

MA615 MidTerm Project

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Introduction

The data we acquired was the Reef Life Survey, Carried out by the professional divers to study the coral reef lives and to improve the biodiversity. Reef Life Survey(RLS) motivated professional divers to gather the data from observations of coral reefs. RLS aimed to raised the global awareness to marine biodiversity and is freely available to all users.

Data and Material

I download the data from the RLS portal <http://reeflifesurvey.imas.utas.edu.au/static/landing.html> to find a dataset for this study. I chose the cryptic fish data from 2006 to 2019 and study the reef habitat.

Before we carry out any further study on the data, we should clean the data first.

Data Cleaning

Luckily, we do not have any missing entries in any rows because te survey was carefully carried out. We get to keep all the original data from the dataset we acquired.

##	American Samoa	Antarctica
##	75	5
##	Argentina	Australia
##	49	50073
##	Belize	Brazil
##	306	115
##	Cambodia	Canada
##	2	93
##	Caribbean Sea	Cayman Islands
##	76	16
##	Chile	China
##	319	38
##	Colombia	Cook Islands
##	331	90
##	Costa Rica	East Timor
##	882	5
##	Ecuador	Egypt
##	264	166
##	Falkland Islands (Malvinas)	France
##	22	149
##	French Polynesia	Greenland
##	772	2
##	Indonesia	Israel
##	4392	48
##	Italy	Japan
##	158	131
##	Maldives	Mexico
##	143	365
##	Morocco	Mozambique

##		105		1
##	Netherlands Antilles		New Zealand	
##		237		2007
##	Nicaragua		Niue	
##		206		18
##	Norway		Panama	
##		9		1830
##	Papua New Guinea		Pitcairn Islands	
##		77		62
##	Portugal		Qatar	
##		66		17
##	Republic of Malta	Republic of the Marshall Islands		
##		1		184
##	Samoa		Seychelles	
##		10		185
##	Solomon Islands		South Africa	
##		55		79
##	Spain		Tanzania	
##		3168		118
##	Tonga	Turks and Caicos Islands		
##		208		35
##	United Kingdom		United States	
##		107		556
##	Vanuatu			
##		31		

Since there are 68459 observations in the data and 50073 of them are in Australia, 73.14% of all the observations, we decided to study the data specifically in Australia.

```
## [1] Actinopterygii Elasmobranchii
## Levels: Actinopterygii Elasmobranchii
```

Among the 50073 observations in Australia, 48736 of them belong to the Actinopterygii Class. In order to carry out a more precise study, we choose to study the Actinopterygii as the majority.

We noticed that the column of SurveyDate was entries of a form as year-month-day-time. Hence we separate the columns into the 4 columns and factor them.

##	Year	NewDepth	NewBlock	NewTotal
##	2006 :1	Min. :5.989	Min. : 42	Min. : 119
##	2008 :1	1st Qu.:6.186	1st Qu.: 2163	1st Qu.: 13707
##	2009 :1	Median :6.673	Median : 5126	Median : 24778
##	2010 :1	Mean :6.785	Mean : 5532	Mean : 31418
##	2011 :1	3rd Qu.:6.944	3rd Qu.: 8380	3rd Qu.: 39927
##	2012 :1	Max. :8.277	Max. :11762	Max. :119637
##	(Other):7			

##	Family	NewDepth	NewBlock	NewTotal
##	: 1	Min. : 1.250	Min. : 1.0	Min. : 1.0
##	Acanthuridae : 1	1st Qu.: 5.503	1st Qu.: 5.0	1st Qu.: 5.5
##	Ambassidae : 1	Median : 6.409	Median : 51.0	Median : 60.0
##	Antennariidae : 1	Mean : 6.501	Mean : 1160.0	Mean : 6587.7
##	Aploactinidae : 1	3rd Qu.: 7.288	3rd Qu.: 714.8	3rd Qu.: 1913.5
##	Aplodactylidae: 1	Max. :10.000	Max. :18192.0	Max. :134639.0
##	(Other) :56			

##	Taxon	NewDepth	NewBlock
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```

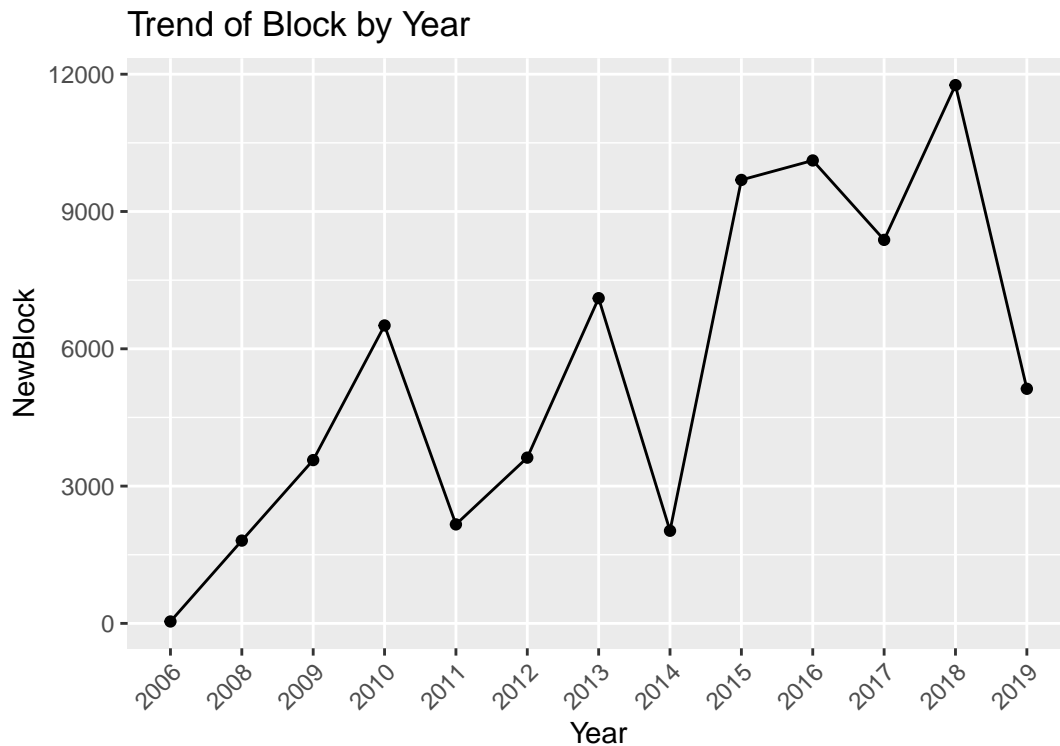
## Acanthistius cinctus : 1 Min. : 1.200 Min. : 1.0
## Acanthistius ocellatus : 1 1st Qu.: 5.000 1st Qu.: 4.0
## Acanthistius pardalotus: 1 Median : 6.050 Median : 17.0
## Acanthistius serratus : 1 Mean : 6.535 Mean : 101.6
## Acanthistius spp. : 1 3rd Qu.: 7.628 3rd Qu.: 73.0
## Actinopterygii spp. : 1 Max. :28.000 Max. :3366.0
## (Other) :702
## NewTotal
## Min. : 1.0
## 1st Qu.: 4.0
## Median : 22.0
## Mean : 576.9
## 3rd Qu.: 164.0
## Max. :55110.0
##
## Depth NewBlock NewTotal
## Min. : 0.000 Min. :1.000 Min. : 1.000
## 1st Qu.: 5.125 1st Qu.:1.433 1st Qu.: 2.509
## Median : 9.850 Median :1.486 Median : 4.448
## Mean :11.328 Mean :1.487 Mean : 5.317
## 3rd Qu.:15.575 3rd Qu.:1.522 3rd Qu.: 6.741
## Max. :42.000 Max. :2.000 Max. :17.611

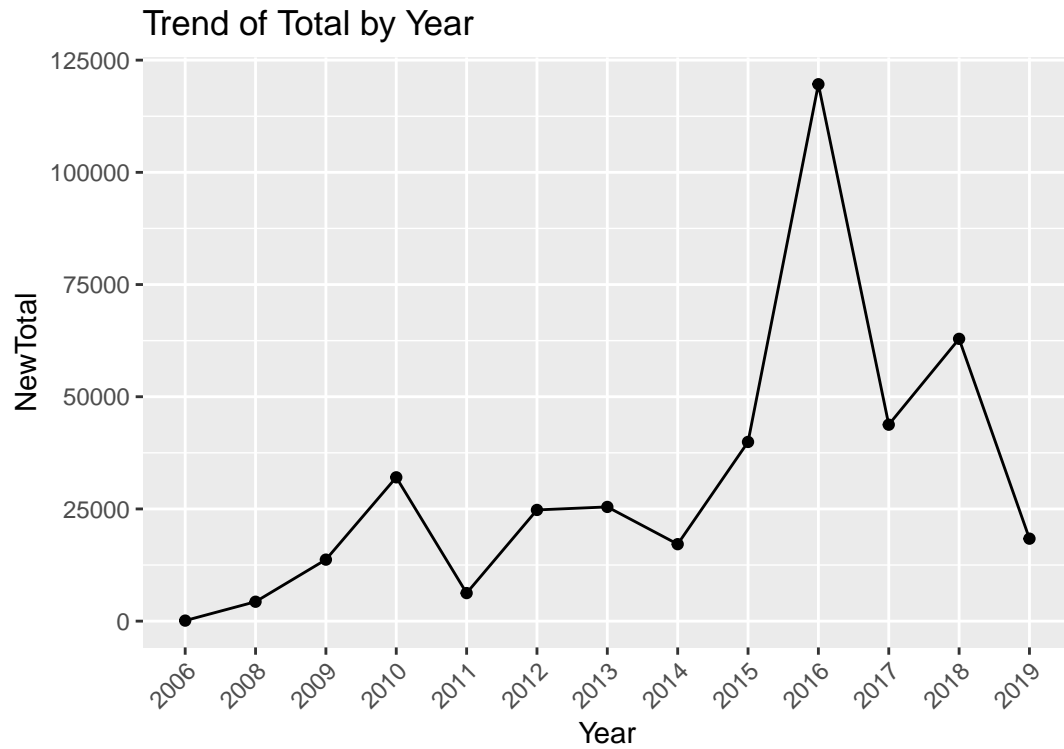
```

I grouped the data on 4 different aspects, the Year, Family, Taxon and Depth, which are, in my opinion, the 4 aspects that would be representative in relation to the total count of blocks of reefs.

Draw the plots for each aspect.

Plots for data grouped by years

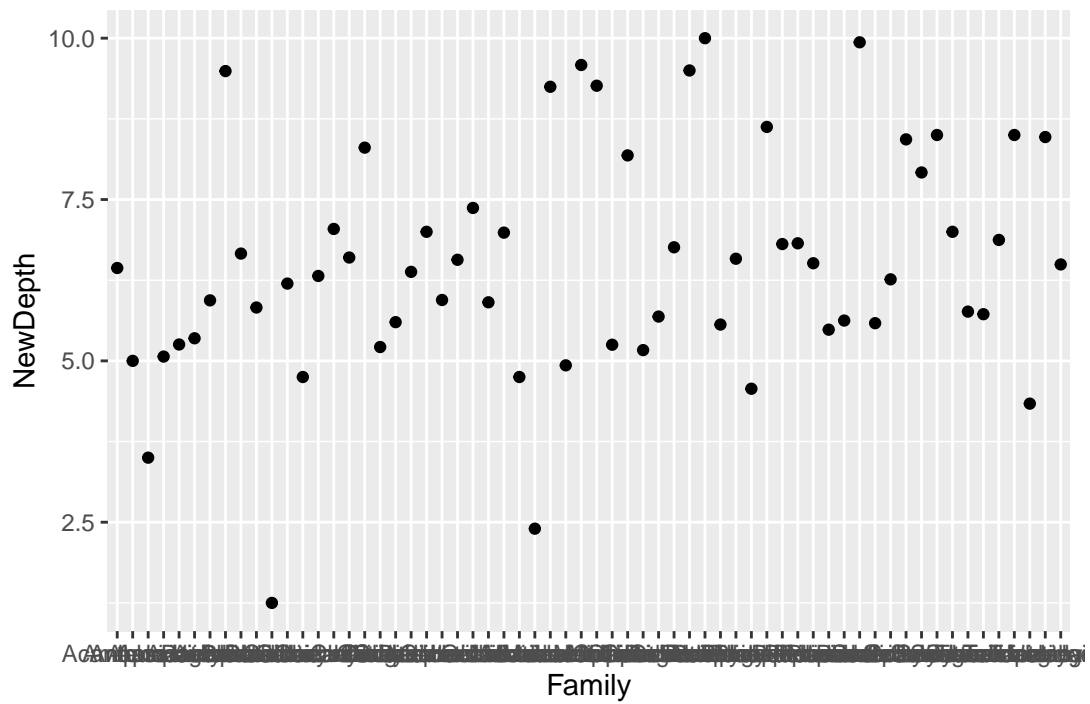




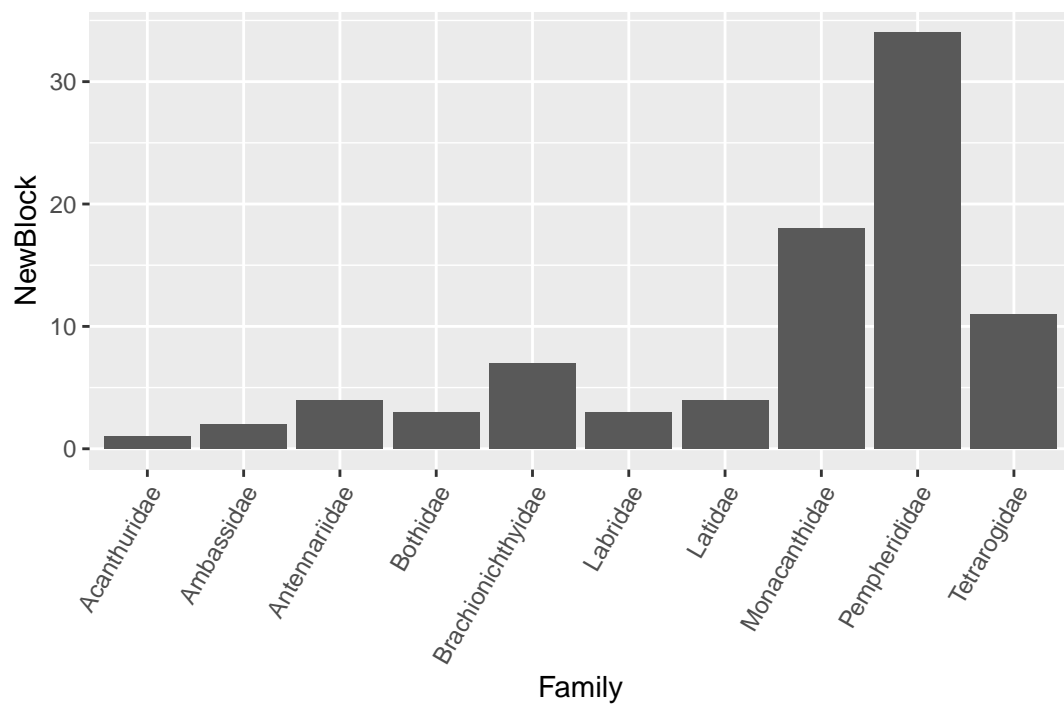
As we could see in the plots, the trend of blocks observed from 2006 to 2019 has been climbing up and down. It has its first drop in 2011, same as the first drop of total number observed. Then they both have a drop in the year 2014. This could be the result of climate changing or environment problems happened in these 2 years. The first plot has its climax point in the year 2018 and the total number trend has its climax point in 2016.

Plots for data grouped by Families

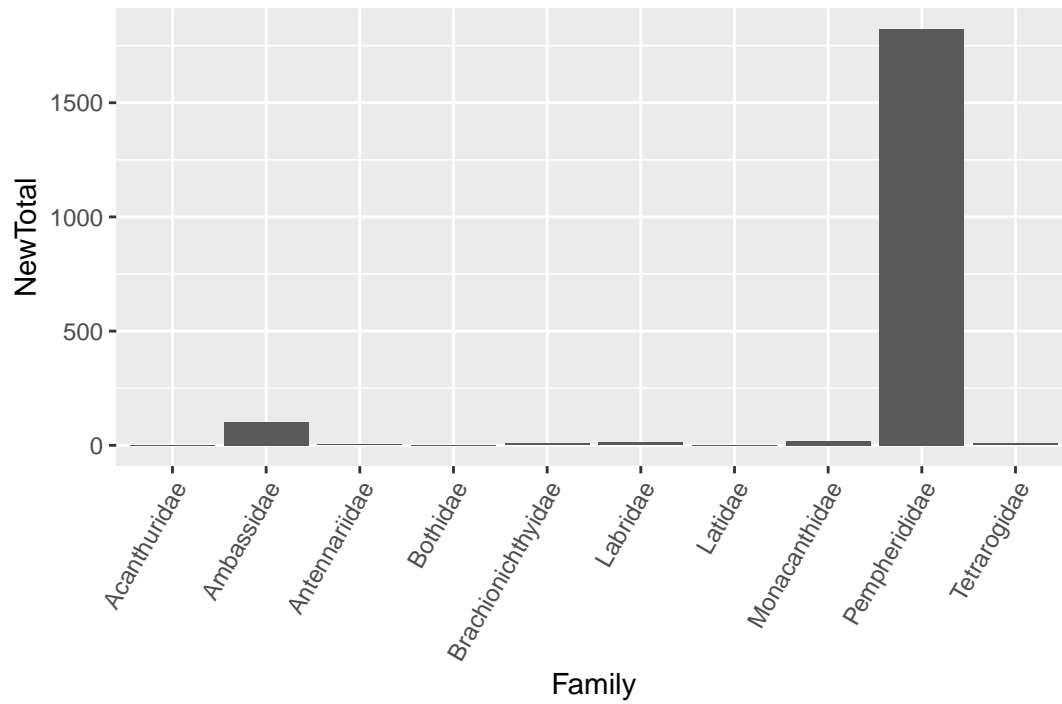
Block # at certain Depths



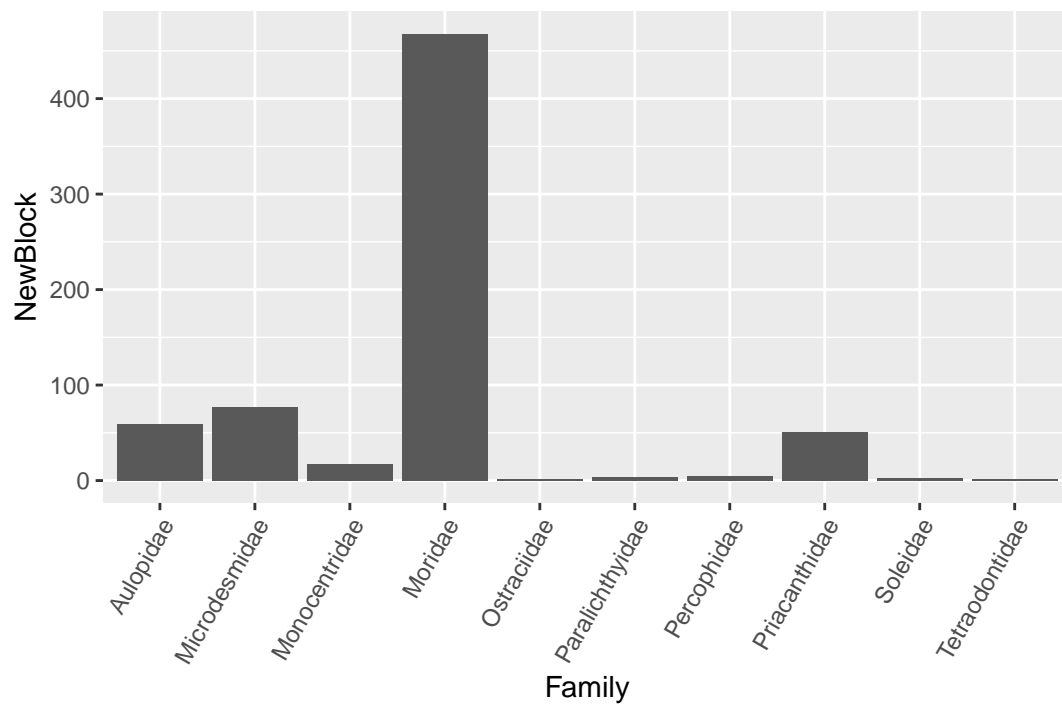
Block# of 5 Families that habitat at the least avg depth

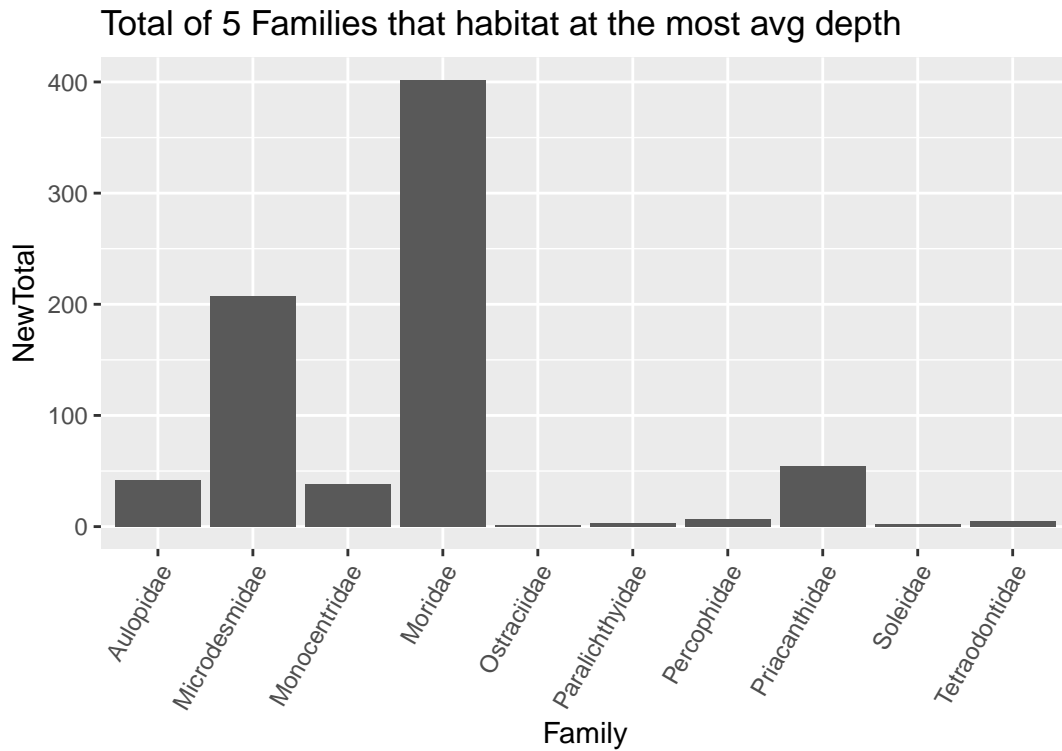


Total of 5 Families that habitat at the least avg depth



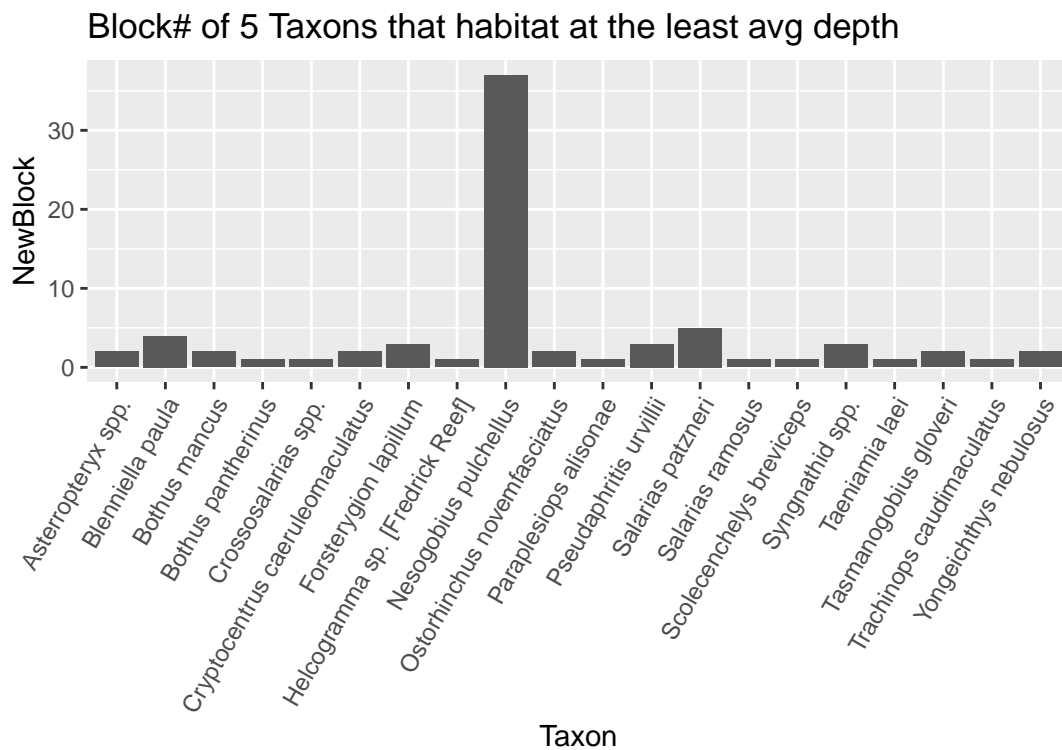
Block# of 5 Families that habitat at the most avg depth



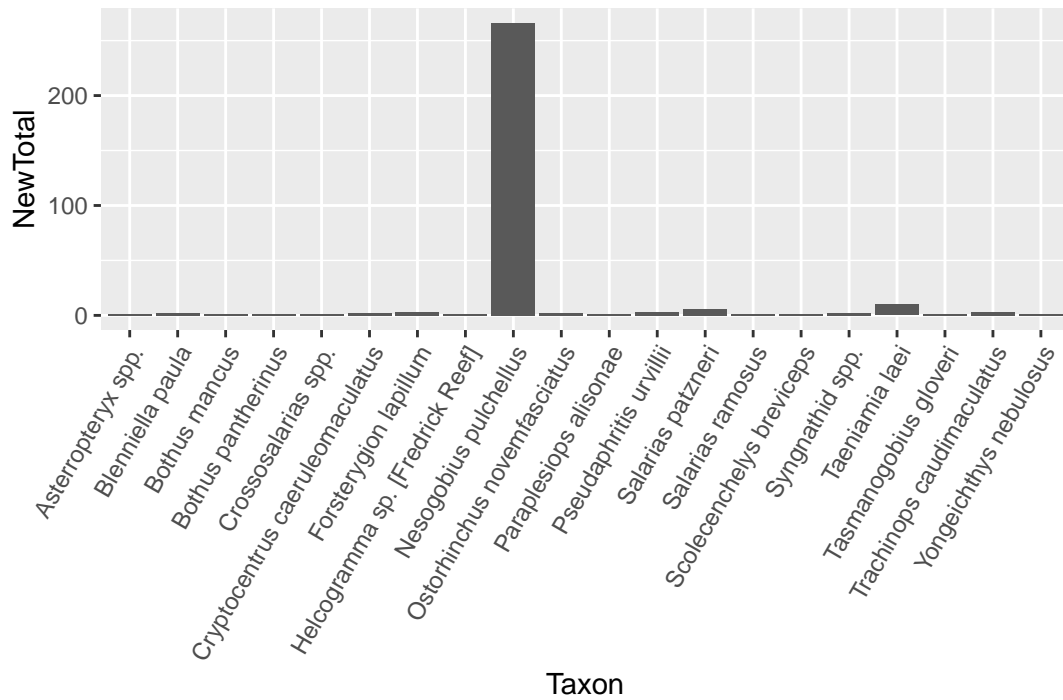


From the first plot, we can tell that it is common for many families of cryptic fish to habitat in an average depth of 6. There are 73 different families in the data and we are only showing 10 with the highest depth of habitats and 10 with the lowest.

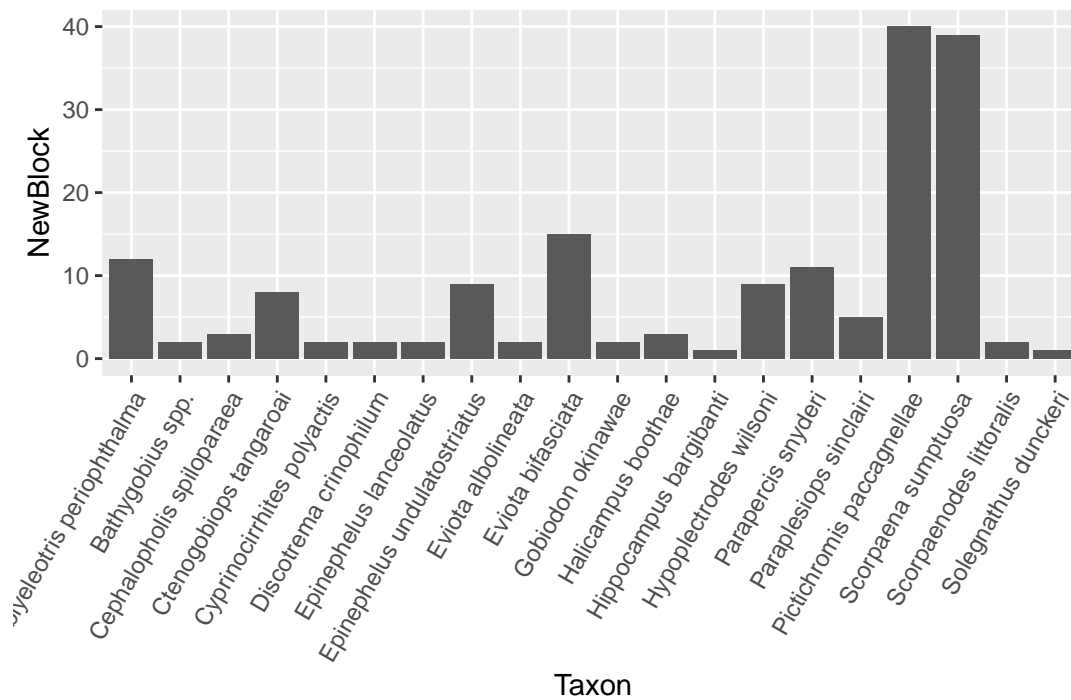
Plots for data grouped by Taxons

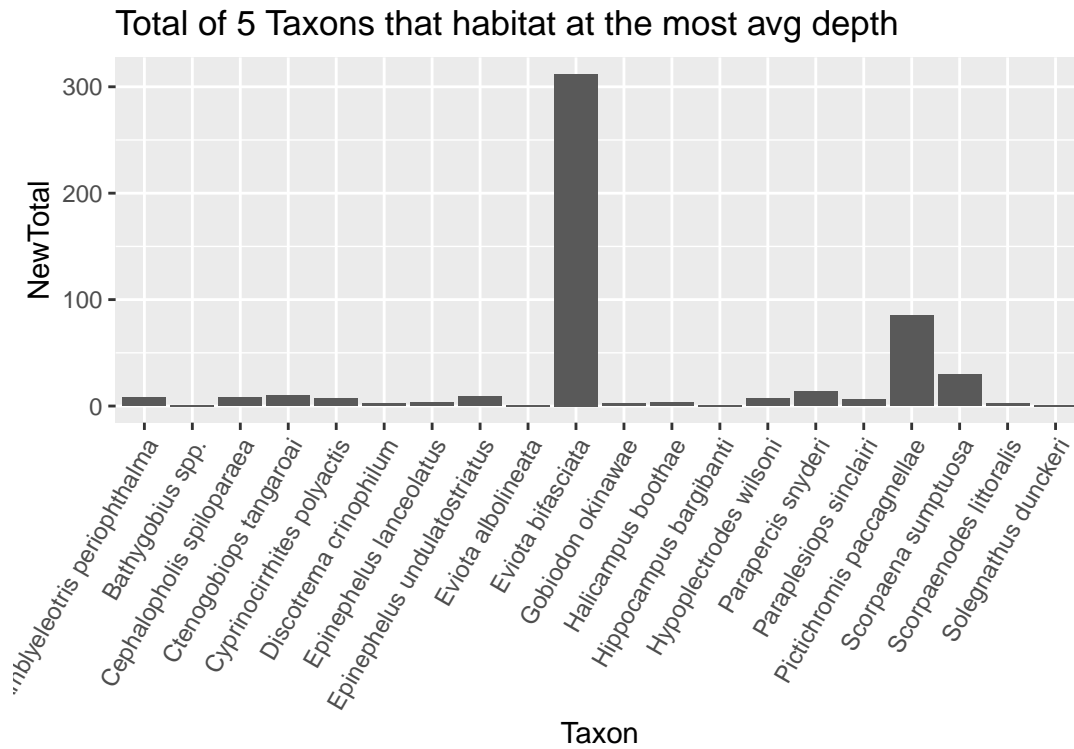


Total of 5 Taxons that habitat at the least avg depth



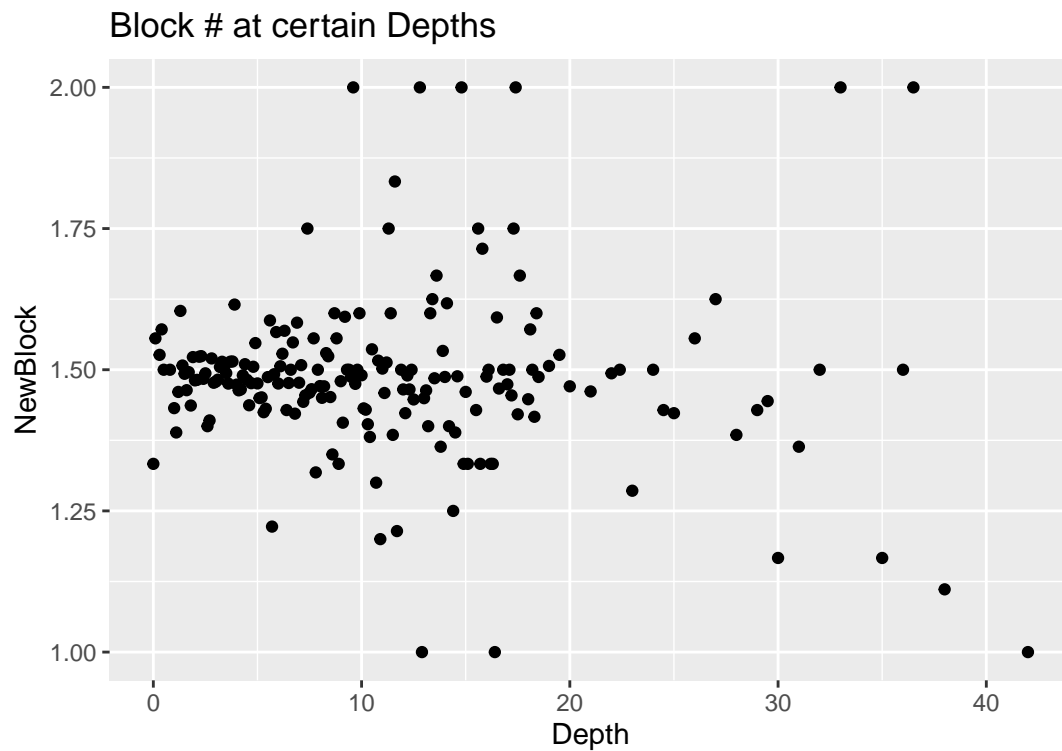
Block# of 5 Taxons that habitat at the most avg depth

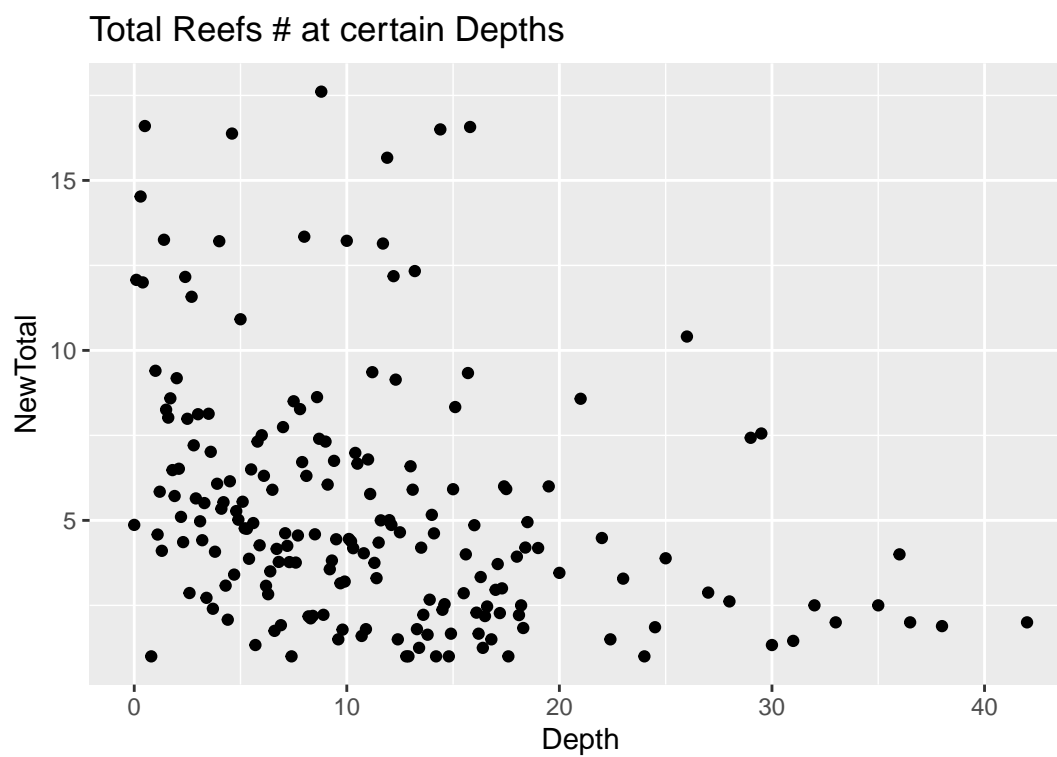




From the plots, we could get an overview of the habitat of different Taxons. There are 755 different taxons in the data and we are only showing 20 with the highest depth of habitats and 20 with the lowest.

Plots for data ordered by Depths





Regardless of the family and taxon, most of the observations of blocks and total are under depth 20.

Reference

Reef Life Survey Data Portal: <http://reeflifesurvey.imas.utas.edu.au/static/landing.html>