**GOA Skate 2023 Update Assessment**

Contact: [lee.cronin-fine@noaa.gov](mailto:lee.cronin-fine@noaa.gov)

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All the files and coded needed to run the assessment can be found in the ***2023*** folder.

**Step 1: Obtaining Catch and Survey Data**

The data is pulled and organized in **23\_08\_15 get\_GOA\_skate\_data.R** located in the ***R*** folder.

Under the **Manual Inputs** section there are three inputs that the user needs to make decisions on.

* *export\_dat* - a True/False statement for whether you want to export the data and figures produced by the R code (T = export, F = don’t export).
* *quary\_dat* - a True/False statement for whether you want to query the data from the AKFIN database. (T = query data, F = don’t query data). There is code for querying survey data from the AFSC database instead of AKFIN but it is commented out.
  + If *quary\_dat* is false, the data will be read in from the “data/raw” folder. In this folder the catch data is in “year-Skate\_catch.csv” and survey data is “year-Survey\_biomass\_by\_strata.csv”. In both names, “year” is the actual year of the assessment in number form.
* *pres\_pl* – a True/False statement that if True prints presentation versions of the figures. False just doesn’t produce the presentation figure versions. The figures are saved in ***figs/Presentations***.
* *current\_yr* – the current assessment year. This plays a role in many things and should be set to the current year.

You will need your username and password for the AKFIN database to access the database. The code is set up to use the *keyring* package, which you can use to store you usernames and passwords. If you don’t use the *keyring* package, you can manually enter your username and password in the **Accessing Databases** section under **# AKFIN database #** where you set *akfin\_user\_nam* to your username and *akfin\_password* to your password.

The R code requires **Big\_Skate\_OFL\_catch.csv**, **Longnose\_Skate\_OFL\_ABC\_TAC.csv** and **Other\_Skate\_OFL\_ABC\_TAC.csv** located in ***data/user\_inputs*** folder. These files have the historical ABC, TAC and OFL values. These files needs to be manually updated with new values and should have ABC’s, TAC’s and OFL’s up to and including the current year. New and old values can be found here (<https://www.fisheries.noaa.gov/alaska/sustainable-fisheries/alaska-groundfish-harvest-specifications>). From the linked page go to the desired year and click on “Gulf of Alaska”. Then click on the “Table 2” to get the total and area specific values.

Below is a list of files and figures produced by **23\_08\_15 get\_GOA\_skate\_data.R**.

Files produced and stored in ***data/raw***. If the file name begins with **year** then **year** is the actual year of the assessment in number form.

* **year-Skate\_catch.csv** – raw catch data
* **year-Survey\_biomass\_by\_strata.csv** – raw survey data
* **catch\_data\_last\_pulled.out** – gives date when catch data was last pulled
* **survey\_data\_last\_pulled.out** – gives date when survey data was last pulled

Files produced and stored in ***data/output***. If the file name begins with **year** then **year** is the actual year of the assessment in number form.

* **year-Big\_Skate\_OFL\_catch.csv** – Big skate catch, ABC, TAC and OFL values
* **year-Longnose\_Skate\_OFL\_catch.csv** – Longnose skate catch, ABC, TAC and OFL values
* **year-Other\_Skate\_OFL\_catch.csv** – Other skates catch, ABC, TAC and OFL values

Figures produced and stored in ***figs***. If the figure name begins with **year** then **year** is the actual year of the assessment in number form.

* **year-All\_Skate\_catch\_specs.png** – Figure of the total catch, ABC and TAC values for all three assessment groups
* **year-Area\_Skate\_catch\_specs.png** – Figure of the area specific Big and Longnose skates catch, ABC and TAC values

**Step 2: Run REMA models**

The Big skate REMA models are run in **23\_08\_29 Running REMA model for Big Skate.R** located in the “R” folder.

Under the **Manual Inputs** section there are multiple inputs that the user need to make decisions on.

* *export\_dat* - a True/False statement for whether you want to export the data and figures produced by the R code (T = export, F = don’t export).
* *pres\_pl* – a True/False statement that if True prints presentation versions of the figures. False just doesn’t produce the presentation figure versions. The figures are saved in ***figs/Presentations***.
* *get\_old\_summary\_values* - a True/False statement for whether you want read in the old summary table from the past assessment in order to create the full summary table for the new assessment (T = get old table, F = don’t get old table). This table is in file called **2022-Summary\_of\_Results\_big\_skate.csv** located in the ***data/user\_inputs*** folder. The values were manually taken from the last assessment. The file name must start with the current year-1.
* *current\_yr* – the current assessment year. This plays a role in many things and should be set to the current year.
* *m* – the natural mortality value for the big skate population
* *tier* – the tier level for the assessment
* *mult\_ofl\_max\_abc* – the multiplier used to determine the *ABCmax* from the OFL
* *mult\_max\_abc\_abc* – the multiplier used to determine the ABC from the *ABCmax*

The **Modify raw data** section reads in **year-Survey\_biomass\_by\_strata.csv** and prepares the data for the REMA model (**year** is the actual year of the assessment in number form).

The **Run the REMA Model** sections runs two REMA models. In this section, the survey data is modified so that the first year of data is 1990 and that the 2001 data is excluded from the analysis.

* **All Big Skate (bs\_one)** segment runs a REMA model where only the total GOA biomass for Big skates is estimated.
* **All Big Skate with strata (bs\_all)** segment runs a REMA model where the Big skate population is divided into three strata (Western [WGOA], Central [CGOA] and Eastern [EGOA]).
  + The estimated biomass is determined by taking the proportion of Big skates estimated in each strata in the **bs\_all** REMA model and multiplying it by the gulf- wide estimate from the **bs\_one** REMA model. The **bs\_all** model does provide a gulf-wide biomass estimate with confidence intervals but the proportions method was used in the previous assessment and this year is an update. I recommend switching to only using the **bs\_all** REMA model when the next full assessment is done.

The **Create Summary of Results Table** section creates the summary of result table for the assessment. It will also print to screen whether overfishing occurred in the previous year (gulf wide and strata specific) and if overfishing is occurring in the current year (gulf wide and strata specifc). It requires five files:

Files in ***data/user\_inputs*** folder.

* **2022-Summary\_of\_Results\_big\_skate.csv** – The summary of results table from the previous assessment. The year in front of the file name should be the year of the assessment.
* **Big\_Skate\_OFL\_ABC\_TAC.csv** – contains the OFL, ABC and TAC values for Big Skate.

Files in ***data/output*** folder. If the file name begins with **year** then **year** is the actual year of the assessment in number form.

* **year-Skate\_total\_catch.csv** – The total catch across the Gulf.
* **year-Skate\_strata\_catch.csv** – The catch by strata.

Files in ***data/raw*** folder:

* **catch\_data\_last\_pulled.out** – The total catch across the Gulf.

Below is a list of files and figures produced by **23\_08\_29 Running REMA model for Big Skate.R**.

Files produced and stored in ***data/output***. If the file name begins with **year** then **year** is the actual year of the assessment in number form.

* **year- Calculate\_biomass\_strata\_big\_skate.csv** – The estimated and observed biomass by strata with CV for the observed and 95% confidence intervals for the estimated values
* **year- Summary\_of\_Results\_big\_skate.csv** – the summary of results table used in the SAFE document
* **year- Big\_Estimate\_Biomass\_all\_GOA.csv** – The estimated biomass produced by **bs\_one**
* **year- Big\_biomass\_strata.csv** – The estimated biomass by strata produced by **bs\_all**

Figures produced and stored in ***figs***. If the figure name begins with **year** then **year** is the actual year of the assessment in number form.

* **year-Big\_Regional\_Biomass\_Estimate.png** – Figure of the estimated biomass by strata.

Longnose skate has an identical R code called **23\_08\_29 Running REMA model for Longnose Skate.R**. The only differences are that **bs\_one** = **ln\_one**, **bs\_all** = **ln\_all** and for all the files and figures produced change the word Big with Longnose.

Other skates has a similar R code called **23\_09\_05 Running REMA model for Other Skate.R**. The main difference is that Other skates biomass is not divided by strata. Only one REMA model is run in which a gulf-wider biomass estimate is determined (**ot\_one**). All files and figures associated with strata are not produced. As for file names, change the word Big with Other.

**Step 3: Create SAFE document**

Before creating the SAFE document there are some addition Tables and Figures you need to make.

***23\_09\_20 make\_index\_estimates\_table.R*** creates Tables and Figures that show the estimated biomass across all three assessments groups.

Under the **Manual Inputs** section there are multiple inputs that the user need to make decisions on.

* *export\_dat* - a True/False statement for whether you want to export the data and figures produced by the R code (T = export, F = don’t export).
* *pres\_pl* – a True/False statement that if True prints presentation versions of the figures. False just doesn’t produce the presentation figure versions. The figures are saved in ***figs/Presentations***.
* *current\_yr* – the current assessment year. This plays a role in many things and should be set to the current year.

The R code requires the following files from the ***data/output*** folder. If the file name begins with **year** then **year** is the actual year of the assessment in number form.

* **year- Big\_Estimate\_Biomass\_all\_GOA.csv** – The Gulf-wide biomass observations and estimates for Big skates.
* **year- Longnose\_Estimate\_Biomass\_all\_GOA.csv** – The Gulf-wide biomass observations and estimates for Longnose skates.
* **year- Other\_Estimate\_Biomass\_all\_GOA.csv** – The Gulf-wide biomass observations and estimates for Other skates.

Files produced and stored in ***data/output***. If the file name begins with **year** then **year** is the actual year of the assessment in number form.

* **year-Skate\_Total\_index.csv** – Table with the estimated and observed biomass for all three assessment groups stored in “data/output”.

Files produced and stored in ***figs***. If the file name begins with **year** then **year** is the actual year of the assessment in number form.

* **year-Skate\_Biomass\_Estimate.png** – Figure with the estimated and observed biomass for all three assessment groups stored in “figs”.

***23-10-23 Determine Exploitation Rates.R*** creates Figures that show the exploitation rates for all three assessments and the strata specific exploitation rates for Big and Longnose skates.

Under the **Manual Inputs** section there are multiple inputs that the user need to make decisions on.

* *current\_yr* – the current assessment year. This plays a role in many things and should be set to the current year.
* *pres\_pl* – a True/False statement that if True prints presentation versions of the figures. False just doesn’t produce the presentation figure versions. The figures are saved in ***figs/Presentations***.

The R code requires the following files from the ***data/output*** folder.

* **year-Skate\_Total\_index.csv** – Table with the estimated and observed biomass for all three assessment groups
* **year-Big\_Skate\_OFL\_catch.csv** – Big skate catch, ABC, TAC and OFL values
* **year-Longnose\_Skate\_OFL\_catch.csv** – Longnose skate catch, ABC, TAC and OFL values
* **year-Other\_Skate\_OFL\_catch.csv** – Other skates catch, ABC, TAC and OFL values
* **year-Skate\_strata\_catch.csv** – The catch by strata.
* **year- Calculate\_biomass\_strata\_big\_skate.csv** – The estimated and observed biomass by strata with CV for the observed and 95% confidence intervals for the estimated values
* **year- Calculate\_biomass\_strata\_longnose\_skate.csv** – The estimated and observed biomass by strata with CV for the observed and 95% confidence intervals for the estimated values

Files produced and stored in ***figs***. If the file name begins with **year** then **year** is the actual year of the assessment in number form.

* **year-** **All\_Skate\_exploitation\_rate.png**– shows the exploitation rate time series for all assessment groups.
* **year- Area\_Skate\_exploitation\_rate.png** – shows the exploitation rate time series for Big and Longnose skates by area.

**Step 4: Modify SARA document**

All SARA files are located in the ***SARA file***. There are three files one for each assessment group: big skate = **BIGSKATEGOA2023\_HQ.dat**, longnose skate = LONGSKATEGOA2023\_HQ.dat and other skates = **SKATEGOA2023\_HQ.dat**.

There is R code for updating each file. For Big skate the file is called ***23-11-14 - Update Big skate SARA file.R***. It has one manual input

* *cur\_yr* – the current year

It requires the following files from ***SARA files***

* **BIGSKATEGOA2023\_HQ.dat**

From the ***data/output***, it requires

* **year-Skate\_Total\_index.csv** – Table with the estimated and observed biomass for all three assessment groups stored in “data/output”.
* **year-Big\_Skate\_OFL\_catch.csv** – Big skate catch, ABC, TAC and OFL values

For Longnose skate the file is called ***23-11-14 - Update Longnose skate SARA file.R***. It has one manual input

* *cur\_yr* – the current year

It requires the following files from ***SARA files***

* **LONGSKATEGOA2023\_HQ.dat**

From the ***data/output***, it requires

* **year-Skate\_Total\_index.csv** – Table with the estimated and observed biomass for all three assessment groups stored in “data/output”.
* **year-Longnose\_Skate\_OFL\_catch.csv** – Big skate catch, ABC, TAC and OFL values

For Other skate the file is called ***23-11-14 - Update Other skate SARA file.R***. It has one manual input

* *cur\_yr* – the current year

It requires the following files from ***SARA files***

* **SKATEGOA2023\_HQ.dat**

From the ***data/output***, it requires

* **year-Skate\_Total\_index.csv** – Table with the estimated and observed biomass for all three assessment groups stored in “data/output”.
* **year-** **Other\_Skate\_OFL\_catch.csv** – Big skate catch, ABC, TAC and OFL values