# Suppl_Figure_2

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**The aim of this script is to replicate Supplementary Figure 2 of Ellis-Soto et al. 2023 NHB**

```
holc_area = read_csv('../../indir/Biodiv_Greeness_Social/main_combined_2022-05-27.csv')  %>%
  dplyr::select(city, holc_grade, area_holc_km2) %>%
  dplyr::group_by(holc_grade) %>%
   dplyr::filter(holc_grade != 'E') %>%
  dplyr::summarise(area_sum = sum(area_holc_km2))
```

```
## Rows: 9851 Columns: 32
## -- Column specification --------------------------------------------------------
## Delimiter: ","
## chr  (7): id, state, city, holc_id, holc_grade, city_state, msa_NAME
## dbl (25): area_holc_km2, holc_tot_pop, msa_GEOID, msa_M, msa_p, msa_H, msa_e...
##
## i Use `spec()` to retrieve the full column specification for this data.
## i Specify the column types or set `show_col_types = FALSE` to quiet this message.
```

```
temporal_2000_2020 = read.table("../../indir/Biodiv_Greeness_Social//R1_biodiv_col_code_by_holc_id_2000_
names(temporal_2000_2020) <- c('Type', 'Sum', 'holc_polygon_id')
temporal_2000_2020$holc_grade = substr(sub(".*?_", "", (sub("_.*?", "", sub("_.*?", "", temporal_2000_2(
# temporal_2000_2020[which(temporal_2000_2020$holc_grade =='2'),]$holc_grade <- 'B'
temporal_2000_2020 = temporal_2000_2020 %>% filter(holc_grade  %in% c('A', 'B', 'C', 'D'))

# --- --- --- --- --- --- --- --- --- --- --- --- --- --- --- --- --- --- --- --- --- --- --- ---
# [10] Plot by observation type ####
# --- --- --- --- --- --- --- --- --- --- --- --- --- --- --- --- --- --- --- --- --- --- --- ---

ebird  = temporal_2000_2020 %>% filter(Type =='ebird')
inat = temporal_2000_2020 %>% filter(Type =='iNaturalist')
other = temporal_2000_2020 %>% filter(Type =='other')

ebird_sampling_density <- plyr::ddply(ebird, 'holc_grade', function(x){
  sampling_sum = sum(x$Sum)
})
ebird_sampling_density_df = left_join(ebird_sampling_density, holc_area)
```

```
## Joining with `by = join_by(holc_grade)`
```

```
ebird_sampling_density_df$sampling_density <- ebird_sampling_density_df$V1 / ebird_sampling_density_df$a
ebird_sampling_density_df = ebird_sampling_density_df %>% filter(holc_grade != 'E')

inat_sampling_density <- plyr::ddply(inat, 'holc_grade', function(x){
  sampling_sum = sum(x$Sum)
})
inat_sampling_density_df = left_join(inat_sampling_density, holc_area)
```

```
## Joining with `by = join_by(holc_grade)`
```

```
inat_sampling_density_df$sampling_density <- inat_sampling_density_df$V1 / inat_sampling_density_df$area
inat_sampling_density_df = inat_sampling_density_df %>% filter(holc_grade != 'E')

other_sampling_density <- plyr::ddply(other, 'holc_grade', function(x){
  sampling_sum = sum(x$Sum)
})

other_sampling_density_df = left_join(other_sampling_density, holc_area)
```

```
## Joining with `by = join_by(holc_grade)`
```

```
other_sampling_density_df$sampling_density <- other_sampling_density_df$V1 / other_sampling_density_df$a
other_sampling_density_df = other_sampling_density_df %>% filter(holc_grade != 'E')

inat_sampling_density_plot = inat_sampling_density_df %>%
  ggplot(aes(holc_grade, sampling_density, fill = holc_grade)) +
  geom_col() +
  scale_fill_manual(values = holc_pal) +
  theme_bw(16) +
  theme_classic(16) +
  labs(title='iNaturalist') +
  theme(legend.position = 'none') +
  ylab('Sampling density in 1km^2') +
  theme(axis.title.x=element_blank(),
        axis.text.x=element_blank()
  )
NULL
```

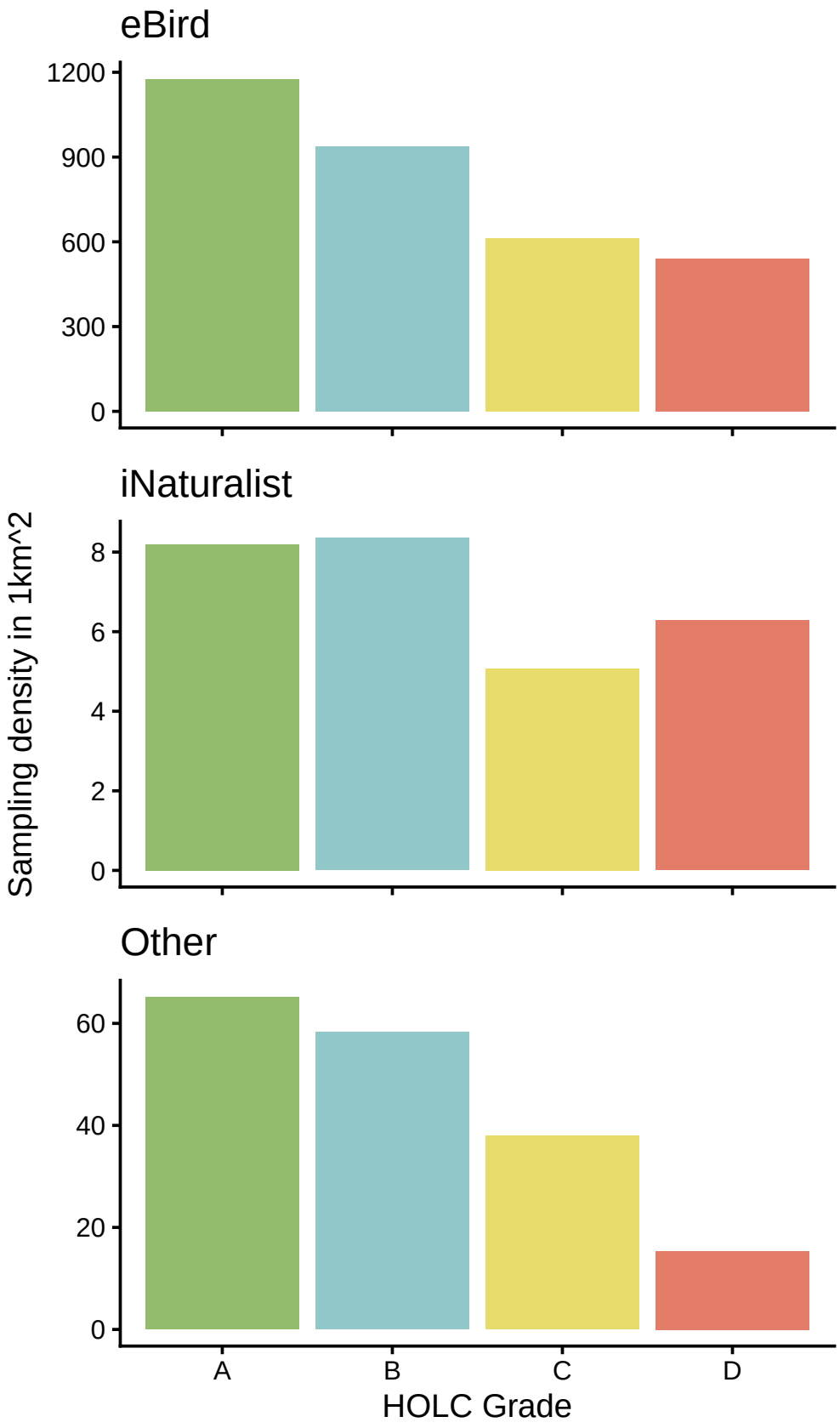
```
## NULL
```

```
other_sampling_density_plot = other_sampling_density_df %>%
  ggplot(aes(holc_grade, sampling_density, fill = holc_grade)) +
  geom_col() +
  scale_fill_manual(values = holc_pal) +
  theme_bw(16) +
  theme_classic(16) +
  labs(title='Other') +
  theme(legend.position = 'none') +
  ylab('Sampling density in 1km^2') +
  xlab('HOLC Grade') +
  theme(
```

```
    axis.title.y=element_blank(),
  ) +
  NULL


ebird_sampling_density_plot = ebird_sampling_density_df %>%
  ggplot(aes(holc_grade, sampling_density, fill = holc_grade)) +
  geom_col() +
  scale_fill_manual(values = holc_pal) +
  theme_bw(16) +
  theme_classic(16) +
  labs(title='eBird') +
  theme(legend.position = 'none') +
  ylab('Sampling density in 1km^2') +
  theme(axis.title.x=element_blank(),
        axis.text.x=element_blank(),
        axis.title.y=element_blank(),
  ) +
  NULL

p =ebird_sampling_density_plot / inat_sampling_density_plot / other_sampling_density_plot
p
```


eBird
1200
900
600
300
0
iNaturalist
8
6
4
2
0
Sampling density in 1km^2
Other
60
40
20
0
A
B
C
D
HOLC Grade

```r
ggsave("../../outdir/Suppl_Fig_2_sampling_density_by_type.png",
       plot = p,
       width = 6,
       height = 9,
       dpi = 600)

sessionInfo()
```

```
## R version 4.4.1 (2024-06-14)
## Platform: aarch64-apple-darwin20
## Running under: macOS Sonoma 14.6
##
## Matrix products: default
## BLAS:   /Library/Frameworks/R.framework/Versions/4.4-arm64/Resources/lib/libRblas.0.dylib
## LAPACK: /Library/Frameworks/R.framework/Versions/4.4-arm64/Resources/lib/libRlapack.dylib;  LAPACK v
##
## locale:
## [1] en_US.UTF-8/en_US.UTF-8/en_US.UTF-8/C/en_US.UTF-8/en_US.UTF-8
##
## time zone: America/Los_Angeles
## tzcode source: internal
##
## attached base packages:
## [1] stats     graphics  grDevices utils     datasets  methods   base
##
## other attached packages:
## [1] ggplot2_4.0.1    patchwork_1.3.0  tidyr_1.3.1      dplyr_1.1.4
## [5] readr_2.1.5      tidycensus_1.7.1 sf_1.0-21
##
## loaded via a namespace (and not attached):
##  [1] gtable_0.3.6       xfun_0.52          tigris_2.1         websocket_1.4.2
##  [5] processx_3.8.6     tzdb_0.5.0         vctrs_0.6.5        tools_4.4.1
##  [9] ps_1.9.1           generics_0.1.4     parallel_4.4.1     tibble_3.3.0
## [13] proxy_0.4-27       pkgconfig_2.0.3    KernSmooth_2.23-26 RColorBrewer_1.1-3
## [17] S7_0.2.1           uuid_1.2-1         lifecycle_1.0.4    compiler_4.4.1
## [21] farver_2.1.2       stringr_1.6.0      textshaping_1.0.1  chromote_0.4.0
## [25] htmltools_0.5.8.1  class_7.3-23       yaml_2.3.10        later_1.4.2
## [29] pillar_1.11.1      crayon_1.5.3       classInt_0.4-11    tidyselect_1.2.1
## [33] rvest_1.0.4        digest_0.6.37      stringi_1.8.7      purrr_1.2.0
## [37] labeling_0.4.3     fastmap_1.2.0      grid_4.4.1         cli_3.6.5
## [41] magrittr_2.0.4     dichromat_2.0-0.1  e1071_1.7-16       withr_3.0.2
## [45] scales_1.4.0       promises_1.3.3     rappdirs_0.3.3     bit64_4.6.0-1
## [49] rmarkdown_2.29     httr_1.4.7         bit_4.6.0          ragg_1.4.0
## [53] hms_1.1.3          evaluate_1.0.3     knitr_1.50         rlang_1.1.6
## [57] Rcpp_1.1.0         glue_1.8.0         DBI_1.2.3          xml2_1.3.8
## [61] rstudioapi_0.17.1  vroom_1.6.5        jsonlite_2.0.0     R6_2.6.1
## [65] plyr_1.8.9         systemfonts_1.2.3  units_0.8-7
```