Get and summarize AFSC survey data

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Contents

AFSC Survey CPUE data: github.com/kholsman/AFSC_CPUE Repo maintained by:
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Overview

The below scripts return a list object cpue_data saved as a compressed Rdata file with the naming ‘reg.srvy#.spp.cpue_data.Rdata’ such as “ebs.srvy98.plk.cpue_data.Rdata”. Each cpue_data list contains 8 data.frames:

```
load(paste0("data/out/",qrydate,"/cpue/ebs/ebs.srvy98.plk.cpue_data.Rdata"))

names(cpue_data)
```

There is a folder for each region “ebs”, “goa”, “ai”. For the “ebs” (Bering Sea) there are two sets of cpue_data, one that is NEBS+SEBS combined (‘ebs.srvy98.[sp].cpue_data.Rdata’) and one that is just SEBS survey areas (‘sebs.srvy98.[sp].cpue_data.Rdata’). For both the Gulf of Alaska (“goa”) and the Bering Sea, mean CPUE (Kg per km2 or Number per km2) for each size bin at each strata was calculated and then multiplied by the STRATA area to get total Biomass and abundance. **Note:Since strata area estimates where not available for the Aleutian Island (“ai”) or slope surveys (“slope”) these AREA was set equal to 1 and the Total Biomass and abundance is actually the sum of mean biomass.**

The data.frames within each cpue_data object are:

1. **totalB_N**: Total biomass (kg) or abundance (# of fish) for the species in each year

2. **mnCPUE_strata_yr** : Average survey CPUE (kg per Km2) or abundance (# per Km2) for the species in each strata and year

3. **total_bin_B_N**: Total biomass (kg) or abundance (# of fish) for each bin (10 mm) for the species in each year

4. **mnCPUE_strata_bin_yr** : Average survey CPUE (kg per Km2) or abundance (# per Km2) for each size bin for the species in each strata and year
5. **CPUE_station_bin_yr**: Station specific survey CPUE (kg per Km2) or abundance (# per Km2) for each size bin for the species in each year

6. **CPUE_station_yr**: Station specific survey CPUE (kg per Km2) or abundance (# per Km2) for the species in each year

7. **propByBin**: proportion of biomass in each size bin per species per year

8. **propByStrata**: proportion of biomass in each strata per species per year
9. **propByStrataBin**: proportion of biomass in each bin and strata per species per year

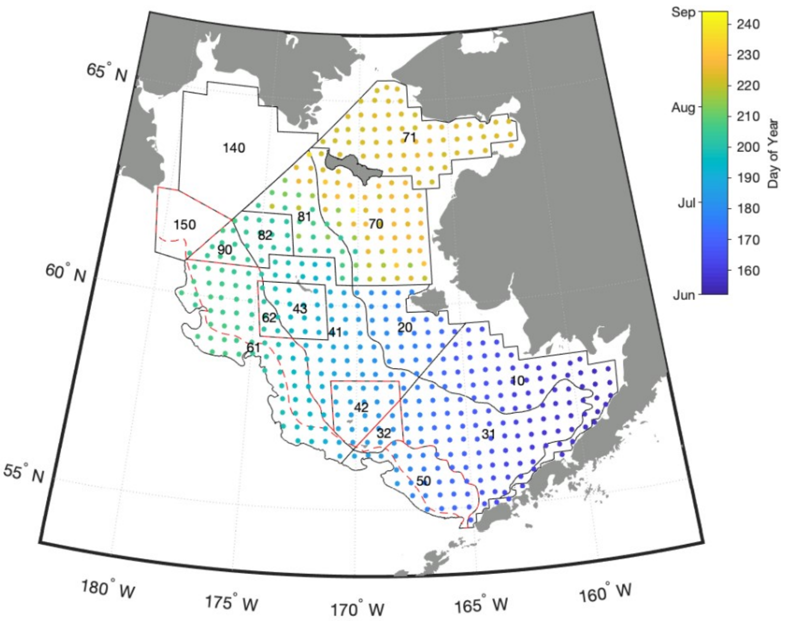


Figure 6: Regional polygons and survey-replication stations associated with the ACLIM indices.

To obtain population level estimates of the biomass or abundance of fish by size bin l, we used a length weight regression to estimate the weight of each size fish j measured ($\hat{W}$) to calculate the proportion by weight or frequency at each station where

$$\hat{W}_j = \alpha_s + L_j^{\beta_s}$$

where the species-specific (s) slope and intercept values (β_s and α_s, respectively) were fit to all available length and weight data from surveys from all years across the EBS, GOA, and AI (rather than each basin separately).

The number and biomass ($hatW_j$) for each 1 (mm) length was summed into 10 mm size bins l and expanded to include stations and bins where CPUE = 0 (saved as the object `cpue_data$CPUE_station_bin_yr`). Bin-specific catch $C\bar{PUE}_{s,k,y,l}$ (kg per Km^2 or number per Km^2) of all stations i in strata k for size bin l

(saved as the object `cpue_data$mnCPUE_strata_bin_yr`)::

$$C\bar{PU}E^{B|N}_{s,k,y,l} = \frac{1}{n_k}\sum_{n_k} CPUE^{B|N}_{s,k,y,l,i}$$

and where $CPUE^{B}_{s,k,y,l,i} = \sum_{n_l}\hat{W}_j$ and $CPUE^{N}_{s,k,y,l,i} = \sum_{n_l} 1$ are the station specific CPUEs for biomass and abundance of fish in size bin l (respectively). CPUE was converted to total strata- and bin-specific biomass ($B_{s,k,y,l} $) by multiplying the strata average catch for each species and bin by the strata area A_k ($Km2$; saved as the object `cpue_data$total_bin_B_N`):

$$B_{s,k,y,l} = C\bar{PU}E^{B}_{s,k,y,l}\dot{}A_k$$

and

$$N_{s,k,y,l} = C\bar{PU}E^{N}_{s,k,y,l}\dot{}A_k$$

We then calculated the proportion of total annual abundance ($N_{s,y} = \sum_k\sum_l N_{s,k,y,l}$) or biomass ($B_{s,y} = \sum_k\sum_l B_{s,k,y,l}$; saved as `cpue_data$totalB_N`) of each species and bin l in each strata k as (saved as the object `cpue_data$propByStrataBin`):

$$p^{N}_{s,k,y,l} = \frac{N_{s,k,y,l}}{\sum_k\sum_l N_{s,k,y,l}}$$

and

$$p^{B}_{s,k,y,l} = \frac{B_{s,k,y,l}}{\sum_k\sum_l B_{s,k,y,l}}$$

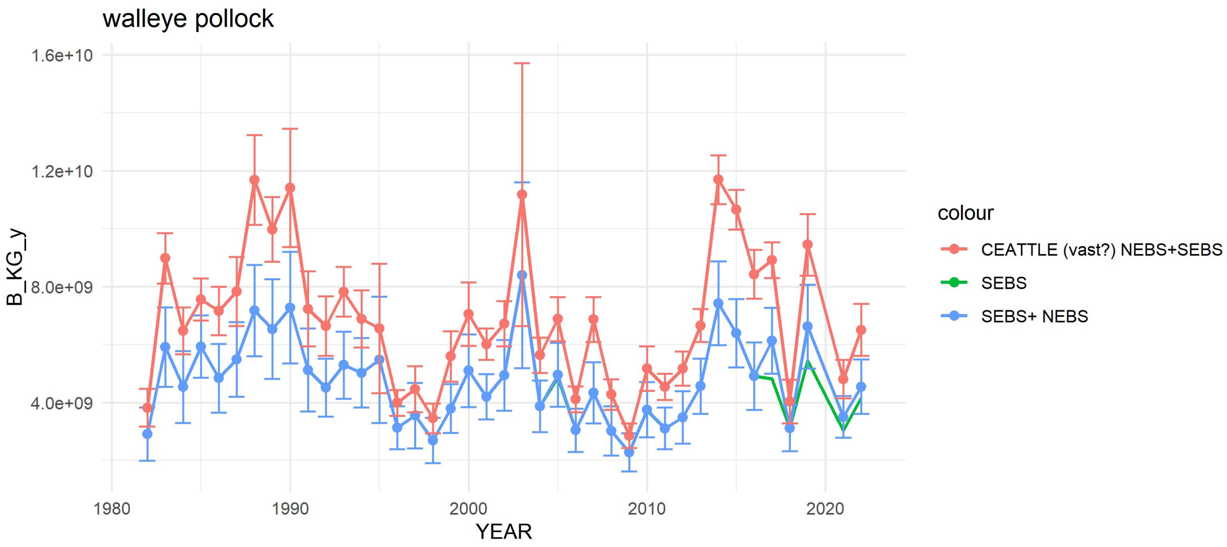
and the proportion of total annual biomass (or abundance) of each species in each strata as (saved as the object `cpue_data$propByStrata`):

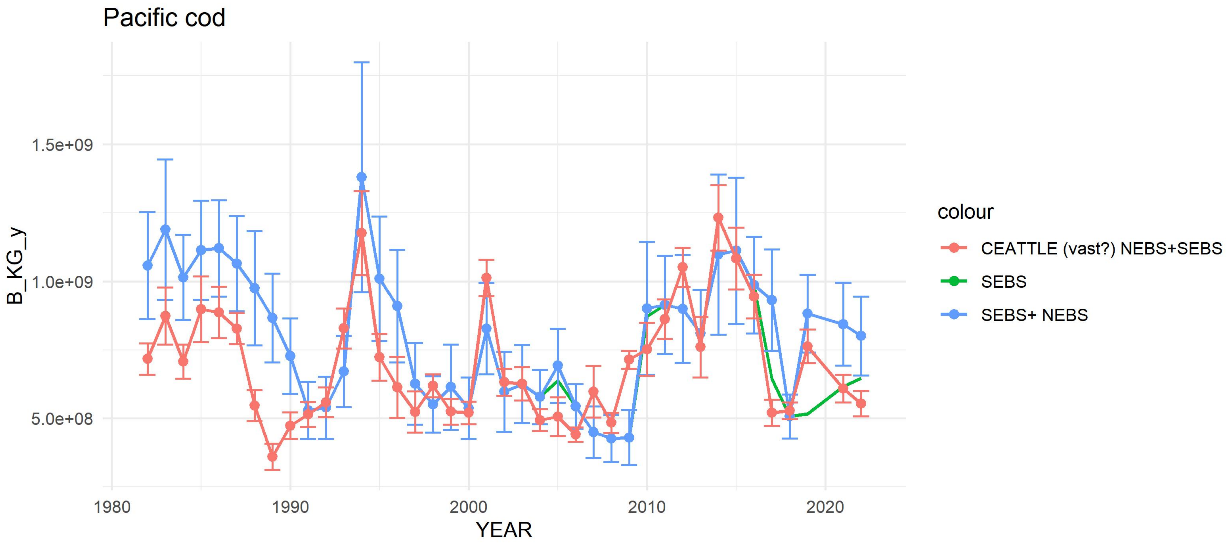
$$p^{B}_{s,k,y} = \frac{\sum_l (B_{s,k,y,l})}{\sum_k\sum_l B_{s,k,y,l}}$$

and the proportion of total annual biomass of each species in each bin l: (saved as the object `cpue_data$propByBin`):

$$p^{B}_{s,k,l} = \frac{\sum_k (B_{s,k,y,l})}{\sum_k\sum_l B_{s,k,y,l}}$$

Comparison of Bering Sea survey values





Code

```
# ## Step 0: Set up the R workspace
#
# The first step is to set up the switches for what files to update and create in the file `R/setup.R`.
#
# ## Step 1: Update SQL queries
# This step must be run on a computer that has access to RACEBASE. The code below will generate the bas

# **IMPORTANT:**
#
#   * **This step  must be connected to the RACEBASE SQL database**
```

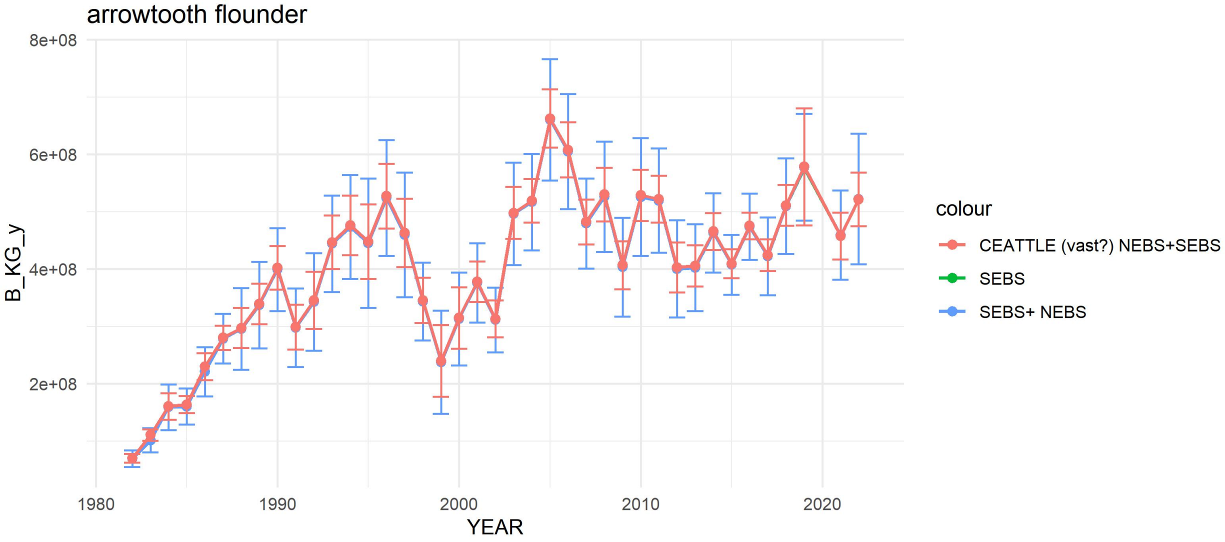


Figure 1: “arrowtooth”

```
#
#   * **To change R studio from the default 64 bit to 32 bit go to Tools>Global options and select the 
#
#   * **The code will connect to the SQL database using your password and username. Remember to update 
#
# <!-- ![Header of `setup.R` where `username_path` can be adjusted. This file also is where species, re
#


  # get everything set up:
  #----------------------------------------
    # rm(list=ls())
    # this uses the password saved in R/password.R
    suppressMessages(source("R/make.R"))

  # update the SQL queries
  #---------------------------------------------

  source(file.path(code.path,"R/sub_scripts/runRACE_qrys.R"))

  # combine sebs and nebs into one region: ebs
  if(dir.exists(file.path(data.path,"ebs")))
      system(paste("rm -r",file.path(data.path,"ebs")))
    dir.create(file.path(data.path,"ebs"))

  # combine files and rename survey area to all of EBS
  for(sp in names(splist)){
    if(dir.exists(file.path(data.path,"ebs",sp)))
      system(paste("rm -r",file.path(data.path,"ebs",sp)))
      dir.create(file.path(data.path,"ebs",sp))
    #"length.Rdata"
    load(file.path(data.path,"nebs",sp,"length.Rdata"))
    length_nebs <- length;rm(length)
    load(file.path(data.path,"sebs",sp,"length.Rdata"))
    length_sebs <- length;rm(length)
    length<- rbind(length_nebs%>%
      mutate(SURVEY_DEFINITION_ID_aka =SURVEY_DEFINITION_ID,SURVEY_DEFINITION_ID =98),
     length_sebs%>%
      mutate(SURVEY_DEFINITION_ID_aka =SURVEY_DEFINITION_ID,SURVEY_DEFINITION_ID =98))

    save(length,file = file.path(data.path,"ebs",sp,"length.Rdata"))
    rm(length)

    #"location.Rdata"
    load(file.path(data.path,"nebs",sp,"location.Rdata"))
    location_nebs <- location;rm(location)
    load(file.path(data.path,"sebs",sp,"location.Rdata"))
    location_sebs <- location;rm(location)
    location<- rbind(location_nebs, location_sebs)

    save(location,file = file.path(data.path,"ebs",sp,"location.Rdata"))


    #"location_catch.Rdata"
    load(file.path(data.path,"nebs",sp,"location_catch.Rdata"))
    location_catch_nebs <- location_catch;rm(location_catch)
    load(file.path(data.path,"sebs",sp,"location_catch.Rdata"))
    location_catch_sebs <- location_catch;rm(location_catch)
    location_catch <- rbind(location_catch_nebs%>%
      mutate(SURVEY_DEFINITION_ID_aka =SURVEY_DEFINITION_ID,SURVEY_DEFINITION_ID =98),
     location_catch_sebs%>%
      mutate(SURVEY_DEFINITION_ID_aka =SURVEY_DEFINITION_ID,SURVEY_DEFINITION_ID =98))

    save(location_catch,file = file.path(data.path,"ebs",sp,"location_catch.Rdata"))

  }


#```


## Step 2: Update the LWA regressions

# The default code for RACEBASE uses set LW relationships, however we prefer to update the LW regressio
#
# #```{r updateLWglms, echo=TRUE, eval=FALSE}

  # update the LW regressions
  #----------------------------------------------

  if(update_LWdata){
     source(file.path(code.path,"R/sub_scripts/updateLW.R"))
     # reload with updated data:
     source(file.path(code.path,"R/load_data.R"))
  }
```

```
  species_lkup

#```


## Step 3: Get CPUE data from the surveys

#This code is the core script for generating the CPUE_NUMKM2 and CPUE_BIOMKM2 values by size bin, regio

#```{r updateCPUE, echo=TRUE, eval=FALSE}

  STRATA_AREA%>%filter(REGION=="BS")%>%
    group_by(YEAR)%>%summarise(mnAREA  = mean(AREA, na.rm=T),
                               sumAREA = sum(AREA, na.rm=T),
                               cnt = length(unique(STRATUM)))

   STRATA_AREA%>%filter(REGION=="GOA")%>%
    group_by(YEAR)%>%summarise(mnAREA  = mean(AREA, na.rm=T),
                               sumAREA = sum(AREA, na.rm=T),
                               cnt = length(unique(STRATUM)))

   STRATA_AREA%>%filter(REGION=="BS",YEAR==2022)%>%select(STRATUM)

   # overwrite the NEBS frame from setup for the next set of code (ebs = sebs+nebs now forward)
  srvys <- data.frame(reg=c("ebs","goa","ai","slope"),RGN = c("BS","GOA","AI","SLOPE"), num=c(98,47,52,
  # srvys <- data.frame(reg=c("ebs","goa","ai"),RGN = c("BS","GOA","AI"), num=c(98,47,52)  )
  nreg <- length(srvys$reg)
  nspp <- length(species_lkup$sp)

  for (r in 1:nreg){
    for(s in 1:nspp){

      if(srvys[r,]$reg =="ebs"){
        # first SEBS only:
        # -------------------------------
        STRATA_AREAUSE <- STRATA_AREA%>%filter(REGION==srvys$RGN[r])
        maxyr <- max(STRATA_AREAUSE$YEAR)
        STRATA_AREAUSE <- STRATA_AREAUSE%>%
          filter(YEAR==2022)%>%
          group_by(REGION,STRATUM)%>%
          summarize(AREA = mean(AREA, na.rm=T))%>%ungroup()

         flnm <- paste0("s",srvys[r,]$reg,".srvy",
                     srvys[r,]$num,".",
                     species_lkup[s,]$sp)
        cat("now getting data for: ",flnm,"\n")
        cpue_data <- suppressMessages(
          get_CPUE_DATA(
          datapath    = data.path,
          out_dir     = file.path(data.out),
          STRATA_AREAIN = STRATA_AREAUSE,
          flnm        = flnm,
          species     = species_lkup[s,]$SPECIES_CODE,
```

```r
          survey     = srvys[r,]$num,
          includeNBS = FALSE,
          NEBSStrataIN = NEBS_strata ,
          saveit     = T,
          bins       = sp_bins[[ species_lkup[s,]$sp ]]))

        rm(cpue_data)

        # Now NESB + SEBS
        # -------------------------------
        flnm <- paste0(srvys[r,]$reg,".srvy",
                     srvys[r,]$num,".",
                     species_lkup[s,]$sp)
        cat("now getting data for: ",flnm,"\n")
        cpue_data <- suppressMessages(
          get_CPUE_DATA(
          datapath    = data.path,
          out_dir     = file.path(data.out),
          STRATA_AREAIN = STRATA_AREAUSE,
          flnm        = flnm,
          species     = species_lkup[s,]$SPECIES_CODE,
          survey      = srvys[r,]$num,
          includeNBS   = TRUE,
          NEBSStrataIN = NEBS_strata ,
          saveit      = T,
          bins        = sp_bins[[ species_lkup[s,]$sp ]]))

      }
      if(srvys[r,]$reg =="goa"){
        STRATA_AREAUSE <- STRATA_AREA%>%filter(REGION==srvys$RGN[r])
        maxyr <- max(STRATA_AREAUSE$YEAR)
        STRATA_AREAUSE <- STRATA_AREAUSE%>%
          filter(YEAR==1993)%>%
          group_by(REGION,STRATUM)%>%
          summarize(AREA = mean(AREA, na.rm=T))%>%ungroup()

        flnm <- paste0(srvys[r,]$reg,".srvy",
                     srvys[r,]$num,".",
                     species_lkup[s,]$sp)
        cat("now getting data for: ",flnm,"\n")
        cpue_data <- suppressMessages(
          get_CPUE_DATA(
          datapath    = data.path,
          out_dir     = file.path(data.out),
          STRATA_AREAIN = STRATA_AREAUSE,
          flnm        = flnm,
          species     = species_lkup[s,]$SPECIES_CODE,
          survey      = srvys[r,]$num,
          includeNBS = FALSE,
          NEBSStrataIN = NEBS_strata ,
          saveit      = T,
          bins        = sp_bins[[ species_lkup[s,]$sp ]]))
      }
      if(!srvys[r,]$reg%in%c("ebs","goa")){
        flnm <- paste0(srvys[r,]$reg,".srvy",
                     srvys[r,]$num,".",
                     species_lkup[s,]$sp)
        cat("now getting data for: ",flnm,"\n")
        cpue_data <- suppressMessages(
          get_CPUE_DATA(
          datapath    = data.path,
          out_dir     = file.path(data.out),
          STRATA_AREAIN = NULL,
          flnm        = flnm,
          species     = species_lkup[s,]$SPECIES_CODE,
          survey      = srvys[r,]$num,
          includeNBS = FALSE,
          NEBSStrataIN = NEBS_strata ,
          saveit      = T,
          bins        = sp_bins[[ species_lkup[s,]$sp ]]))

      }

      # # check the data :
      if(1==10){
        tt <- cpue_data%>%
              group_by(YEAR,REGION,STATIONID,SN)%>%
              filter(BIN ==400)%>%
              summarize(cnt =length(STATIONID))
         max(tt$cnt)  #Should be 1
        #this looks to be a duplicate sampling...
        #mis-entry or code error ?
         cpue_data%>%filter(YEAR==1988,STATIONID=="J-13")
      }
       rm(cpue_data)

    }
  }

# Now make BT and SST files for strata, station and all basin


  # srvys <- data.frame(reg=c("ebs","goa","ai"),RGN = c("BS","GOA","AI"), num=c(98,47,52)  )
  nreg <- length(srvys$reg)

  na.length <- function(x,na.rm=F){
    if(na.rm == T)
       if(any(is.na(x)))
         x <- x[!is.na(x)]
   return( length(x))
  }
  i <-0
  for(regfl in srvys[,1] ){
    if(regfl!="slope"){
    i <- i +1
    load(file.path(data.path,regfl,"plk/location.Rdata"))

    tmp<-location%>%group_by(YEAR,STRATUM,STATIONID)%>%
      summarize(
        TEMP=mean(TEMP,na.rm=T),
       # sdTEMP = sd(TEMP,na.rm=T),
        num= na.length(TEMP,na.rm=T),
        SST = mean(SST,na.rm=T),
       # sdSST = sd(SST,na.rm=T),
        LAT=mean(LAT,na.rm=T),
        LON = mean (LON,na.rm=T),
        MONTH = mean(MONTH,na.rm=T),
        DAY = mean (DAY,na.rm=T))%>%mutate(region = regfl)

    if(i ==1)
      TEMP <- tmp
    else
      TEMP <- rbind(TEMP,tmp)
    rm(tmp)
}
  }
  TEMP_station <- TEMP
  TEMP_yk <- TEMP%>%group_by(YEAR,STRATUM,region)%>%
      summarize(
        mnTEMP=mean(TEMP,na.rm=T),
        sdTEMP = sd(TEMP,na.rm=T),
        num= na.length(TEMP,na.rm=T),
        mnSST = mean(SST,na.rm=T),
        sdSST = sd(SST,na.rm=T),
        LAT=mean(LAT,na.rm=T),
        LON = mean (LON,na.rm=T),
        MONTH = mean(MONTH,na.rm=T),
        DAY = mean (DAY,na.rm=T))%>%ungroup()

  # Now just for EBS and GOA

  # -------------------------------
        STRATA_AREAUSE <- STRATA_AREA%>%filter(REGION=="BS")
        STRATA_AREAUSE <- STRATA_AREAUSE%>%
          filter(YEAR==2022)%>%
          group_by(REGION,STRATUM)%>%
          summarize(AREA = mean(AREA, na.rm=T))%>%ungroup()

  sub<- TEMP_yk%>%
    group_by(YEAR,STRATUM,region)%>%
    filter(region %in% c("nebs","sebs"))%>%
    mutate(REGION = "BS")%>%
    left_join(STRATA_AREAUSE)%>%
    ungroup()

  sub<- sub%>%
    left_join(
      sub%>%group_by(YEAR,STRATUM,REGION)%>%
        summarize(AREA = unique(AREA))%>%ungroup()%>%
        group_by(YEAR,REGION)%>%
        summarize(sumAREA=sum(AREA,na.rm=T)))%>%
    mutate(propA = AREA/sumAREA)%>%ungroup()


  sub%>%group_by(YEAR,REGION)%>%
        summarize(sum(propA,na.rm=T))


  SEBS_NEBS_TEMP_y <- sub%>%
    group_by(YEAR,REGION)%>%
    summarize(
        mnTEMP = sum(mnTEMP*propA,na.rm=T),
        sdTEMP = sum(sdTEMP*propA,na.rm=T),
        mnSST  = sum(mnSST*propA,na.rm=T),
        sdSST  = sum(sdSST*propA,na.rm=T),
        num    = sum(num,na.rm=T),
        MONTH  = sum(MONTH*propA,na.rm=T),
        DAY    = sum (DAY*propA,na.rm=T))%>%ungroup()

  # now just the NEBS:
  sub<- TEMP_yk%>%
    group_by(YEAR,STRATUM,region)%>%
    filter(region %in% c("nebs"))%>%
    mutate(REGION = "BS")%>%
    left_join(STRATA_AREAUSE)%>%
    ungroup()

  sub<- sub%>%
    left_join(
      sub%>%group_by(YEAR,STRATUM,REGION)%>%
        summarize(AREA = unique(AREA))%>%ungroup()%>%
        group_by(YEAR,REGION)%>%
        summarize(sumAREA=sum(AREA,na.rm=T)))%>%
    mutate(propA = AREA/sumAREA)%>%ungroup()

  sub%>%group_by(YEAR,REGION)%>%
        summarize(sum(propA,na.rm=T))


  NEBS_TEMP_y <- sub%>%
    group_by(YEAR,REGION)%>%
    summarize(
        mnTEMP = sum(mnTEMP*propA,na.rm=T),
        sdTEMP = sum(sdTEMP*propA,na.rm=T),
        mnSST  = sum(mnSST*propA,na.rm=T),
        sdSST  = sum(sdSST*propA,na.rm=T),
        num    = sum(num,na.rm=T),
        MONTH  = sum(MONTH*propA,na.rm=T),
        DAY    = sum (DAY*propA,na.rm=T))%>%ungroup()

   # now just the NEBS:
```

```
sub<- TEMP_yk%>%
  group_by(YEAR,STRATUM,region)%>%
  filter(region %in% c("sebs"))%>%
  mutate(REGION = "BS")%>%
 left_join(STRATA_AREAUSE)%>%
  ungroup()

sub<- sub%>%
  left_join(
    sub%>%group_by(YEAR,STRATUM,REGION)%>%
      summarize(AREA = unique(AREA))%>%ungroup()%>%
      group_by(YEAR,REGION)%>%
      summarize(sumAREA=sum(AREA,na.rm=T)))%>%
  mutate(propA = AREA/sumAREA)%>%ungroup()


sub%>%group_by(YEAR,REGION)%>%
      summarize(sum(propA,na.rm=T))


SEBS_TEMP_y <- sub%>%
  group_by(YEAR,REGION)%>%
  summarize(
      mnTEMP = sum(mnTEMP*propA,na.rm=T),
      sdTEMP = sum(sdTEMP*propA,na.rm=T),
      mnSST  = sum(mnSST*propA,na.rm=T),
      sdSST  = sum(sdSST*propA,na.rm=T),
      num    = sum(num,na.rm=T),
      MONTH  = sum(MONTH*propA,na.rm=T),
      DAY    = sum (DAY*propA,na.rm=T))%>%ungroup()


# now for GOA

STRATA_AREAUSE <- STRATA_AREA%>%filter(REGION=="GOA")
     STRATA_AREAUSE <- STRATA_AREAUSE%>%
        filter(YEAR==1993)%>%
        group_by(REGION,STRATUM)%>%
        summarize(AREA = mean(AREA, na.rm=T))%>%ungroup()

sub<- TEMP_yk%>%
  group_by(YEAR,STRATUM,region)%>%
  filter(region %in% c("goa"))%>%
  mutate(REGION = "GOA")%>%
  left_join(STRATA_AREAUSE)%>%
  ungroup()

sub<- sub%>%
  left_join(
    sub%>%group_by(YEAR,STRATUM,REGION)%>%
      summarize(AREA = unique(AREA))%>%ungroup()%>%
      group_by(YEAR,REGION)%>%
      summarize(sumAREA=sum(AREA,na.rm=T)))%>%
    mutate(propA = AREA/sumAREA)%>%ungroup()


  sub%>%group_by(YEAR,REGION)%>%
        summarize(sum(propA,na.rm=T))


  GOA_TEMP_y <- sub%>%
    group_by(YEAR,REGION)%>%
    summarize(
        mnTEMP = sum(mnTEMP*propA,na.rm=T),
        sdTEMP = sum(sdTEMP*propA,na.rm=T),
        mnSST  = sum(mnSST*propA,na.rm=T),
        sdSST  = sum(sdSST*propA,na.rm=T),
        num    = sum(num,na.rm=T),
        MONTH  = sum(MONTH*propA,na.rm=T),
        DAY    = sum (DAY*propA,na.rm=T))%>%ungroup()


  if(!dir.exists(file.path(data.out,"Temp")))
    dir.create(file.path(data.out,"Temp"))
  save(GOA_TEMP_y,file = file.path(data.out,"Temp/GOA_TEMP_y.Rdata"))
  save(SEBS_TEMP_y,file = file.path(data.out,"Temp/SEBS_TEMP_y.Rdata"))
  save(NEBS_TEMP_y,file = file.path(data.out,"Temp/NEBS_TEMP_y.Rdata"))
  save(SEBS_NEBS_TEMP_y,file = file.path(data.out,"Temp/SEBS_NEBS_TEMP_y.Rdata"))
  save(TEMP_station,file = file.path(data.out,"Temp/TEMP_station.Rdata"))
  save(TEMP_yk,file = file.path(data.out,"Temp/TEMP_yk.Rdata"))


#
# ```
#
# *The cpue files are now saved in the directory `r file.path(data.out,"../")`*
#
# ```{r viewcpue_data, echo=TRUE, eval=FALSE}
  # this uses the password saved in R/password.R
  #  suppressMessages(source("R/make.R"))
load(file.path(data.out,"cpue/ebs/ebs.srvy98.pcod.cpue_data.Rdata"))

names(cpue_data)

library(dplyr)

checkit <-function(x){
   if(round(max(x ),1)!=1) {
     warning("ERROR! propB > 1 ")
     print(x)}

}

  #double check the results
  cnt_ByStrataBin <- cpue_data$propByStrataBin%>%
    select("REGION","YEAR","STRATUM",BIN,BIN_mm,
```

```
           SPECIES_CODE,CN,SN,sp,num,
           "propB_ykl","propN_ykl")%>%
    group_by(YEAR,REGION,SN,CN)%>%
    summarise(sum_propB_ykl=sum(propB_ykl,na.rm=T),
              sum_propN_ykl=sum(propN_ykl,na.rm=T))

  cnt_ByStrata <- cpue_data$propByStrata%>%
    select("REGION","YEAR","STRATUM",
           SPECIES_CODE,CN,SN,sp,num,
           "propB_yk","propN_yk")%>%
    group_by(YEAR,REGION,SN,CN)%>%
    summarise(sum_propB_yk=sum(propB_yk,na.rm=T),
              sum_propN_yk=sum(propN_yk,na.rm=T))

  cnt_ByBin <- cpue_data$propByBin%>%
    select("REGION","YEAR",BIN,BIN_mm,num,
           SPECIES_CODE,CN,SN,sp,
           "propB_yl","propN_yl")%>%
    group_by(YEAR,REGION,SN,CN)%>%
    summarise(sum_propB_yl=sum(propB_yl ,na.rm=T),
              sum_propN_yl=sum(propN_yl ,na.rm=T))

  checkit(cnt_ByStrataBin$sum_propB_ykl)
  checkit(cnt_ByStrata$sum_propB_yk)
  checkit(cnt_ByBin$sum_propB_yl)

#
```

Appendix 1: R/setup.Rprimary setup script