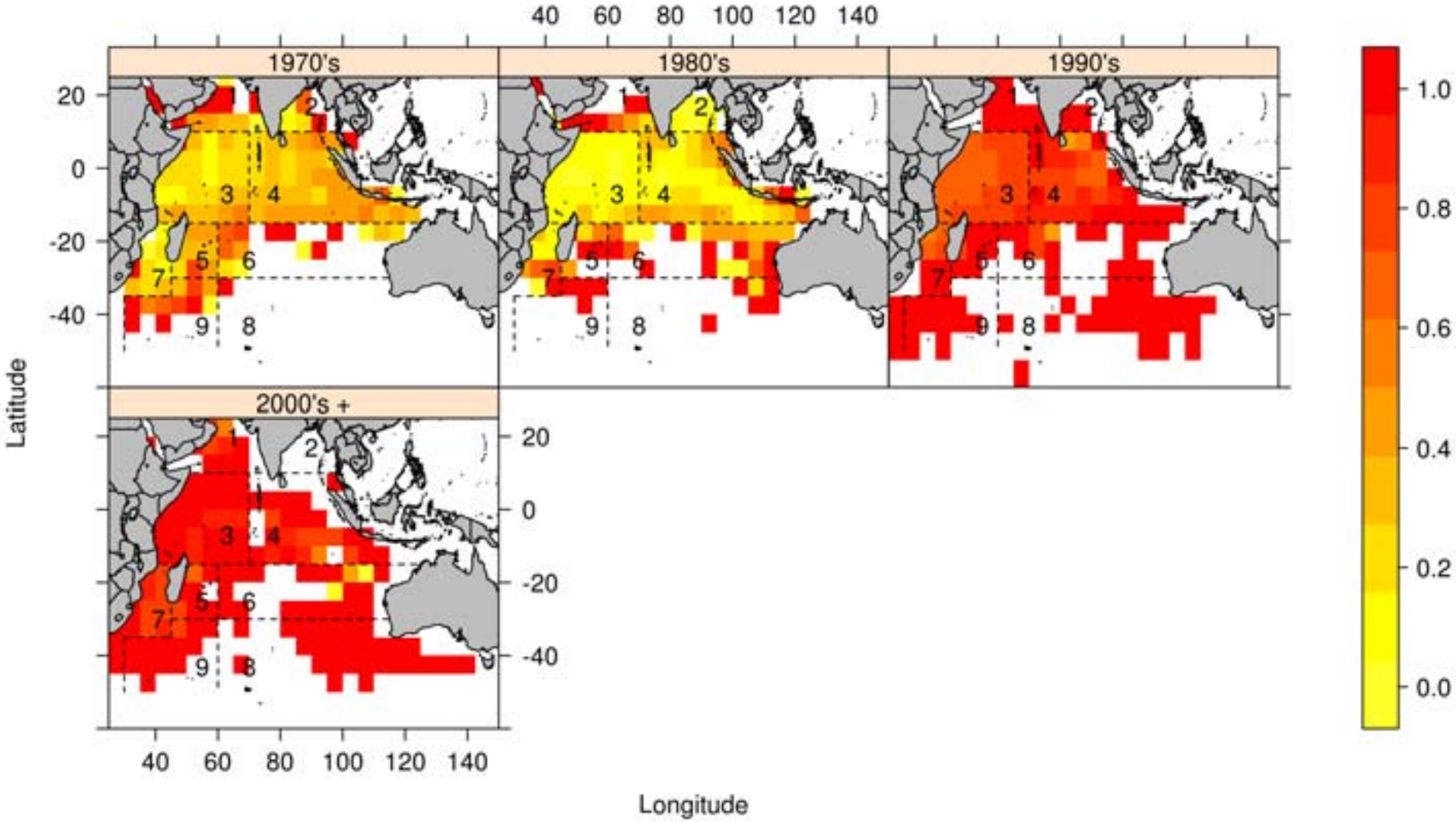


Proportion of Zero Catches

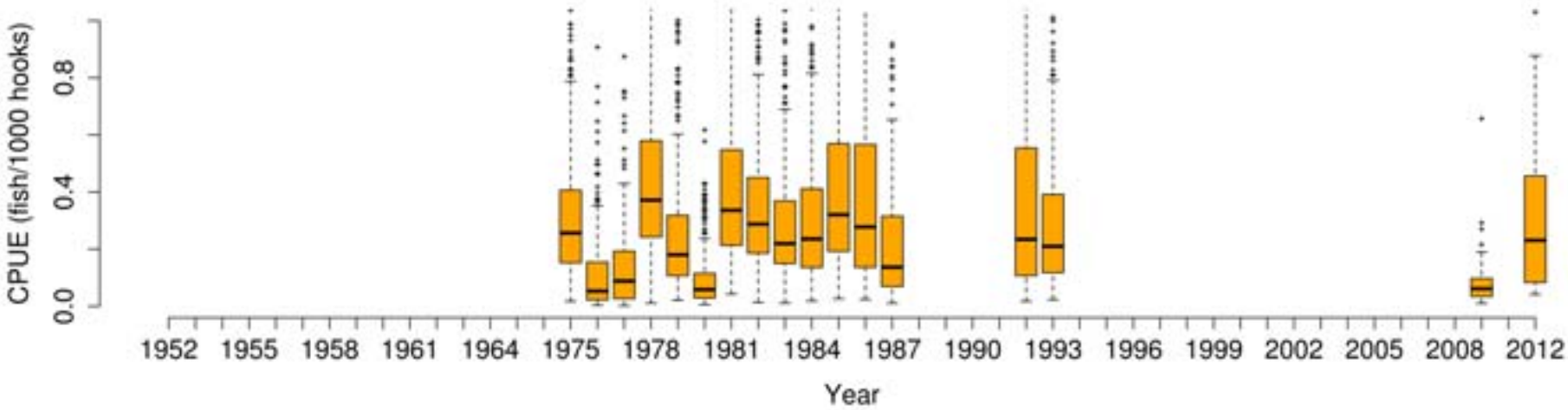


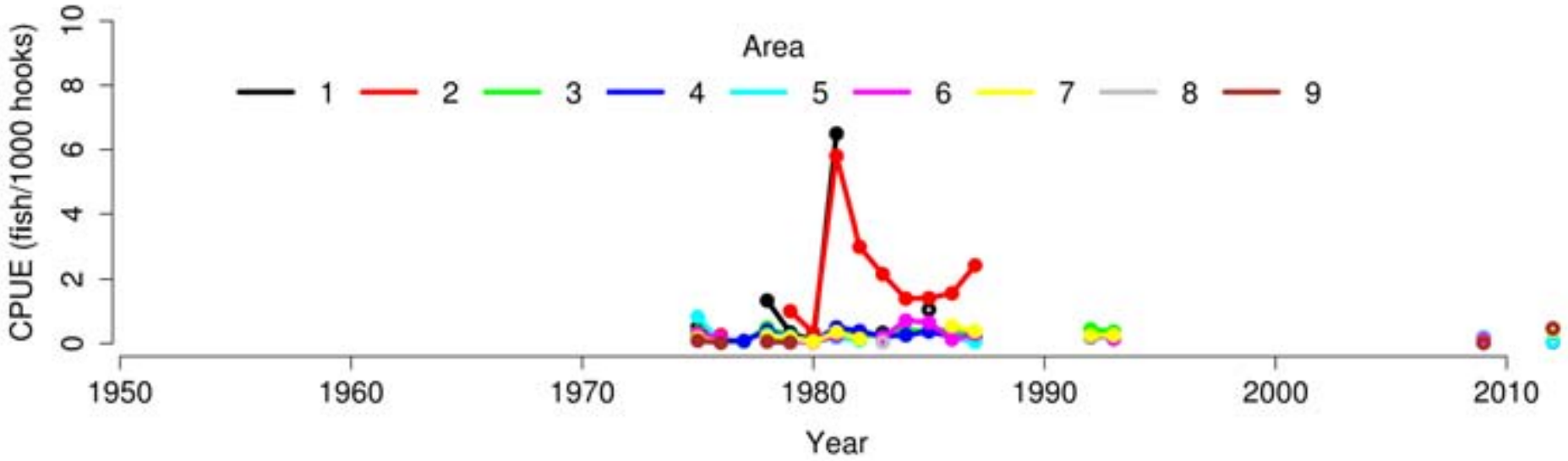


Proportion of Zero Catches

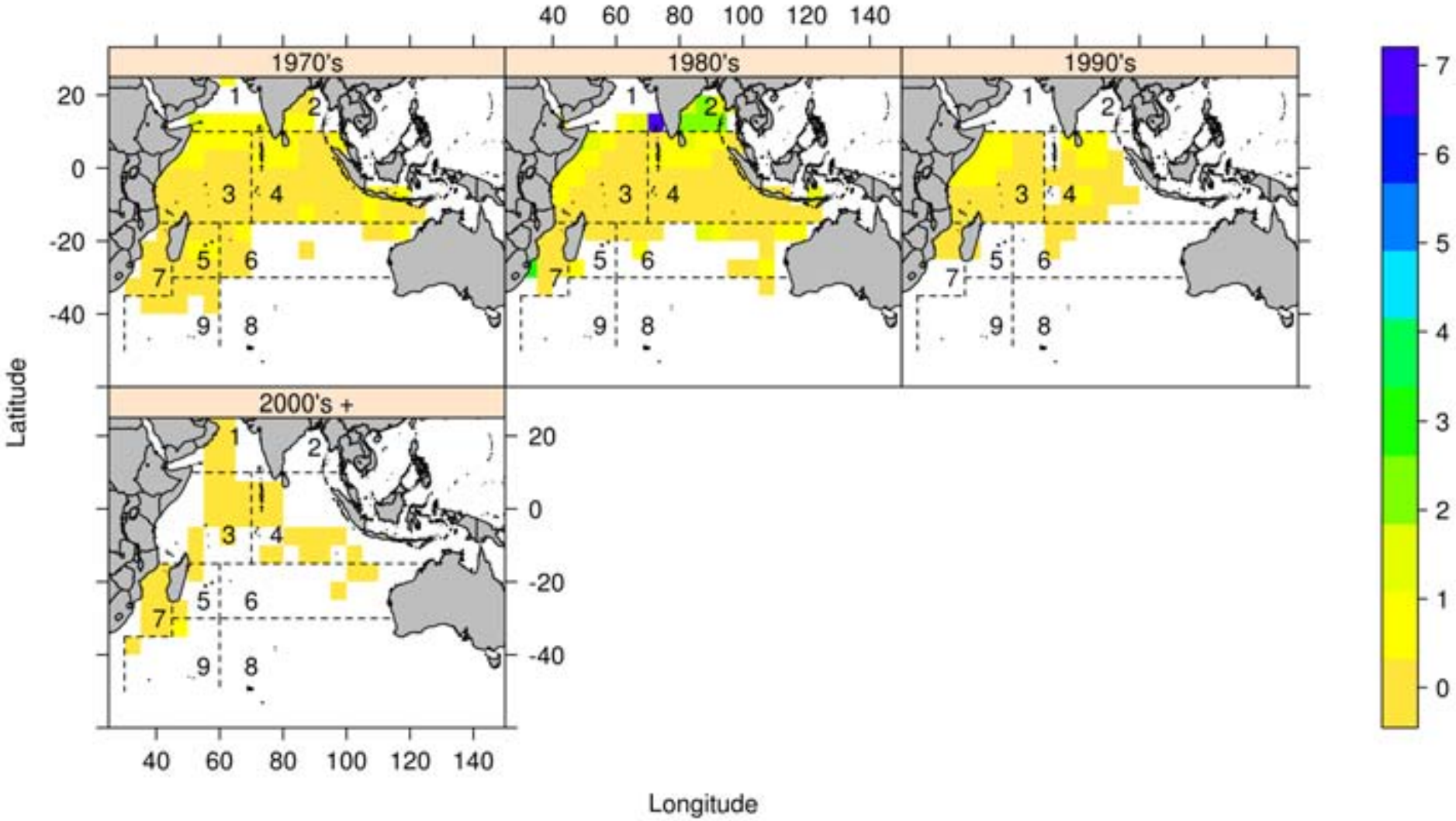


CPUE – Positive Catches





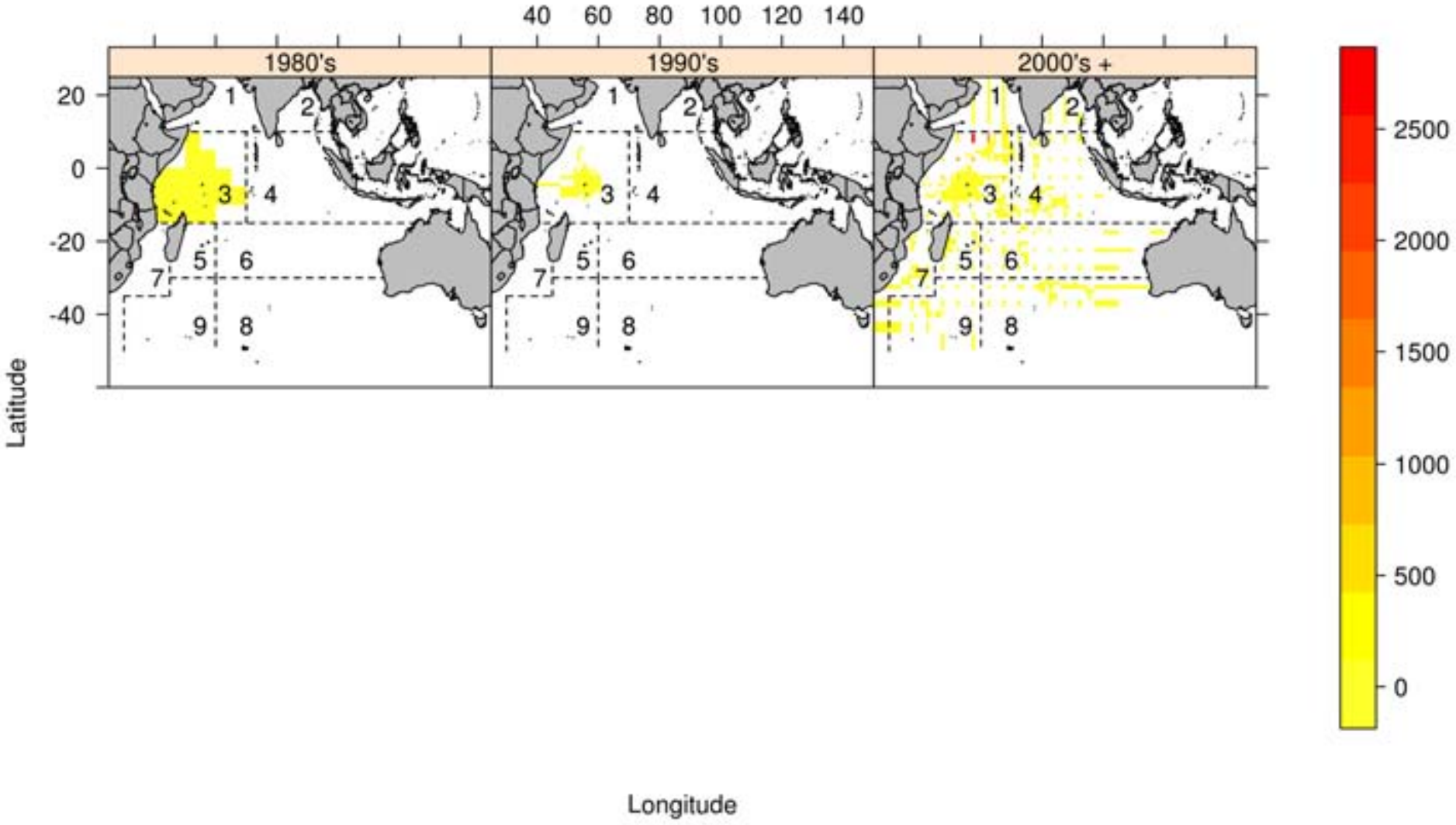
CPUE – Positive Catches



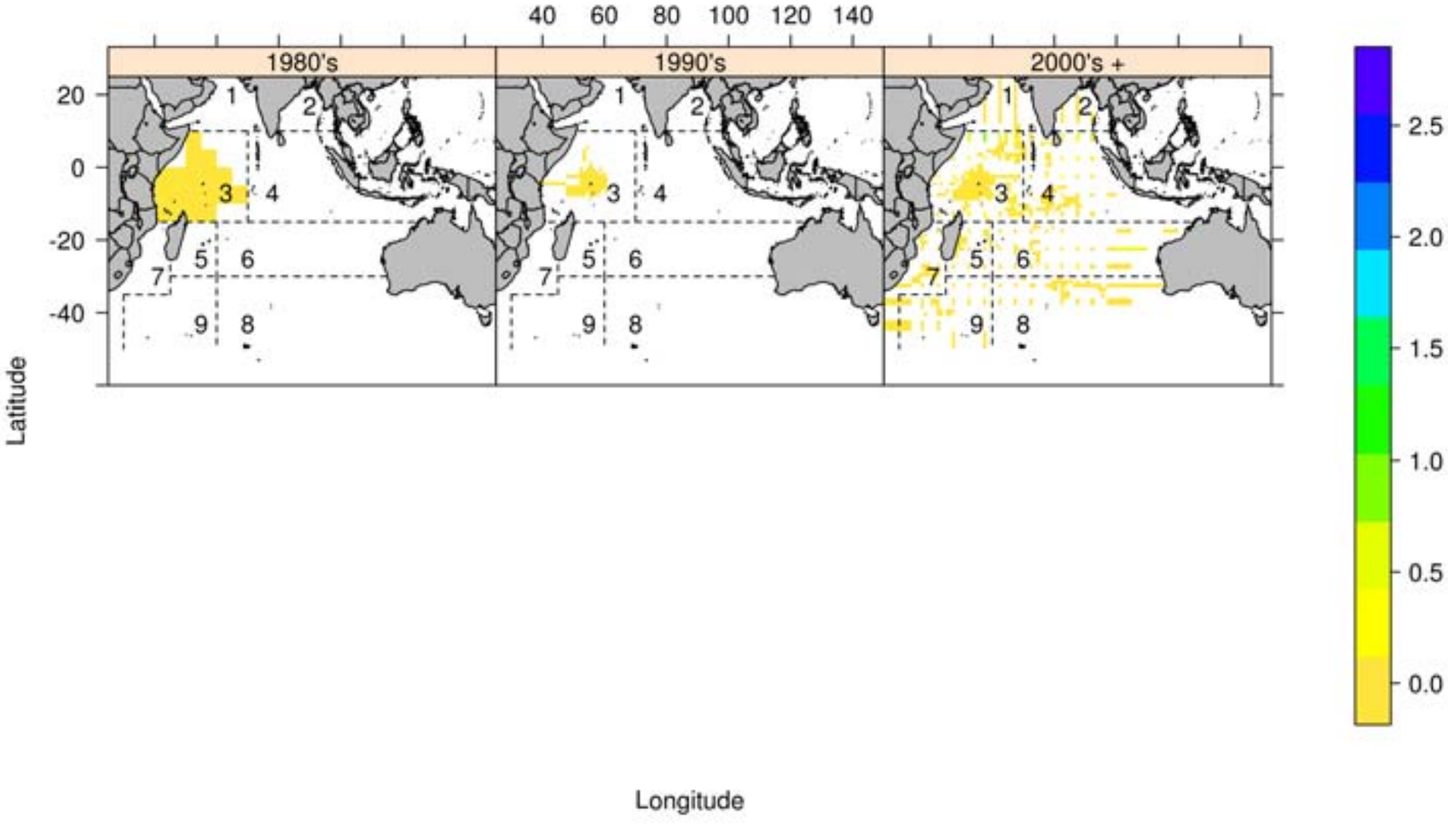
Remarks – MLS Korea Dataset

1. Catches were high in area 3 in 1980's and 1990's;
2. Catch rates were high in areas 1, 2 and 3 in 1970's and 1980's;
3. Catch rates were high in 1^{st} quarter in areas 1 and 2;
4. Data are not informative about the proportion of zero catches;
5. Mean catch rate as calculated for positive dataset show an outstanding peak in the the beginning of 1980's in areas 1 and 2.

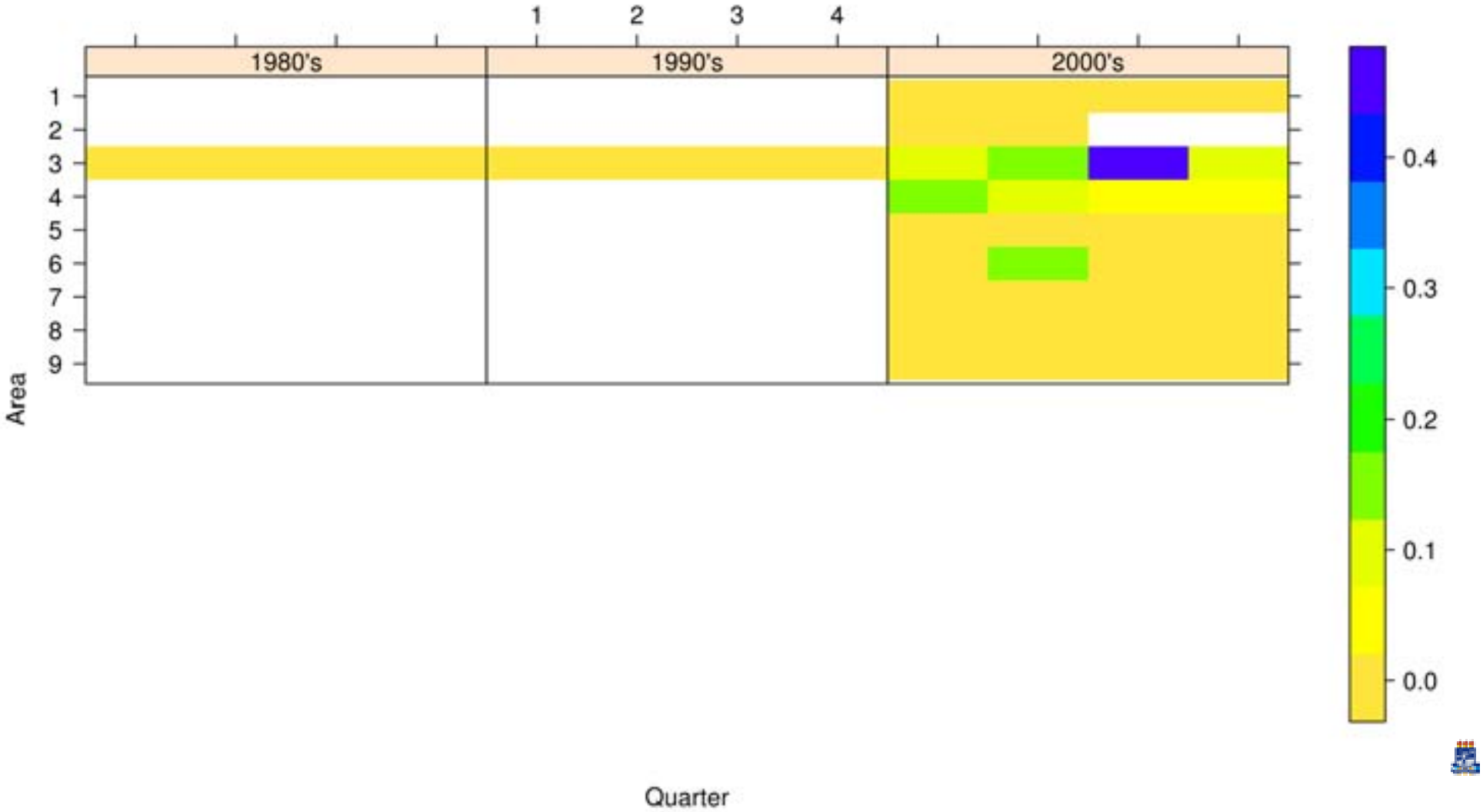
MLS - number of fish - Seychelles dataset



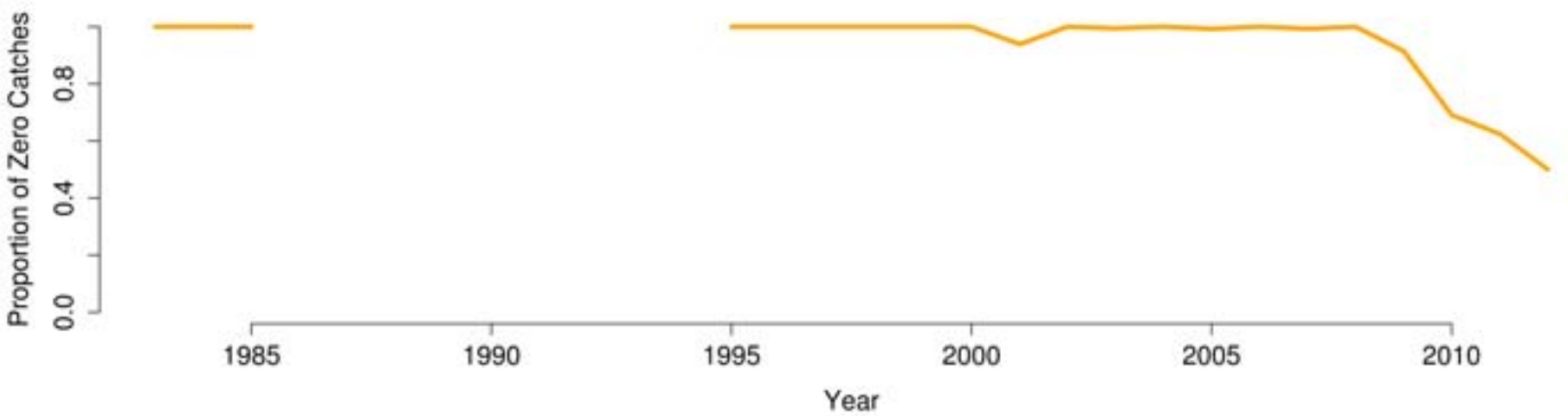
MLS - number of fish/1000 hooks - Decade x Lat x Lon

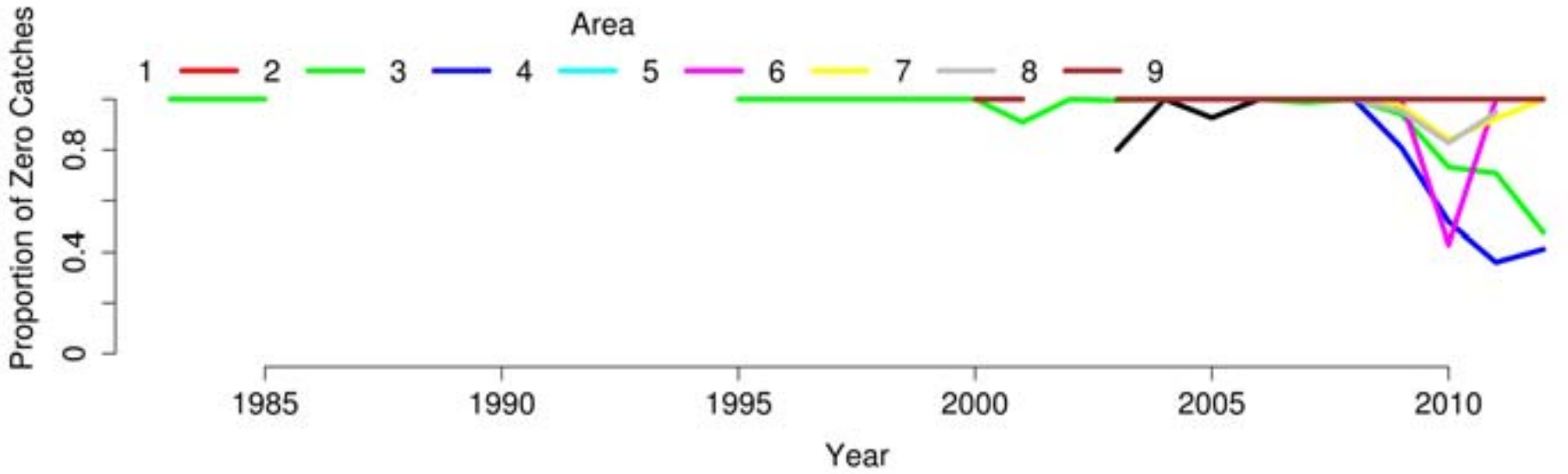


MLS - number of fish/1000 hooks - Decade x Quarter x Area

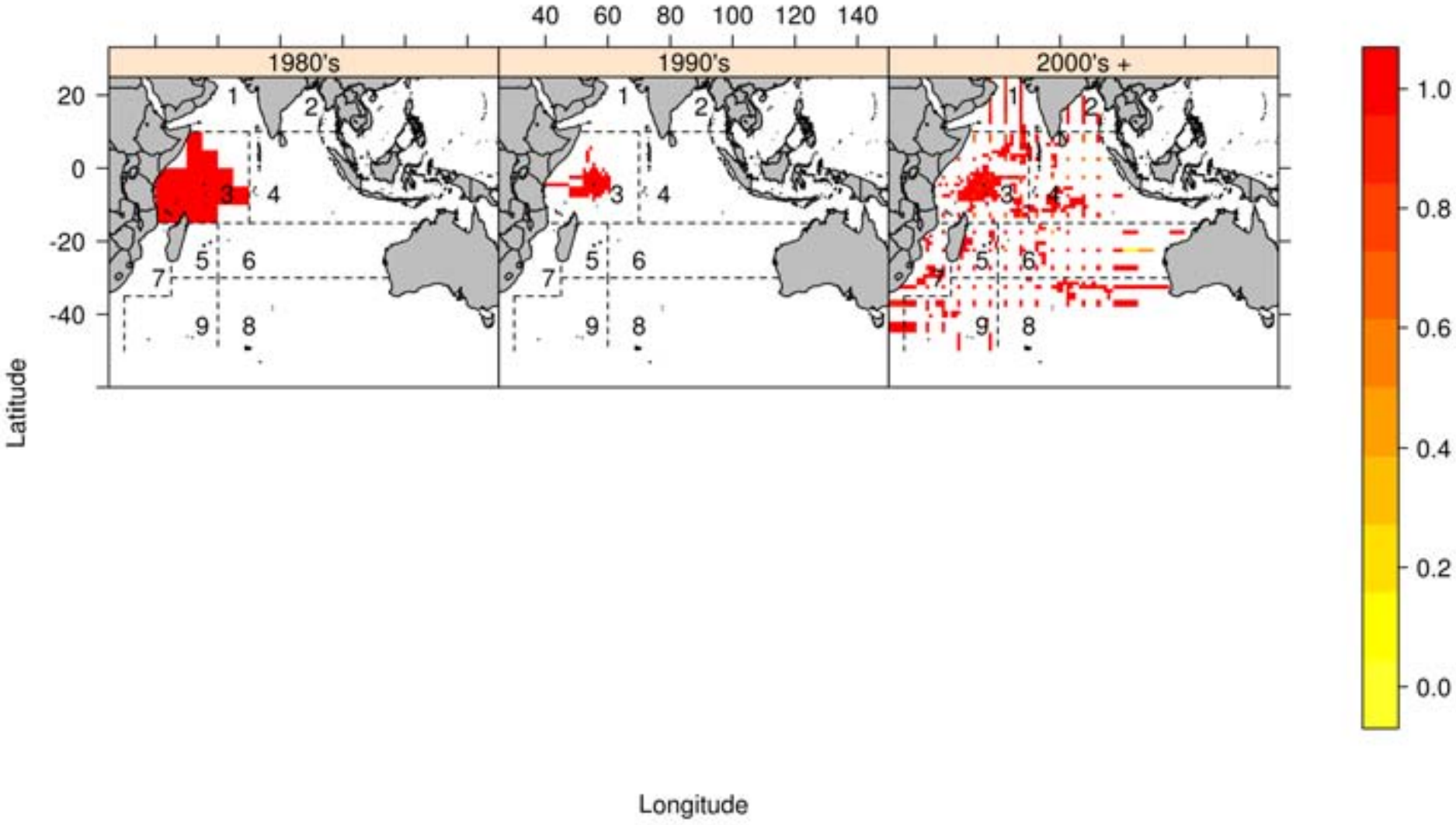


Proportion of Zero Catches

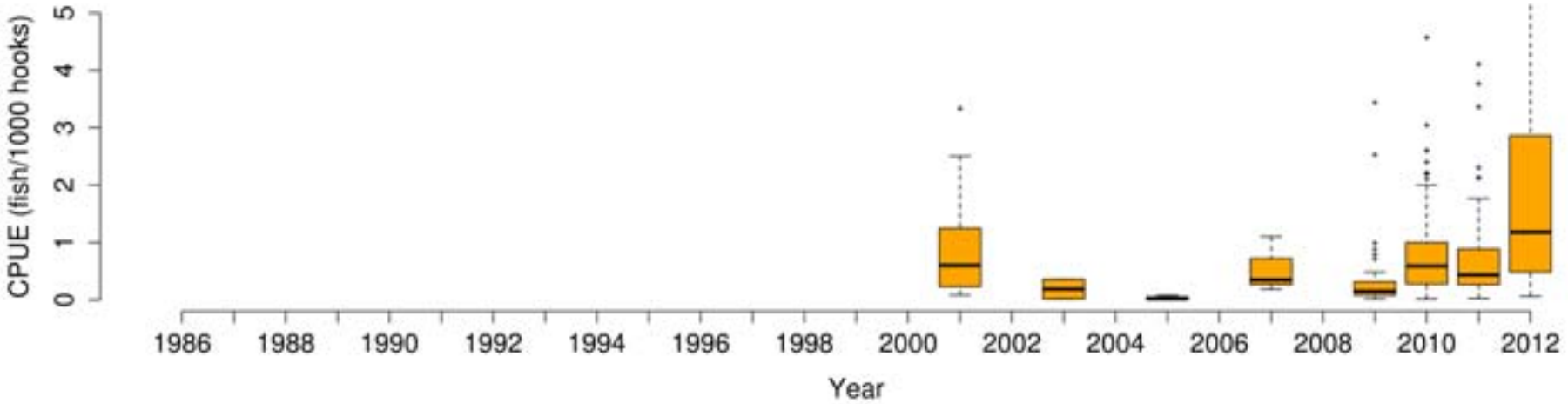


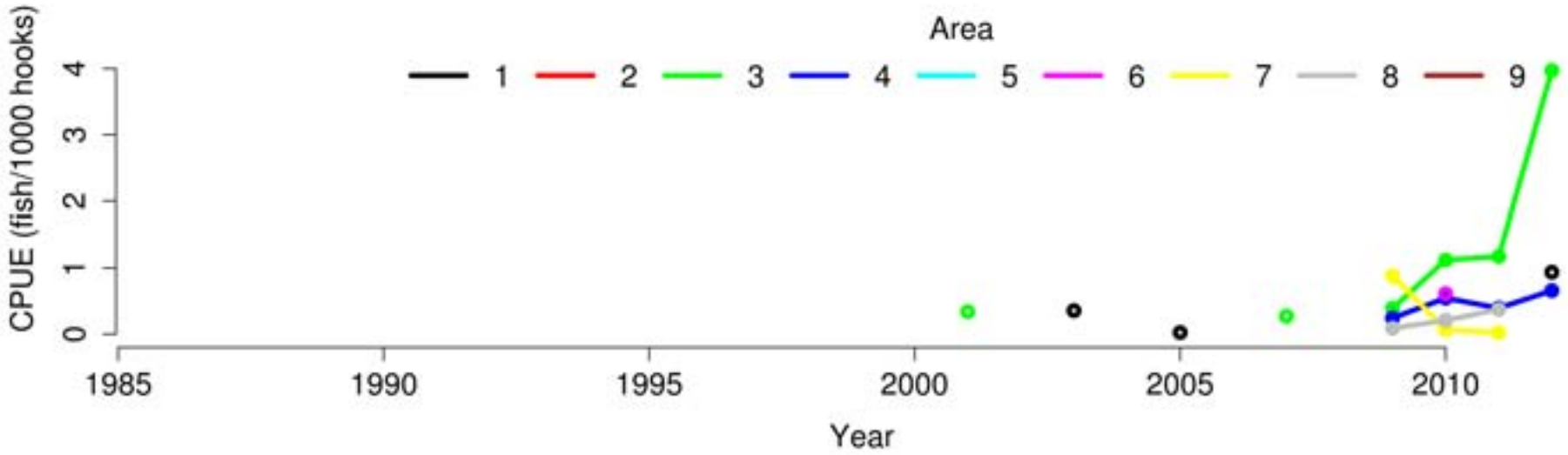


Proportion of Zero Catches

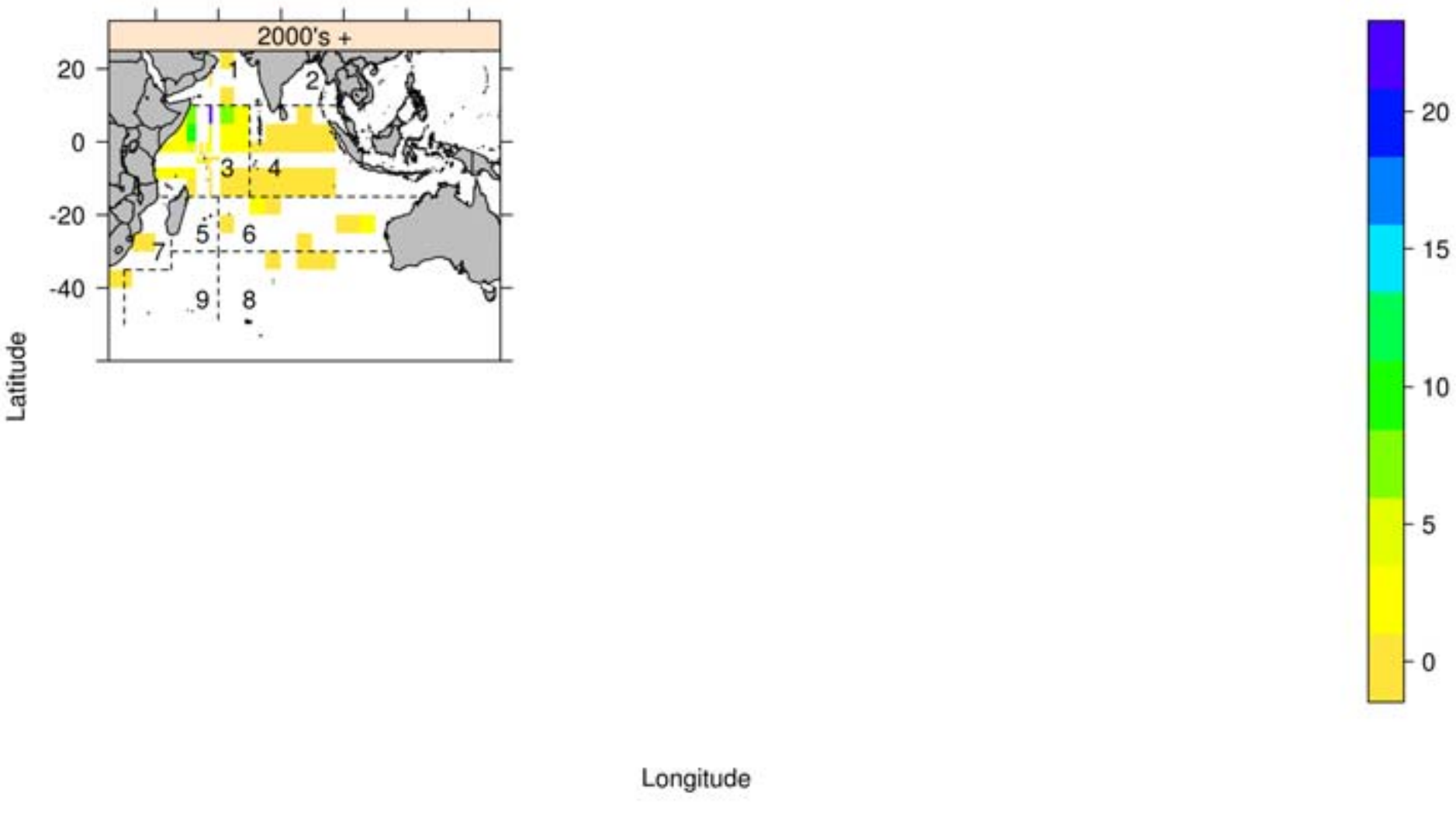


CPUE – Positive Catches





CPUE – Positive Catches

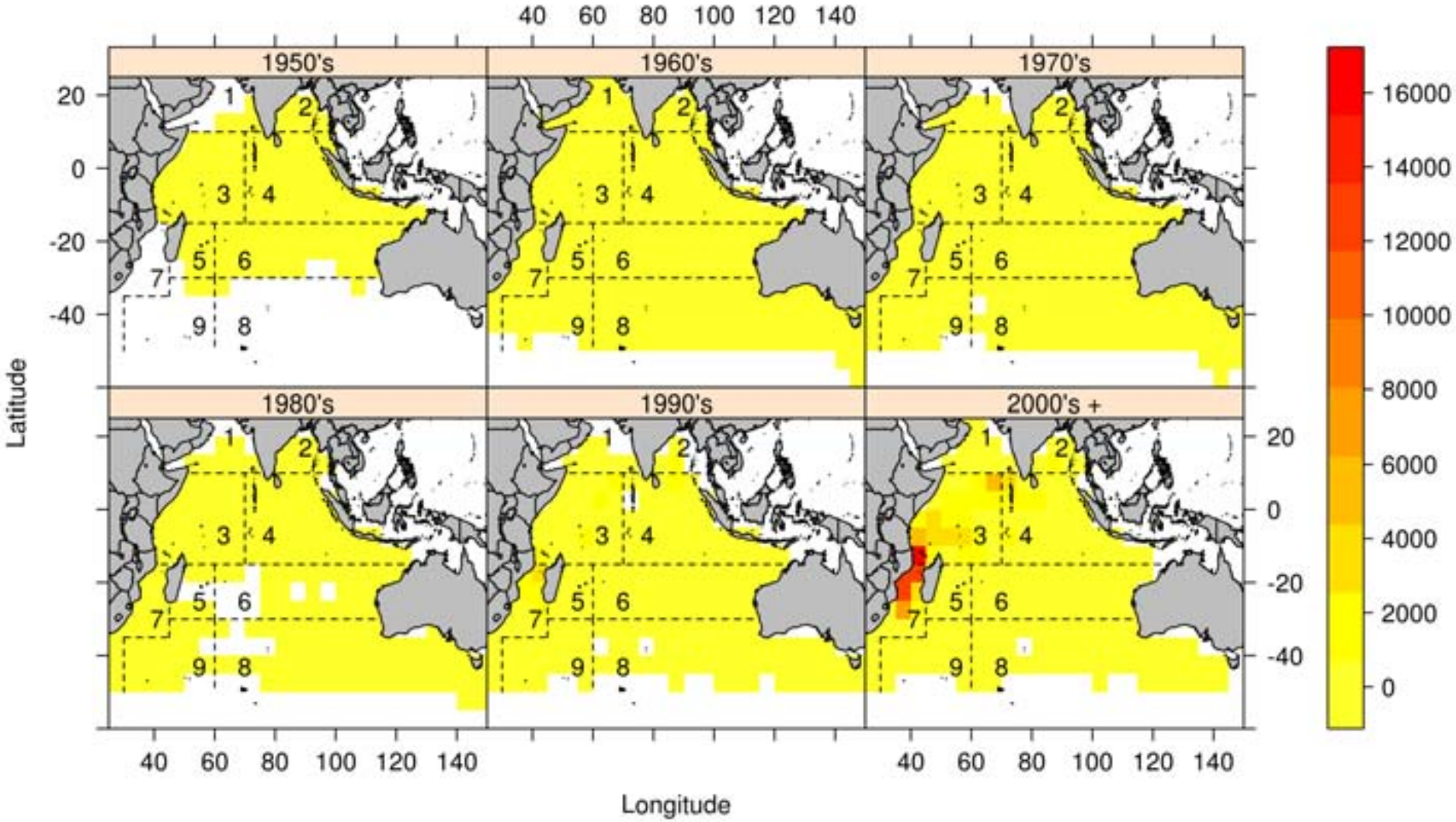


Remarks – MLS Seychelles Dataset

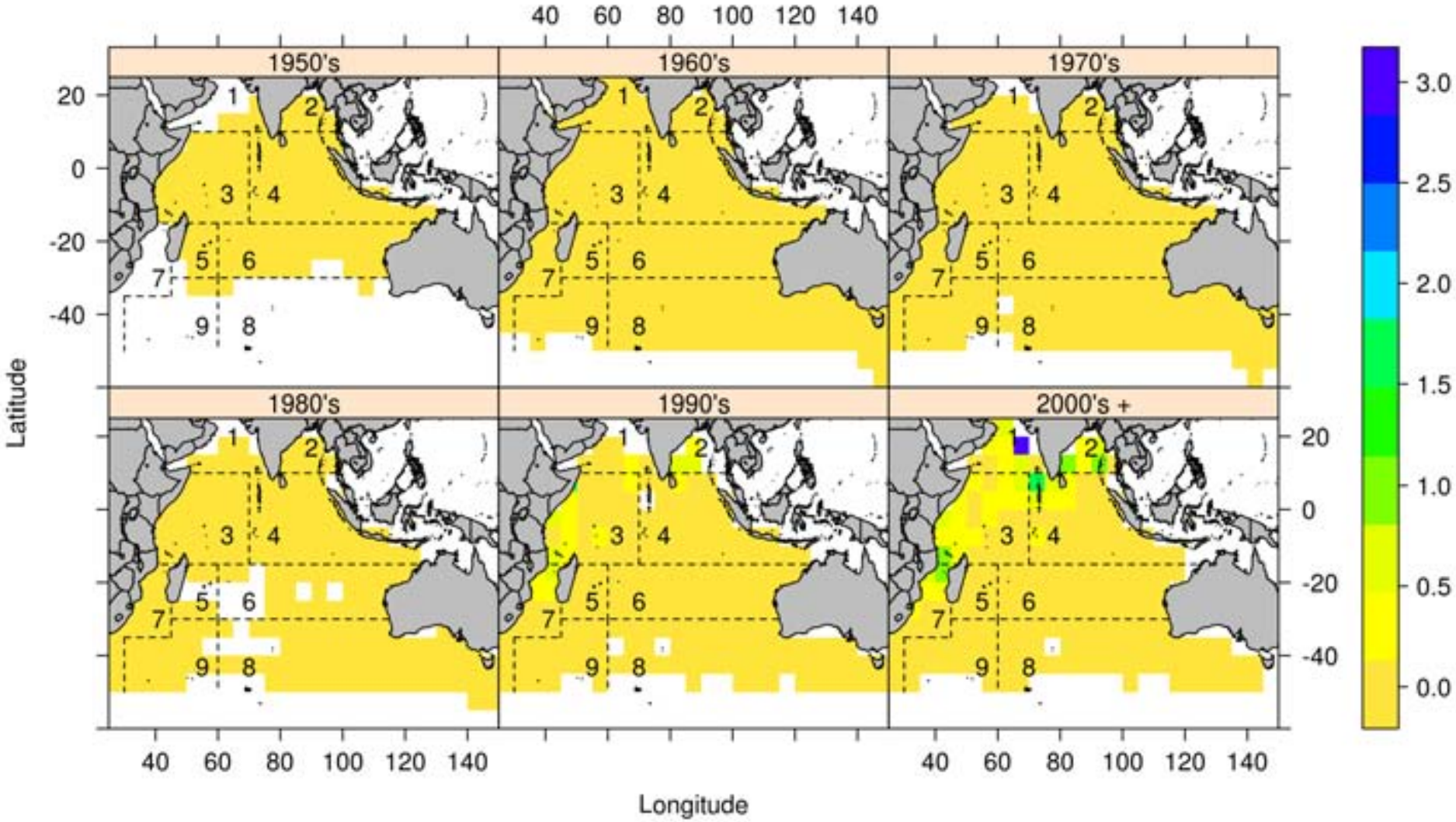
1. Catches were high in area 3 in 2000's;
2. Catch rates were high in some squares inside areas 3, 4 and 6 in 2000's;
3. Data are not informative about the proportion of zero catches.

Indo-Pacific Sailfish (SFA)

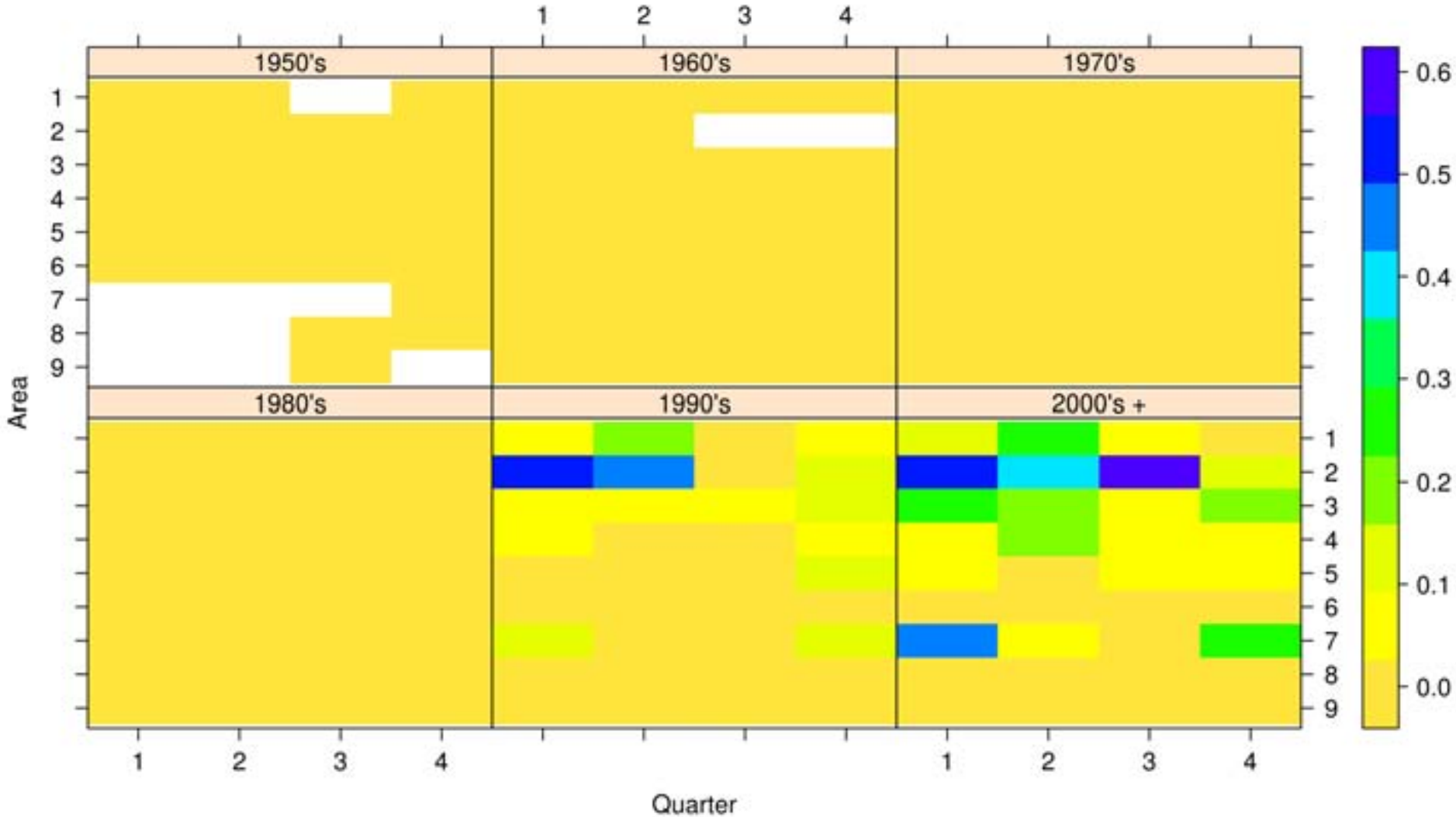
SFA - number of fish - Japan Dataset



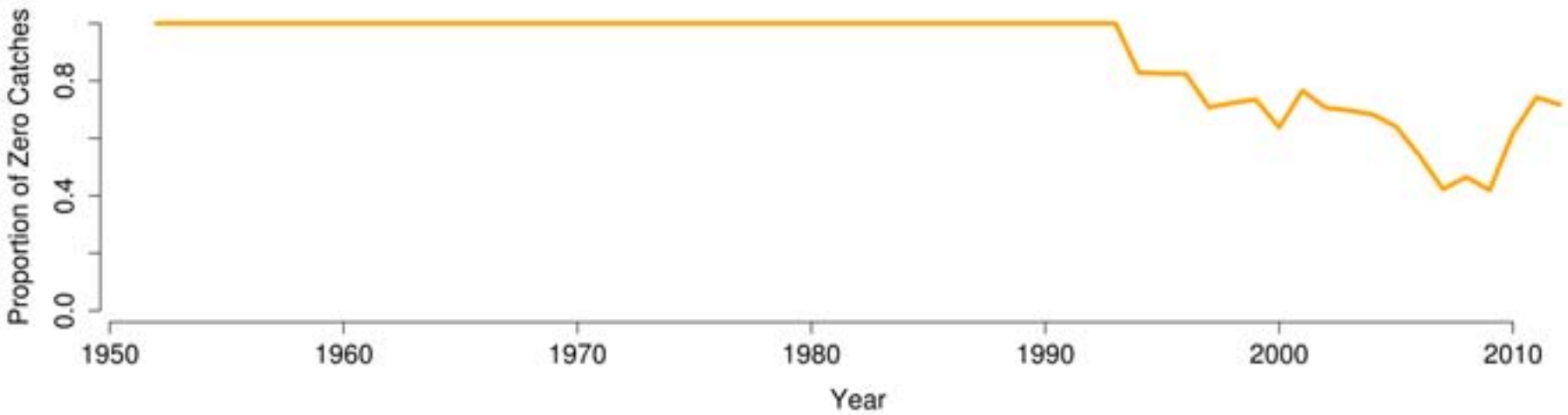
SFA - number of fish/1000 hooks - Decade x Lat x Lon

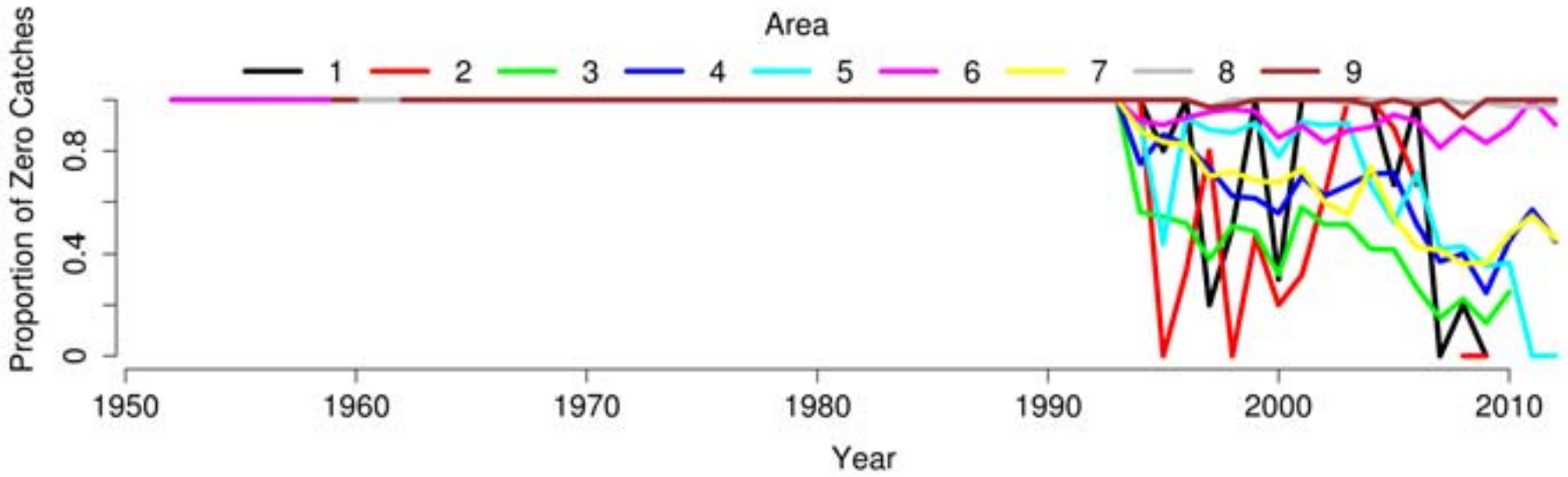


SFA - number of fish/1000 hooks - Decade x Quarter x Area

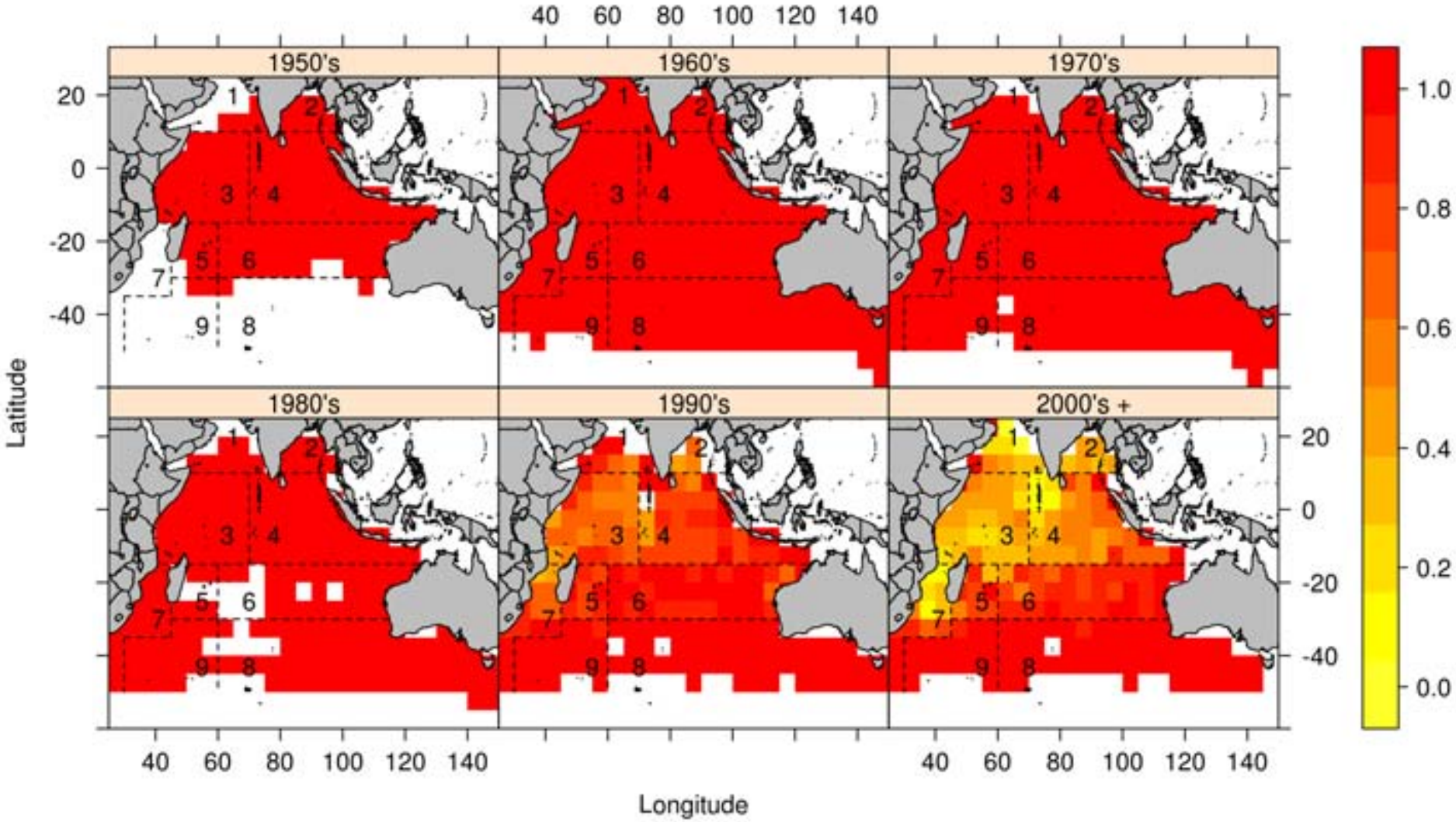


Proportion of Zero Catches

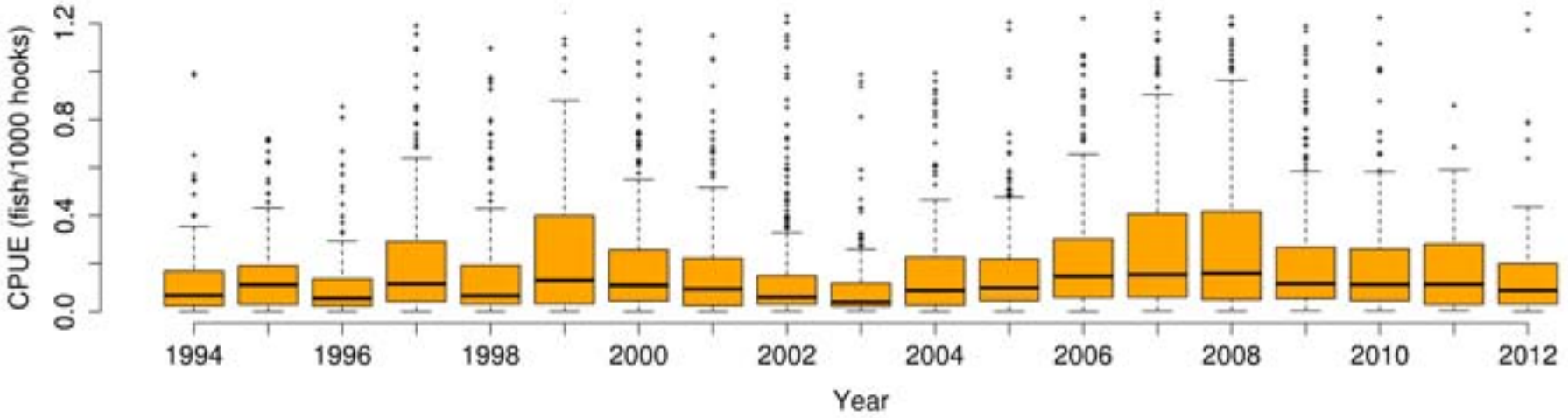


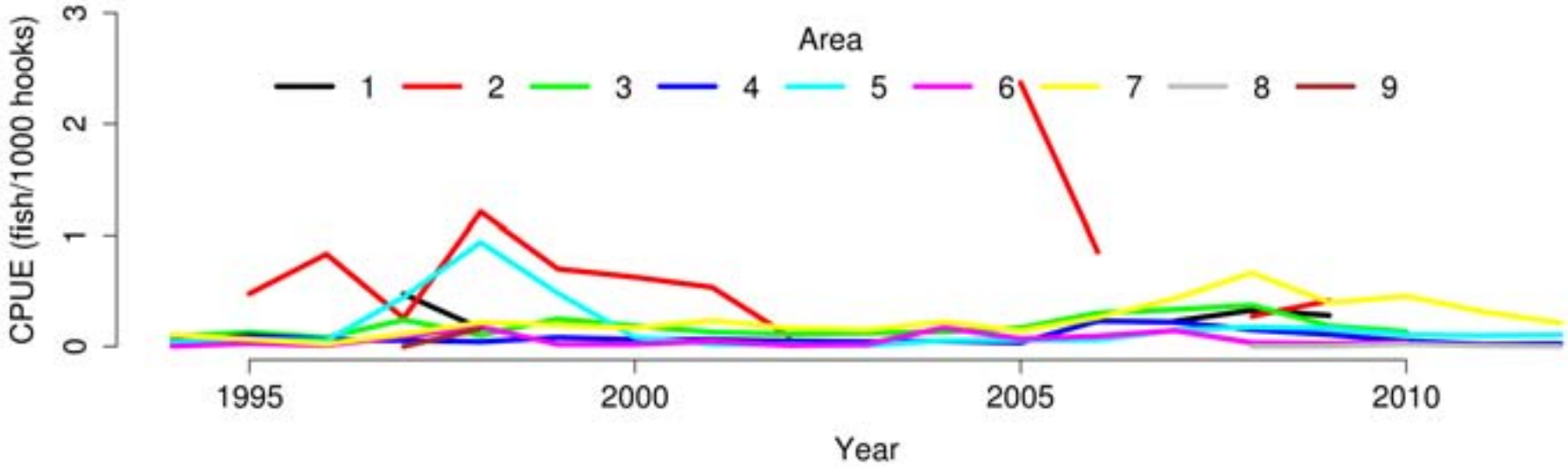


Proportion of Zero Catches

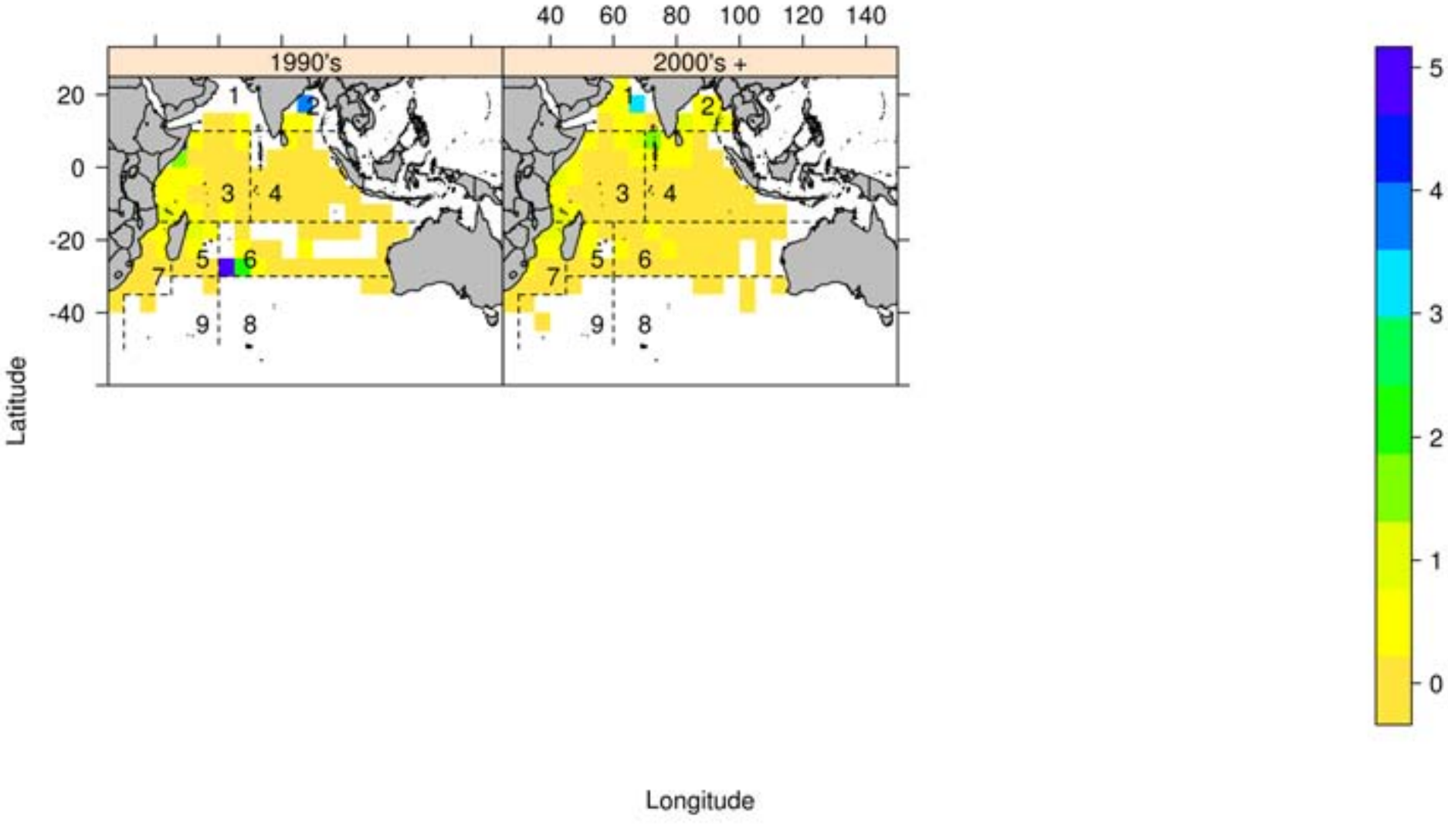


CPUE – Positive Catches





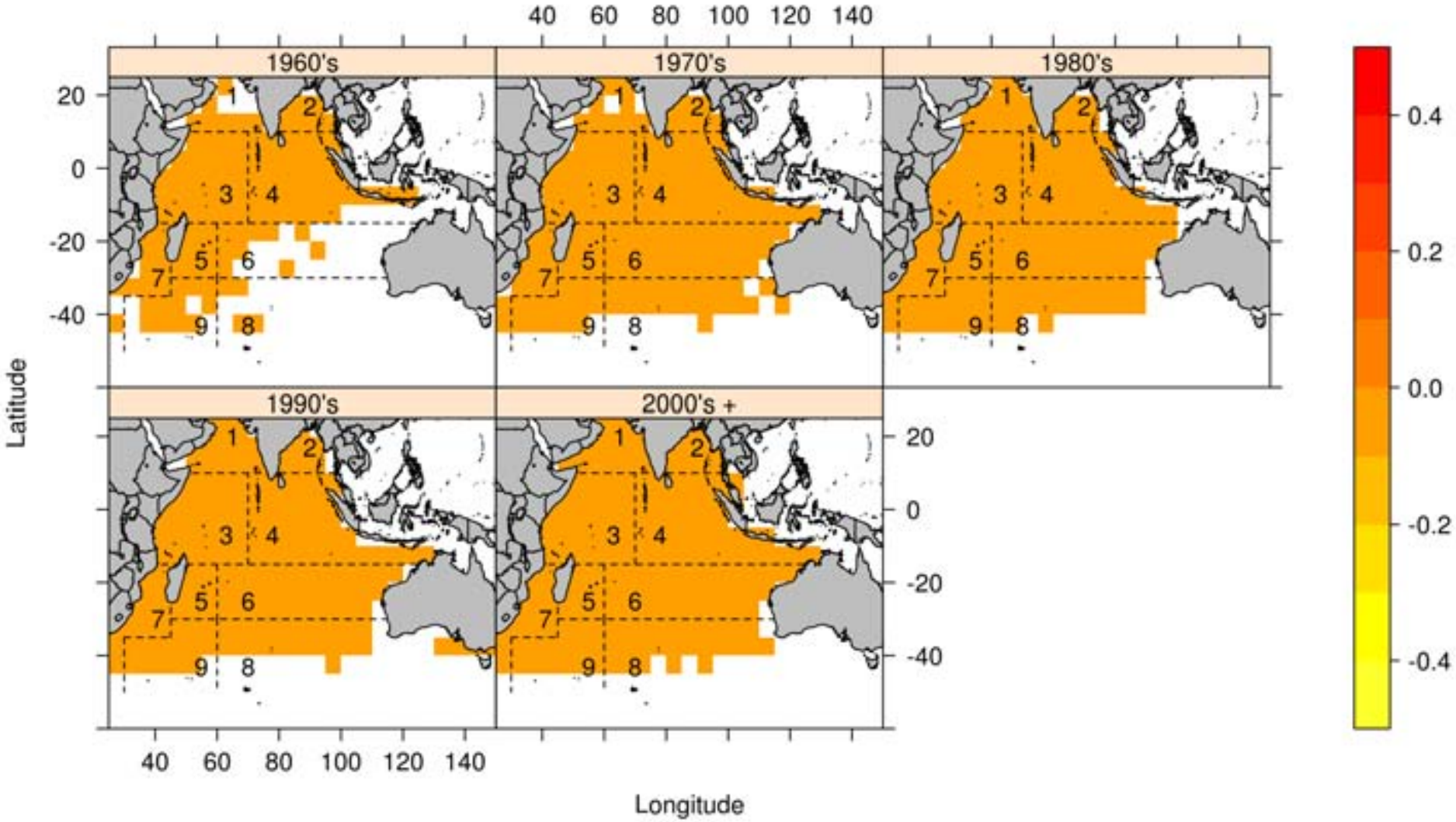
CPUE – Positive Catches



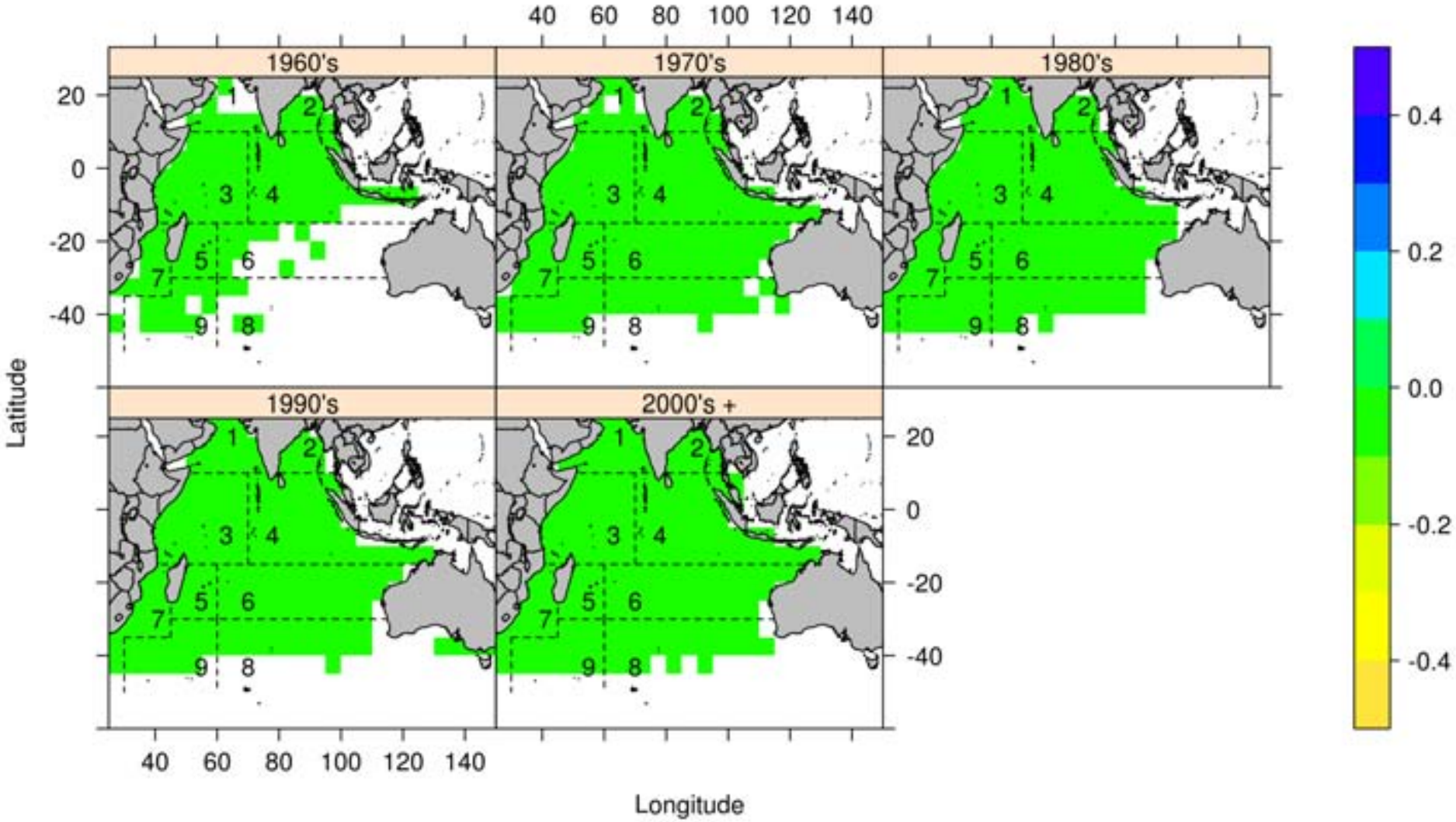
Remarks – SFA Japan Dataset

1. Catches were high in areas 3 and 7 in 1970's especially between Mozambique and Madagascar;
2. Overall catch rates were high in areas 1, 2, 3 and 7 in 2000's;
3. Catch rates seem to be high in the 1^{st} and 2^{nd} quarters in north and west margin of the Indic Ocean close to equator (areas 1, 2 and 3) while catch rates were high in the 1^{st} and $4th$ quarters in the south west margin (area 7);
4. Data about proportion of zero catches are not informative before 1990's. Since that decade the prorportion of zero catches have decreased especially in areas 3, 4, 5 and 7;
5. Catch rates as calculated for positive dataset do not show clear time trend;
6. Overall catch rates for positive dataset were high in some squares inside areas 1, 2, 3, 6 and 7 especially in the west margim of the Indic Ocean.

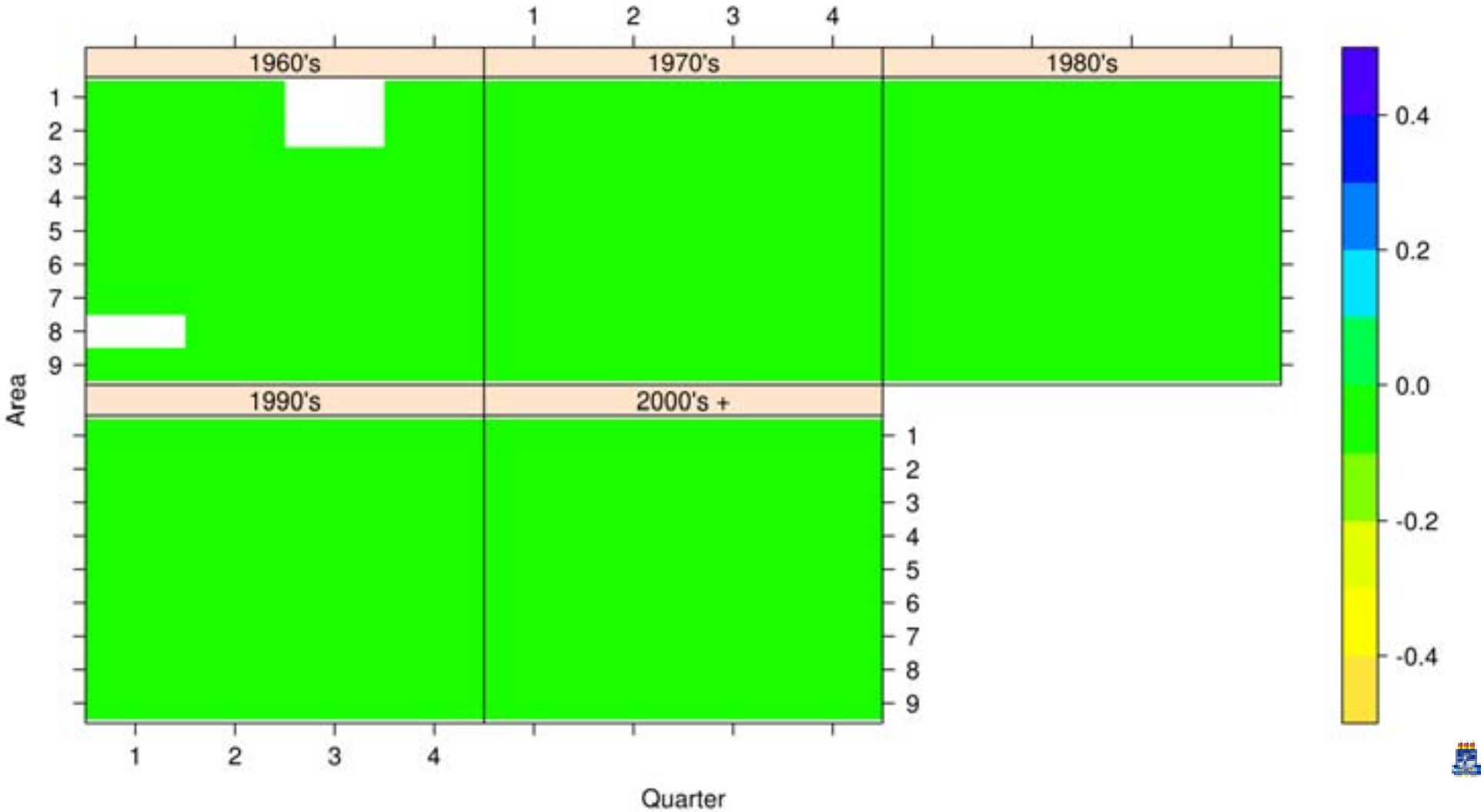
SFA - number of fish - Taiwan dataset



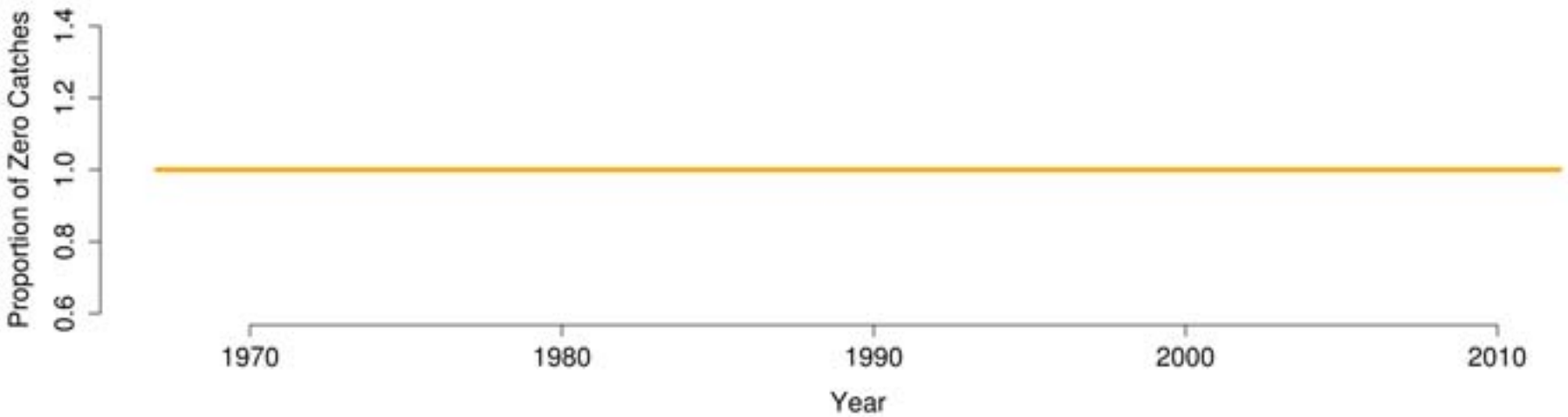
SFA - number of fish/1000 hooks - Decade x Lat x Lon

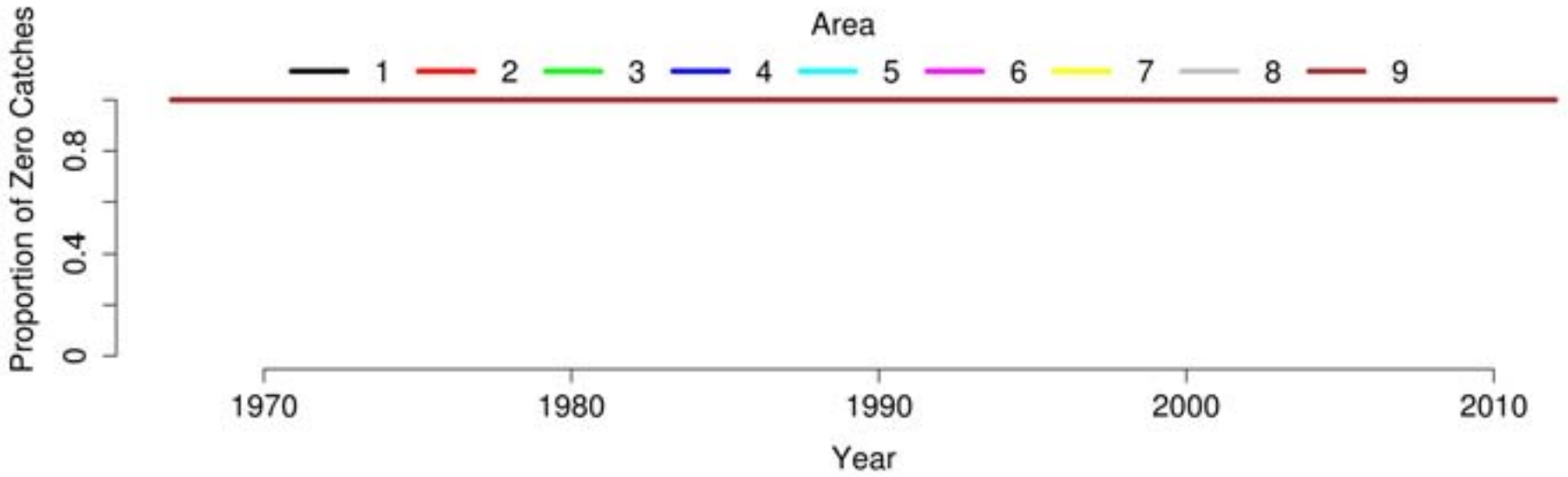


SFA - number of fish/1000 hooks - Decade x Quarter x Area

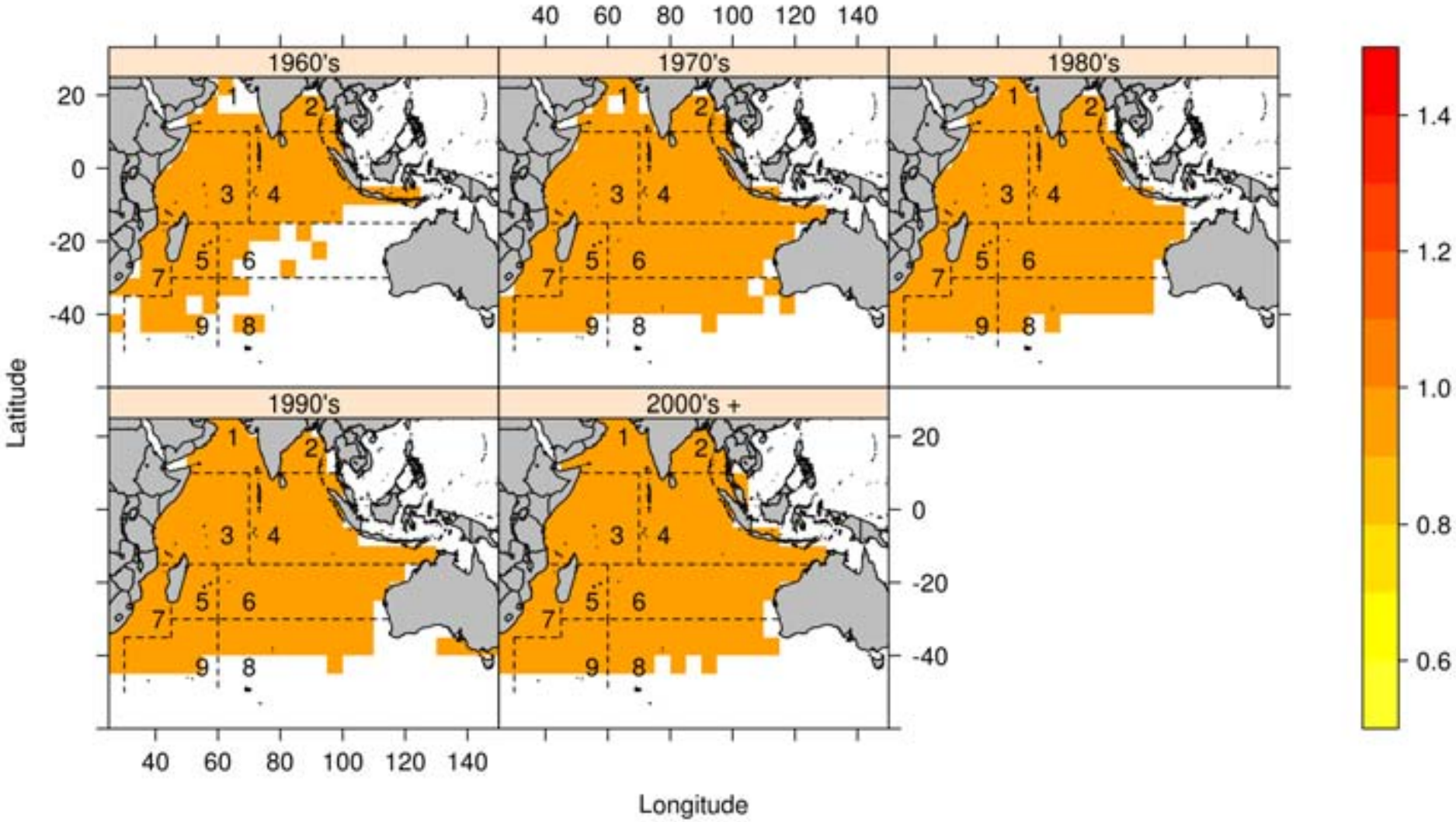


Proportion of Zero Catches

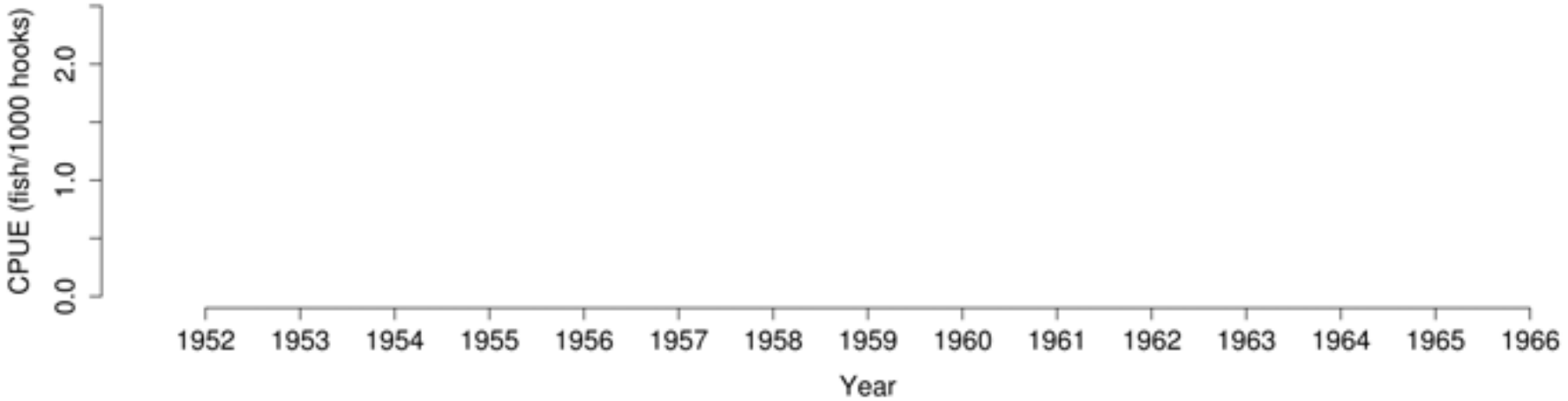


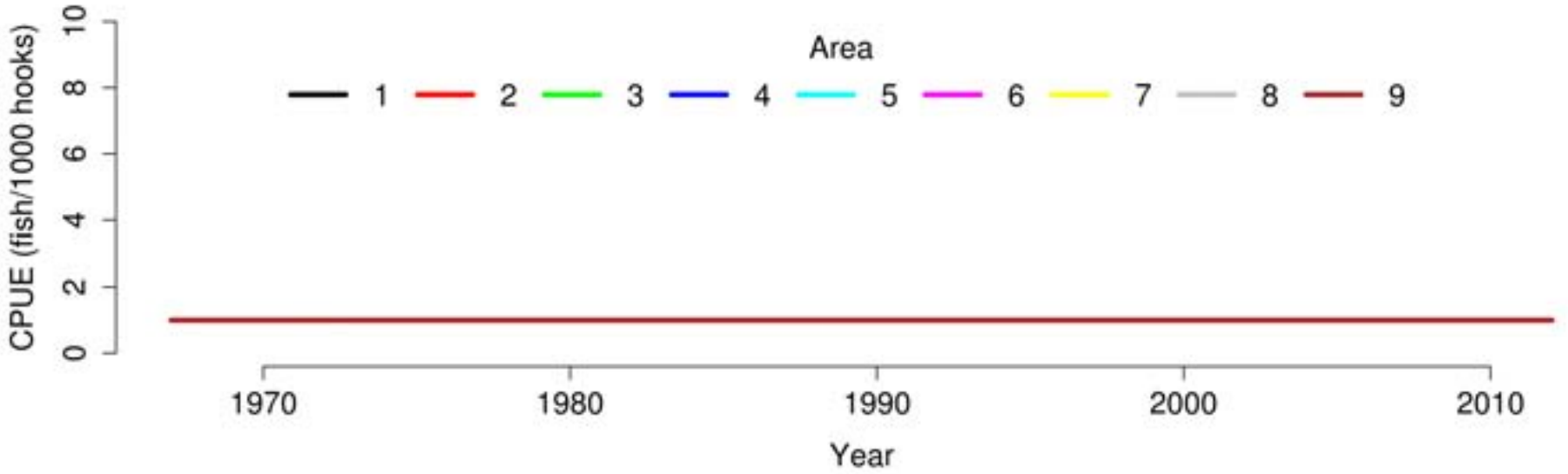


Proportion of Zero Catches



CPUE – Positive Catches





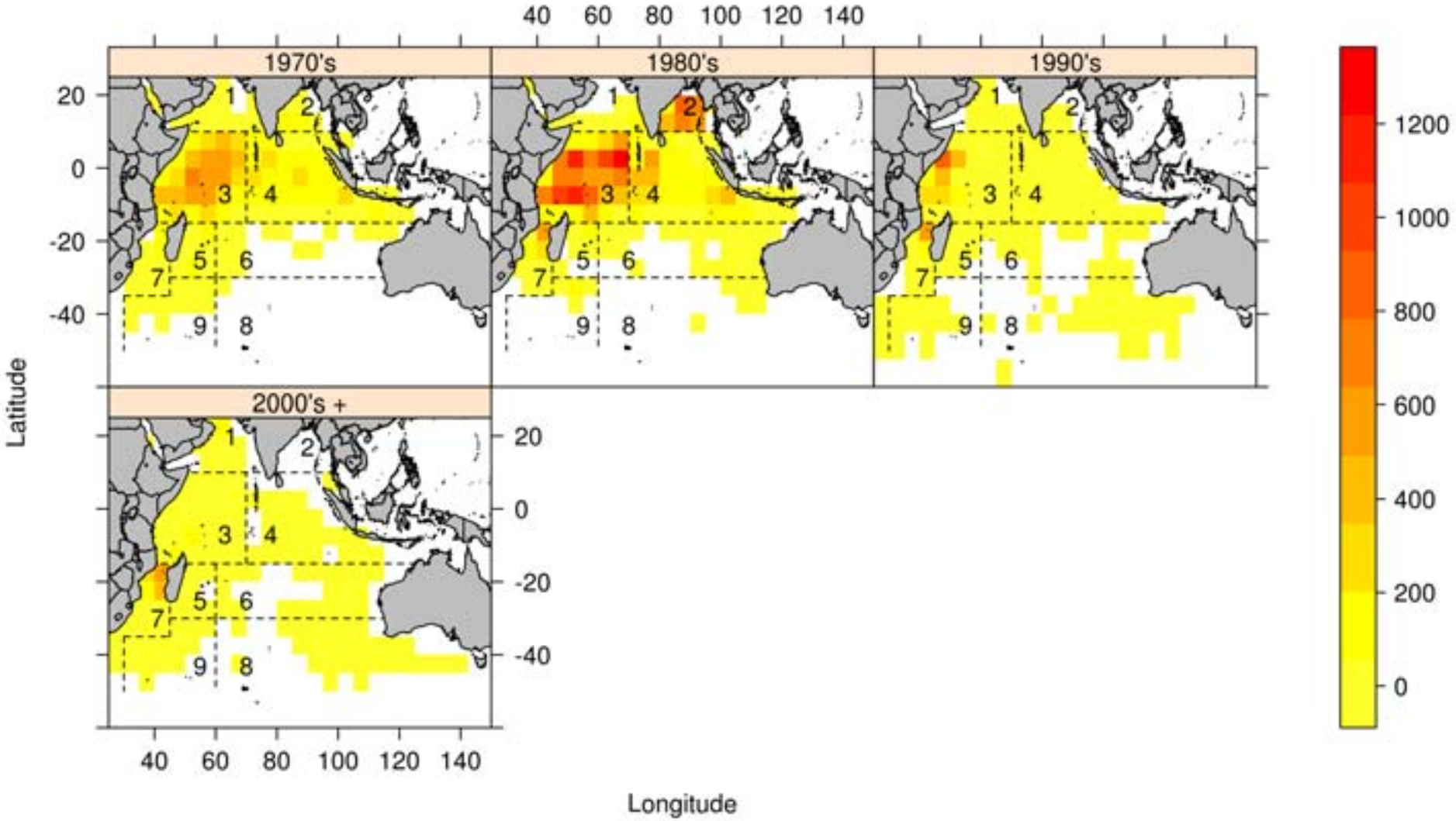
CPUE – Positive Catches

mapalltwnposSFANOcpue.png

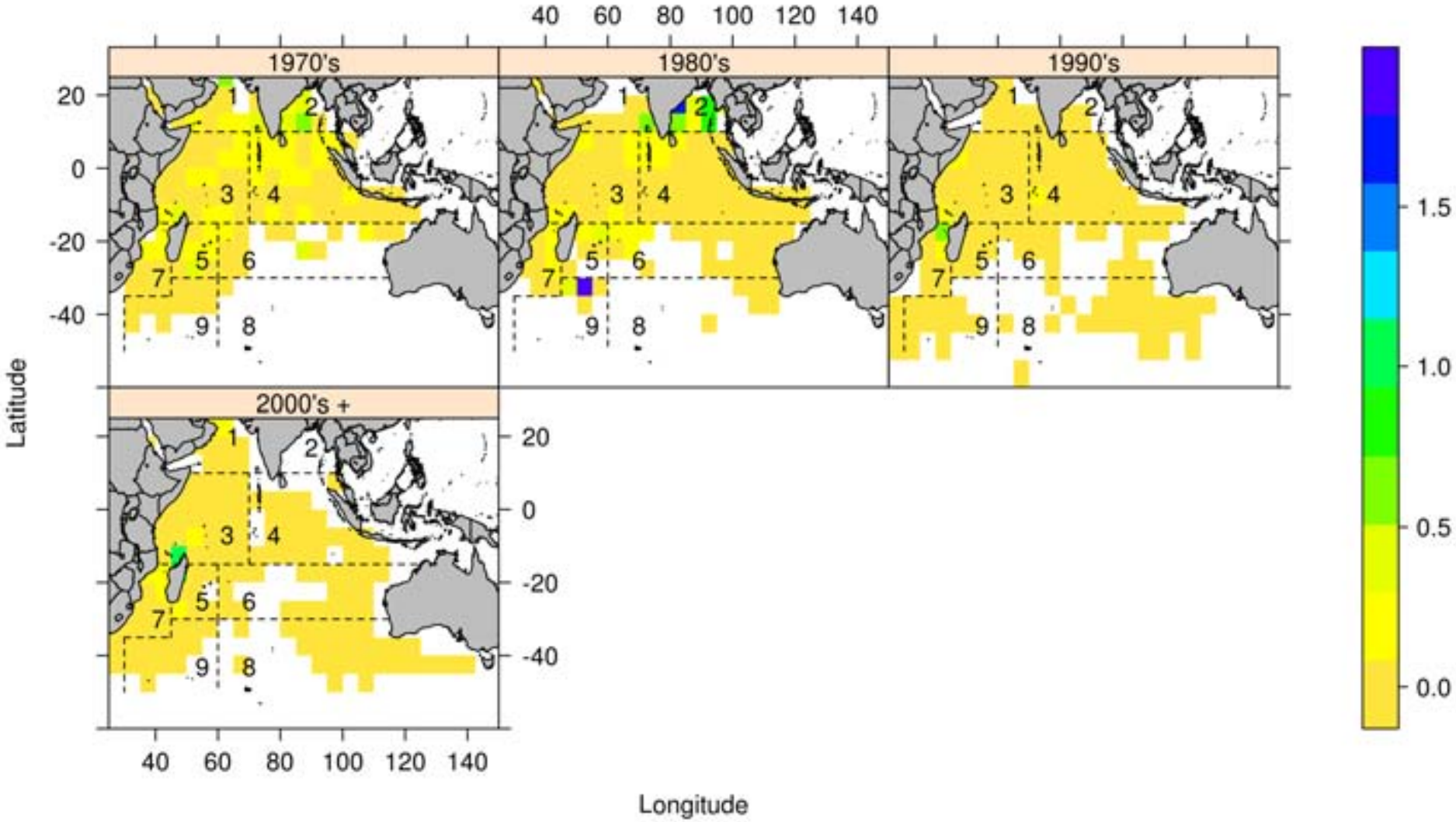
Remarks – SFA Taiwan Dataset

There is not information about catch (number of fish) of Indo-Pacific sailfish.

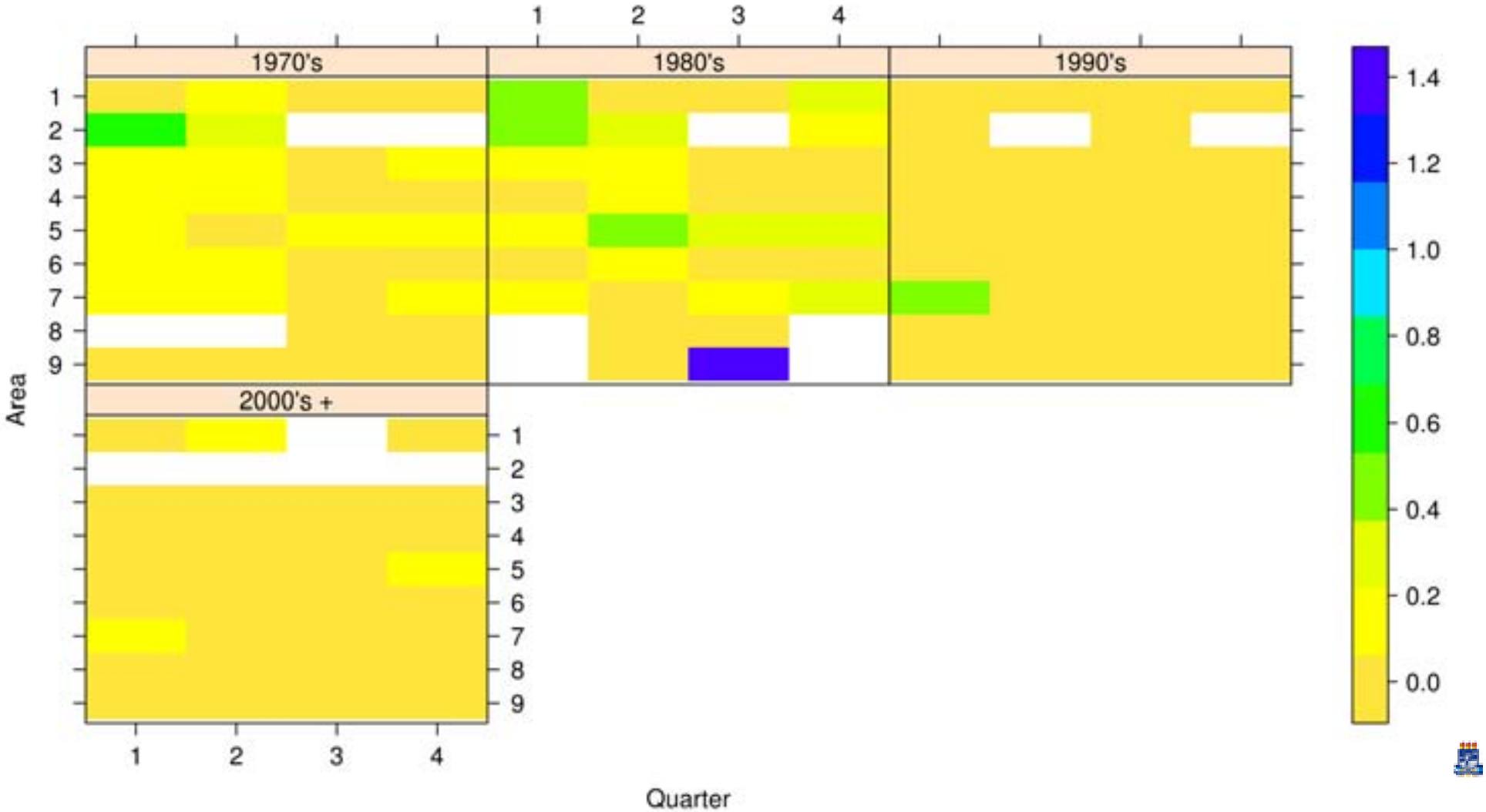
SFA - number of fish - Korea dataset



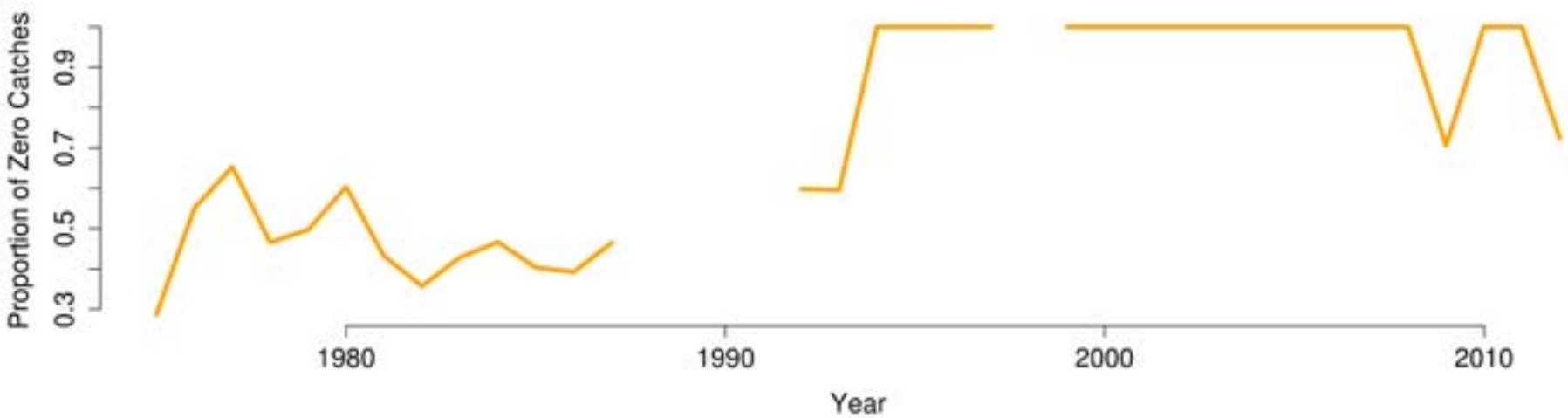
SFA - number of fish/1000 hooks - Decade x Lat x Lon

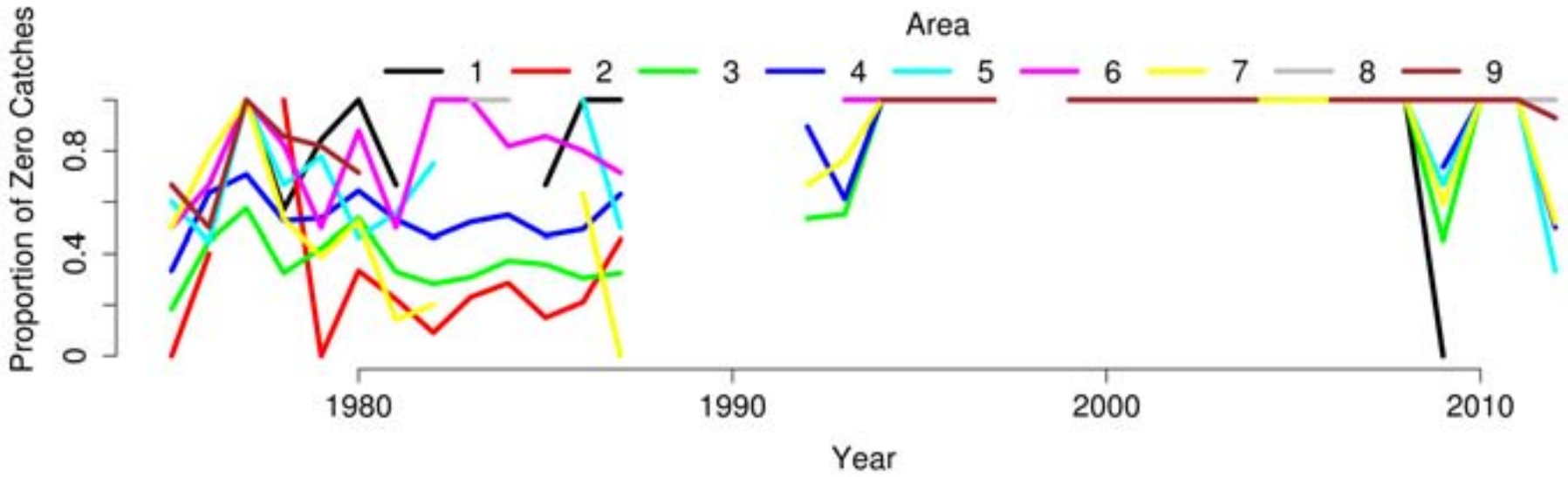


SFA - number of fish/1000 hooks - Decade x Quarter x Area

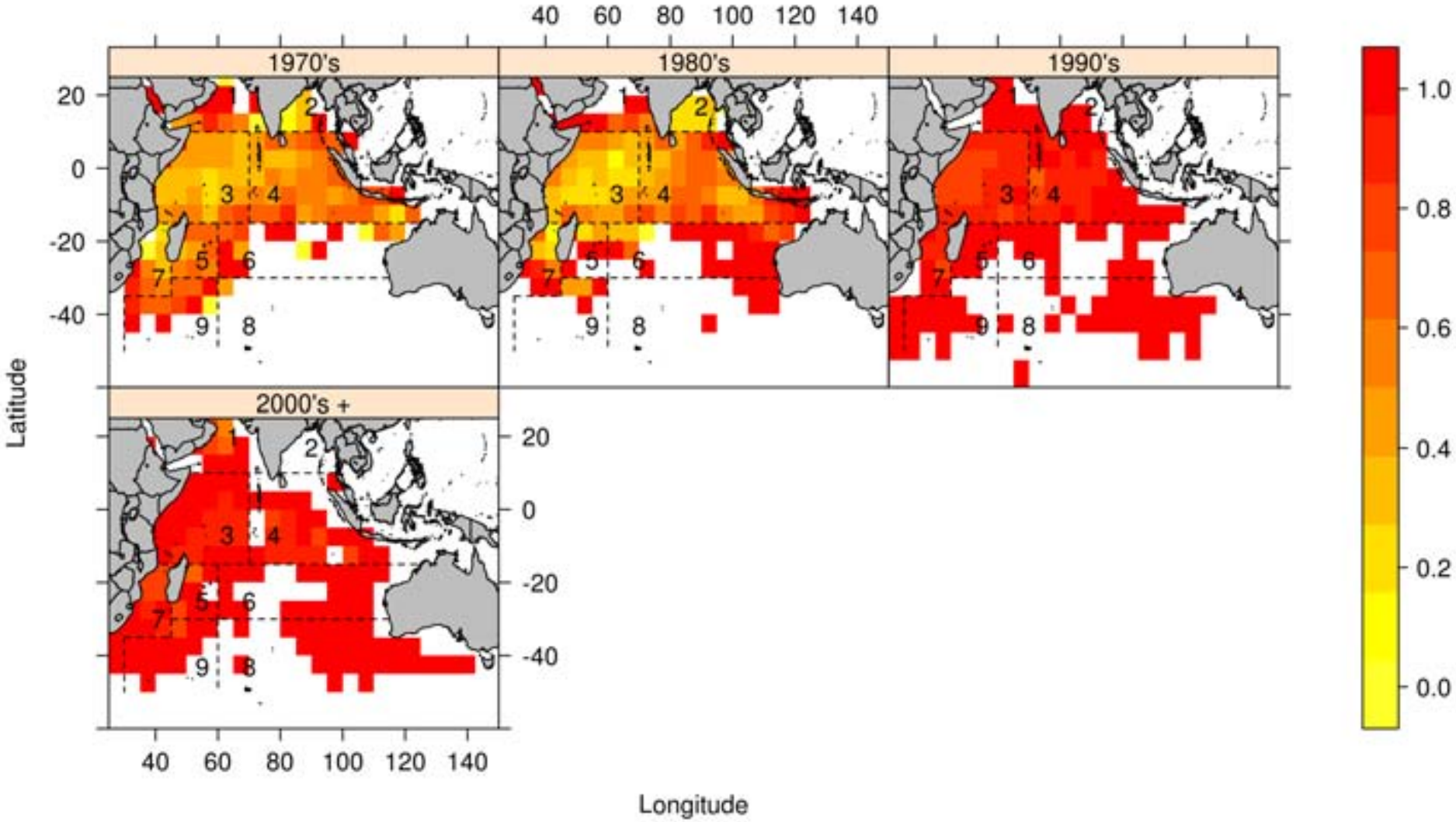


Proportion of Zero Catches

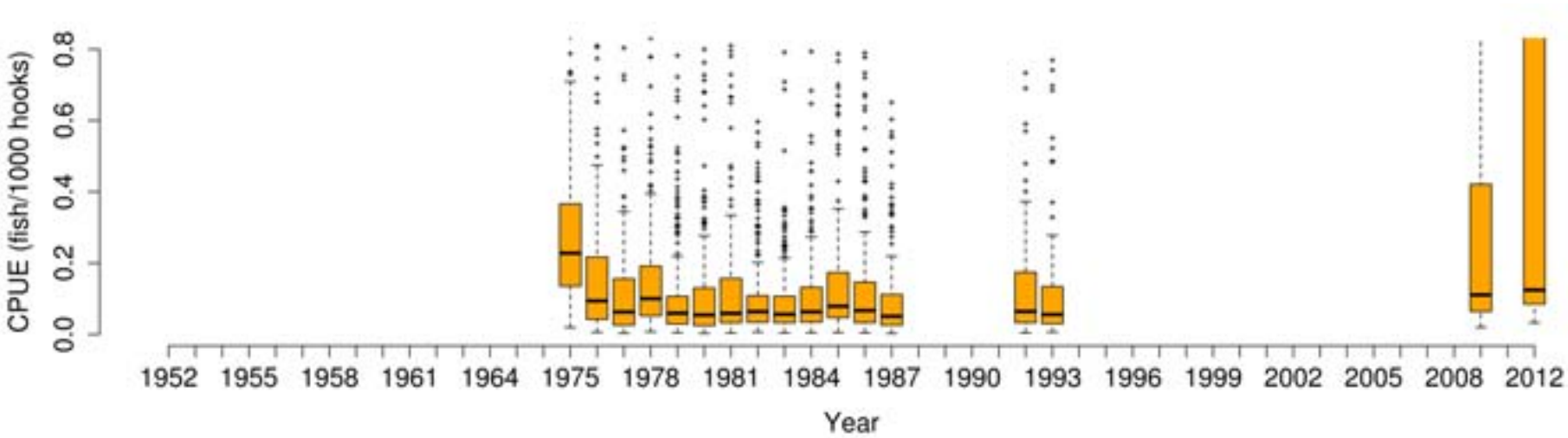


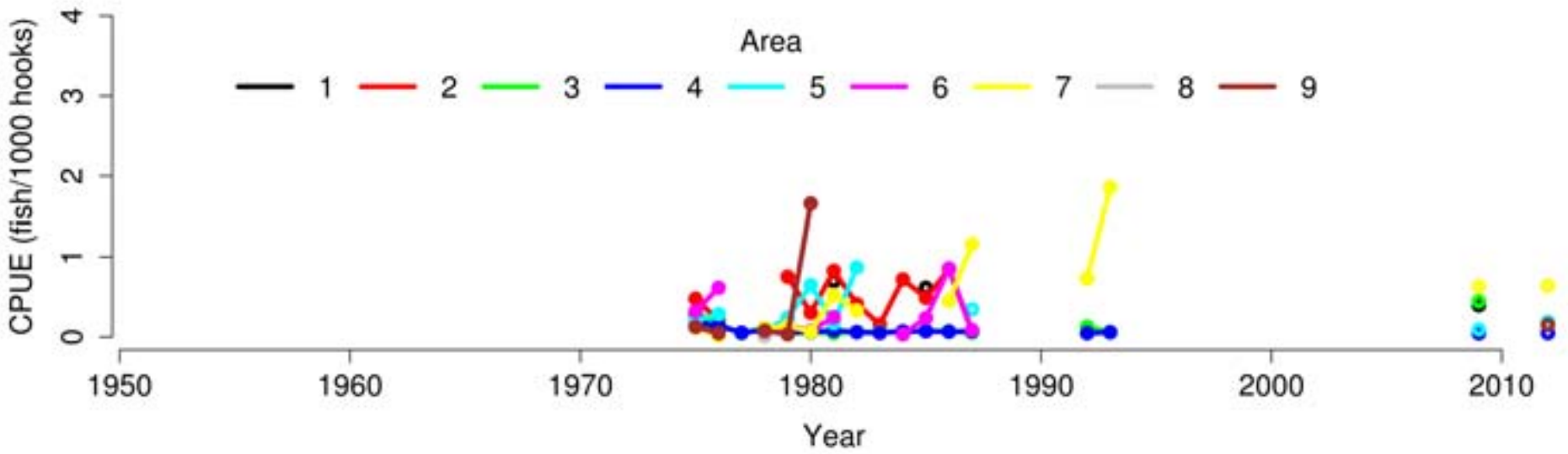


Proportion of Zero Catches

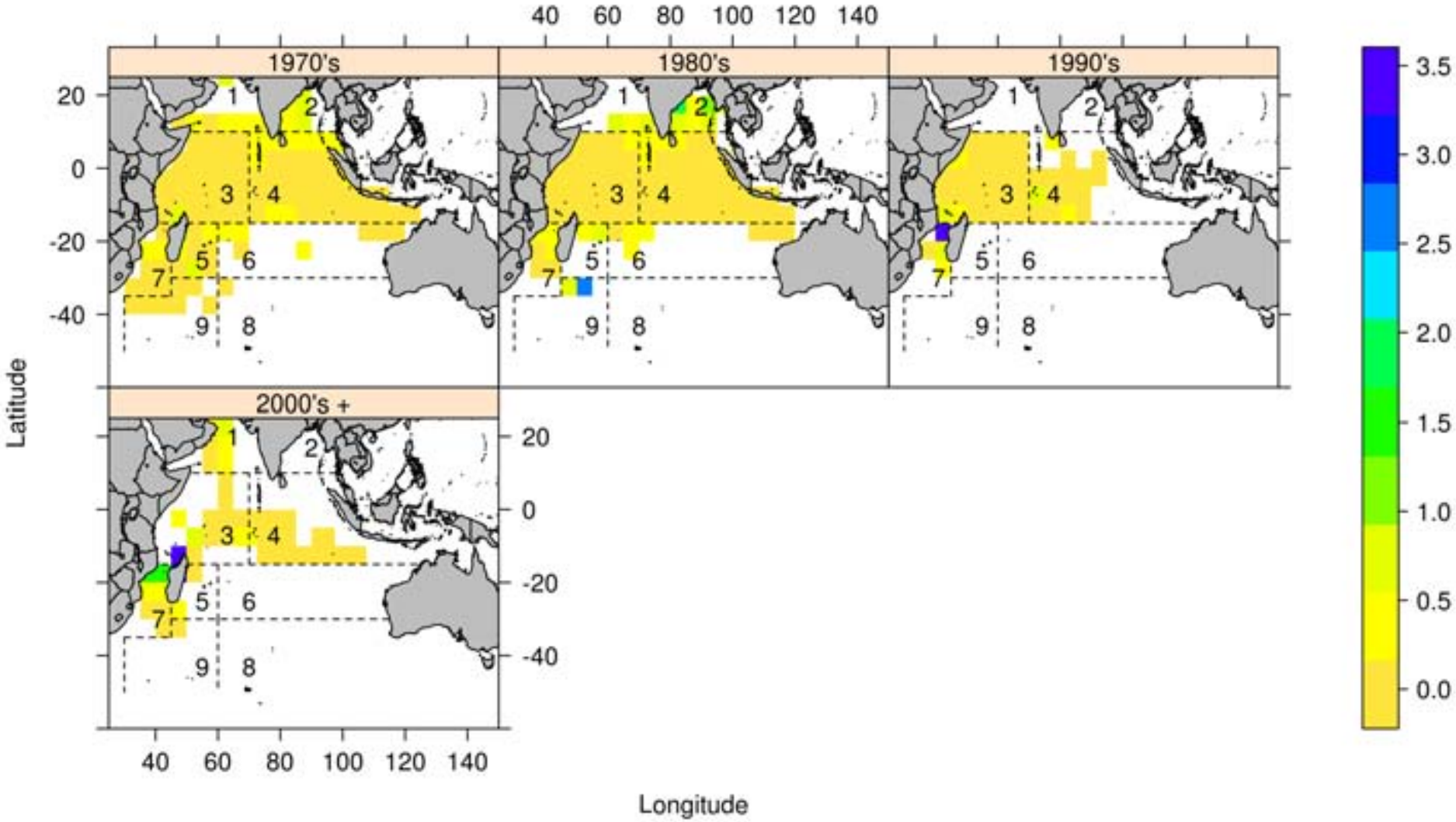


CPUE – Positive Catches





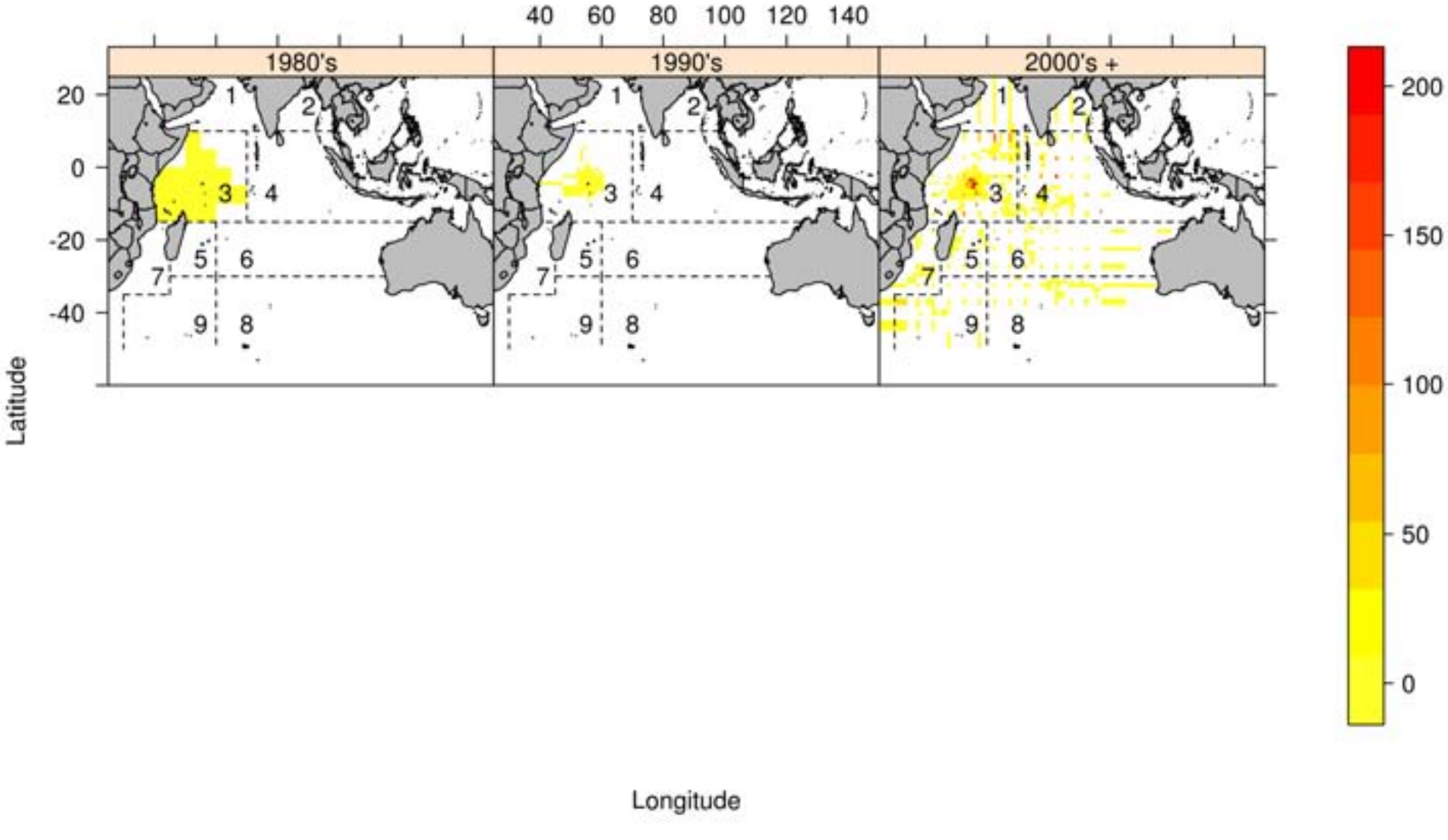
CPUE – Positive Catches



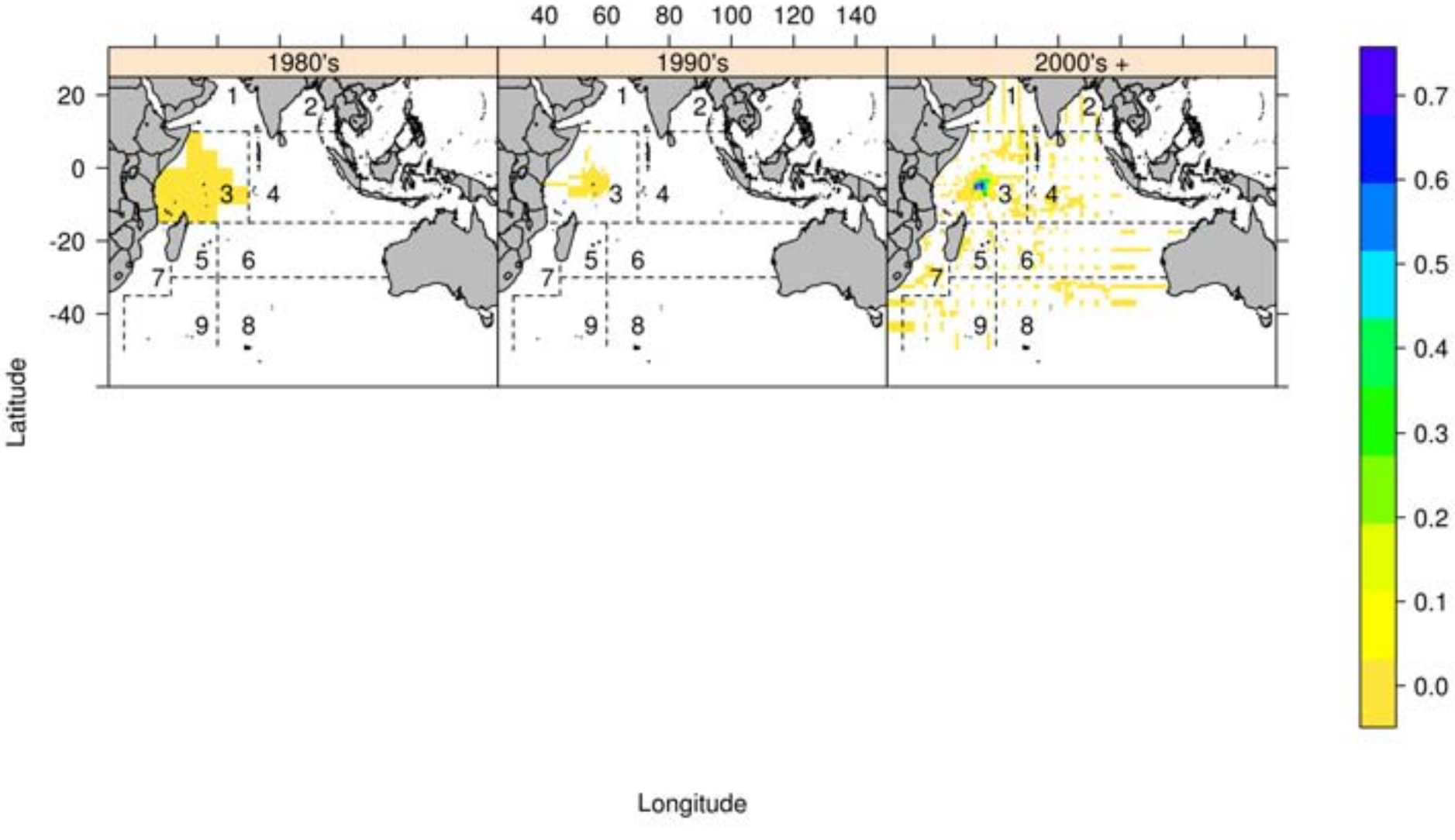
Remarks – SFA Korea Dataset

1. Data is informative only for 1970's and 1980's;
2. Catches were high in areas 2 and 3 especially in 1980's;
3. Overall catch rates were high in areas 1, 2, 3, 5 and 7 in 1970's and 1980's. There were also a couple of squares with high catch rate in area 9 in 1980's;
4. Proportion of zero catches were close to 0.5 in 1970's and 1980's;
5. Catch rates as calculated for positive dataset show a decreasing trend in the end of 1970's.

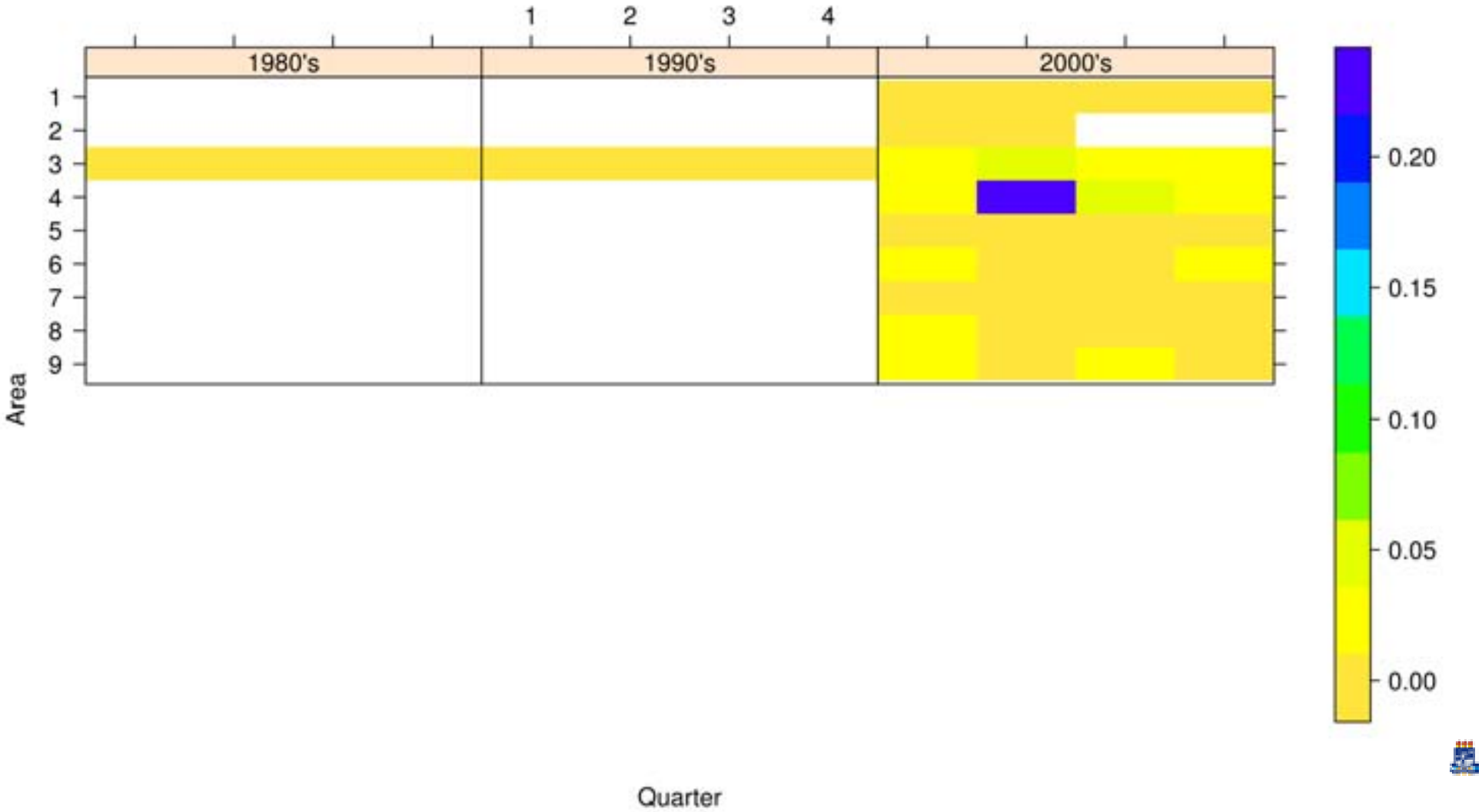
SFA - number of fish - Seychelles dataset



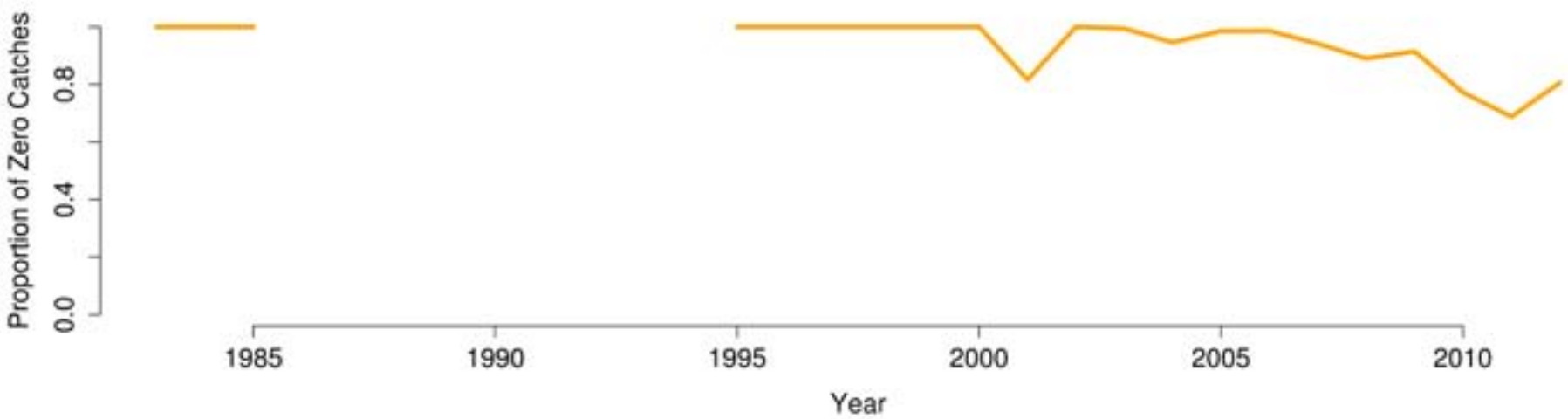
SFA - number of fish/1000 hooks - Decade x Lat x Lon

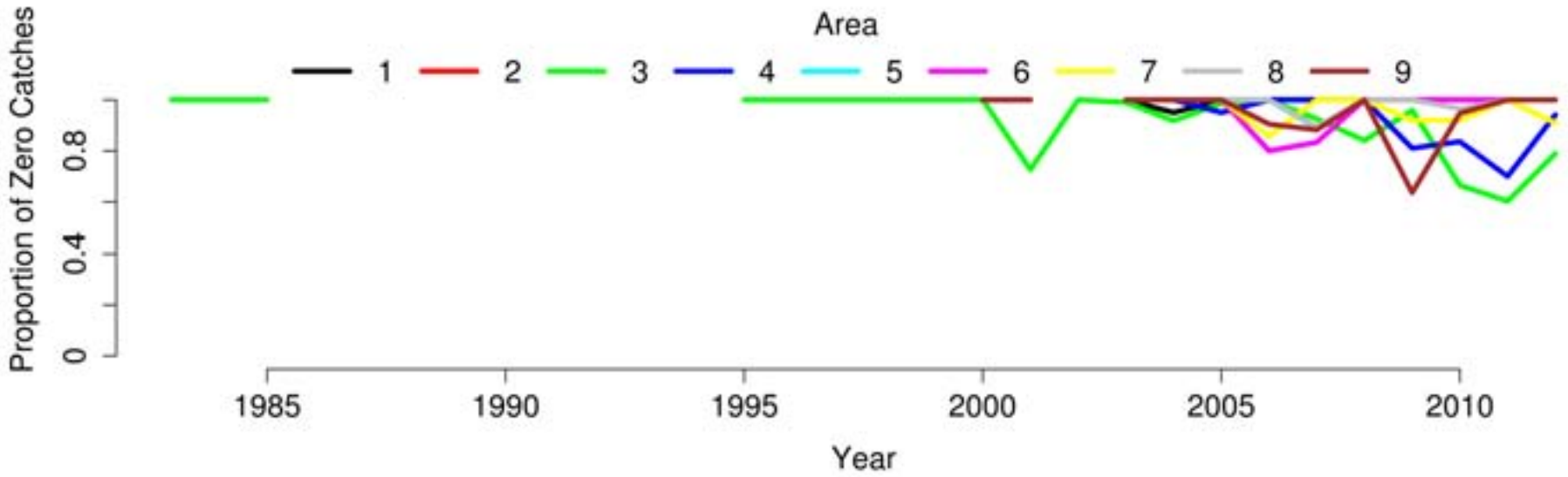


SFA - number of fish/1000 hooks - Decade x Quarter x Area

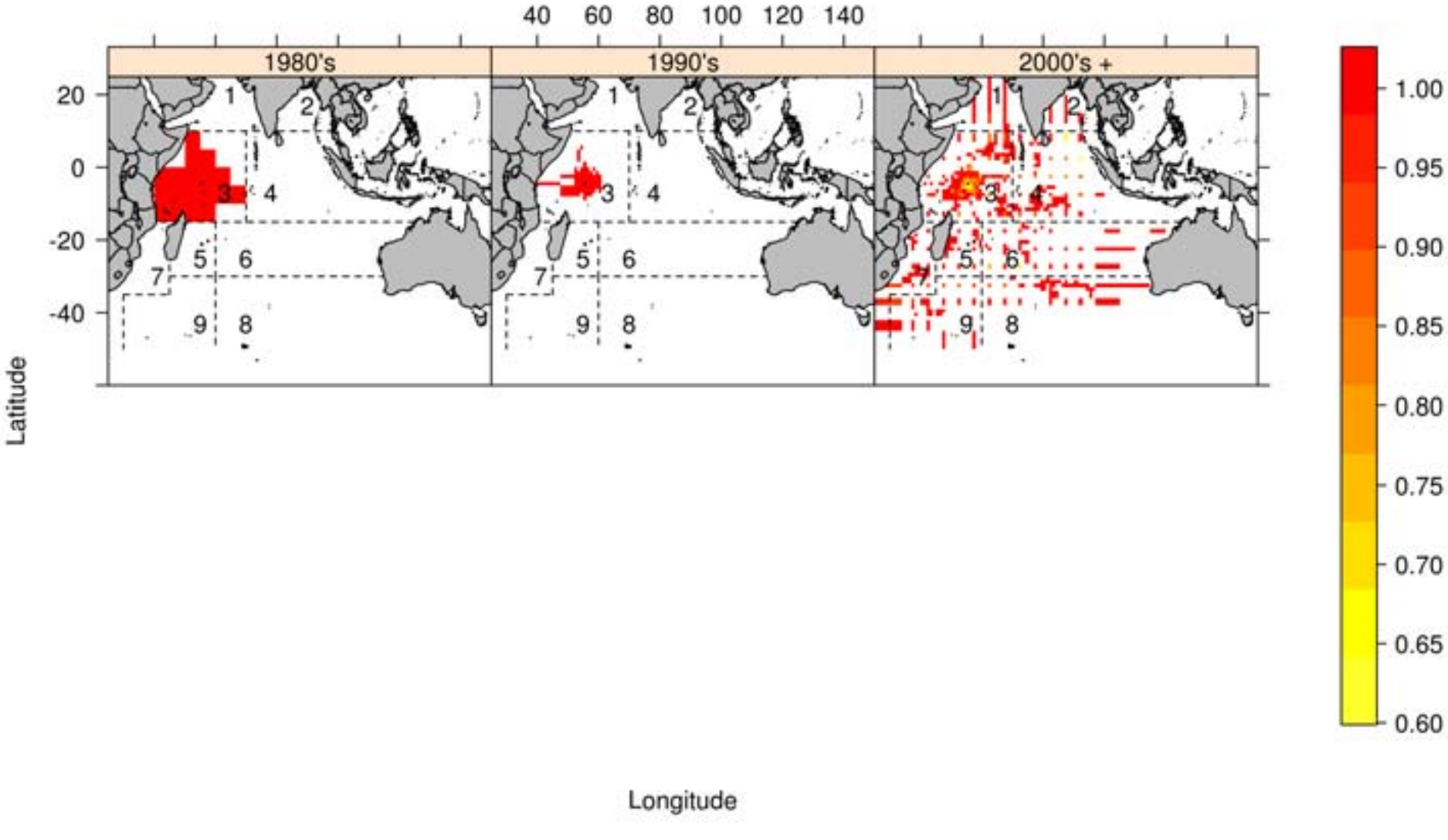


Proportion of Zero Catches

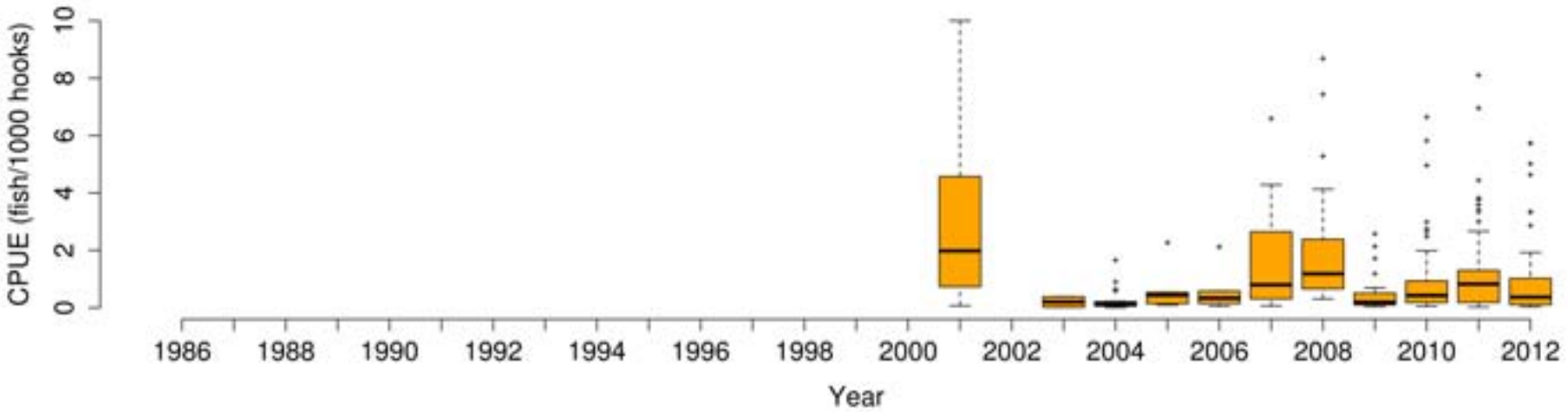


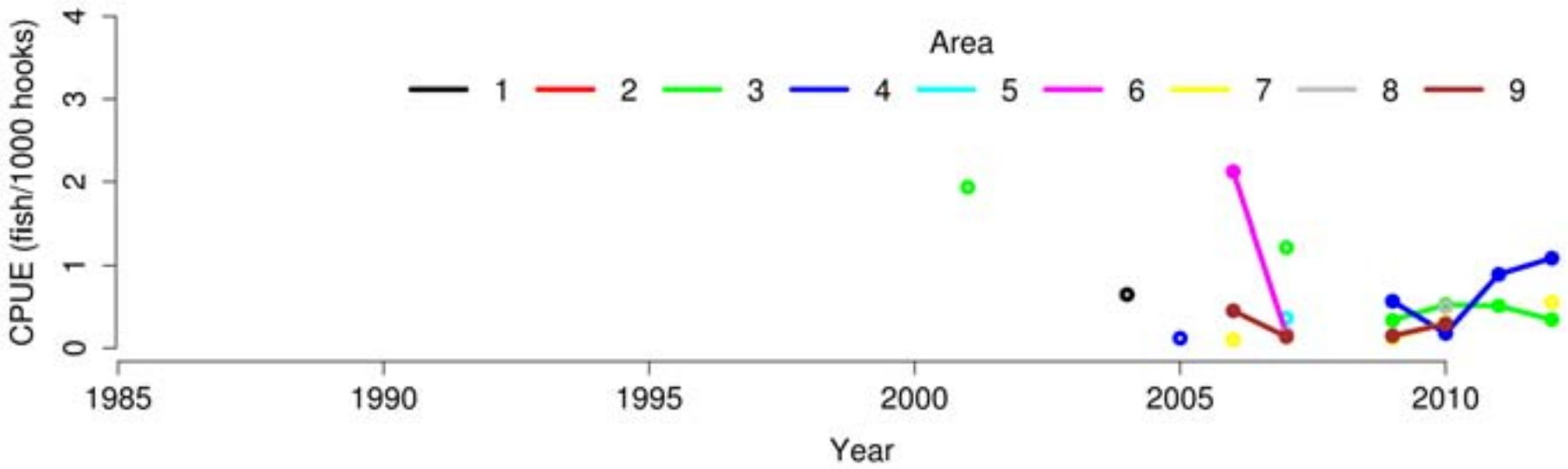


Proportion of Zero Catches



CPUE – Positive Catches





CPUE – Positive Catches

Remarks – SFA Seychelles Dataset

1. Catches and catch rates were high in area 3 in 2000's;
2. Data is not very informative about the proportion of zero catches and the catch rates for positive dataset.

Final Remarks

1. Japan and Taiwan are the more consistent longline datasets concerning black, blue and striped marlins;
2. There are not evidences of overdispersion due to the excess of zero catches except in the south (areas 8 and 9).