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Background Rationale for Status Quo Management Advice on Division 3M Redfish

by

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Introduction

For past several years management advice for the 3M redfish stocks has been based on a common sense approach to the status of these stocks. Basically no changes were found in the stock indicators when the catches were kept around or bellow 20,000 tons. For the period where catches were well above that level (40,000 tons-80,000 tons) both survey biomass and commercial catch rates declined.
This year however a yield per recruit curve was carried out for 3M beaked redfish (Ávila de Melo *et al.*, 1997) and the estimated F0.1 value is within the range of values found for the neighbouring redfish stocks (Power,1997). The purpose of this work is to develop a rationale for providing advice consistent with the objective of management at F 0.1.

Description of the rationale and results

From the 1997 assessment of 3M redfish stocks (Ávila de Melo *et al.*) either biomass and abundance estimates from the EU bottom trawl survey series suggests no changes on both golden and Acadian redfish stocks, together with a continuous increase of the deep water redfish stock observed since 1993. The combined redfish bottom biomass from the EU survey presents since 1991 an interannual fluctuation synchronized with the Portuguese commercial catch rate series available, both series showing no apparent trend during this most recent period.

The EU redfish bottom biomass estimates were considered to be more representative than the obtained by the Russian bottom trawl survey series due to:

a) smaller relative inter-annual variability.
b) number of sets proportional to the area of each stratum and higher number of valid tows each year.

c) Good match between survey and commercial catch rate series, as well with the 1996 bottom biomass estimate (and its distribution over the bank) from the Canadian survey.
d) same survey vessel used throughout the time series (1988-1996), except for 1989 and 1990.

From the EU survey series it seems that the combined 3M redfish bottom biomass didn't change during the 1991-1996 period, fluctuating instead between consecutive years from an average low of 66,700 tons (1991, 1993 and 1995) and an average high of 102,500 tons (1992 and 1996). The 1994 biomass peak for this period is discarded in the estimation of the mean upper limit, since this estimate is highly influenced by an unusual concentration of golden redfish near the bottom (Cornus, 1996).

The Russian bottom trawl survey series has been complemented with an acoustic estimate of the pelagic component of the redfish stocks between 1987 and 1993 and at present is the only series providing an acoustic estimate of redfish biomass in midwater. This later estimate is given by the difference between the Russian total and the Russian bottom redfish biomass presented on last year STACFIS assessment (NAFO, 1997).

In order to get a proportion of redfish biomass near the bottom that could be used in the convertion of the EU redfish bottom biomass to a total biomass estimate for the more recent period of overall stability (1991-1996), the annual total redfish biomass for the years 19988-1993 was recalculated according to the bottom trawl catchability of the EU survey. This new estimate is given by the sum of the EU bottom biomass with the Russian acoustic biomass for each of the overlapping years of the 2 survey series (Table 1).

A mean high and a mean low proportion of bottom redfish biomass were estimated next by averaging the high and low values of the annual ratios between the EU bottom biomass and the "new" total biomass (EU bottom/ Russian acoustic combined) (Table 1).

The average lower bottom biomass from the EU survey (1991-1996) was then divided by the mean low proportion of bottom biomass in order to get an estimate of the average total redfish biomass. This assumes that, for the 1991-1996 period, low bottom trawl biomass correspond to years with a low proportion of biomass near the bottom. The annual exploitation rate corresponding to F0.1was applied to this estimate of the mean total redfish biomass for the 1991-1996 period of 208,053 tons, giving an yield at F0.1 of 24,263 tons (Table 2).

In order to get a second estimate of the mean 1991-1996 total redfish biomass a similar calculation was done using the average high bottom redfish biomass from the EU survey and the mean high proportion of bottom biomass, assuming again the synchronism of these two parameters. The same annual exploitation rate at F0.1 was applied to this second estimate of 202,868 tons giving an yield at F0.1 of 23,659 tons (Table 2).

Finally a more conservative mean 1991-1996 total redfish biomass was estimated using the average low bottom redfish biomass but now assuming that this low bottom biomass corresponds to the mean high proportion of bottom biomass. The annual exploitation rate at F0.1 applied to this conservative estimate of 131,983 tons gives an yield at F0.1 of 15,392 tons (Table 2).

Conclusion

Taking into account the variability associated with the survey data used in this exercise, all the above F0.1 catch options do not differ significantly from the TAC (or upper catch limit) recommended by the NAFO Scientific Council for the 3M redfish stocks for the 1986-1989 and 1993-1997 periods (20,000 tons). Furthermore, this reccomended TAC has been consistent with the objective of management at F 0.1. The recommended TAC´s for the 1990-1992 period were < 50,000 tons, 43,000 tons and 35,000 tons respectively.

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TABLE 1: Combined trawlable biomass from EU (1988-1996) survey and acoustic biomass from Russian (1987-1993) survey.
Total redfish biomass (EU trawl plus Russian acoustic), 1988-1993.

YEAR	EU bottom		Russia Acoustic	Total	bottom proportion		
1987							
1988	158.222		332.000	490.222	0.323	low	
1989	136.633		282.600	419.233	0.326	low	
1990	104.193		228.700	332.893	0.313	low	
1991	63.846	low	62.300	126.146	0.506	high	
1992	104.477	high	81.300	185.777	0.562	high	
1993	62.589	low	77.300	139.889	0.447	high	
1994	126.011						
1995	73.641	low			0.321	mean low	
1996	100.544	high			0.505	mean high	

TABLE 2: 3M redfish yield at F0.1 level for different levels of mean total biomass (1991-1996).

	bottom biomass	bottom proportion	total biomass	Annual F0.1	Yield at F0.1		
mean 1991,1993,199	66.692	0.321	208.053	0.117	**24.263**		
mean 1992,1996	102.511	0.505	202.868	0.117	**23.659**		
mean 1991,1993,199	66.692	0.505	131.983	0.117	**15.392**		