SEACAR Nekton Analysis: Species Richness

Last compiled on 08 May, 2023

Contents

Important Notes

These scripts were created by J.E. Panzik for SEACAR.

All scripts and outputs can be found on the SEACAR GitHub repository:

https://github.com/FloridaSEACAR/SEACAR_Trend_Analyses

This markdown file is designed to be compiled by SEACAR_Nekton_SpeciesRichness_ReportRender.R.

Details on the determination of catch per unit effort can be found in the document SEACAR Nekton catch per unit effort.pdf.

Libraries and Settings

Loads libraries used in the script. The inclusion of `scipen` option limits how frequently R defaults to scientific notation. Sets default settings for displaying warning and messages in created document, and sets figure dpi.

```
library(knitr)
library(data.table)
library(dplyr)
library(lubridate)
library(ggplot2)
library(scales)
library(tidyr)
```

```
library(gridExtra)
#library(tidyverse)
library(ggpubr)
library(scales)
options(scipen=999)
opts_chunk$set(warning=FALSE, message=FALSE, dpi=200)
```

File Import

Imports file that is determined in the SEACAR_Nekton_SpeciesRichness_ReportRender.R script.

The command `fread` is used because of its improved speed while handling large data files. Only columns that are used by the script are imported from the file, and are designated in the `select` input.

The script then gets the name of the parameter as it appears in the data file and units of the parameter.

The file being used for the analysis is: **Presence-2022-Jun-29.txt**

```
#Import data from nekton file
data <- fread(file_in, sep="|", header=TRUE, stringsAsFactors=FALSE,
              na.strings="")

cat(paste("The data file used is:", file_in, sep="\n"))
```

```
## The data file used is:
## data/Presence-2022-Jun-29.txt
```

Data Filtering

Documentation on database filtering is provided here: SEACAR Documentation- Analysis Filters and Calculations.pdf.

Imported data is initially filtered to only contain the parameter of interest.

The other filtering performed by the script at this point removes rows that are missing values for `ResultValue` and `EffortCorrection_100m2`, and removes any `EffortCorrection_100m2` that is 0 because it will cause an infinite number when determining Species Richness.

A group of unique `ManagedAreaName`, `ProgramID`, `ProgramName`, `ProgramLocationID`, `SampleDate`, and `GearSize_m` are being considered a "reference" for measurement. For each "reference", the number of observed species is summed and then divided by the `EffortCorrection_100m2`to determine the Species Richness per 100 square meters.

The `ManagedAreaName` values from the data are actually shortened versions, and are merged with the full versions. The species richness data is then written to a file. And the list of Managed Areas with observations is stored.

```
# Filter data for the desired parameter
data <- data[data$ParameterName==param_name,]

if (param_name=="Presence"){
         parameter <- "Species Richness"
      }
```

```
# # Replace instances where NA values imported as blank character string or as "NA"
# data <- replace(data, data=="", NA)
# data <- replace(data, data=="NA", NA)

# Gets the units of the data
unit <- unique(data$ParameterUnits)

# Remove any data with missing EffortCorrection values
data <- data[!is.na(data$EffortCorrection_100m2),]

# Only keep data that has non-zero EffortCorrection values
data <- data[data$EffortCorrection_100m2!=0,]

# Remove any data with missing ResultValue entries
data <- data[!is.na(data$ResultValue),]

# Create Species Richness values for groups of unique combinations of
# ManagedAreaName, ProgramID, ProgramName, ProgramLocationID, SampleDate,
# GearType, and GearSize_m.
data <- data %>%
   group_by(ManagedAreaName, ProgramID, ProgramName, ProgramLocationID,
            SampleDate, GearType, GearSize_m) %>%
   summarise(ParameterName=parameter,
             Year=unique(Year), Month=unique(Month),
             N_Species=sum(ResultValue),
             EffortCorrection_100m2=unique(EffortCorrection_100m2),
             SpeciesRichness=N_Species/unique(EffortCorrection_100m2))

# Adds AreaID for each managed area by combining the MA_All datatable to the
# data based on ManagedAreaName
data <- merge.data.frame(MA_All[,c("AreaID", "ManagedAreaName")],
                         data, by="ManagedAreaName", all=TRUE)

# Writes this data that is used by the rest of the script to a text file
fwrite(data, paste0(out_dir,"/Nekton_", param_file, "_UsedData.txt"), sep="|")

# Makes sure SampleDate is being stored as a Date object
data$SampleDate <- as.Date(data$SampleDate)

# Creates a variable with the names of all the managed areas that contain
# species observations
MA_Include <- unique(data$ManagedAreaName[!is.na(data$N_Species)])

# Puts the managed areas in alphabetical order
MA_Include <- MA_Include[order(MA_Include)]

# Determines the number of managed areas used
n <- length(MA_Include)
```

Managed Area Statistics

Gets summary statistics for each managed area. Uses piping from dplyr package to feed into subsequent steps. The following steps are performed:

1. Group data that have the same `ManagedAreaName`, `Year`, `Month`, `GearType`, and `GearSize_m`.
   - Second summary statistics do not use the `Month` grouping and are only for `ManagedAreaName` and `Year`.
   - Third summary statistics do not use `Year` grouping and are only for `ManagedAreaName` and `Month`
2. For each group, provide the following information: Parameter Name (ParameterName), Number of Entries (N_Data), Lowest Value (Min), Largest Value (Max), Median, Mean, Standard Deviation, and a list of all Program IDs included in these measurements.
3. Sort the data in ascending (A to Z and 0 to 9) order based on `ManagedAreaName` then `Year` then `Month`
4. Write summary stats to a pipe-delimited .txt file in the output directory
   - Nekton Output Files in SEACAR GitHub

```
# Create summary statistics for each managed area based on Year and Month
# intervals, and each gear type and size.
MA_YM_Stats <- data %>%
   group_by(AreaID, ManagedAreaName, Year, Month, GearType, GearSize_m) %>%
   summarize(ParameterName=parameter,
             N_Data=length(na.omit(SpeciesRichness)),
             Min=min(SpeciesRichness),
             Max=max(SpeciesRichness),
             Median=median(SpeciesRichness),
             Mean=mean(SpeciesRichness),
             StandardDeviation=sd(SpeciesRichness),
             Programs=paste(sort(unique(ProgramName), decreasing=FALSE),
                            collapse=', '),
             ProgramIDs=paste(sort(unique(ProgramID), decreasing=FALSE),
                            collapse=', '))
# Puts the data in order based on ManagedAreaName, Year, Month, then GearSize
MA_YM_Stats <- as.data.table(MA_YM_Stats[order(MA_YM_Stats$ManagedAreaName,
                                               MA_YM_Stats$Year,
                                               MA_YM_Stats$Month,
                                               MA_YM_Stats$GearSize_m), ])
# Writes summary statistics to file
fwrite(MA_YM_Stats, paste0(out_dir,"/Nekton_", param_file,
                           "_MA_MMYY_Stats.txt"), sep="|")
# Removes variable storing data to improve computer memory
rm(MA_YM_Stats)

# Create summary statistics for each managed area based on Year intervals,
# and each gear type and size.
MA_Y_Stats <- data %>%
   group_by(AreaID, ManagedAreaName, Year, GearType, GearSize_m) %>%
   summarize(ParameterName=parameter,
             N_Data=length(na.omit(SpeciesRichness)),
             Min=min(SpeciesRichness),
             Max=max(SpeciesRichness),
             Median=median(SpeciesRichness),
             Mean=mean(SpeciesRichness),
```

```
            StandardDeviation=sd(SpeciesRichness),
            Programs=paste(sort(unique(ProgramName), decreasing=FALSE),
                           collapse=', '),
            ProgramIDs=paste(sort(unique(ProgramID), decreasing=FALSE),
                           collapse=', '))
# Puts the data in order based on ManagedAreaName, Year, then GearSize
MA_Y_Stats <- as.data.table(MA_Y_Stats[order(MA_Y_Stats$ManagedAreaName,
                                             MA_Y_Stats$Year,
                                             MA_Y_Stats$GearSize_m), ])
# Writes summary statistics to file
fwrite(MA_Y_Stats, paste0(out_dir,"/Nekton_", param_file,
                          "_MA_Yr_Stats.txt"), sep="|")

# Create summary statistics for each managed area based on Month intervals,
# and each gear type and size.
MA_M_Stats <- data %>%
   group_by(AreaID, ManagedAreaName, Month, GearType, GearSize_m) %>%
   summarize(ParameterName=parameter,
            N_Data=length(na.omit(SpeciesRichness)),
            Min=min(SpeciesRichness),
            Max=max(SpeciesRichness),
            Median=median(SpeciesRichness),
            Mean=mean(SpeciesRichness),
            StandardDeviation=sd(SpeciesRichness),
            Programs=paste(sort(unique(ProgramName), decreasing=FALSE),
                           collapse=', '),
            ProgramIDs=paste(sort(unique(ProgramID), decreasing=FALSE),
                           collapse=', '))
# Puts the data in order based on ManagedAreaName, Month, then GearSize
MA_M_Stats <- as.data.table(MA_M_Stats[order(MA_M_Stats$ManagedAreaName,
                                             MA_M_Stats$Month,
                                             MA_M_Stats$GearSize_m), ])
# Writes summary statistics to file
fwrite(MA_M_Stats, paste0(out_dir,"/Nekton_", param_file,
                          "_MA_Mo_Stats.txt"), sep="|")
# Removes variable storing data to improve computer memory
rm(MA_M_Stats)

# Create summary overall statistics for each managed area based each gear type
# and size.
MA_Ov_Stats <- data %>%
   group_by(AreaID, ManagedAreaName, GearType, GearSize_m) %>%
   summarize(ParameterName=parameter,
            N_Years=length(unique(na.omit(Year))),
            EarliestYear=min(Year),
            LatestYear=max(Year),
            N_Data=length(na.omit(SpeciesRichness)),
            Min=min(SpeciesRichness),
            Max=max(SpeciesRichness),
            Median=median(SpeciesRichness),
            Mean=mean(SpeciesRichness),
            StandardDeviation=sd(SpeciesRichness),
            Programs=paste(sort(unique(ProgramName), decreasing=FALSE),
```

```
                              collapse=', '),
            ProgramIDs=paste(sort(unique(ProgramID), decreasing=FALSE),
                              collapse=', '))
# Puts the data in order based on ManagedAreaName then GearSize
MA_Ov_Stats <- as.data.table(MA_Ov_Stats[order(MA_Ov_Stats$ManagedAreaName,
                                               MA_Ov_Stats$GearSize_m), ])
# Creates Year_MinRichness and Year_MaxRichness columns
MA_Ov_Stats$Year_MinRichness <- NA
MA_Ov_Stats$Year_MaxRichness <- NA

# Loops through each ManagedAreaName, GearType, and GearSize_m.
# determines what year the minimum and maximum species richness occurred
for(m in 1:nrow(MA_Ov_Stats)){
   # Stores ManagedAreaName, GearType, and GearSize_m for this row
   ma <- MA_Ov_Stats$ManagedAreaName[m]
   gear <- MA_Ov_Stats$GearType[m]
   size <- MA_Ov_Stats$GearSize_m[m]
   # Skips to next row if there are no data for this combination
   if(MA_Ov_Stats$N_Data[m]==0){
      next
   }
   # Gets subset of data from MA_Y_Stats (yearly summary stats) with this
   # combination of ManagedAreaName, GearType, and GearSize_m
   ds <- MA_Y_Stats[MA_Y_Stats$ManagedAreaName==ma &
                    MA_Y_Stats$GearType==gear &
                    MA_Y_Stats$GearSize_m==size,]
   # Gets the minimum and maximum Mean (yearly averages)
   min <- min(ds$Mean)
   max <- max(ds$Mean)
   #Determines what years those minimum and maximum values occured
   year_min <- ds$Year[ds$Mean==min]
   year_max <- ds$Year[ds$Mean==max]
   # Stores the occurrence years of the minimum and maximum into the overall
   # stats for this row
   MA_Ov_Stats$Year_MinRichness[m] <- year_min
   MA_Ov_Stats$Year_MaxRichness[m] <- year_max
}
# Replaces blank ProgramIDs with NA (missing values)
MA_Ov_Stats$ProgramIDs <- replace(MA_Ov_Stats$ProgramIDs,
                                  MA_Ov_Stats$ProgramIDs=="", NA)
MA_Ov_Stats$Programs <- replace(MA_Ov_Stats$Programs,
                                  MA_Ov_Stats$Programs=="", NA)
# Write overall statistics to file
fwrite(MA_Ov_Stats, paste0(out_dir,"/Nekton_", param_file,
                           "_MA_Overall_Stats.txt"), sep="|")
# Removes entries from the overall statistics that do not have data.
# Based on presence or absence of EarliestYear
MA_Ov_Stats <- MA_Ov_Stats[!is.na(MA_Ov_Stats$EarliestYear), ]
```

Appendix I: Managed Area Species Richness

The plots shown here are the species richness for each managed area with a yearly average, separated by gear size.

1. Set common plot theme.
2. Determine the earliest and latest year of the data to create x-axis scale and intervals
3. Determine the upper and lower limit of the plot for better y-axis labels
4. Determines what gear types are present and adjusts legend entries
5. Add the plot line
6. Set the plot type as a point plot with the size of the points
7. Create the title, x-axis, y-axis, and color fill labels
8. Set the y and x limits
9. Apply common plot theme
10. Add table with summary statistics below each figure

- Numerical non-integer values are rounded to 2 decimal places
- StandardDeviation is renamed StDev for space reasons

11. Create file name to save figure
12. Save figure as png file

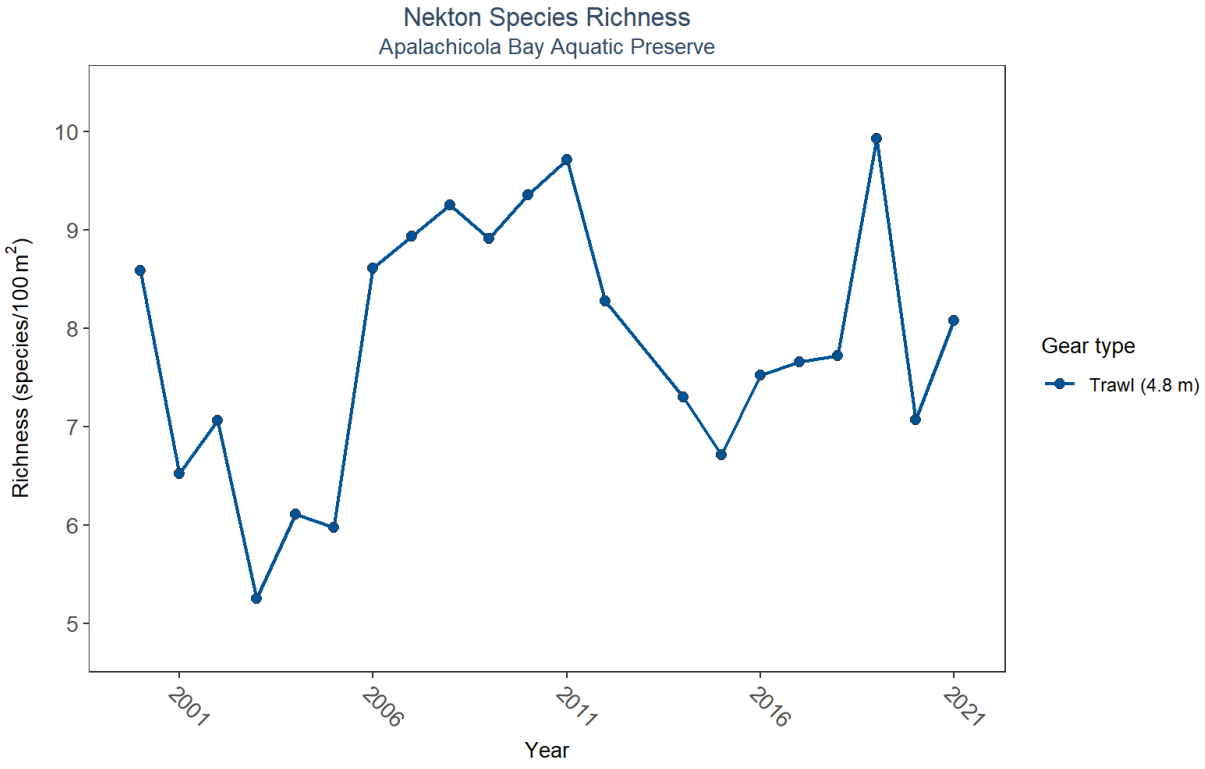
- Nekton Figures in SEACAR GitHub

```
# Defines standard plot theme: black and white, no major or minor grid lines,
# Arial font. Title is centered, size 12, and blue (hex coded). Subtitle is
# centered, size 10, and blue (hex coded). Legend title is size 10 and the
# legend is left-justified. X-axis title is size 10 and the margins are padded
# at the top and bottom to give more space for angled axis labels. Y-axis title
# is size 10 and margins are padded on the right side to give more space for
# axis labels. Axis labels are size 10 and the x-axis labels are rotated -45
# degrees with a horizontal justification that aligns them with the tick mark
plot_theme <- theme_bw() +
   theme(panel.grid.major = element_blank(),
         panel.grid.minor = element_blank(),
         text=element_text(family="Arial"),
         plot.title=element_text(hjust=0.5, size=12, color="#314963"),
         plot.subtitle=element_text(hjust=0.5, size=10, color="#314963"),
         legend.title=element_text(size=10),
         legend.text.align = 0,
         axis.title.x = element_text(size=10, margin = margin(t = 5, r = 0,
                                                              b = 10, l = 0)),
         axis.title.y = element_text(size=10, margin = margin(t = 0, r = 10,
                                                              b = 0, l = 0)),
         axis.text=element_text(size=10),
         axis.text.x=element_text(angle = -45, hjust = 0))

# Color palette for SEACAR
color_palette <- c("#005396", "#0088B1", "#00ADAE", "#65CCB3", "#AEE4C1", "#FDEBA8", "#F8CD6D", "#F5A80

# Defines and sets variable with standardized gear colors for plots
gear_colors <- c("Trawl (4.8 m)"=color_palette[1],
```

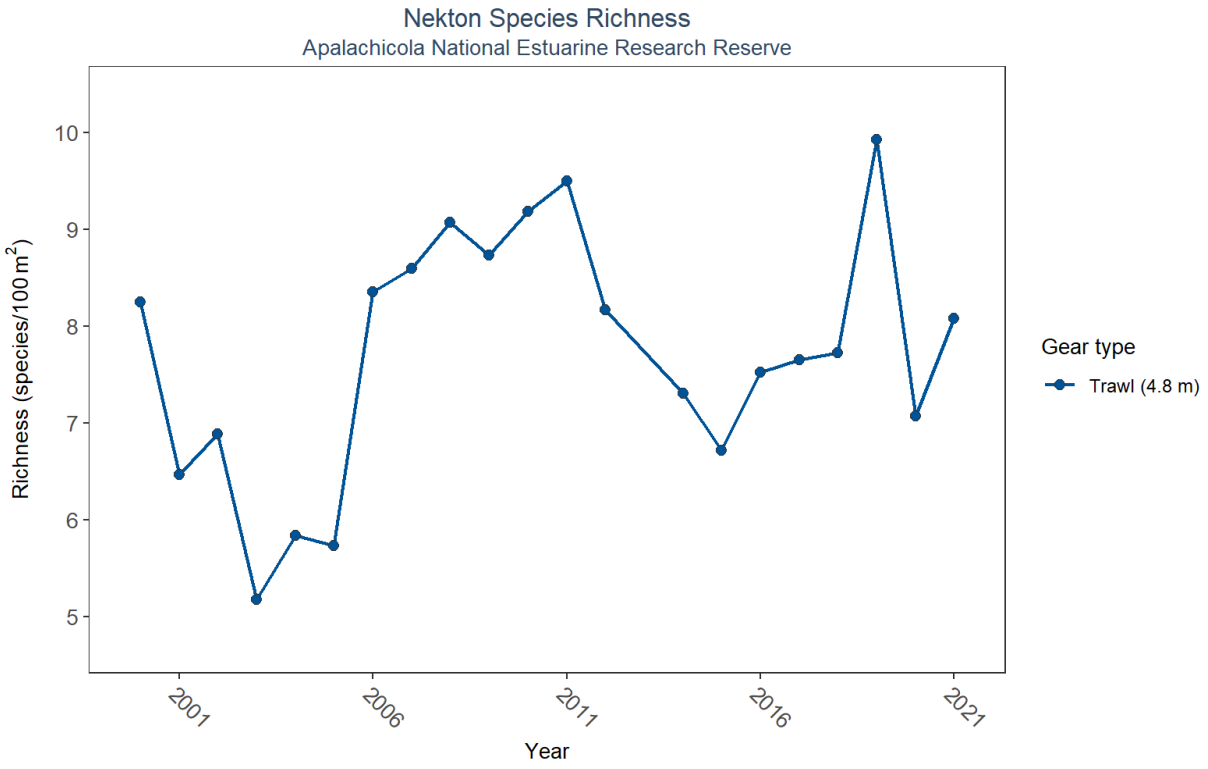
```
                "Trawl (6.1 m)"=color_palette[2],
                "Seine (183 m)"=color_palette[3])

# Defines and sets variable with standardized gear shapes for plots
gear_shapes <- c("Trawl (4.8 m)"=21,
                 "Trawl (6.1 m)"=22,
                 "Seine (183 m)"=24)

# Loop that cycles through each managed area with data
if(n==0){
   # Prints a statement if there are no managed areas with approproiate data
   print("There are no monitoring locations that qualify.")
} else {
   for (i in 1:n) {
      # Gets data for target managed area
      plot_data <- MA_Y_Stats[MA_Y_Stats$ManagedAreaName==MA_Include[i]]
      # Gets the gear type(s) present for the managed area.
      # Combine type and size into one label for plots
      plot_data$GearType_Plot <- paste0(plot_data$GearType, " (",
                                        plot_data$GearSize_m, " m)")
      # Determines most recent year with available data for managed area
      t_max <- max(MA_Ov_Stats$LatestYear[MA_Ov_Stats$ManagedAreaName==
                                            MA_Include[i]])
      # Determines earliest recent year with available data for managed area
      t_min <- min(MA_Ov_Stats$EarliestYear[MA_Ov_Stats$ManagedAreaName==
                                              MA_Include[i]])
      # Determines how many years of data are present
      t <- t_max-t_min

      # Creates break intervals for plots based on number of years of data
      if(t>=30){
         # Set breaks to every 10 years if more than 30 years of data
         brk <- -10
      }else if(t<30 & t>=10){
         # Set breaks to every 5 years if between 30 and 10 years of data
         brk <- -5
      }else if(t<10 & t>=4){
         # Set breaks to every 2 years if between 10 and 4 years of data
         brk <- -2
      }else if(t<4){
         # Set breaks to every year if less than 4 years of data
         brk <- -1
      }
      # Determine range of data values for the managed area
      y_range <- max(plot_data$Mean) - min(plot_data$Mean)

      # Determines lower bound of y-axis based on data range. Set based on
      # relation of data range to minimum value. Designed to set lower boundary
      # to be 10% of the data range below the minimum value
      y_min <- if(min(plot_data$Mean)-(0.1*y_range)<0){
         # If 10% of the data range below the minimum value is less than 0,
         # set as 0
         y_min <- 0
```

```
} else {
   # Otherwise set minimum bound as 10% data range below minimum value
   y_min <- min(plot_data$Mean)-(0.1*y_range)
}

# Sets upper bound of y-axis to be 10% of the data range above the
# maximum value.
y_max <- max(plot_data$Mean)+(0.1*y_range)

# Determines what combination of gear are present for managed area
# and subsets color and shape scheme to be used by plots.
# Used so only gear combinations present for managed area appea in legend.
gear_colors_plot <- gear_colors[unique(plot_data$GearType_Plot)]
gear_shapes_plot <- gear_shapes[unique(plot_data$GearType_Plot)]

# Creates plot object using plot_data and grouping by the plot gear types.
# Data is plotted as symbols with connected lines.
p1 <- ggplot(data=plot_data, group=as.factor(GearType_Plot)) +
   geom_line(aes(x=Year, y=Mean, color=as.factor(GearType_Plot)),
             size=0.75, alpha=1) +
   geom_point(aes(x=Year, y=Mean, fill=as.factor(GearType_Plot),
                  shape=as.factor(GearType_Plot)), size=2,
              color="#333333", alpha=1) +
   labs(title="Nekton Species Richness",
        subtitle=MA_Include[i],
        x="Year", y=bquote('Richness (species/100'*~m^{2}*')'),
        fill="Gear type", color="Gear type", shape="Gear type") +
   scale_x_continuous(limits=c(t_min-0.25, t_max+0.25),
                      breaks=seq(t_max, t_min, brk)) +
   scale_y_continuous(limits=c(y_min, y_max),
                      breaks=pretty_breaks(n=5)) +
   scale_fill_manual(values=gear_colors_plot) +
   scale_color_manual(values=gear_colors_plot) +
   scale_shape_manual(values=gear_shapes_plot) +
   plot_theme
# Sets file name of plot created
outname <- paste0("Nekton_", gsub(" ", "", MA_Include[i]), "_",
                  param_file, ".png")
# Saves plot as a png image
png(paste0(out_dir, "/Figures/", outname),
    width = 8,
    height = 4,
    units = "in",
    res = 200)
print(p1)
dev.off()

# Creates a data table object to be shown underneath plots in report
ResultTable <-
   MA_Ov_Stats[MA_Ov_Stats$ManagedAreaName==MA_Include[i],]
# Removes location, gear, and parameter information because it is in plot
# labels
ResultTable <- ResultTable[,-c("AreaID", "ManagedAreaName",
```

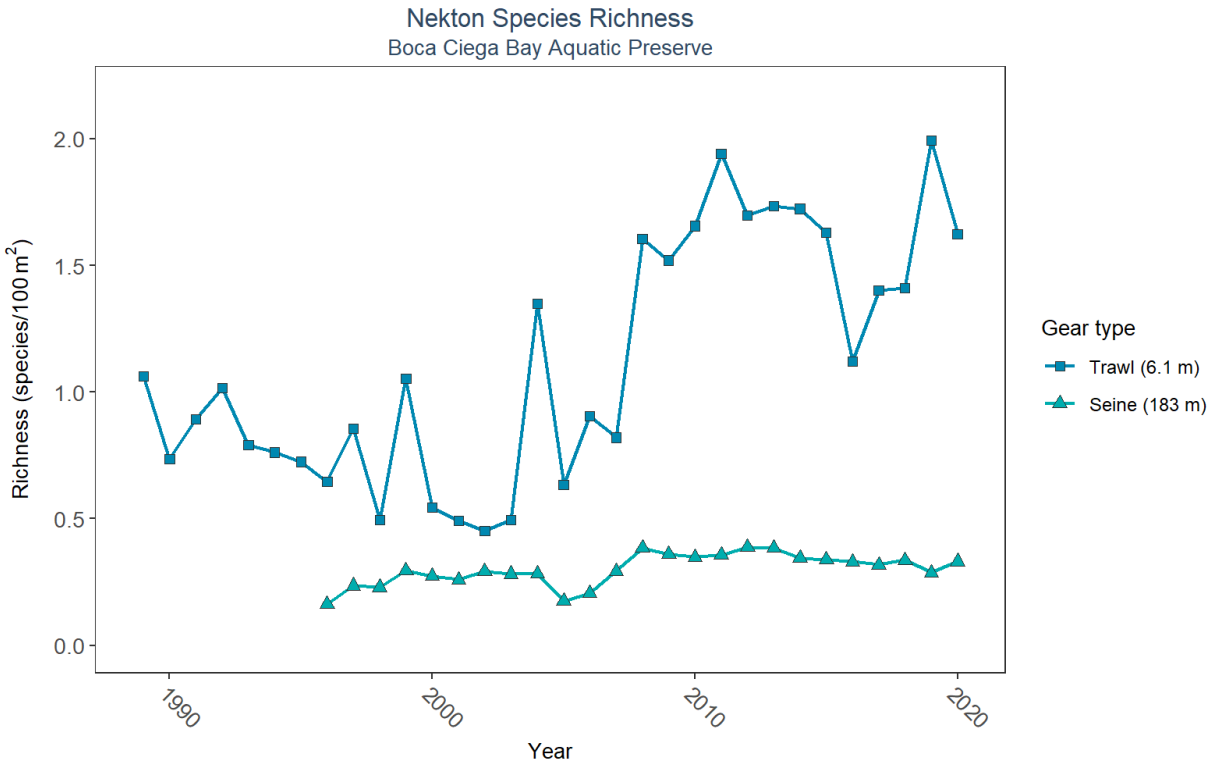
```
                                    "ProgramIDs", "GearType_Plot",
                                    "ParameterName")]
      # Renames StandardDeviation to StDev to save horizontal space
      ResultTable <- ResultTable %>%
         rename("StDev"="StandardDeviation")
      # Converts all non-integer values to 2 decimal places for space
      ResultTable$Min <- round(ResultTable$Min, digits=2)
      ResultTable$Max <- round(ResultTable$Max, digits=2)
      ResultTable$Median <- round(ResultTable$Median, digits=2)
      ResultTable$Mean <- round(ResultTable$Mean, digits=2)
      ResultTable$StDev <- round(ResultTable$StDev, digits=2)
      # Stores as plot table object
      t1 <- ggtexttable(ResultTable, rows = NULL,
                        theme=ttheme(base_size=7))
      # Combines plot and table into one figure
      print(ggarrange(p1, t1, ncol=1, heights=c(0.85, 0.15)))

      # Add extra space at the end to prevent the next figure from being too
      # close
      cat("\n \n \n \n")
   }
}
```



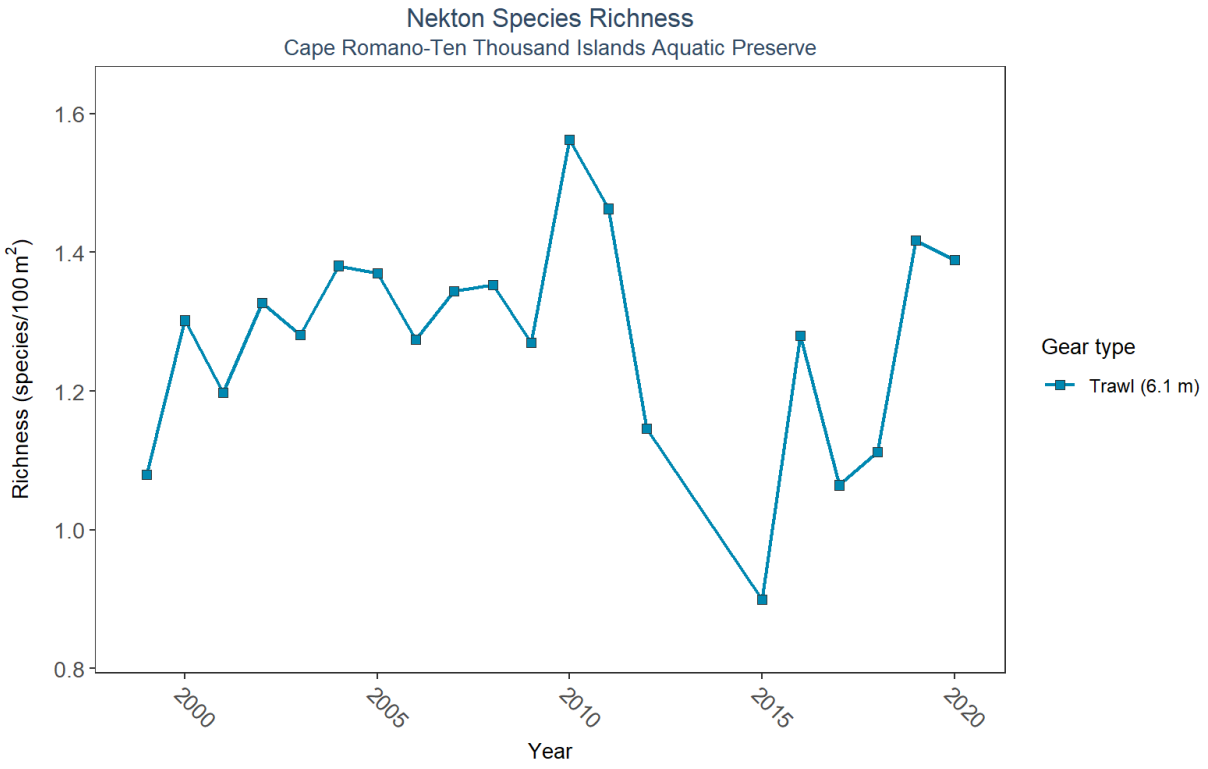
tYear	LatestYear	N_Data	Min	Max	Median	Mean	StDev	Programs
)0	2021	1664	0.19	24.81	7.78	7.79	3.62	Apalachicola National Estuarine Research Reserve Juvenile Fish and Benthic Macroinvertebrate Monitor



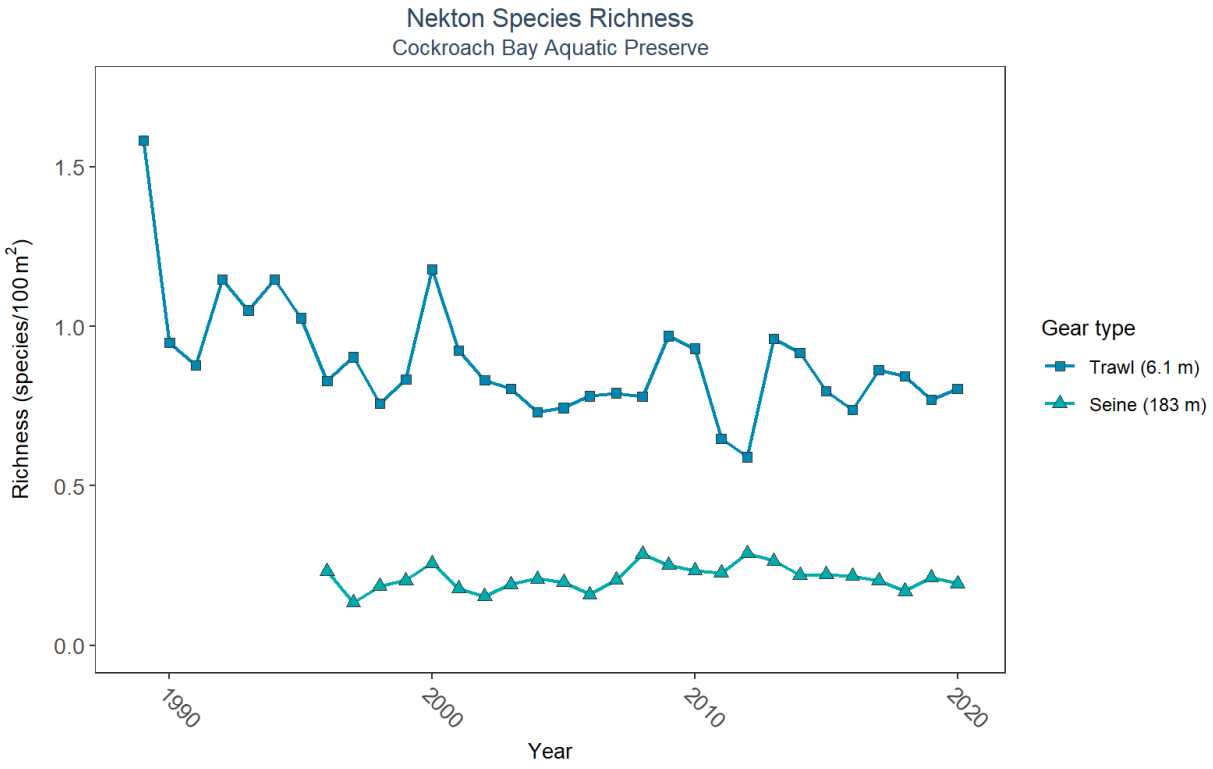
tYear	LatestYear	N_Data	Min	Max	Median	Mean	StDev	Programs
0	2021	1931	0.19	24.81	7.41	7.62	3.72	Apalachicola National Estuarine Research Reserve Juvenile Fish and Benthic Macroinvertebrate Monitor



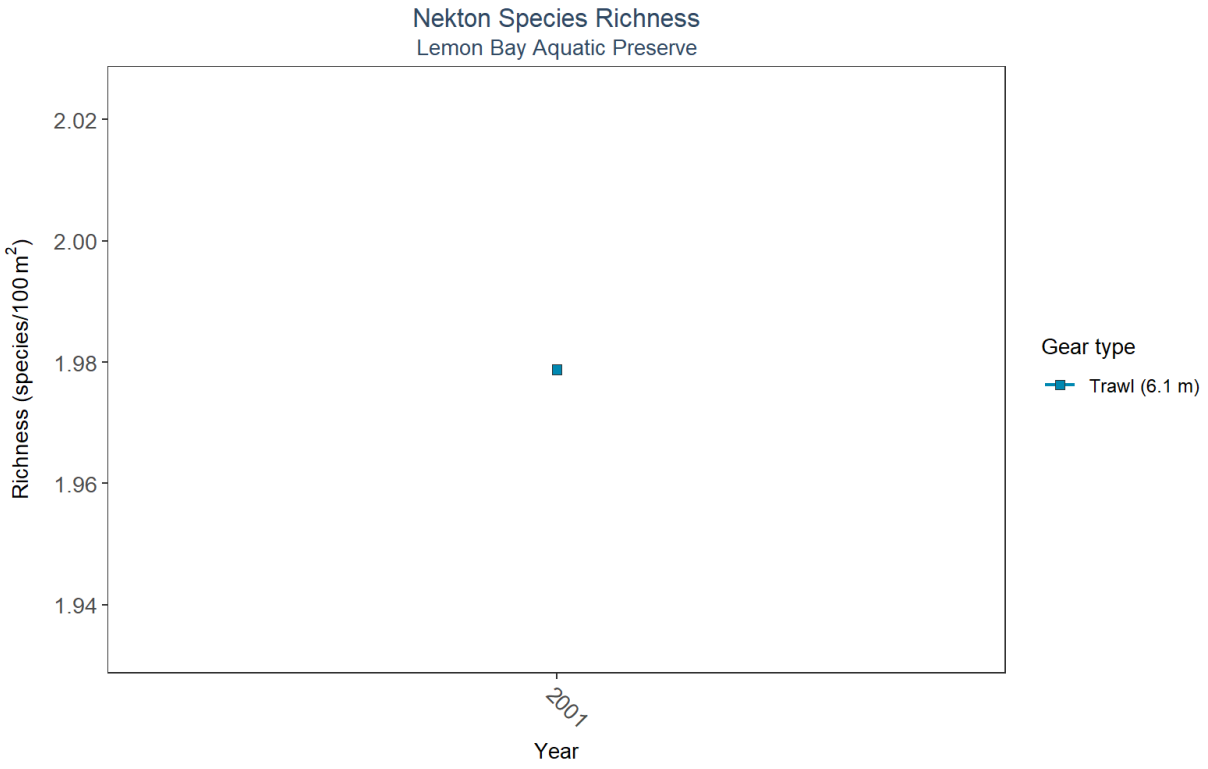
ze_m	N_Years	EarliestYear	LatestYear	N_Data	Min	Max	Median	Mean	StDev	Programs	Year_MinRichness
1	32	1989	2020	868	0	4.59	1.01	1.33	0.92	Fisheries-Independent Monitoring (FIM) Program	2002
0	25	1996	2020	997	0	0.92	0.29	0.31	0.17	Fisheries-Independent Monitoring (FIM) Program	1996



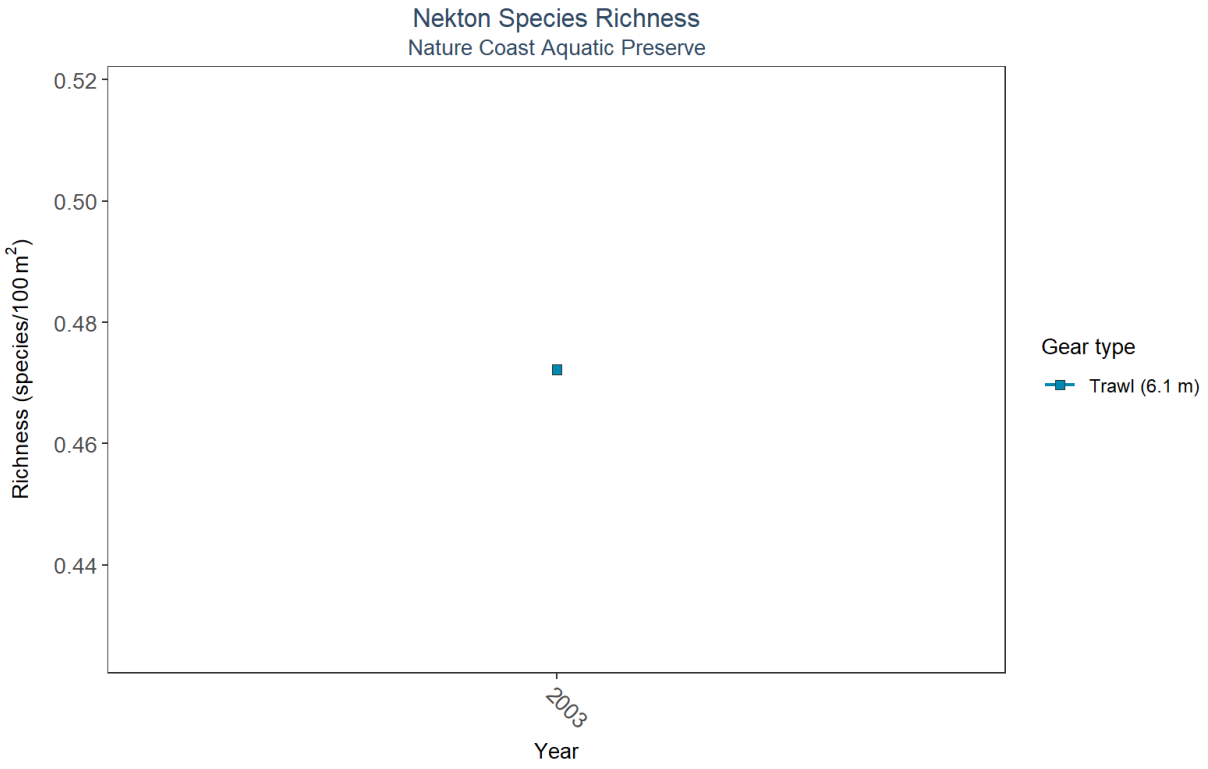
GearSize_m	N_Years	EarliestYear	LatestYear	N_Data	Min	Max	Median	Mean	StDev	Programs	Year_MinRichness	Year_Ma
6.1	20	1999	2020	2555	0	3.37	1.35	1.31	0.53	RBNERR Fish Assessment	2015	2



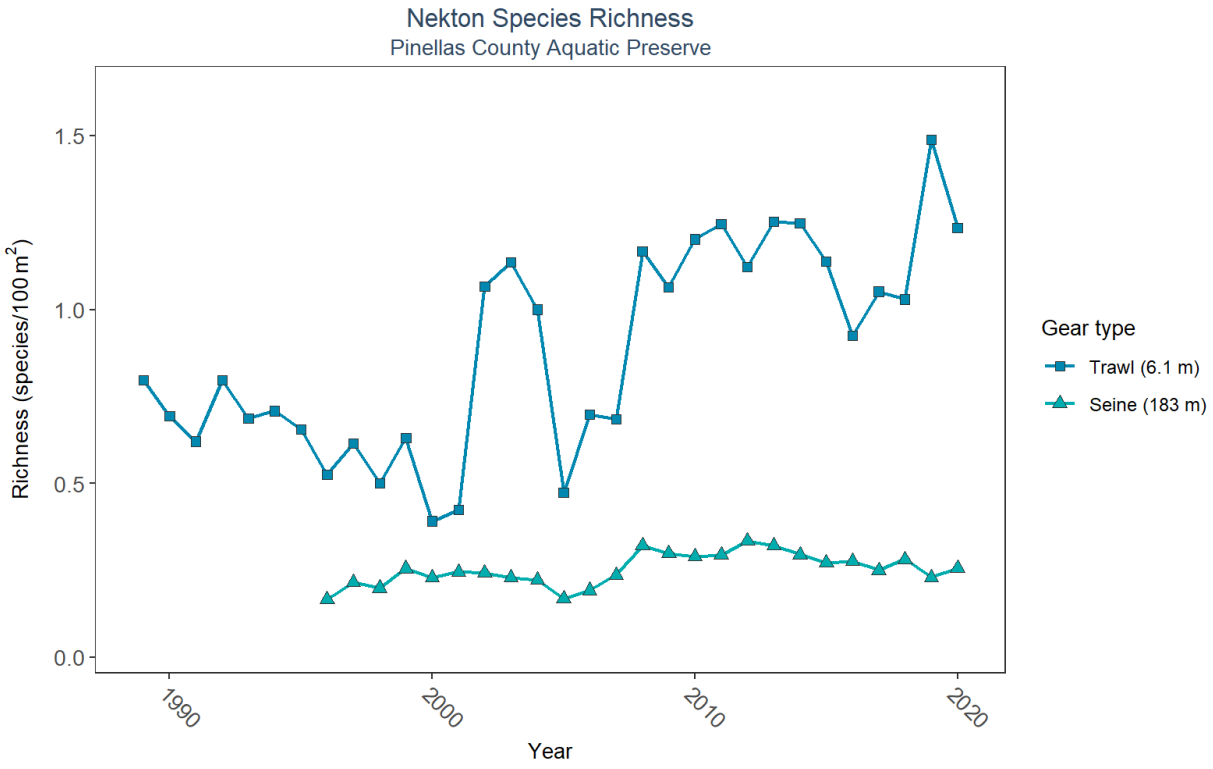
ze_m	N_Years	EarliestYear	LatestYear	N_Data	Min	Max	Median	Mean	StDev	Programs	Year_MinRichness
1	32	1989	2020	1666	0	3.75	0.75	0.84	0.54	Fisheries-Independent Monitoring (FIM) Program	2012
0	25	1996	2020	476	0	0.78	0.19	0.21	0.12	Fisheries-Independent Monitoring (FIM) Program	1997



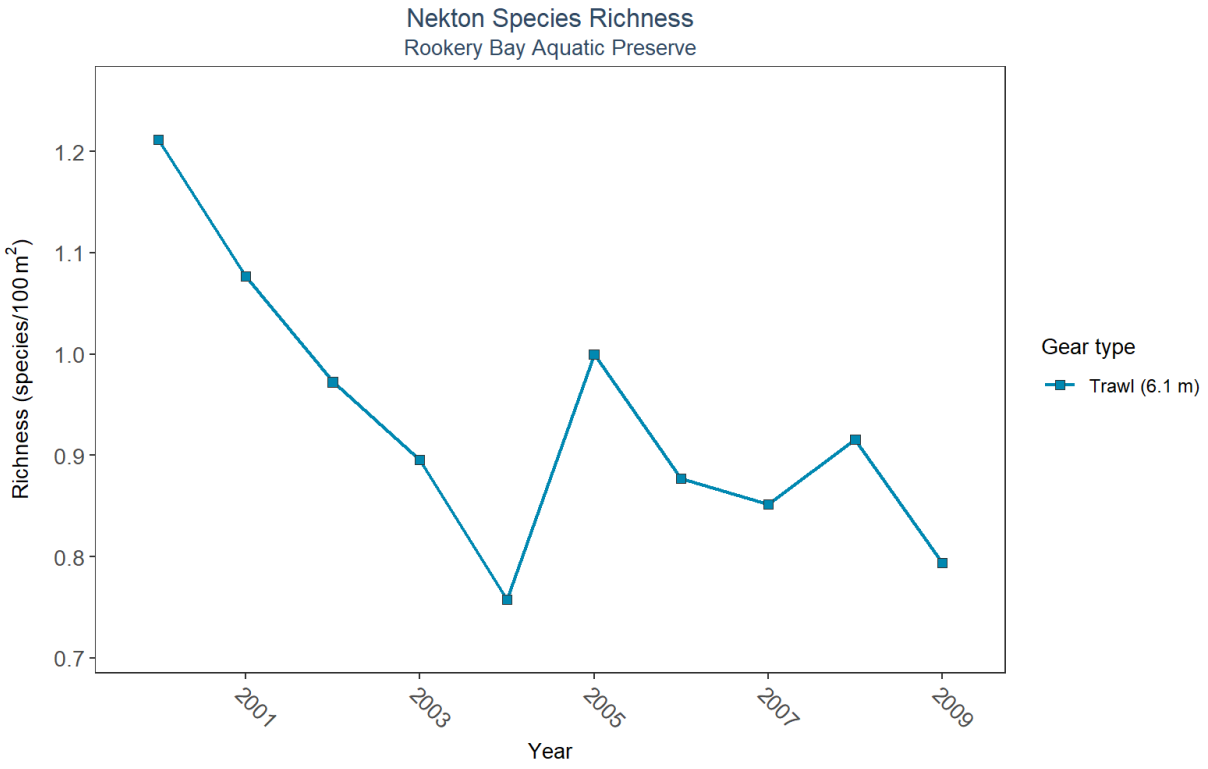
ɛ_m	N_Years	EarliestYear	LatestYear	N_Data	Min	Max	Median	Mean	StDev	Programs	Year_MinRichness
	1	2001	2001	3	1.48	2.43	2.02	1.98	0.47	Fisheries-Independent Monitoring (FIM) Program	2001



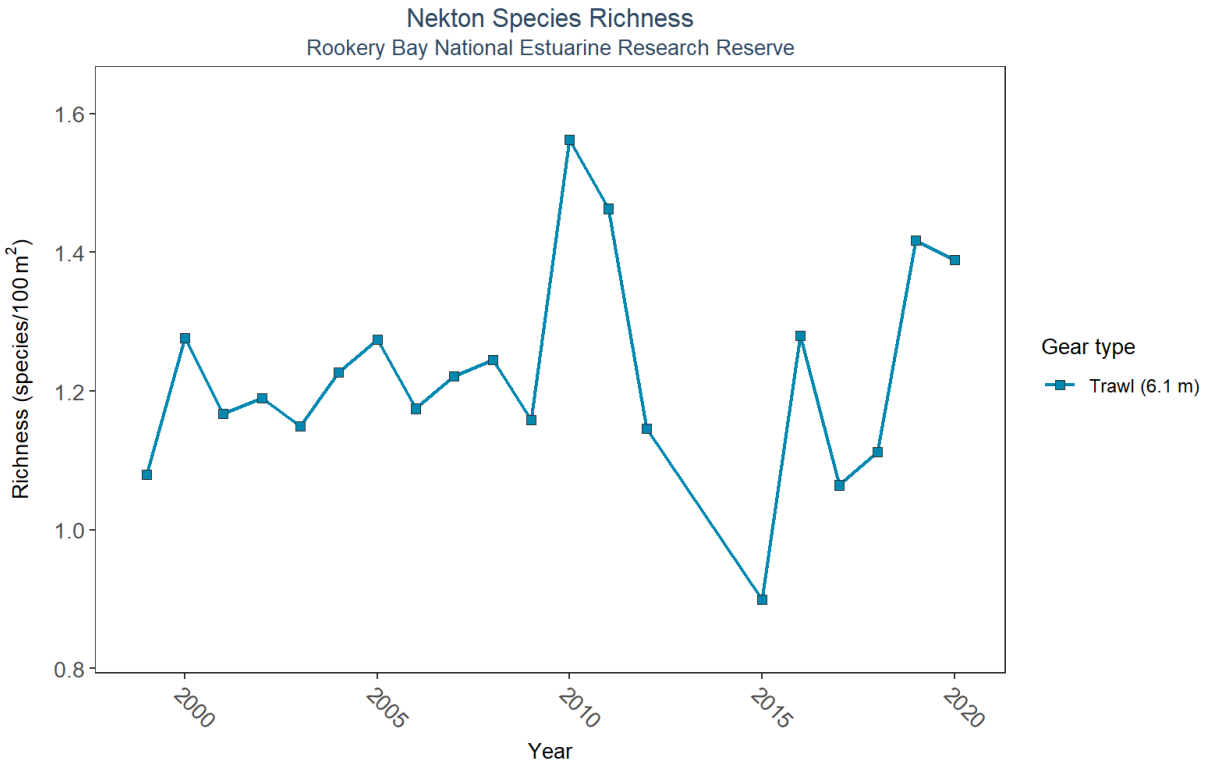
ze_m	N_Years	EarliestYear	LatestYear	N_Data	Min	Max	Median	Mean	StDev	Programs	Year_MinRichness
	1	2003	2003	2	0	0.94	0.47	0.47	0.67	Fisheries-Independent Monitoring (FIM) Program	2003



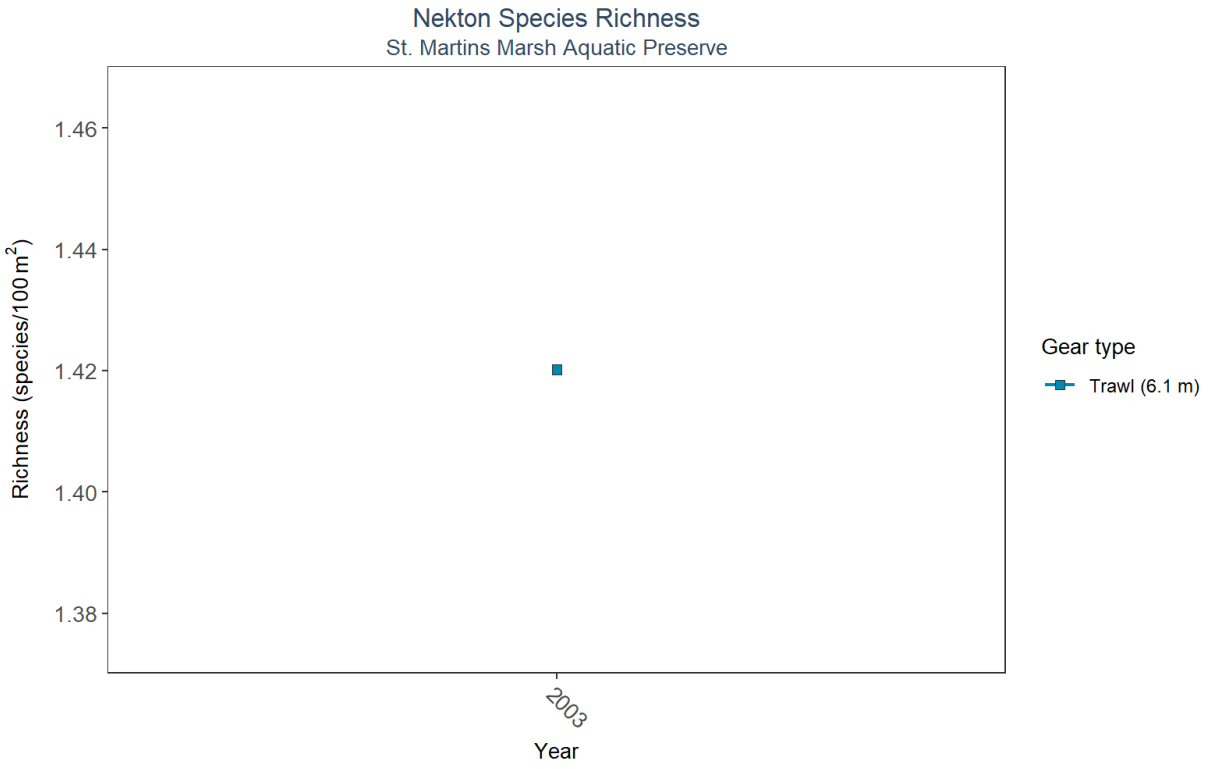
ze_m	N_Years	EarliestYear	LatestYear	N_Data	Min	Max	Median	Mean	StDev	Programs	Year_MinRichness
1	32	1989	2020	2903	0	6.21	0.71	0.95	0.78	Fisheries-Independent Monitoring (FIM) Program	2000
0	25	1996	2020	2621	0	0.92	0.22	0.26	0.15	Fisheries-Independent Monitoring (FIM) Program	1996



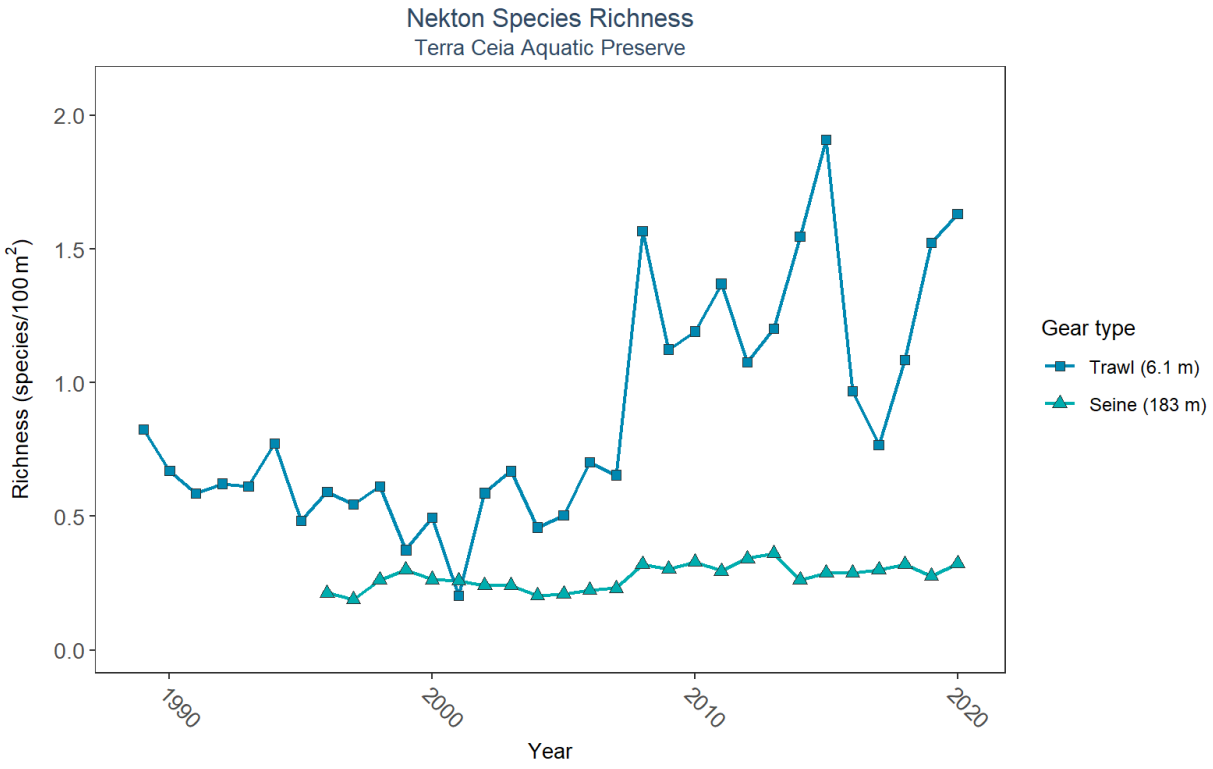
GearSize_m	N_Years	EarliestYear	LatestYear	N_Data	Min	Max	Median	Mean	StDev	Programs	Year_MinRichness	Year_Ma
6.1	10	2000	2009	535	0	2.56	0.94	0.94	0.42	RBNERR Fish Assessment	2004	2



GearSize_m	N_Years	EarliestYear	LatestYear	N_Data	Min	Max	Median	Mean	StDev	Programs	Year_MinRichness	Year_Ma
6.1	20	1999	2020	3098	0	3.37	1.21	1.24	0.53	RBNERR Fish Assessment	2015	2



ɛe_m	N_Years	EarliestYear	LatestYear	N_Data	Min	Max	Median	Mean	StDev	Programs	Year_MinRichness
	1	2003	2003	1	1.42	1.42	1.42	1.42	NA	Fisheries-Independent Monitoring (FIM) Program	2003



ze_m	N_Years	EarliestYear	LatestYear	N_Data	Min	Max	Median	Mean	StDev	Programs	Year_MinRichness
1	32	1989	2020	709	0	4.22	0.74	1.03	0.84	Fisheries-Independent Monitoring (FIM) Program	2001
0	25	1996	2020	921	0	0.75	0.27	0.28	0.13	Fisheries-Independent Monitoring (FIM) Program	1997