

# Algal turf and macroalgae productivity from the RLS dataset

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```
library(tidyverse)
library(brms)
library(tidybayes)
library(patchwork)
library(PNWColors)
```

## Loading the two meta-analysis models

One developed to predict algal turf productivity from depth, and the other simply as an average macroalgal productivity (no predictors)

```
macr_prodmmod <- readRDS('macro_prod_brms.RDS')
turf_prodmmod <- readRDS('turf_prod_brms.RDS')
```

## And loading RLS data for which they will be predicted

```
load('RLStropical_raw.rdata')
load('RLS_env_spatio_temporal.rdata')
load('RLS_sitesInfos.rdata')
```

## But sure there is a bit of processing to be done

```
rls <- RLS_sitesInfos %>%
  select(SurveyID, depth=Depth) %>%
  right_join(.,
    RLStropical_raw %>%
      mutate(SurveyID = as.integer(rownames(RLStropical_raw))),
    by='SurveyID'
  ) %>%
  left_join(.,
    RLS_env_spatio_temporal %>%
      select(SurveyID, chl=median_chl_5year, sst=mean_sst_5year, minsst=min_sst_5year),
    by='SurveyID'
  ) %>%
  mutate(
    algal_turf = rowSums(.,c('coral rubble','turf algae'))/100,
```

```
macroalgae = rowSums(.,c('canopy forming macroalgae','fleshy algae','understory macroalgae'))/100
) %>%
select(SurveyID,depth,chl,sst,minsst,algal_turf,macroalgae)
```

## Turf prediction coming

```
pred_val <- posterior_epred(turf_prodm,
  newdata=rls %>% mutate(se_prod=0.1), ndraws=1000)

tot_turf_prod <- ((rls$algal_turf * t(pred_val)) * 10000)/1000
## in kg C ha day-1

# aggregating

rls_pred <- cbind(rls,
  turf_prod_kghaday_med=apply(tot_turf_prod,1,median),
  turf_prod_kghaday_lhd=apply(tot_turf_prod,1,function(x) median_hdci(x)$ymin),
  turf_prod_kghaday_uhd=apply(tot_turf_prod,1,function(x) median_hdci(x)$ymax))
```

## But also macroalgae

```
pred_val2 <- posterior_epred(macrod,
  newdata=rls %>% mutate(se_prod=0.1), ndraws=1000)

tot_macr_prod <- ((rls$macroalgae * t(pred_val2)) * 10000)/1000
## in kg C ha day-1

# aggregating

rls_pred <- cbind(rls_pred,
  macr_prod_kghaday_med=apply(tot_macr_prod,1,median),
  macr_prod_kghaday_lhd=apply(tot_macr_prod,1,function(x) median_hdci(x)$ymin),
  macr_prod_kghaday_uhd=apply(tot_macr_prod,1,function(x) median_hdci(x)$ymax))
```

## How to they relate to each other?

```
ggplot(rls_pred) +
  geom_linerange(
    aes(xmin=turf_prod_kghaday_lhd,
      xmax=turf_prod_kghaday_uhd,
      y=macr_prod_kghaday_med),
    size=0.1) +
  geom_linerange(
    aes(ymin=macr_prod_kghaday_lhd,
      ymax=macr_prod_kghaday_uhd,
```

```

    x=turf_prod_kghaday_med),
  size=0.1) +
  geom_point(
    aes(x=turf_prod_kghaday_med,
        y=macr_prod_kghaday_med,
        colour=log(chl))) +
  scale_colour_gradientn(colours=pnw_palette("Bay",10)) +
  labs(x=expression(Algal~turf~productivity~(' '*kg~C~ha^-1*day^-1*')),
       y=expression(Macroalgae~productivity~(' '*kg~C~ha^-1*day^-1*'))) +
  theme_minimal()

```

