

BSAI Catch Function Instructions

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Catch Function

The catch function has been programmed up as an R package to make it easier to share, update, and use.

These are the instructions to install it plus some extra info.

The package is called `catchfunction` and the function is `catch_function()`. Once installed and loaded, check the documentation (`?catch_function`) for further information.

Note that `catchfunction` has two dependencies: `systemfit` and `VGAM`. Both will automatically be installed when you install `catchfunction` and loaded and attached when you load and attach `catchfunction`

Installing

You will need to have the package `devtools` installed and loaded and attached in order to install this package, as it lives in github.

```
install.packages("devtools")
```

once that's done (or if you already have `devtools`) you can install the package by running the following code:

```
library("devtools")
devtools::install_github("amandafaig/catchfunction")
```

The above code will also update the package as new versions are made available. I will send out emails as that occurs, but if you're unsure you can always just try: R will tell you if no changes have occurred and skip the install if you're up to date.

Some updates will be minor (e.g. changes to the estimation technique) and other updates will be major (e.g. adding the code for a new economic scenario). The documentation of the function specifies which scenarios are up and running.

From here on in you can use the function whenever you load the package.

```
library("catchfunction")
catch.values <- catch_function(...)
```

Troubleshooting

It turns out it can be not so easy to install a package from github if you're using a NOAA computer.

This has to do with the fact that R doesn't NOAA's default directory's name.

If you try the above package and get an error that sounds roughly like this: `Error in library(...): no library trees found in 'lib.loc'` your default path directory may just not be to R's liking.

```
.libPaths()
```

```
## [1] "/Volumes/HOME/Users/faig/Library/R/3.3/library"
## [2] "/Library/Frameworks/R.framework/Versions/3.3/Resources/library"
```

Will let you know what your path directory(ies) is(are). If you see that yours is something like "\\AKCOSS-N086/REFM_Users/..." then we've found your problem.

If you go to "Start" and then "Computer" and then click the "Map network drive" button, you will be able to give a single letter nickname to your network drive.

I believe all you need to do then is simply run:

```
.libPaths(c("H:/..."))
```

where H is the letter you chose and ... is exactly the same ... from "\\AKCOSS-N086/REFM_Users/...". If you do this, it will temporarily change your library path.

To permanently include this new pathway, you will need to add that line of code in to your .Rprofile so that the library-pathway modifying code is essentially run every time you open up R or RStudio.

Some assumptions this function makes you should know about

1. How does the model work?

The user will pass the scenario (for now scenario 1, aka Status Quo, is the only option) and the ABCs for the biologically modeled species to the function each year in the simulation.

catch_function will take the given ABCs (e.g. the ABCs for Pollock, PCod and Arrowtooth in the case of CEATTLE) and for any species where the ABC is *not* given it will assign an ABC. Refer to the next subsection to see how it is done in the current version.

Now, with a vector of all ABCs (both given and estimated) the model will, based on historical data, determine how many tons of each species is likely to be caught. The function will only return to the user the *specified* species. Catches are returned as a data table with a single row. Each column is headed by the name of the species and contains the catch for that species, for that year, based on the ABCs given by the user.

2. How is ABC estimated in species where the ABC is not given by the user

Modeling species TAC and CATCH in the BSAI can't really be done in a vacuum—especially since the 2MT cap exists.

In version 1.2.1 of the catchfunction package (the version we are using for the October council meeting) any species that is not specified by the user will be assigned the historical (1992-2016) average ABC. This was suggested and agreed upon in the August 29th ACLIM meeting.

3. What happens if your ABC goes way out of range?

As with any regression, prediction does less well if you go way out of the range the regression was trained on. I've put in some rules to avoid incredibly silly predictions but in general, as with any model trained on historical data, if you're a couple orders of magnitude out of the observed range you should proceed with caution.

4. Anything else?

Right now the catch prediction comes from an ensemble of 6 models that have varying strengths and weaknesses.

If you'd like to see the code that was used to come up with these 6 models (and more..) we can link you to the google drive, just ask me or Alan.