

UVC datasets - exploring monitoring structure and herbivore assemblages

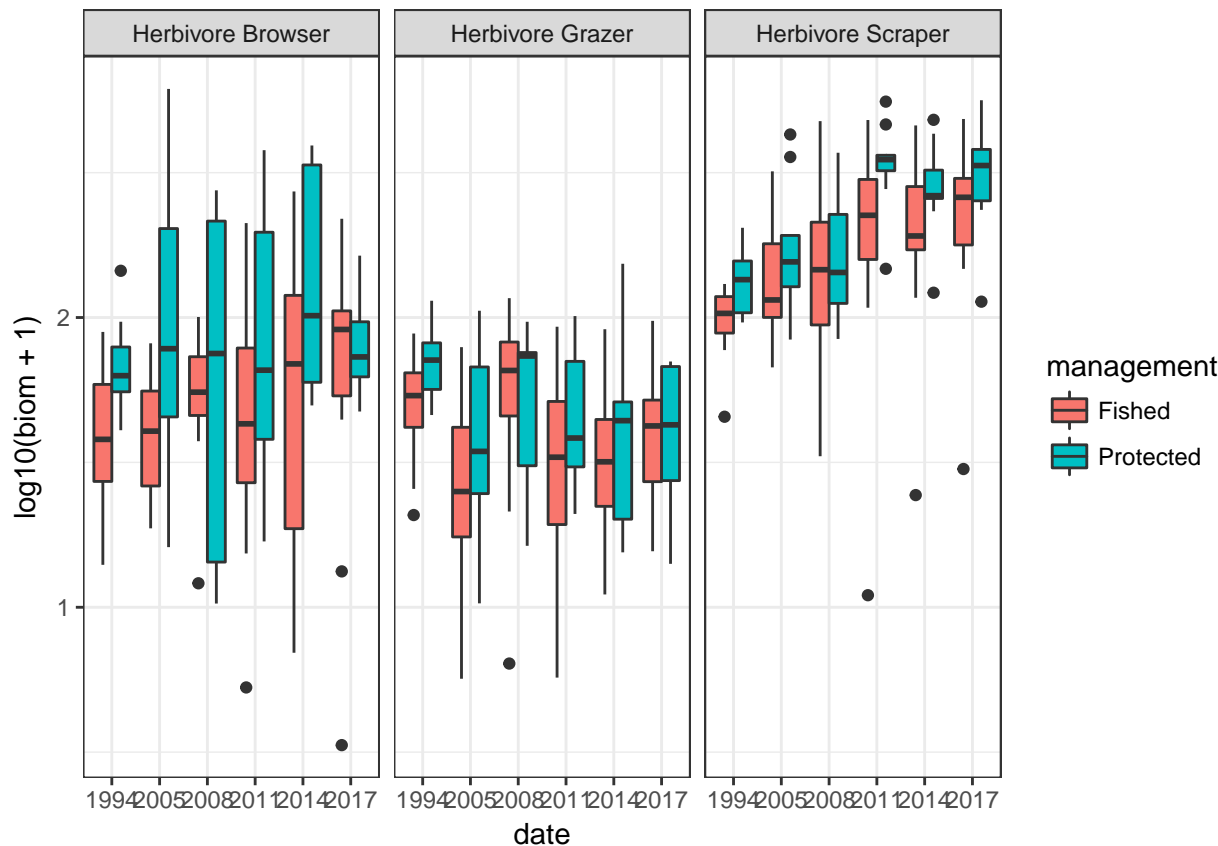
Seychelles

- Seychelles data are 7m radius point counts conducted at 21 reef sites in 1994, 2005, 2008, 2011, 2014, 2017.
- Sites were stratified according to habitat (granite = 7, patch = 7, carbonate = 7) and management status (12 = fished, 9 = MPAs)
- Reefs are the inhabited Seychelles islands, Mahe and Praslin
- Useful papers describing dataset methods: Graham et al. 2015 (Predicting climate-driven regime shifts..., Nature)

Across all surveys, 37 herbivore species were recorded, which are composed of:

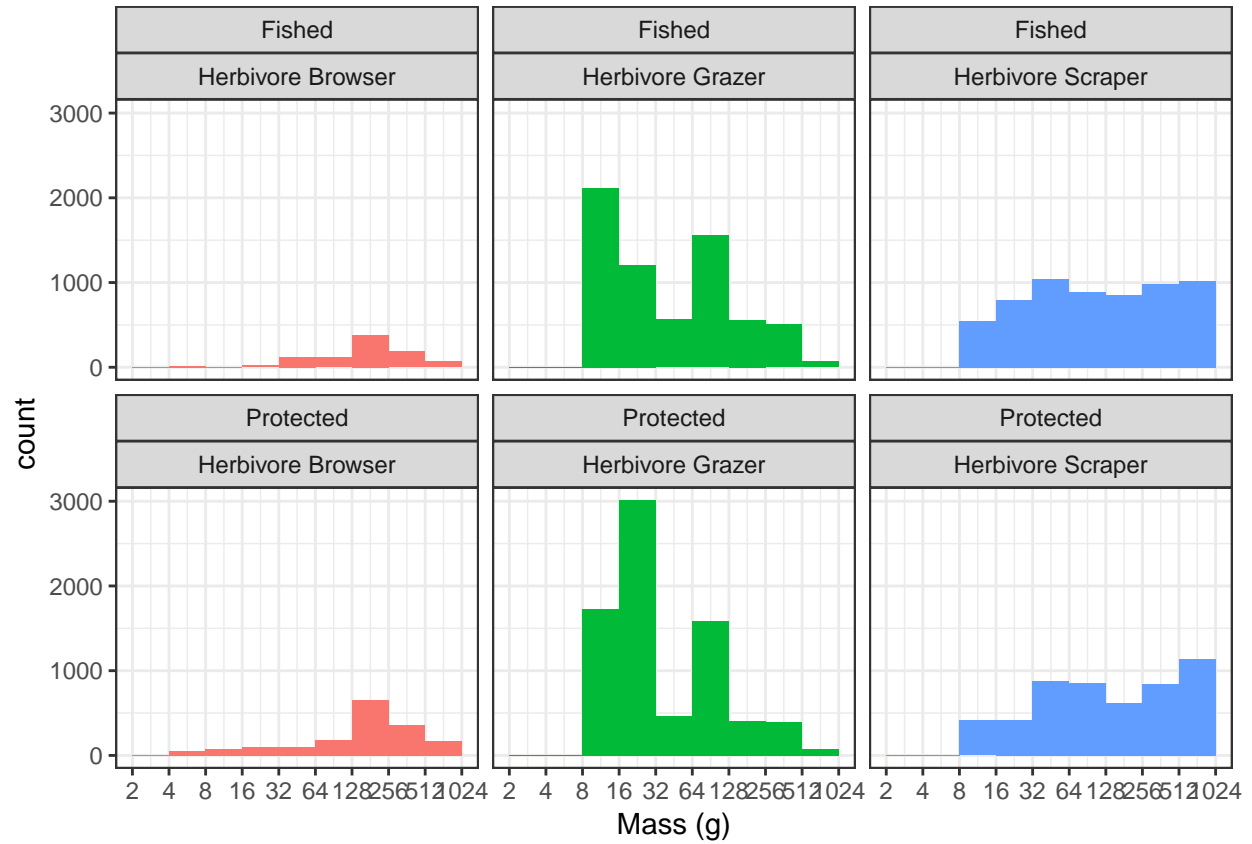
| ## | FG species |
|------------------------|------------|
| ## 1 Herbivore Browser | 5 |
| ## 2 Herbivore Grazer | 15 |
| ## 3 Herbivore Scraper | 17 |

Scrapers dominated herbivore assemblages on both fished and protected reefs, and browser biomass was slightly higher than grazer biomass after 1994 (i.e. after bleaching). High variability in browser biomass suggests that strong spatial variation in browser presence. This was less true for scrapers, for which biomass may be high at all reef sites. There was a weak protection effect apparent, with slightly higher biomass of all feeding groups in protected sites.



Grazer size distributions indicated high abundance of small-bodied individuals. Scraper and browser sizes were

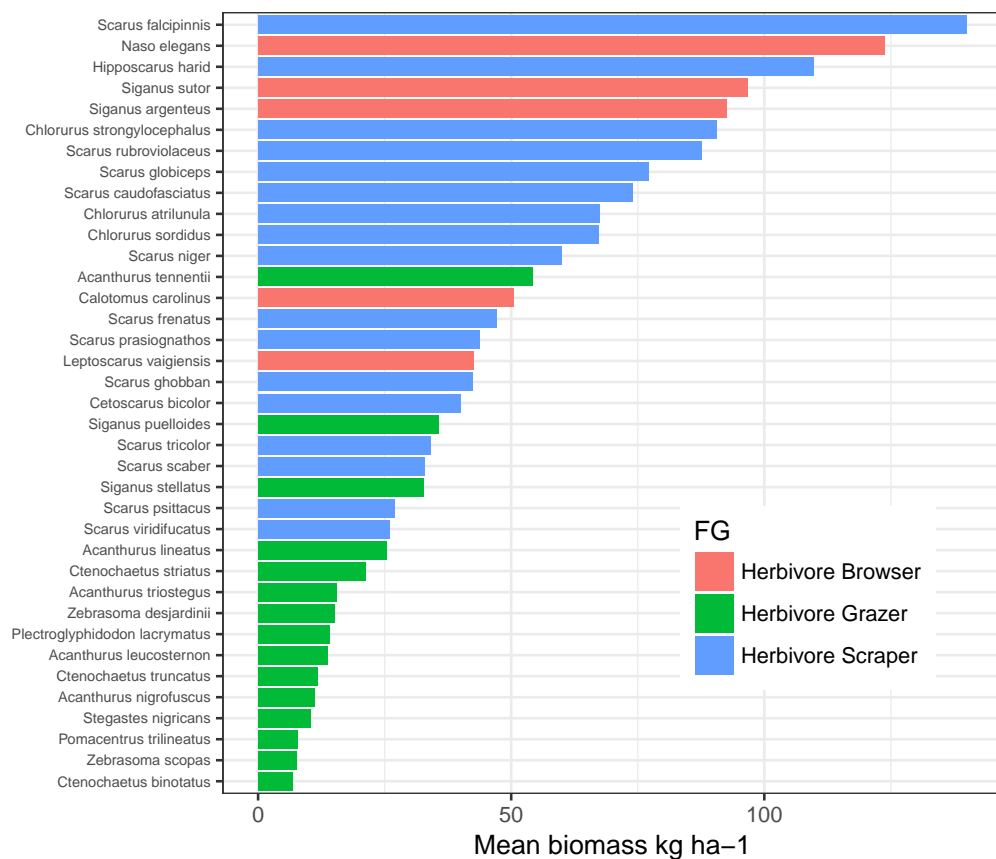
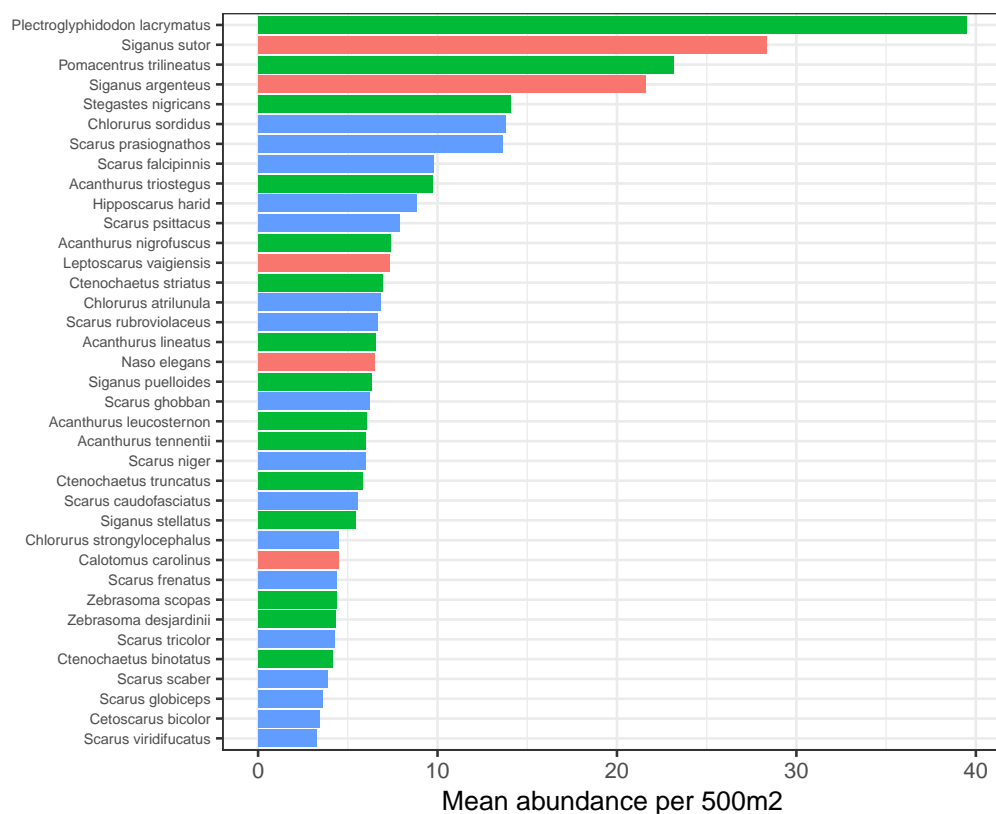
more equitably distributed across the size range. Scrapers had the largest body sizes, with some individuals between 0.5-2 kg.



Common herbivore species

Considering common species as those that are high in abundance or biomass (i.e. mean biomass across UVC replicates at each site).

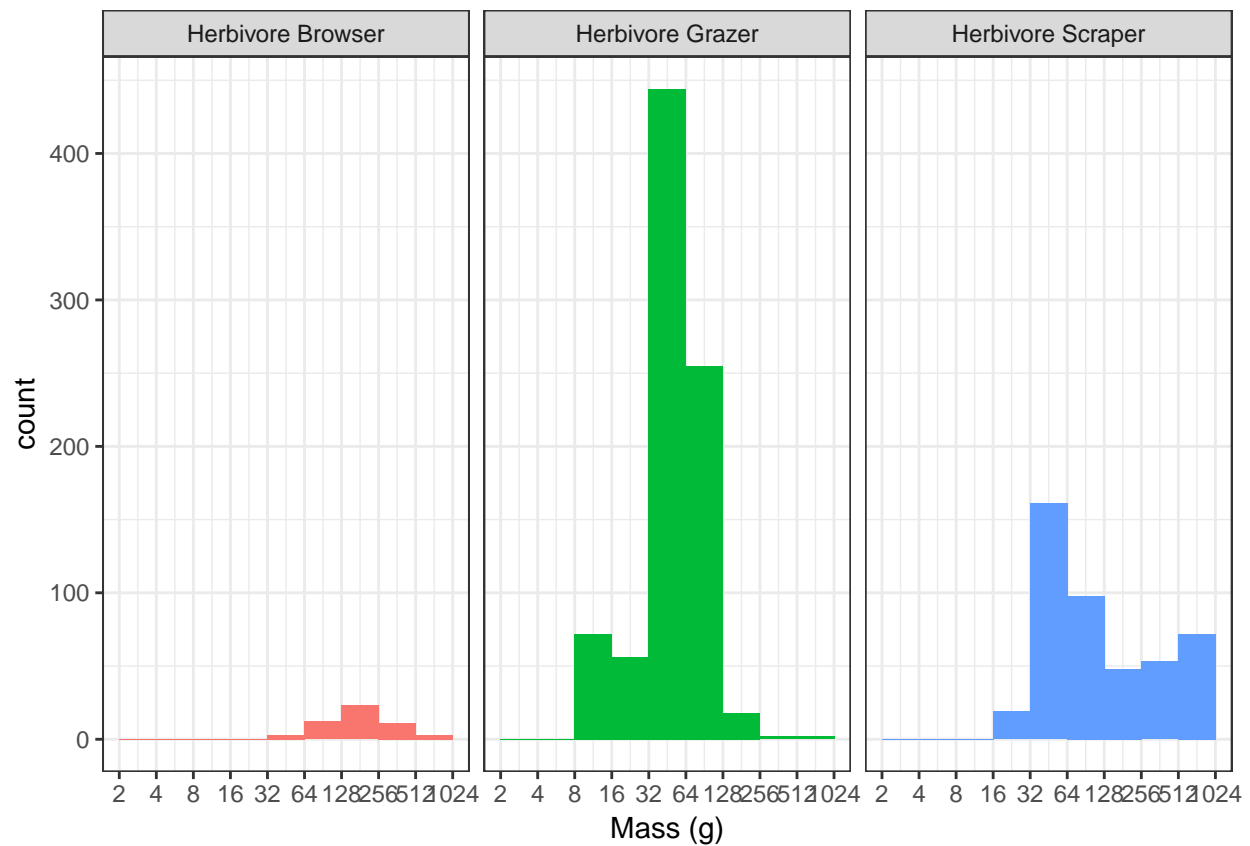
Seychelles: abundance/biomass distributions



Maldives

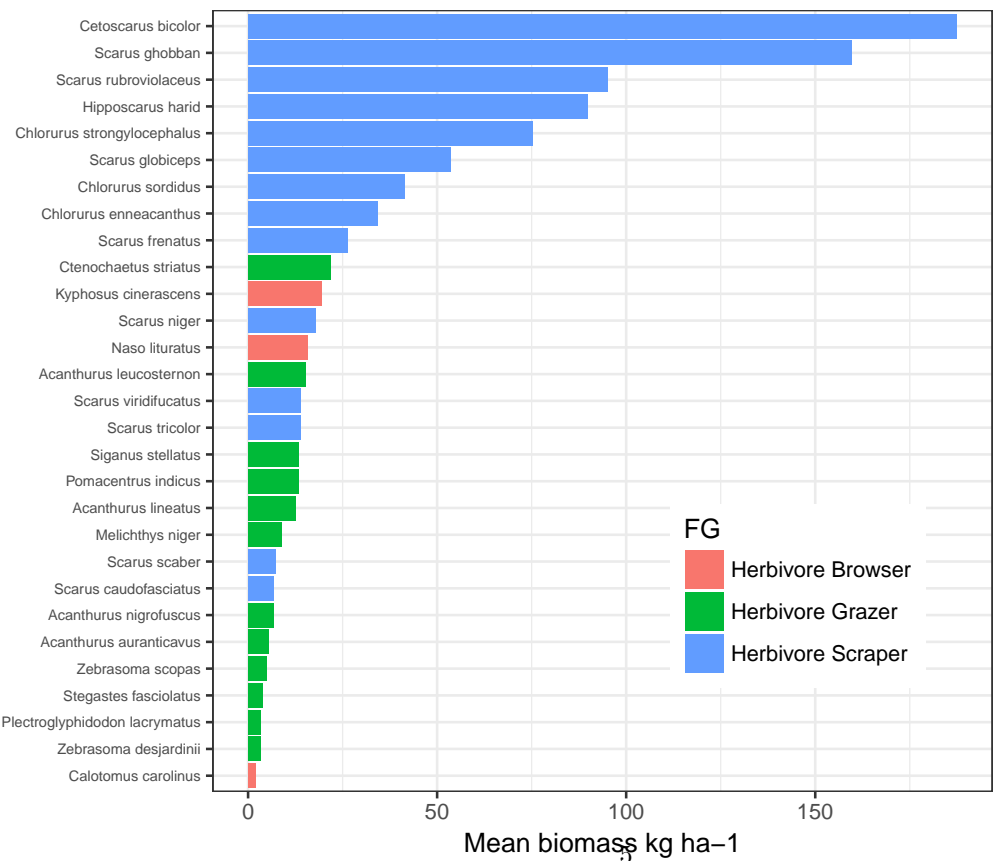
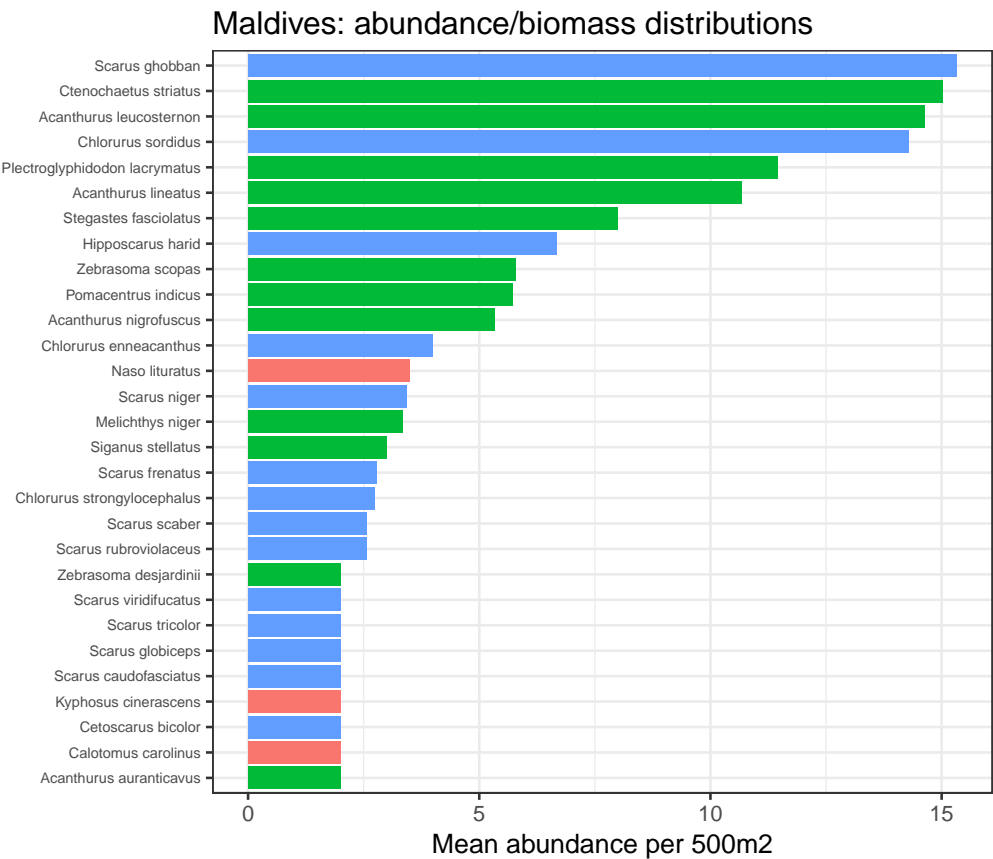
- 11 sampled sites
- 4 transects each site of 250 m² (most) or 100 m² area
- 1 depth level (8m)
- 1 management level (Fished)
- 1 habitat level (Exposed)
- 30 herbivore species (3 browser spp., 13 grazer spp., 14 scraper spp.)
- 7 herbivore families

biomass ditribution across functional groups



*Browsers few but large, grazers smaller but many, scrapers more equally spread in both

common herbivore species



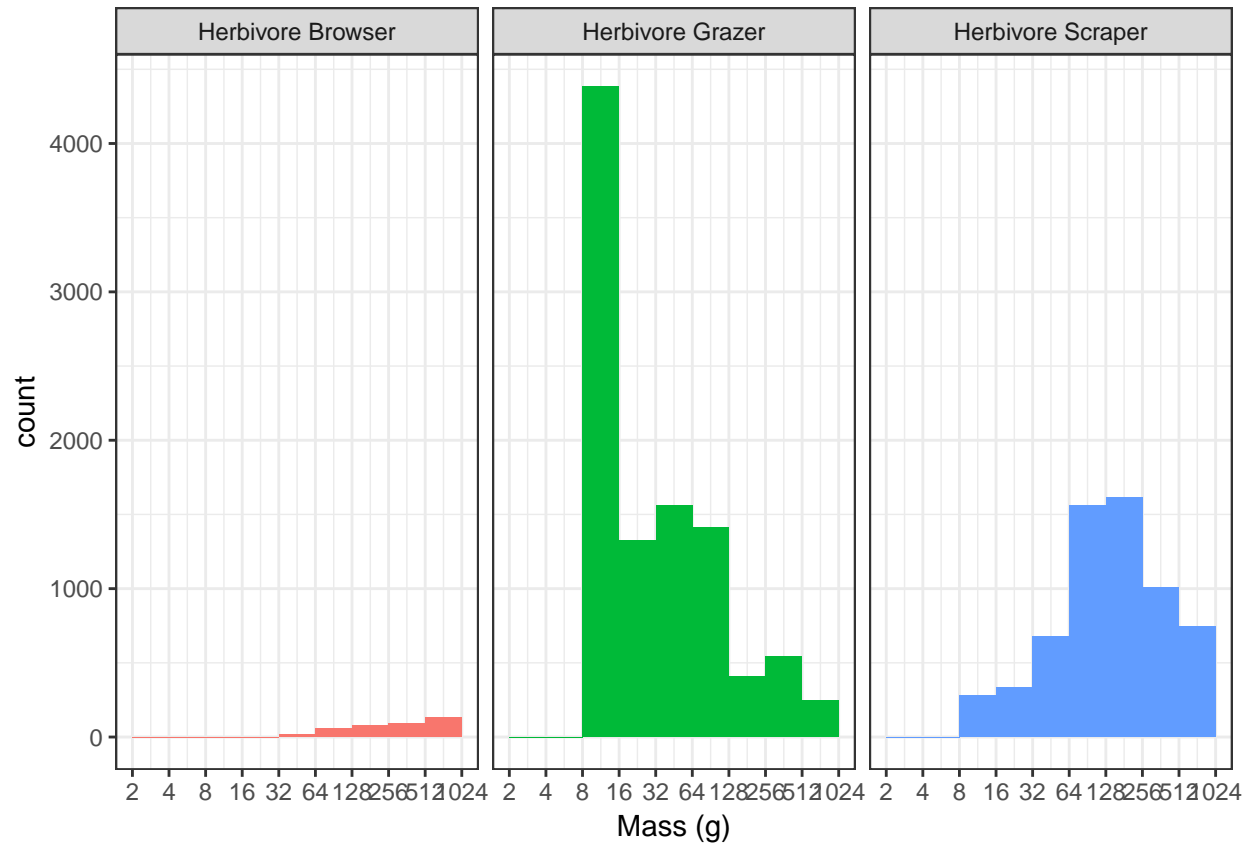
GBR

- Nov 2010 & Jan 2011
- 5 reefs, 3 sites each, 4 transects each of 250 m² (most) or 100 m² area
- 1 management level (fished)
- 18 habitat levels (3 exposed, 3 sheltered, crossed with crest-flat-slope)
- NA depth
- 8 herbivore families
- 71 species (10 browser spp., 40 grazer spp., 21 scraper spp.)

```
library(ggplot2)
library(tidyverse)

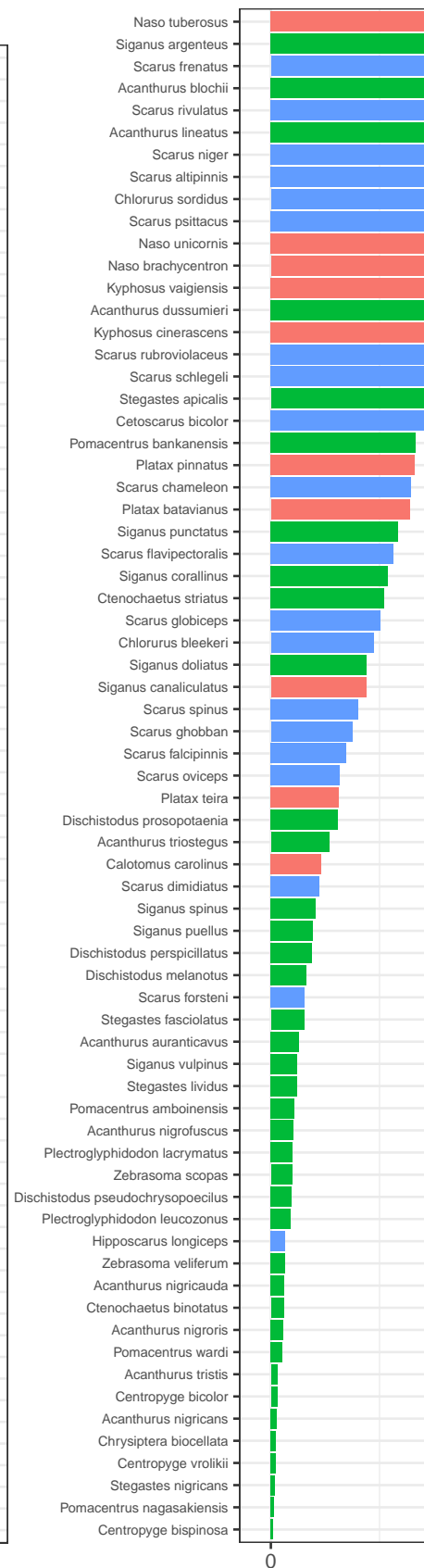
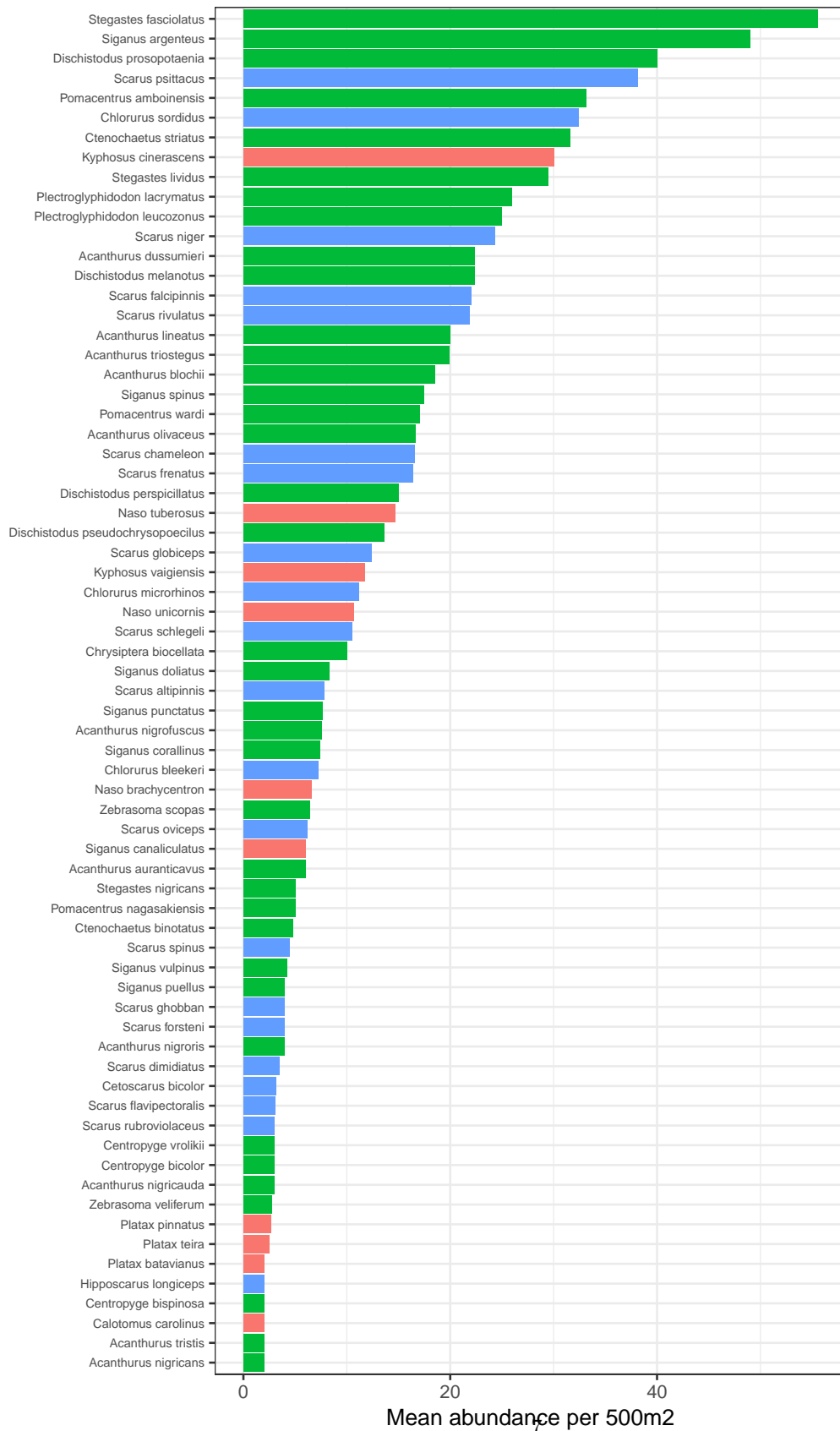
load('data/wio_gbr_herb_master.Rdata')
gbr <- herb %>% filter(dataset=='GBR')
```

biomass by functional group

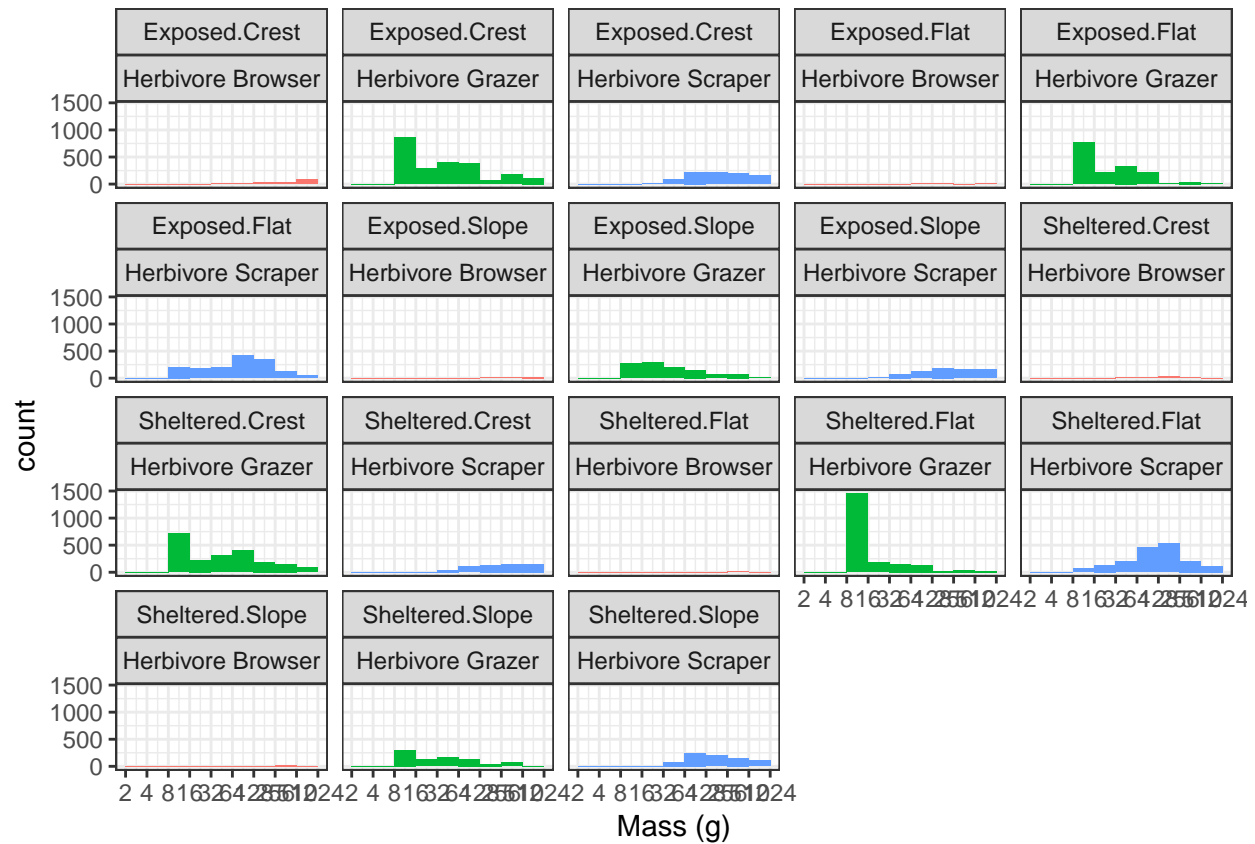


common species

GBR: abundance/biomass distributions



```
ggplot(gbr, aes(log(mass.g, 2), fill=FG)) + geom_histogram(breaks=c(1:10)) +
  facet_wrap(habitat~FG) + theme(legend.position='none') +
  scale_x_continuous(breaks=c(1:10), labels=c(2^c(1:10))) + labs (x='Mass (g)')
```



Ugly biomass gradient across habitat levels - find it somewhat useful

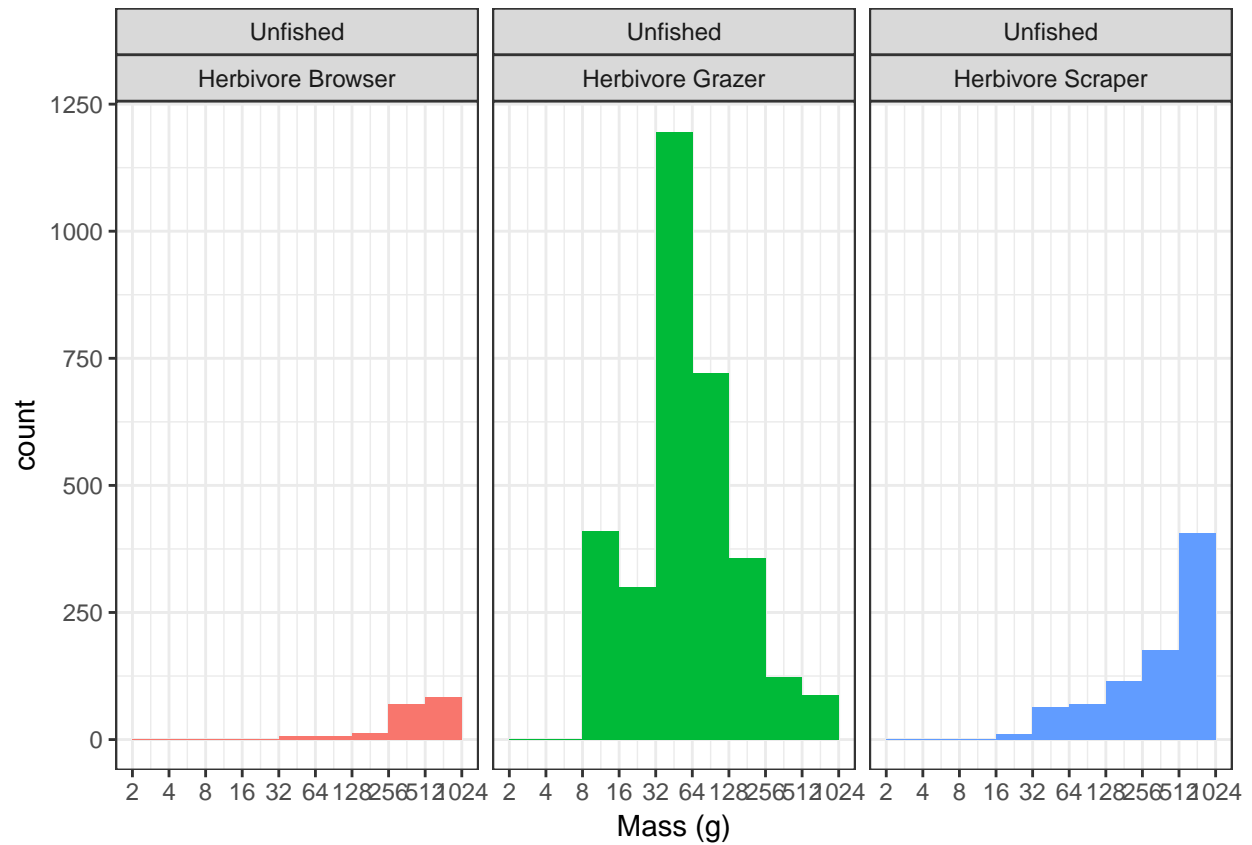
Chagos

Exploring the data

Chagos dataset: total of 52 species, 5729 records, across 20 sites at 4 reefs, with between 1-4 transects at each site.

```
##          FG species
## 1 Herbivore Browser      4
## 2 Herbivore Grazer     18
## 3 Herbivore Scraper    21
```

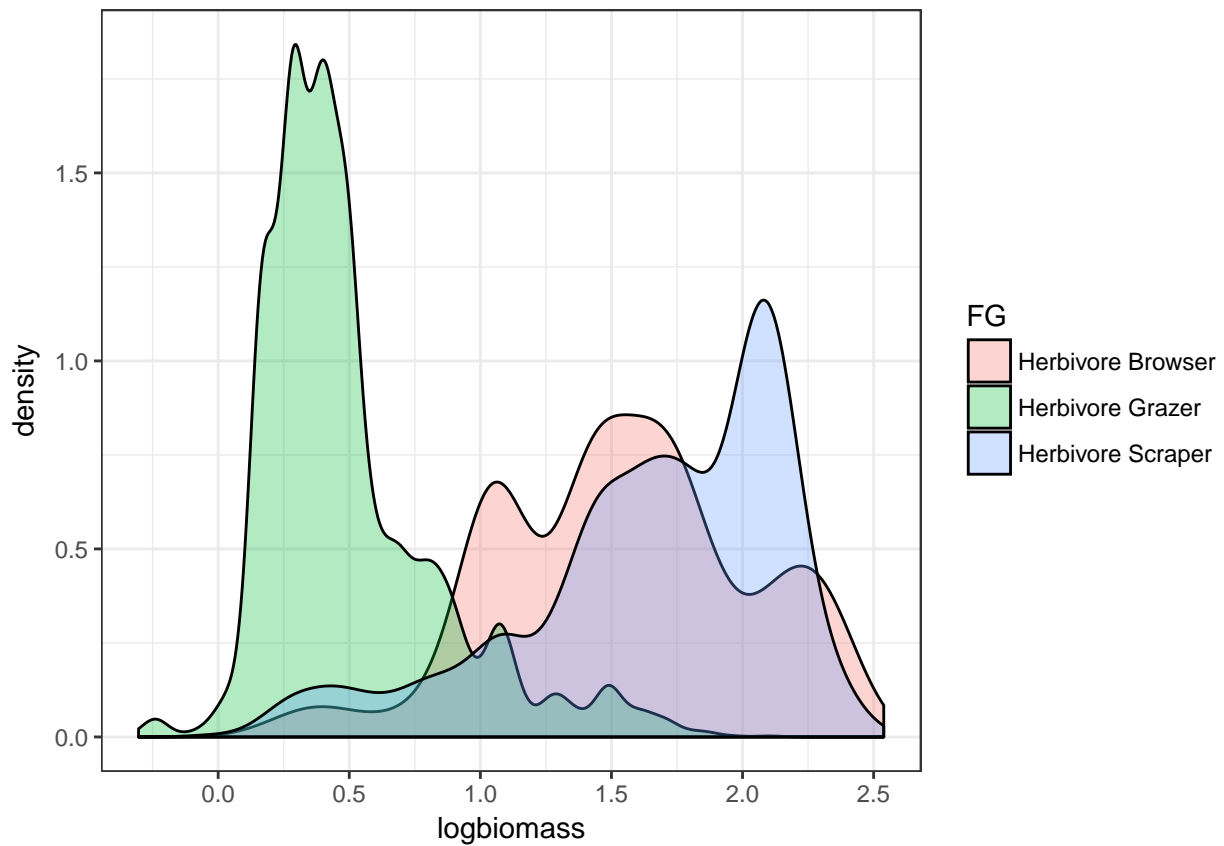
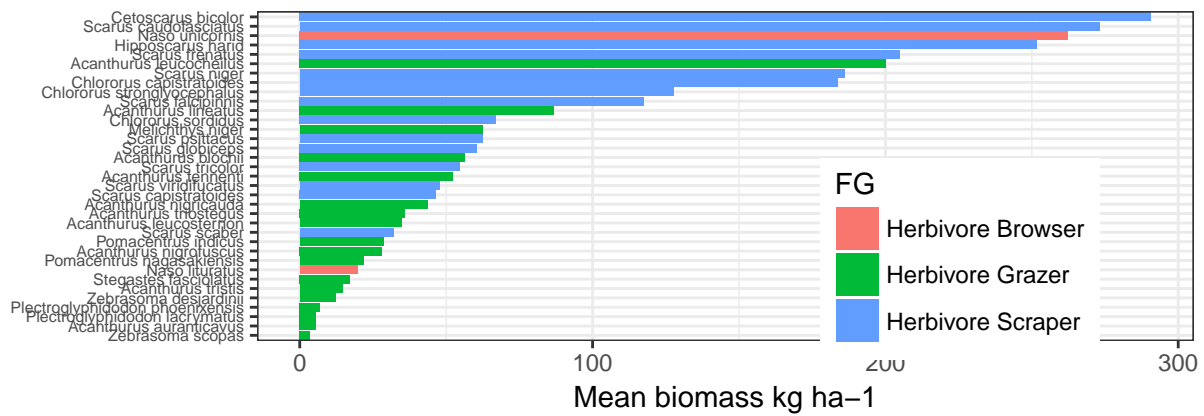
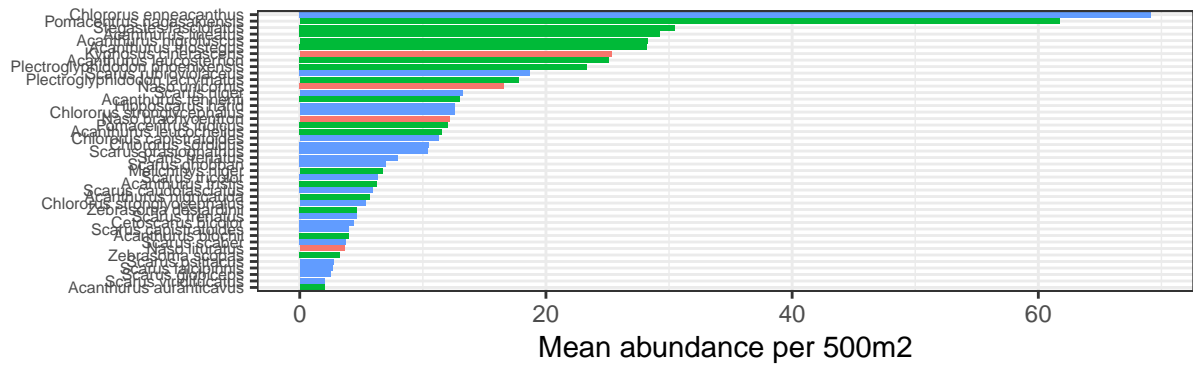
Very few browser species (5) as compared to grazers (22) and scrapers (25)... but there are some duplicate species due to typos, so still need to clean that up.



There are more grazers than any other functional group. Most grazers are mid-sized, whereas there are more large scrapers and browsers. The mean size of browsers is 1476g, grazers 115g, and scrapers 1808.

Now need to look at abundance and biomass of species and functional groups across sites...

Chagos: abundance/biomass distributions



There are no dates recorded for the Chagos dataset, so no time series analyses could be done. Additionally, all of Chagos is “unfished”. Therefore, only “depth” and “habitat” gradients were explored further to biomass. If lat long values can be attached to site names, a spatial look at the data can be done as well.

