nims

Fishing mortality is also size-specific. The selectivity for a specified gear type *q* is given by:

 (16),

where *ci,j,q* and *di,j,*q are model parameters and *l* is the midpoint of the *jth* length interval.

Fishing mortality *F* is currently defined as fishing effort multiplied by catchability for each fleet, summed across the three fleets.

The yield from species *i* at time *t* is then:

(17),

where *Wi,j,k* is the mean weight of a individual of species *i* and length *j.*

We further assumed that the trawl fleet would catch all species, that the longline fleet would catch Atlantic cod, haddock, dogfish, skates, and goosefish, and that the pelagic gear would catch Atlantic herring, mackerel, and haddock

Starting at 1980

**Fleet 1 demersal**

**Spiny dogfish**

index-based methods thing: high F for the first 20 years, and then a low F for the last 20 years. That would probably emulate these patterns that we are seeing here.

First 20 years twice FMSY

0.5 Fmsy first half and then 0.5 for the other half

Scalar for dogfish to change the F using cod values

**Cod**

**Change values in line 32 of pin file and line 34 for deviations first 20 years are going to be zero**

**F for the primary stock: average value plus deviations q es 1 para el stock principal**

**Q es un offset para las especies secundarias**

**Check wgsam F values document**

**2 veces msy por los primeros 20 anos y después la mitad por los próximos anos**

**Cod F 0.2 para la primera mitad de la time series y F 0.5 para la segunda mitad de la time series**

**F for one year multiplied for de deviation and an offset for non target stocks**

High values of F de first 15 -20 years so F of 0.5 for the first half and then 0.2 for the second half of the time series

**Fleet 2 pelagic**

**Herring**

Values around 1 and 0.4 use a constant F

**Tpl calculate F**

Fyr(area,spp,fleet,iyr) = fishery\_q(area,spp,fleet,iyr)\*mfexp(avg\_F(area,fleet)+F\_devs(area,fleet,iyr));

**From dat file**

obs\_effort (1,Nareas,1,Nfleets,1,Nyrs) (I am not using this anywhere)

# fleet types demersal pelagic

# Observed effort. No assessment

1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1

1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1

**Parameter section**

matrix effort\_updated(1,Nareas,1,Nfleets) // calculated new Effort for each fleet following threshold exceedence calc\_assessment\_strategy not using this either

3darray obs\_effortAssess(1,Nareas,1,Nfleets,1,Nyrs) //standardized effort units needed

!!obs\_effortAssess = obs\_effort;

//\*\*\*\*\*\*\*\*\*\*\*June 2014 replace with F = q\*E formulation\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*

4darray Fyr(1,Nareas,1,Nspecies,1,Nfleets,1,Nyrs) //array to get annual Fs by fleet from either avg/devs or q\*effort, logspace

// GF March 2022 - modifying fishing for estimation

init\_3darray indicator\_fishery\_q(1,Nareas,1,Nfleets,1,Nspecies) // used to determin which species used to calculate updated effort under assessment MATRIZ CON CEROS Y UNOS

//Fishery selectivities, fleet F and catch, fishery q

init\_matrix fishsel\_pars(1,2,1,Nfleets,fsphase) FROM PIN FILE

init\_matrix ln\_fishery\_q(1,Nqpar\_vec,1,Nqpars,fqphase) //Nareas,1,Nspecies,1,Nfleets,fqphase) FROM PIN FILE

# init\_3darray indicator\_fishery\_q(1,Nareas,1,Nfleets,1,Nspecies)

# which species represent targeted catch. These are used to estmate exploitation rate in assessment

1 0 0 1

0 1 1 0

2 y3 julio

6 y 7 agosto

14 y 15 octubre

Tentative para noviembre

Params

New F values

Demersal average F 0.5 (-0.6931472)

Pelagic average F 0.2 (-1.6094379)

Annual deviations demersal first 20 year 0 second half 0.5 (-1.64872127)

Q offset for dogfish should be the opposite low values first 20 years higher values second half

Annual deviations pelagic constant in 0

Estimated values

Estimated q for dogfish 1.9

Estimated q for mackerel 3.9

Check M1 values

Mackerel should be higher

Herring check magnitude

Mackerel is tricky (should be higher)

Change weight in dat file

Off set for fleets 🡪 reconcile catcxh and abundance trnds, example assumption pretend is a close population to make it easier, estimation performance weather or not I am follow the dynamics

M1 In aggregate it should be similar check stock assessment no hay mucho comiendo dogfish or cod

Assessment de herring que usen consumption estimates

Start with low values of other food

Check folder and excel and scenarios

## comments may

Did you explore any of the analyses we discussed during the meeting on Monday? (e.g. values for M, values for other food, etc.)

How are the fits to the stomach data?

How do the estimated trends compare to what you expect?

* For now, F values are low for pelagic because we only have fishing occurring on the largest length bin (see the selectivity estimates). Thus, the realized F is much lower than what you are trying to achieve. (As discussed on Monday this is very evident from the fact that predicted catch/biomass is nowhere near the intended values for the exploitation rate).
  + Predicted catch/biomass improved for mackerel after using just one survey
  + Dogfish biomass should be low (from assessment) in the last couple years but it’s not (actually is really high). If I check the other variables like F is lower in the second half of the time series (this makes sense if I have higher biomass values in the last years) but recruitment estimates are low, selectivity for demersal fleet is 1 in the length bin 3 so it is fully catching bins 3, 4 and 5 but selectivity for the pelagic fleet is 1 in the length bin 2. What does that mean? The pelagic fleet is catching smaller dogfish because the fishing gear is designed for smaller fish? Is dogfish part of the bycatch in the pelagic fleet?
  + For cod and dogfish F is high in the first 20 years which is consistent with the catch values
  + Biomass trends for herring are consistent with the stock assessment, starting with low values and then 2 maximums and low values at the end.
  + For mackerel, estimated biomass has 4 maximum values during the time series and the stock assessment just 2 (starting in 1980), but I think the total trend is kind of similar (decreasing over time).
* You're also getting some very large rec devs at the end of the time series (e.g. mackerel) - have you explored implications of changing these - what about fixing the later values that have little data to inform them.
  + Recruitment deviations are lower for mackerel after using just one survey
  + Selectivity still high for the larger length bins in pelagic fleet. Should I change the selectivity params for pelagic fleet in the pin file?)
* Same for survey selectivity.
  + Better results for selectivity using just one survey
* You don't really have anything feeding on dogfish or cod, so why would you expect the predation mortality to be 0.1?
  + Predation mortality should be more than 0.1 for herring and mackerel and not for dogfish and cod because they are predators in this model.
* In terms of diet composition data all other pray is the most important component for cod and dogfish, and for cod herring and cod in some years and mackerel and herring for dogfish. So, predation mortality should be bigger for those species. (Higher M2 in mackerel for sizes 2 and 3. Sizes 1 for cod due to cannibalism because it doesn’t look like dogfish is eating much cod.
* In terms of length compositions aggregated by year observed and predicted values in the catch data are similar with the biggest differences in cod and dogfish.
* Length composition aggregated by year for survey there are more differences between the observed and estimated data for all the four species.