**Purpose:** Contour.gen is actually a family of 7 functions (contour.gen being the parent function calling the other 6).

Notes: I believe there are several problems with the current version of this function,

* The internal plot function appears to be broken at the moment.
* The internal functions have options that are specified within contour plot function, this isn’t good squishy, so I am extracting the internal functions and making a contour family of individual functions in it’s own directory and tidying up contour.gen so that we can change the sub-function inputs in the call to contour.gen.
* I’m very slightly worried about our aspect ratio calculation here, it is using the same idea as what is used in PBS mapping, but we take the mean of the data from a bank, how different is that than the projection that PBSmapping calculates using the grid corridinates? The calculation is the same but what exactly does PBSmapping do. Need to dig into the functions to find that. Also a slight problem given the range of latitudes in the plot and these data are not the same looks like this could give differences in the aspect ratio of a few percent.

**Version Control:** Likely many versions of this function

**Libraries**:, splacns

**Function Arguments Summary**

1. **fishery.data**: Fishery data from **logs\_and\_fishery\_data.r**.
2. **yr**: The years of interest. Default is to use all years from 1955 to current year. Note that since this is using output from **logs\_and\_fishery\_data.r** ensure that the years in the call to that function include the years used in this function.
3. **bk**: Which bank to select from using abbreviated bank id. Default is GBa (Georges Bank)

The options are:

* + "GBa": Georges a
  + "GBb": Georges b
  + "BBn": Browns north
  + "BBs": Browns south
  + “Ger": German
  + "Mid": Middle
  + "Sab": Sable
  + "Ban": Banquereau
  + "SPB": St. Pierre Bank

1. **nafo.div**: Used if interested in a particular NAFO division within the bank chosen. This will

always just look at CPUE in NAFO division on the bank chosen. There are currently 42

possible NAFO areas to choose from (any combination of the 42 is acceptable just

ensure they align with the bank):

* + 4VN 4VS 4VSB 4VSC 4VSE 4VSV 4W 4WD 4WE 4WF 4WG 4WH 4WJ 4WK 4WL 4WM 4W 4X 4XL 4XM 4XN 4XO 4XP 4XQ 4XR 4XS 4XX 5Y 5YB 5YC 5YD 5YE 5YF 5ZC 5ZE 5ZEG 5ZEH 5ZEJ 5ZEM 5ZEN 5ZEO 5ZWQ

1. **Gin**: Use the table gbcatch which includes historic calculations of the actual catch on Georges

Bank. (T/F) default is F.

1. **export**: Export the annual CPUE table. (T/F) default is F
2. **method**: How are we calculating the annual CPUE + variance, options are “avgdaily” and

“jackknife”. Default option is “avgdaily’ which is simply calculating the mean for the year + variance using every data point available. The preferred, yet slower if using large datasets, option is to use ‘jackknife’ function based on Smith(1980) to obtain an unbiased estimate of CPUE and its variance.

1. **model.out**: Specifiy the ‘out’ object to have a specific format. (T/F) default is F.
2. **period**: Are we looking at the calendar year or the survey year. Calendar year = 'calyr' while survey year ='survyr'
3. **surv:** If period = ‘survyr’ do you want to split the data using the spring ‘May” or summer

“August” survey.

**Section 1**

Within this section the data are subdivided by year. The year division depends on whether we are looking at the survey year or calendar year. If looking at calendar year it is relatively straightforward, if looking at survey year your brain may start to melt later in the function.

* + The month of the survey (May or August depending which you are interested in) is the last month of the survey year.
    1. For example: if looking at the spring survey (May) a year is defined as June-May, the year tagged to this survey year is the larger of the two. Thus June 1992 – May 1993 is considered the survey year 1993 for later calculations.
  + If sub-dividing by survey year some data will “disappear” as it is incomplete.
    1. For example, if looking at years 1992-2009 spring survey year. The data from January-May 1992 is orphaned (to be a real survey year the June-December 1991 data is needed), thus it is discarded.
    2. Conversely, in the most recent year the data from June-December 2009 would orphaned and would represent an incomplete survey year, thus it is discarded. The survey year 2009 would exist but as date from June 2008 – May 2009.
    3. If interested in the survey years it is recommended you select an extra year earlier and later (if possible) to ensure complete coverage of the years of interest.

**Section 2**

This part of the function largely deals with obtaining the Bank specific annual Catch and effort data. For all banks after 1999 this is straightforward. For the years before 1999 it is more complex for GB and BB as they were not yet subdivided. To get an estimate of the total catch these sub-banks from 1998 and earlier the proportion of the data we have available that was found to be on a particular sub-bank (say GBa on GB) was calculated. From that proportion we determine how much of the total catch was obtained on that bank. Problematically, this excludes varying amounts of catch that was obtained in the US portion of Georges Bank from before 1977 and even into the early 1980’s. If we are interested in getting this correct that US Georges bank information should be included in some way in these calculations. This is not a problem on Browns bank as data found to have come from US waters was originally sourced as GB.

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