Indicators Handbook

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This handbook contains a description of all files needed to calculate the NYB ecosystem health indicators as of the 2023 Indicator Report. Most of the files are in R, a few (ending in .ipynb) are python Jupyter notebooks. Some Indicators that required four dimensional netcdf data were easier to complete in python. Each Indicator is listed, along with any code files needed to acquire and process the data as well as create the figures for the indicator report. All of these files are located in the Nyelab Indicators Github repository at:

<https://github.com/Nyelab/NYB_Indicators_Calculations>

You may find some extra files in the github repository that are not described here. In previous years slightly different methods or different datasets may have been used for some indicators. The files described here are the ones most recently used for the 2023 indicator report but I have not deleted those used for previous indicator reports.

Although all of the final time series used to create the figures for the indicator report are included in the Github repository, many of the raw datasets were too large to include. These datasets can be found on the NYOS google drive at:

<https://drive.google.com/drive/u/0/folders/15DAWcAxZqI9feBMp2zCarzV58lkSB-d8>

And a backup of all files is stored on the hard drive xxx

(Laura Gruenburg also has a hardrive backup of all code and data as of May xx 2024)

Many of the file paths in the code that deal with this data from the NYOS megafolder refer to where I stored this data on my local machine. You will have to change these filepaths to reflect where you decide to store this data on your machine. Or maybe you will discover a way to filepath directly to the google drive! Amazing!

Some people you might want to contact:

**Carbonate chemistry and dissolved oxygen**

Baoshan Chen (baoshan.chen@stonybrook.edu)

Tyler Menz (tyler.menz@stonybrook.edu)

**Acoustics**

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**General Advice**

**Start sooner than you think is necessary. August** would be a good time to go through all the indicators and consider what new data you will need to get. Many indicators use data that is publicly available and the formating/location/availability of this data changes pretty frequently. Data I used for the 2023 report may no longer be available, may now be in a new location, the mission may have ended, the data may be corrected or reprocessed and updated to a newer version, coordinate systems may change. This happened with a few indicators ***every year*** - it will probably happen next year too. Finding the data at its new url, downloading all the corrected data, or finding a suitable replacement dataset all take time.

The structure of this handbook is as follows:

**Indicator Name**

file\_name\_1.R

(location of file as a file path)

file\_name\_2.R

(location of file as a file path)

file\_name\_n.R

(location of file as a file path)

**file\_name\_1.R**

1. Description of what this file does and what its outputs are
2. Description of what this file does and what its outputs are

**file\_name\_2.R**

1. Description of what this file does and what it outputs are

**file\_name\_n.R**

1. Description of what this file does and what it outputs are

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# Physical and Chemical Indicators

## SST

Get\_OISST.Rmd (NYB\_Indicators\_Calculations/CalculateIndicators/WaterTemperature/RScripts)

OISST\_means.R

(NYB\_Indicators\_Calculations/CalculateIndicators/WaterTemperature/RScripts)

SST\_*year*.R

(NYB\_INdicators\_Calculations/CalculateIndicators/Final\_Timeseries\_Figures/Figures\_*year*)

### Get\_OISST\_data.Rmd

1. Retrieves the SST data, saves it to your machine, and formats it labeling points inside the NYB
2. Please rename any raw files (they are downloaded as a long string of numbers and letters) and manually put them into the NYOS\_megafolder under NYOS\_megafolder/indicator.development/Indicators\_MOST\_RECENT\_2023/Raw Data/Temperature/raw data
3. Saves SST data as a file called L1\_SST\_data\_Processed*DATE\_YEAR*.csv
4. Please manually put this file into the NYOS\_megafolder under NYOS\_megafolder/indicator.development/Indicators\_MOST\_RECENT\_2023/Raw Data/Temperature. Most of the raw data is too big to go on the github

### OISST\_means.R

1. Formats the data for the final time series
2. This will save the formatted data to Final\_Timeseries\_Figures/TImeseries\_*year*

### SST\_year.R

1. Makes the final figure
2. Determines the 30th and 70th percentiles to compare with the average of the last 5 years of data for the short term column in the Indicators at a glance chart
3. Save this as a .png to Final\_Timeseries\_Figures/Figures\_*year*

## Marine Heatwaves

MarineHeatwaves.R

(NYB\_Indicators\_Calculations/CalculateIndicators/WaterTemperature/RScripts)

Glorys\_Bottom\_temp\_daily.R

(NYB\_Indicators\_Calculations/CalculateIndicators/WaterTemperature/RScripts)

Marine\_Heatwaves\_2023.R

(NYB\_Indicators\_Calculations/Final\_Timeseries\_Figures/Figures\_2023)

### MarineHeatwaves.R

1. Takes the L1 SST data from your SST indicator and the bottom temperature from **Glorys\_bottom\_temp\_daily.R** (this script just formats the netcdfs as usable dataframes)
2. Uses Rheatwaves to calculate the marine heatwave metrics
3. Also uses a loop to calculate the heatwave metrics with a moving baseline

### Glorys\_bottom\_temp\_daily.R

1. Takes the netcdfs as downloaded from Copernicus and reformats them into a table, labeling points within the NYB, for ease of use in **Marineheatwaves.R**
2. Please put any new GLORYS data into the NYOS\_megafolder under indicators.development/Indicators *YEAR*/raw data.

### Marine\_Heatwaves\_year.R

1. Creates marine heatwave figures
2. Determines the 30th and 70th percentiles to compare with the average of the last 5 years of data for the short term column in the Indicators at a glance chart
3. Save this as a .png to Final\_Timeseries\_Figures/Figures\_*year*

## Bottom Temperature

ProcessCTD\_SeaWolf.R

(NYB\_Indicators\_Calculations/CalculateIndicators/WaterTemperature/RScripts)

HowtogetWODdata\_UPDATE2023.Rmd

(NYB\_Indicators\_Calculations/CalculateIndicators/WaterTemperature/RScripts)

Bot\_Temp\_updated\_12\_08\_2023.R

(NYB\_Indicators\_Calculations/CalculateIndicators/WaterTemperature/RScripts)

Bottom\_Temp\_year.R

(NYB\_Indicators\_Calculations/Final\_Timeseries\_Figures/Figures\_year)

### ProcessCTD\_SeaWolf.R

1. Takes individual .cnv files for the seawolf (in the .L1 folder for each cruise on the NYOS megafolder in google drive - if you are unsure ask Tyler Menz) and formats and saves them into one table

### HowtogetWODdata\_UPDATE2023.Rmd

1. Retrieves all relevant files from the World Ocean Database, formats them and saves them. Starting with the 2023 report only the last 5 years of data will be downloaded and appended to the data from previous years.
2. These files are too large to be stored on github. Please put the new WOD data into the NYOS\_megafolder under indicators.development/Indicators *YEAR*/raw data.

### Bot\_Temp\_updated\_12\_08\_2023.R

1. Merges all Seawolf and WODB data and creates the final time series of bottom temperature saved to the Timeseries\_Files\_*Year* file

### Bottom\_Temp\_year.R

1. Creates the final bottom temperature figure for the Indicator report.
2. Determines the 30th and 70th percentiles to compare with the average of the last 5 years of data for the short term column in the Indicators at a glance chart
3. Save this as a .png to Final\_Timeseries\_Figures/Figures\_*year*

## Cold Pool

Cold\_Pool\_and\_Lobster.ipynb

(NYB\_Indicators\_Calculations/CalculateIndicators/Coldpool and Lobster Thermal Habitat)

Cold\_Pool\_Glider\_year.R

(NYB\_Indicators\_Calculations/Final\_Timeseries\_Figures/Figures\_year)

CP\_Volume\_year.R

(NYB\_Indicators\_Calculations/Final\_Timeseries\_Figures/Figures\_year)

### Cold\_Pool\_and\_Lobster.ipynb

1. Loads the GLORYS12 reanalysis data
2. Creates map figures for indicator report of different waypoints on the offshore cruise and of the three buoys used for the windspeed indicator
3. Calculates the time series of area of NYB inhospitable to lobster. See **Lobster Thermal Habitat**.
4. Determines the volume of the cold pool within the NYB.

### Cold\_Pool\_Glider\_year.R

1. Loads in the Cold Pool volume data (from Charlies calculations)
2. Creates the figure for the indicator report
3. Save this as a .png to Final\_Timeseries\_Figures/Figures\_*year*

### CP\_Volume\_year.R

1. Loads in the Cold Pool volume data (glorys reanalysis based)
2. Creates the final Cold Pool figure for the Indicator report.
3. Determines the 30th and 70th percentiles to compare with the average of the last 5 years of data for the short term column in the Indicators at a glance chart
4. Save this as a .png to Final\_Timeseries\_Figures/Figures\_*year*

## Bottom Dissolved Oxygen

Bottom\_DO\_2023.Rmd

(NYB\_Indicators\_Calculations/CalculateIndicators)

Bottom\_DO\_2023.R

(NYB\_Indicators\_Calculations/Final\_Timeseries\_Figures/Timeseries\_Files\_*year*)

### Bottom\_DO\_2023.Rmd

1. Imports all the niskin bottle data from the Seawolf Cruises
2. Assigns a season to the data and removes erroneous data.
3. Writes the final DO timeseries and saves it to the Timeseries\_Files\_*year* folder.

### 

### Bottom\_DO\_2023.R

1. Creates the final figure for the indicator report.
2. Save this as a .png to Final\_Timeseries\_Figures/Figures\_*year*

## Ocean Acidification Risk

## Wind Speed

NYOS\_NOAA\_BUOYDATA.R

(NYB\_Indicators\_Calculations/CalculateIndicators/Wind Stress)

Wind\_new.Rmd

(NYB\_Indicators\_Calculations/Final\_Timeseries\_Figures/Figures\_*year*)

### NYOS\_NOAA\_BUOYDATA.R

1. Retrieves data from relevant NOAA buoys
2. Calculates wind stress
3. Saves wind speed and stress files to Final\_Timeseries\_Figures/Timeseries\_Files\_*year*

### Wind\_new.Rmd

1. Reads in the wind speed data and calculates the 30th and 70th percentiles for the the short term trend comparison by buoy and season
2. Makes the final plot for the indicator report
3. Save this as a .png file to Final\_Timeseries\_Figures/Figures\_*year*
4. This script does a lot of other plotting when I was experimenting to see what different things looked like. Feel free to revisit these plots or ignore them!

## Stratification

Stratification\_Seasonally\_2023.R

(NYB\_Indicators\_Calculations/CalculateIndicators/Stratification)

Stratification\_year.R

(Final\_Timeseries\_Figures/Figures\_*year*)

### Stratification\_Seasonally\_2023.R

1. Combines the WODB and Seawolf data
2. Creates the timeseries for the NYB and saves to Final\_Timeseries\_Figures/Timeseries\_Files\_*year*

### Stratification\_year.R

1. Reads in the stratification data and calculates the 30th and 70th percentiles for the the short term trend comparison by season
2. Makes the final plot for the indicator report
3. Save this as a .png file to Final\_Timeseries\_Figures/Figures\_*year*

## Hudson River Flow

## Salinity

## Global CO2

CO2\_*year*.R

(Final\_Timeseries\_Figures/Figures\_*year*)

### CO2\_*year*.R

1. Please downloaded the most updated data directly from the url below and save it to Final\_TImeseroes\_Figures/TImeseries\_Files\_*year* <https://scrippsco2.ucsd.edu/data/atmospheric_co2/icecore_merged_products.htm>
2. Reads in the CO2 data and calculates the 30th and 70th percentiles for the the short term trend comparison
3. Makes the final plot for the indicator report
4. Save this as a .png file to Final\_Timeseries\_Figures/Figures\_*year*

## Surface 20C Isotherm

20C\_isotherm\_year.ipynb

(NYB\_Indicators\_Calculations/CalculateIndicators/WaterTemperature)

### 20C\_isotherm\_year.ipynb

1. Loads all the sst data that are obtained from Get\_OISST.Rmd
2. Subsets by season (for the 2023 report we use JJA for summer and SON for autumn. In this notebook there is an option to use JAS for summer and OND for autumn. You may wish to change this - or even consider JJAS for summer and ON for autumn or something else as the seasons change)
3. Makes the final plot for the indicator report
4. Save this as a .png file to Final\_Timeseries\_Figures/Figures\_*year*

## Lobster Thermal Habitat

### Cold\_Pool\_and\_Lobster.ipynb

(NYB\_Indicators\_Calculations/CalculateIndicators/Coldpool and Lobster Thermal Habitat)

Lobster\_Thermal\_Habitat\_year.R

(NYB\_Indicators\_Calculations/Final\_Timeseries\_Figures/Figures\_year)

### Cold\_Pool\_and\_Lobster.ipynb

1. Loads the GLORYS12 reanalysis data
2. Creates map figures for indicator report of different waypoints on the offshore cruise and of the three buoys used for the windspeed indicator
3. Calculates the time series of area of NYB inhospitable to lobster and saves this to the Timeseries\_Files\_*Year* file

### Lobster\_Thermal\_Habitata\_year.R

1. Creates Lobster Thermal Habitat figure for the Indicator Report
2. Determines the 30th and 70th percentiles to compare with the average of the last 5 years of data for the short term column in the Indicators at a glance chart
3. Save this as a .png to Final\_Timeseries\_Figures/Figures\_*year*

## Large Storms

Large\_Storms.Rmd

(NYB\_Indicators\_Calculations/CalculateIndicators)

Large\_Storms\_*year.*R

(NYB\_Indicators\_Calculations/Final\_Timeseries\_Figures/Figures\_*year*)

### Large\_Storms.Rmd

1. Reads in the cyclone data (Located in NYOS megafolder. Please double check website listed in code for updates before running)
2. Subsets for our study area and determined cyclone strength based on the local laplacian of pressure
3. Saves time series to Final\_Timeseries\_Figures/Timeseries\_Files\_*year*

### Large\_Storms\_year.R

1. Creates the final storms figure for the Indicator report.
2. Determines the 30th and 70th percentiles to compare with the average of the last 5 years of data for the short term column in the Indicators at a glance chart
3. Save this as a .png to Final\_Timeseries\_Figures/Figures\_*year*

# Biological Indicators

## Chlorophyll

Chla\_format\_indicators.ipynb

(NYB\_Indicators\_Calculations/CalculateIndicators/Phytoplankton)

chla\_*year*.R

(NYB\_Indicators\_Calculations/Final\_Timeseries\_Figures/Figures\_*year*)

### Chla\_format\_indicators.ipynb

1. Starting in 2023 data was manually downloaded from the TerraModis satellite mission at this URL <https://oceancolor.gsfc.nasa.gov/about/missions/terra> and is saved to the NYOS megafolder (NYOS\_megafolder/indicator.development/Indicators\_MOST\_RECENT\_2023/Raw Data/Temperature/raw data/Chlorophyll)
2. This python notebook reads in each netcdf and formats the surface chlorophyll data into a spatially averaged time series for the NYB polygon only and saves this .csv file to Final\_Timeseries\_Figures/Timseries\_*year*

### chla\_*year*.R

1. Creates the final chlorophyll figure for the Indicator report.
2. Determines the 30th and 70th percentiles to compare with the average of the last 5 years of data for the short term column in the Indicators at a glance chart
3. Save this as a .png to Final\_Timeseries\_Figures/Figures\_*year*

## *Calanus finmarchicus*

Zoops\_*year*.R

(NYB\_Indicators\_Calculations/CalculateIndicators/Zooplankton/Rscripts)

Zoops\_*year*\_ecomon.R

(NYB\_Indicators\_Calculations/Final\_Timeseries\_Figures/Figures\_*year*)

### Zoops\_*year*.R

1. Loads the ecomon data which is stored on the NYOS megafolder (NYOS\_megafolder/indicators.development/Indicators\_MOST\_RECENT\_2023/Raw Data/Temperature/raw data/)
2. Please double check for updated ecomon data at <https://www.ncei.noaa.gov/access/metadata/landing-page/bin/iso?id=gov.noaa.nodc:0187513> and upload any new field to the NYOS megafolder before you proceed
3. This script cleans the data and formats it - including identifying data in the nyb polygon
4. Saves the final timeseries file to Final\_Timeseries\_Figures/Timeseries\_Files\_*year*

### Zoops\_*year*\_ecomon.R

1. Creates the final *Calanus finmarchicus* figure for the Indicator report.
2. Determines the 30th and 70th percentiles to compare with the average of the last 5 years of data for the short term column in the Indicators at a glance chart
3. Save this as a .png to Final\_Timeseries\_Figures/Figures\_*year*

## *Centropages typicus*

Zoops\_*year*.R

(NYB\_Indicators\_Calculations/CalculateIndicators/Zooplankton/Rscripts)

Zoops\_*year*\_ecomon.R

(NYB\_Indicators\_Calculations/Final\_Timeseries\_Figures/Figures\_*year*)

### Zoops\_*year*.R

1. Loads the ecomon data which is stored on the NYOS megafolder (NYOS\_megafolder/indicators.development/Indicators\_MOST\_RECENT\_2023/Raw Data/Temperature/raw data/)
2. Please double check for updated ecomon data at <https://www.ncei.noaa.gov/access/metadata/landing-page/bin/iso?id=gov.noaa.nodc:0187513> and upload any new field to the NYOS megafolder before you proceed
3. This script cleans the data and formats it - including identifying data in the nyb polygon
4. Saves the final timeseries file to Final\_Timeseries\_Figures/Timeseries\_Files\_*year*

### Zoops\_*year*\_ecomon.R

1. Creates the final *Centropages typicus* figure for the Indicator report.
2. Determines the 30th and 70th percentiles to compare with the average of the last 5 years of data for the short term column in the Indicators at a glance chart
3. Save this as a .png to Final\_Timeseries\_Figures/Figures\_*year*

## Copepod Size Index

Zoops\_*year*.R

(NYB\_Indicators\_Calculations/CalculateIndicators/Zooplankton/Rscripts)

Zoops\_*year*\_ecomon.R

(NYB\_Indicators\_Calculations/Final\_Timeseries\_Figures/Figures\_*year*)

### Zoops\_*year*.R

1. Loads the ecomon data which is stored on the NYOS megafolder (NYOS\_megafolder/indicators.development/Indicators\_MOST\_RECENT\_2023/Raw Data/Temperature/raw data/)
2. Please double check for updated ecomon data at <https://www.ncei.noaa.gov/access/metadata/landing-page/bin/iso?id=gov.noaa.nodc:0187513> and upload any new field to the NYOS megafolder before you proceed
3. This script cleans the data and formats it - including identifying data in the nyb polygon
4. Saves the final timeseries file to Final\_Timeseries\_Figures/Timeseries\_Files\_*year*

### Zoops\_*year*\_ecomon.R

1. Creates the final Small to Large Copepod Ratio figure for the Indicator report.
2. Determines the 30th and 70th percentiles to compare with the average of the last 5 years of data for the short term column in the Indicators at a glance chart
3. Save this as a .png to Final\_Timeseries\_Figures/Figures\_*year*

## Bottom Trawl Indicators

NYBight\_Indicators\_bio\_2023.R

(NYB\_Indicators\_Calculations/CalculateIndicators/Biological\_indicators)

### NYBight\_Indicators\_bio\_2023.R

1. Loads and formats the NESFC bottom trawl data. This data can be foound in the NYOS megafolder (NYOS\_megafolder/indicator.development/Indicators\_MOST\_RECENT\_2023/Raw Data/Temperature/raw data/Bottom\_Trawl)
2. Calculates the timeseries of all the biological indicators below and saves to Final\_Timeseries\_Figures/Timeseries\_Files\_*year*

## American Lobster

(See bottom trawl indicators)

American\_Lobster\_*year*.R

(NYB\_Indicators\_Calculations/Final\_Timeseries\_Figures/Figures\_*year*)

### American\_Lobster\_*year*.R

1. Creates the final American Lobster figure for the Indicator report.
2. Determines the 30th and 70th percentiles to compare with the average of the last 5 years of data for the short term column in the Indicators at a glance chart
3. Save this as a .png to Final\_Timeseries\_Figures/Figures\_*year*

## Jonah Crab

(See bottom trawl indicators)

Jonah\_Crab\_*year*.R

(NYB\_Indicators\_Calculations/Final\_Timeseries\_Figures/Figures\_*year*)

### Jonah\_Crab\_*year*.R

1. Creates the final Jonah Crab figure for the Indicator report.
2. Determines the 30th and 70th percentiles to compare with the average of the last 5 years of data for the short term column in the Indicators at a glance chart
3. Save this as a .png to Final\_Timeseries\_Figures/Figures\_*year*

## Longfin Squid

(See bottom trawl indicators)

Longfin\_Squid\_*year*.R

(NYB\_Indicators\_Calculations/Final\_Timeseries\_Figures/Figures\_*year*)

### Longfin\_Squid\_*year*.R

1. Creates the final Longfin Squid figure for the Indicator report.
2. Determines the 30th and 70th percentiles to compare with the average of the last 5 years of data for the short term column in the Indicators at a glance chart
3. Save this as a .png to Final\_Timeseries\_Figures/Figures\_*year*

## Shortfin Squid

(See bottom trawl indicators)

Shortfin\_Squid\_*year*.R

(NYB\_Indicators\_Calculations/Final\_Timeseries\_Figures/Figures\_*year*)

### Shortfin\_Squid\_*year*.R

1. Creates the final Shortfin Squid figure for the Indicator report.
2. Determines the 30th and 70th percentiles to compare with the average of the last 5 years of data for the short term column in the Indicators at a glance chart
3. Save this as a .png to Final\_Timeseries\_Figures/Figures\_*year*

## Forage Species Biomass

(See bottom trawl indicators)

Forage\_Species\_*year*.R

(NYB\_Indicators\_Calculations/Final\_Timeseries\_Figures/Figures\_*year*)

### Forage\_Species\_*year*.R

1. Creates the final Forage Species figure for the Indicator report.
2. Determines the 30th and 70th percentiles to compare with the average of the last 5 years of data for the short term column in the Indicators at a glance chart`
3. Save this as a .png to Final\_Timeseries\_Figures/Figures\_*year*

## Aggregate Feeding Groups

(See bottom trawl indicators)

Feeding\_Groups\_*year*.R

(NYB\_Indicators\_Calculations/Final\_Timeseries\_Figures/Figures\_*year*)

### Feeding\_Groups\_*year*.R

1. Creates the final Feeding Groups figure for the Indicator report.
2. Determines the 30th and 70th percentiles to compare with the average of the last 5 years of data for the short term column in the Indicators at a glance chart
3. Save this as a .png to Final\_Timeseries\_Figures/Figures\_*year*

## Total Trawl Biomass

(See bottom trawl indicators)

Feeding\_Groups\_*year*.R

(NYB\_Indicators\_Calculations/Final\_Timeseries\_Figures/Figures\_*year*)

### Feeding\_Groups\_*year*.R

1. Creates the final Feeding Groups figure for the Indicator report.
2. Determines the 30th and 70th percentiles to compare with the average of the last 5 years of data for the short term column in the Indicators at a glance chart
3. Save this as a .png to Final\_Timeseries\_Figures/Figures\_*year*

## Black Sea Bass

(See bottom trawl indicators)

Black\_Sea\_Bass\_*year*.R

(NYB\_Indicators\_Calculations/Final\_Timeseries\_Figures/Figures\_*year*)

### Black\_Sea\_Bass\_*year*.R

1. Creates the final Black Sea Bass figure for the Indicator report.
2. Determines the 30th and 70th percentiles to compare with the average of the last 5 years of data for the short term column in the Indicators at a glance chart
3. Save this as a .png to Final\_Timeseries\_Figures/Figures\_*year*

## Summer Flounder

(See bottom trawl indicators)

Summer\_Flounder\_*year*.R

(NYB\_Indicators\_Calculations/Final\_Timeseries\_Figures/Figures\_*year*)

### Summer\_Flounder\_*year*.R

1. Creates the final Summer Flounder figure for the Indicator report.
2. Determines the 30th and 70th percentiles to compare with the average of the last 5 years of data for the short term column in the Indicators at a glance chart
3. Save this as a .png to Final\_Timeseries\_Figures/Figures\_*year*

## Ratio of Northern to Southern Species

(See bottom trawl indicators)

Norther\_to\_Southern\_*year*.R

(NYB\_Indicators\_Calculations/Final\_Timeseries\_Figures/Figures\_*year*)

### Northern\_to\_Southern\_*year*.R

1. Creates the final Ratio of Northern to Southern Species figure for the Indicator report.
2. Determines the 30th and 70th percentiles to compare with the average of the last 5 years of data for the short term column in the Indicators at a glance chart
3. Save this as a .png to Final\_Timeseries\_Figures/Figures\_*year*

## Ratio of Benthic to Pelagic Species

(See bottom trawl indicators)

Benthic\_Pelagic\_*year*.R

(NYB\_Indicators\_Calculations/Final\_Timeseries\_Figures/Figures\_*year*)

### Benthic\_Pelagic\_*year*.R

1. Creates the final Ratio of Benthic to Pelagic Species figure for the Indicator report.
2. Determines the 30th and 70th percentiles to compare with the average of the last 5 years of data for the short term column in the Indicators at a glance chart
3. Save this as a .png to Final\_Timeseries\_Figures/Figures\_*year*

## Fish Species Richness

(See bottom trawl indicators)

Richness\_*year*.R

(NYB\_Indicators\_Calculations/Final\_Timeseries\_Figures/Figures\_*year*)

### Richness\_*year*.R

1. Creates the final Fish Species Richness figure for the Indicator report.
2. Determines the 30th and 70th percentiles to compare with the average of the last 5 years of data for the short term column in the Indicators at a glance chart
3. Save this as a .png to Final\_Timeseries\_Figures/Figures\_*year*

## Average Trophic Level of the Fish Community

(See bottom trawl indicators)

Average\_TL\_*year*.R

(NYB\_Indicators\_Calculations/Final\_Timeseries\_Figures/Figures\_*year*)

### Average\_TL\_*year*.R

1. Creates the final Average Trophic Level of the Fish Community figure for the Indicator report.
2. Determines the 30th and 70th percentiles to compare with the average of the last 5 years of data for the short term column in the Indicators at a glance chart
3. Save this as a .png to Final\_Timeseries\_Figures/Figures\_*year*

## Temperature Preference of the Fish Community

(See bottom trawl indicators)

Temp\_pref\_*year*.R

(NYB\_Indicators\_Calculations/Final\_Timeseries\_Figures/Figures\_*year*)

### Temp\_pref\_*year*.R

1. Creates the final Temperature Preference of the Fish Community figure for the Indicator report.
2. Determines the 30th and 70th percentiles to compare with the average of the last 5 years of data for the short term column in the Indicators at a glance chart
3. Save this as a .png to Final\_Timeseries\_Figures/Figures\_*year*

# Human Populations Indicators

## Commercial Harvest (KG)

Commercial\_Landings\_*year*.Rmd

(NYB\_Indicators\_Calculations/CalculateIndicators/CommercialFishing/Rscripts)

### Commercial\_Landings\_*year*.Rmd

1. Explains where to get the landings data from
2. Cleans the data and saves the final timeseries to Final\_Timeseries\_Figures/Timeseries\_Files\_*year*

## Commercial Harvest (USD)

Commercial\_Landings\_*year*.Rmd

(NYB\_Indicators\_Calculations/CalculateIndicators/CommercialFishing/Rscripts)

### Commercial\_Landings\_*year*.Rmd

1. Explains where to get the landings data from
2. Cleans the data and saves the final timeseries to Final\_Timeseries\_Figures/Timeseries\_Files\_*year*

## Recreational Harvest

Recreational\_Fishing\_*year*.Rmd

(NYB\_Indicators\_Calculations/CalculateIndicators/RecreationalFishing)

Recreational\_Harvest\_*year*.R

(NYB\_Indicators\_Calculations/Final\_Timeseries\_Figures/Figures\_*year*)

### Recreational\_Fishing\_*year*.Rmd

1. Explains where to get the landings and effort data
2. Cleans the data and saves the final timeseries to Final\_Timeseries\_Figures/Timeseries\_Files\_*year*

### Recreational\_Harvest\_*year*.R

1. Creates Recreational Harvest figure for the Indicator Report
2. Determines the 30th and 70th percentiles to compare with the average of the last 5 years of data for the short term column in the Indicators at a glance chart
3. Save this as a .png to Final\_Timeseries\_Figures/Figures\_*year*

## Recreational Effort

Recreational\_Fishing\_*year*.Rmd

(NYB\_Indicators\_Calculations/CalculateIndicators/RecreationalFishing)

Recreational\_Effort\_*year*.R

(NYB\_Indicators\_Calculations/Final\_Timeseries\_Figures/Figures\_*year*)

### Recreational\_Fishing\_*year*.Rmd

1. Explains where to get the landings and effort data
2. Cleans the data and saves the final timeseries to Final\_Timeseries\_Figures/Timeseries\_Files\_*year*

### Recreational\_Effort\_*year*.R

1. Creates Recreational Effort figure for the Indicator Report
2. Determines the 30th and 70th percentiles to compare with the average of the last 5 years of data for the short term column in the Indicators at a glance chart
3. Save this as a .png to Final\_Timeseries\_Figures/Figures\_*year*

## Vessel Density

TEUs\_*year*.R

(Final\_Timeseries\_Figures/Figures\_*year*)

### TEUs\_*year*.R

1. We began to use TEUs for this indicator in 2023. The yearly values are manually copied and pasted from this website <https://www.panynj.gov/port/en/our-port/facts-and-figures.html> into an excel spreadsheet to be saved as a .csv file to Final\_Timeseries\_Figures/Timeseries\_Files\_*year*
2. Creates Vessel Density figure for the Indicator Report
3. Determines the 30th and 70th percentiles to compare with the average of the last 5 years of data for the short term column in the Indicators at a glance chart
4. Save this as a .png to Final\_Timeseries\_Figures/Figures\_*year*

## Human Population

LI\_population\_*year*.R

(Final\_Timeseries\_Figures/Figures\_*year*)

### LI\_population\_*year*.R

1. You must download the data manually from the ny state website <https://data.ny.gov/Government-Finance/Annual-Population-Estimates-for-New-York-State-and/krt9-ym2k/about_data> and save it to Final\_Timeseries\_Figures/Timeseries\_Files\_*year*
2. Creates Long Island Population figure for the Indicator Report
3. Determines the 30th and 70th percentiles to compare with the average of the last 5 years of data for the short term column in the Indicators at a glance chart
4. Save this as a .png to Final\_Timeseries\_Figures/Figures\_*year*

## Sea Level Rise

SL\_Rise\_year.R

(Final\_Timeseries\_Figures/Figures\_*year*)

### SL\_Rise\_year.R

1. The data need to be manually downloaded for Montauk and Sandy Hook from <https://tidesandcurrents.noaa.gov/sltrends/> and saved to Final\_Timeseries\_Figures/TImeseries\_Files\_*year*
2. Creates Sea Level Rise figure for the Indicator Report
3. Determines the 30th and 70th percentiles to compare with the average of the last 5 years of data for the short term column in the Indicators at a glance chart
4. Save this as a .png to Final\_Timeseries\_Figures/Figures\_*year*

# Ongoing Indicator Development

## Whale Body Condition

This indicator is still in development. The relevant people to talk to are Lesley Thorne, Nathan Hirtle, and Chelsi Napoli.

## Odontocete Strandings

This indicator is still in development. Please check with Lesley Thorne.

## Seabirds

This indicator is still in development. Please check with Lesley Thorne.

## NASC

This indicator is still in development.

## Subsurface Chlorophyll