Write-up/pseudocode of function for shifting CA DC fishing effort

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**General**

* The minimum season start date is defined Nov 15 for region “CenCA”, and Dec 1 for all other regions
  + NOTE: There are 1797 total records (of 129282) that have dates before their region’s minimum season start date. The dates for these records are changed to the minimum season start date

**Delayed opening**

* First filter for the region to be delayed (the non-filtered data will be added back in at the end)
* For each crab fishing season + region, determine:
  + 1) Original opening: the date that of the season opening (the first day with data using original data)
  + 2) Original closing: the date that of the season closing (the last day with data using original data)

3) Management opening: the date the season would open under the provided management scenario

* + 4) “season\_days\_delayed”: (3) – (1), i.e. the number of days that the season opening is delayed in that region under the provided management scenario
* Join the fishing data and ^, by region and crab season
* Shift fishing data dates
  + If the season was delayed (i.e. season\_days\_delayed > 0) for that region/crab season:
    - Lag: shift all records for that region/crab season forward in time by season\_days\_delayed
    - Pile: shift records that came before the provided start date forward in time by season\_days\_delayed
* Redistribute effort
  + Temporal fidelity:
    - Get the sum of the effort that needs to be redistributed, grouped by region and shifted date
    - Next, get the percent of the redistributed effort that should go in each grid cell as follows. Filter for records that came after the provided start date. Then divide the effort values of the variable we’re using to calculate the redistribution percentages (i.e. var\_perc, currently Num\_DCRB\_VMS\_pings), by the sum of var\_perc (grouped by region/crab season).
      * For year-month-regions that data has been shifted into but that do not have any original data (e.g. months past the end of the original season), the data is not redistributed spatially
    - Final steps: Filter for records that came after the provided start date. Join with the effort to redistribute, matching the regions and year\_month with the original year\_month from the effort that came after the provided start date. Multiply the effort to redistribute the percent calculated earlier. Bind this effort with any effort that was not shifted, and sum fishing metrics (grouped by Region, date, and grid cell ID)
      * Note that this results in effort redistributed both spatially and in the temporal patters
  + Spatial fidelity
    - The records that are shifted forward maintain stay in their grid cells, i.e. maintain spatial fidelity. No additional work is needed
* Error checking
  + We check that none of the records were shifted into a new crab season
  + With these delayed opening redistribution methods, particularly a lag shift, records may be shifted outside the standard window of the fishing season. Thus, we add column “date\_past\_end”, a logical indicating whether the new date is after the original closing (season end date).
* ‘Add back in’ effort that was not delayed (i.e. that was filtered out at the start)

**Early closure**

* For early closures, we assume that if all areas are closed, the effort goes away and is not redistributed backwards in time. If only certain regions are closed, e.g. BIAs or Central CA, then the effort from those areas is redistributed to regions that remained open.
* For each crab fishing season + region, determine the management closing date, i.e. the date the season would close under the provided management scenario. Then use this information to add a logical column indicating if each record came after the management closing date (and thus will either be deleted or shifted in space)
* If all regions are closed:
  + Effort is simply removed
  + Question: should we try something where some (all?) of this effort is shifted earlier? This seems to represent a situation where fishers know the season will close early, and thus put more effort into fishing early
* If only BIAs are closed:
  + Redistribute closed effort to its respective region (i.e. northern/central CA, whichever that record is in) using the pile up + temporal fidelity redistribution method
* If one of central CA/northern CA is closed:
  + Redistribute effort to the other (i.e., open) CA region using the pile up + temporal fidelity redistribution method