REASSESSING FLEET-SPECIFIC CATCH RATES IN THE EAST ATLANTIC AND MEDITERRANEAN BLUEFIN TUNA FISHERY

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SUMMARY

Fleet-specific potential catch rates for the East Atlantic and Mediterranean bluefin tuna fishery were reassessed based on individual quota allocations during 2009-2011. Results point to conservative values of potential catches per vessel being significantly higher than those used by SCRS in the last few years, a trend which is particularly conspicuous with purse seines. Extrapolating these values to the active fleet in the period 2008-2010 yields estimates of potential annual catches at 31,500-34,000 tons, considerably higher than the reported figures. Exploration of the effects of the new potential catch rates on the assessment of overall catch capacity of national fleets suggests that considerable overcapacity would remain even in the event of full compliance with the current capacity reduction plan.

KEYWORDS: Thynnus thynnus, fleet capacity, catch rates, annual catch

1. Introduction

In 2010 SCRS reviewed Atlantic bluefin tuna catch estimates in the East Atlantic and the Mediterranean in 2008 and 2009 based on the number of active vessels and information on weekly catch reports submitted to ICCAT. The methodological approach was similar to that carried out in the precedent years, involving the calculation of mean catch rates per fishing vessel categories (Table 1) and extrapolating them to the whole fleet to obtain an estimate of the total catch by the overall fleet[2]. Mean catch rates per fleet segment categories were first assessed by SCRS in 2008 - involving this time expert knowledge information (including guesstimates from individual national scientists), and these are currently used as reference to implement the fishing capacity management plan (ICCAT Rec. 08-05 and ICCAT Rec. 10-04).

Overall catch estimates obtained by SCRS in 2010 for 2009 and 2008 pointed to relatively low values compared to previous assessments for 2006 and 2007. This led SCRS to hypothesize either changes in the estimation procedure or the effect of stricter management measures to explain the sharp differences. Moreover, SCRS acknowledged that both weekly catch reports and BCDs -on which calculations relied- were still incomplete for 2009 and 2009, and concluded that results obtained for 2008 and 2009 were not a good approximation of both active and the latent potential fishing capacity: “the Working Group felt that the current estimations do not reflect the fishing capacity but it does not see any better alternative for the moment”.

With the above antecedents, and given the paramount relevance of knowing as precisely as possible capacity levels in order to 1) adequately deliver on the agreed fleet capacity reduction goals and 2) estimate real catch levels, here we develop an alternative approach based on individual quota allocations to estimate catch rates per fleet segment, and we discuss why we think this methodology yields precautionary figures closer to reality. Finally we address some of the management implication of the new approach by reviewing catch levels in 2008 and 2009 and reassessing actual compliance with capacity reduction objectives by some ICCAT CPC fleets.

2. Materials and Methods

Allocation of individual quotas to active vessels in the Atlantic bluefin tuna fishery was first provided for by ICCAT on a voluntary basis through Rec. 2006-05, and it became obligatory for all active vessels over 24-m starting in 2009 (through Rec. 08-05). We assumed that mean values of individual quotas per fleet segment could be used as more reliable estimates of potential catch rates per vessel type once the factors related to 1) the inter-annual variation in the duration of the fishing season per fleet gear and 2) the constrains on the realization of

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[2] http://www.iccat.int/Documents/Meetings/Docs/2010_BFT_Data_Prep_Rep_ENG.pdf

potential fishing capacity imposed by national TACs, were taken into account. To address the latter factor, we decided to consider only individual quota values above the best estimates for 2009 adopted by SCRS in 2010 (Table 1). Estimated yield values for 2009 were deemed more conservative than those estimated for 2008, as fishing seasons in 2009 were generally shorter. Individual quotas below best estimate yields by SCRS wouldn't actually inform on catch potential but would rather be an artifact of low national quotas. Indeed, for a given fleet segment it is the higher individual quotas values the ones that would better reflect catch potential; this is particularly true for purse seiners as their cooperative fishing strategy wouldn't result in large discrepancies in catch potential among vessels within the same fleet category. As a result, it can be concluded that mean individual quotas per fleet segment, calculated excluding the lower values, are a precautionary estimate of actual catch potential per vessel type, accounting for the duration of the season (though these would still be underestimates as even large values are constrained by TAC levels and national quotas). The example of individual quotas allocated to large purse seines in 2010 and 2011 is shown in Figure 1.

In 2008 the duration of the fishing season for purse seiners in most of the Mediterranean was set at 6 months (1st January – 30th June), and that of large longlines at 5 months (1st January – 31st May) (Rec. 06-05). As Rec. 06-05 in force that year didn't include a legal obligation to set individual quotas per vessel we explored, as best proxy, the use of individual quota records available on the ICCAT vessel database for 2009 (and later years). It should be noted, however, that extrapolation of 2009 and later years' data to 2008 results in potential underestimates for purse seiners, as the fishing season in 2008 was much longer than in recent years (1 to 2 months; Rec 08-05 & Rec. 10-04). This reinforces the highly conservative nature of our approach.

For the year 2009 and 2010 we analyzed individual quotas per fleet category available on the ICCAT vessel database relative to the years 2009, 2010 and 2011, grouping the data as necessary based on season length.

Statistical significance of differences in mean individual quotas among fleet categories and years was tested (t-test) and data was pooled accordingly.

Estimated yield in the East Atlantic and Mediterranean bluefin tuna fishery in 2008, 2009 was calculated by extrapolating the new potential catch rates per fleet category to the active fleet composition estimated by SCRS for 2008 and 2009 (ICCAT, 2010), following the same procedure as the SCRS. For 2010, we extrapolated to the active fleet as it appears on the ICCAT vessel database.

Finally, the new potential catch rates were used to assess the robustness of the current ICCAT fleet capacity reduction plan .We recalculated the EU catch capacity in 2011 based on the new rates using the official equation R= (C08-C11)/(C08-Q11), being R: reduction of fishing capacity, C08: fishing capacity in 2008, C11: fishing capacity in 2011 and Q11: assigned quota for 2011, and assessed the degree of alignment with the mandatory capacity reduction levels.

3. Results

Table 2 shows our conservative best estimates for potential catch rates per fleet category based in the ICCAT available data on individual fishing quotas for 2009 and 2010/2011 (data was pooled as the legal duration of fishing seasons those two years remained the same). No significant statistical differences were found among potential mean catch rates for purse seines larger and lower than 40 meters in 2009 and larger than 40 m in 2010/11, so a single mean value was estimated at 116.52 tons. This contrasts with potential catch rates for purse seiners below 40 m in 2010/11, for which a significantly lower value was estimated at 75.16 tons.

Applying to the overall active fleet the new potential catch rate values shown in Table 2, supplemented with the standard values adopted by SCRS (2010) for the fleet categories for which no new information could be estimated here, yields very different results from those obtained by SCRS (Tables 3 & 4). Results obtained suggest that a conservative estimate of maximum potential catches based on active fleet capacity and accounting for the new management limitations in 2008, 2009 and 2010 would amount to 32,337 t., 34,038 t. and 31,500 t, respectively.

The new catch capacity calculated for the EU fleet in 2011 amounts to 9,728.46 tons (Table 5), which contrasts with the 8,104 tons in the 2011 EU Capacity Plan (ICCAT, 2011, App. 7), based on lower catch rate figures, particularly those relating to purse seines. The new estimate for EU capacity corresponds to a reduction level of only 62.7% with respect to the 2008 baseline, contrasting with the 78% obtained using the official capacity estimation in the EU Capacity Plan. The new figure is well below the mandatory threshold of 75% reduction in 2011 provided for by the current ICCAT recovery plan.

4. Discussion

The new estimates for vessel catch capacity were significantly higher than those formerly considered by SCRS, particularly those for purse seines (around 116 t. for large purse seines vs. only 61 t.). However, we would like to stress that our proposed methodology based on individual quota allocations is still constrained by TACs and quotas (that were much lower the last years), so it has to be considered highly conservative in its ability to inform on the full potential for realization of catches. This is exemplified by the much high higher individual quota values recorded for certain vessels in those countries benefiting from the largest quotas.

Total yield estimates in the fishery in 2008-2010 based on the updated catch rates should be interpreted as the conservative estimates of maximum possible catches by the legally registered fleet, accounting for IUU, similarly to figures estimated by SCRS in 2008 for the previous years. Obviously, real catch figures would have resulted from the tradeoff between MCS measures aiming at achieving enforcement of the rules and the natural tendency of the fleet towards fully realizing their catch capacity, so it can be assumed they lie somewhere within the red range shown in Figure 2. It's worth nothing, though, that upper estimates of this range derived from our study (31,500-34,000 t./year) are in good agreement with annual trade flows estimated recently by Mielgo (2011), based on markets data (37,931 t., 35,241 t and 28,500 t of equivalent round weight in 2008, 2009 and 2010, respectively).

Consideration of the right potential catch rates is crucial to the success of the current fleet capacity reduction plan that is being implemented in the Eastern Atlantic BFT fishery. The example of the EU fleet –which holds much of the fishing capacity in this fishery--, is illustrative enough of the risk of retaining significant overcapacity while nominally accomplishing the objectives of the plan. Indeed, using the updated catch rates the EU fleet would fall short from delivering on its capacity reduction objectives for 2011 (63% reduction against the 75% objective).

References

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Table 1. Bluefin tuna catch rates per fleet segment (East Atlantic and Mediterranean) as currently used in ICCAT. "ICCAT BFT Fishing Capacity Management Plans" refers to capacity management obligations under Rec. 10-04 and earlier ones. The corresponding catch rates detailed below are currently in use to estimate fleet capacity. Catch rates referenced "SCRS 2010" were used by ICCAT SCRS to assess potential catches in 2008 and 2009 based on fleet capacity.

Category	Source	Catch rate (tons)
PS large (> 40 m)	ICCAT BFT Fishing Capacity Management Plans	70.7
PS (>=40)	SCRS 2010	66 (2008); 61 (2009)
PS med. (24-40 m)	ICCAT BFT Fishing Capacity Management Plans	49.8
PS (>= 20 - <40)	SCRS 2010	54 (2008); 45 (2009)
PS small (<=24 m)	ICCAT BFT Fishing Capacity Management Plans	33.7
PS (>15 - <20)	SCRS 2010	5 (2008)
PS (<=15)	SCRS 2010	1 (2008)
LL (>= 40)	SCRS 2010	24 (2008); 53 (2009)
LL med. (24-40 m)	ICCAT BFT Fishing Capacity Management Plans	5.7
LL (>=20 - < 40)	SCRS 2010	14 (2008); 10 (2009)
LL small (<= 24 m)	ICCAT BFT Fishing Capacity Management Plans	5
LL (>15 - <20)	SCRS 2010	6 (2008); 5 (2009)
LL (<=15)	SCRS 2010	2 (2008 & 2009)
Baitboat	ICCAT BFT Fishing Capacity Management Plans	19.8
BB (>=20 - <40)	SCRS 2010	20 (2008); 12 (2009)
BB (>15 - <20)	SCRS 2010	10 (2008); 1 (2009)
BB (<=15)	SCRS 2010	0 (2008 & 2009)
Handline	ICCAT BFT Fishing Capacity Management Plans	5
HL	SCRS 2010	5 (2008); 3 (2009)
Trawl	ICCAT BFT Fishing Capacity Management Plans	10
TW	SCRS 2010	6 (2008 & 2009)
Other artisanal	ICCAT BFT Fishing Capacity Management Plans	5
OT	SCRS 2010	36 (2008); 18 (2009)
Trap	ICCAT BFT Fishing Capacity Management Plans	130
TP	SCRS 2010	130 (2008 & 2009)

Table 2. Best estimates (in tons) of potential catch rates per fishing category obtained in this study. As explained in the text, means are based on individual quota records larger than 2009 catch rates estimated by SCRS (2010a); see footnotes 1-5).

	2009			2010 & 2011		
Category	**n**	**mean (t.)**	**Std. err.**	**n**	**mean (t.)**	**Std. err.**
Purse seines						
PS (>=40)[1]	12	119.72[a]	13.67	21	114.93[a]	6.70
PS (>= 20 - <40)[2]	8	115.88[a]	15.49	40	75.16	4.65
Longlines						
LL (>= 40)[3]	1	73.29	-	-	-	-
LL med. (24-40 m)[4]	-	-	-	2	11.61	0.38
Baitboats						
BB (>=20 - <40)[5]	-	-	-	19	22.56	1.59

[1] > 61 t ; [2] > 45 t; [3] > 53 t; [4] > 10 t; [5] > 12 t (SCRS, 2010)

[a] differences non-significant (T-test, P=0,78). Overall mean (n: 41) = 116.52

Table 3. Conservative estimates of maximum potential catches on Atlantic Bluefin tuna in the East Atlantic and Mediterranean fishery in 2008 and 2009 based on active fleet capacity. Underlined figures correspond to new potential catch rates derived by this study (see Table 2). Fleet data and remaining catch rates are as in SCRS (2010a).

	2008			**2009**		
Category	**Nb. Vessels**	**Catch rates (t.)**	**Est. yield (t.)**	**Nb. vessels**	**Catch rates (t.)**	**Est. yield (t.)**
Purse seines						
<15m	3	1	3	-	-	-
15–20m	5	5	25	-	-	-
20-40m	156	116.52	18,177.12	152	116.52	17,711.04
>40m	51	116.52	5,942.52	62	116.52	7,224.24
Longlines						
<15m	185	2	370	135	2	270
15-20m	59	6	354	56	5	280
20-40m	37	14	518	37	10	370
>4m0	6	73.29	439.74	36	73.29	2,638.44
Baitboats						
15- 20m	3	10	30	3	1	3
20-40m	60	22.56	1,353.6	59	22.56	1,328.68
Handlines	92	5	460	91	3	273
Trawlers	76	6	456	46	6	276
Traps	26	130	3,380	25	130	3,250
Other	23	36	828	23	18	414
TOTAL			**32,336.98**			**34,038.40**

Table 4. Conservative estimates of maximum potential catches on Atlantic Bluefin tuna in the East Atlantic and Mediterranean fishery in 2010 based on active fleet capacity. Underlined figures correspond to new potential catch rates derived by this study (see Table 2). Fleet data is based on ICCAT national fishing plans as found in the 2010 Report of the Inter-sessional Meeting of the Compliance Committee.

			2010
Category	**Nb. Vessels**	**Catch rates**	**Est. yield**
Purse seines			
<24m	33	5	165
24 -40m	130	<u>75.16</u>	9,770.8
>40m	43	<u>116.52</u>	5,010.36
Longlines			
<24	197	5	985
24-40m	17	<u>11.61</u>	197.37
>40m	39	<u>73.29</u>	2,858.31
Baitboats			
>24m	69	<u>22.56</u>	1,553.88
Handlines	47	5	235
Trawlers	78	6	468
Traps	26	130	3,380
Other	382	18	6,876
TOTAL			**31,499.72**

Table 5. Calculation of total capacity for the EU fleet in 2011 based on the new catch rates (underlined). Fleet figures and non-updated catch rates as are in the EU Capacity Plan for 2011 endorsed by ICCAT after discussion at the 2011 COC Inter-sessional.

	2011		
Category	**Number of vessels**	**Catch rates**	**Capacity (t.)**
Purse seines			
24-40m	18	75.16	1,352.88
>40m	20	116.52	2,330.4
Longlines			
<24m	168	5	840
24- 40m	10	11.61	116,1
Baitboats	68	22.56	1,534.08
Handlines	31	5	155
Trawlers	60	10	600
Traps	13	130	1,690
Other	222	5	1,110
TOTAL			**9,728.46**

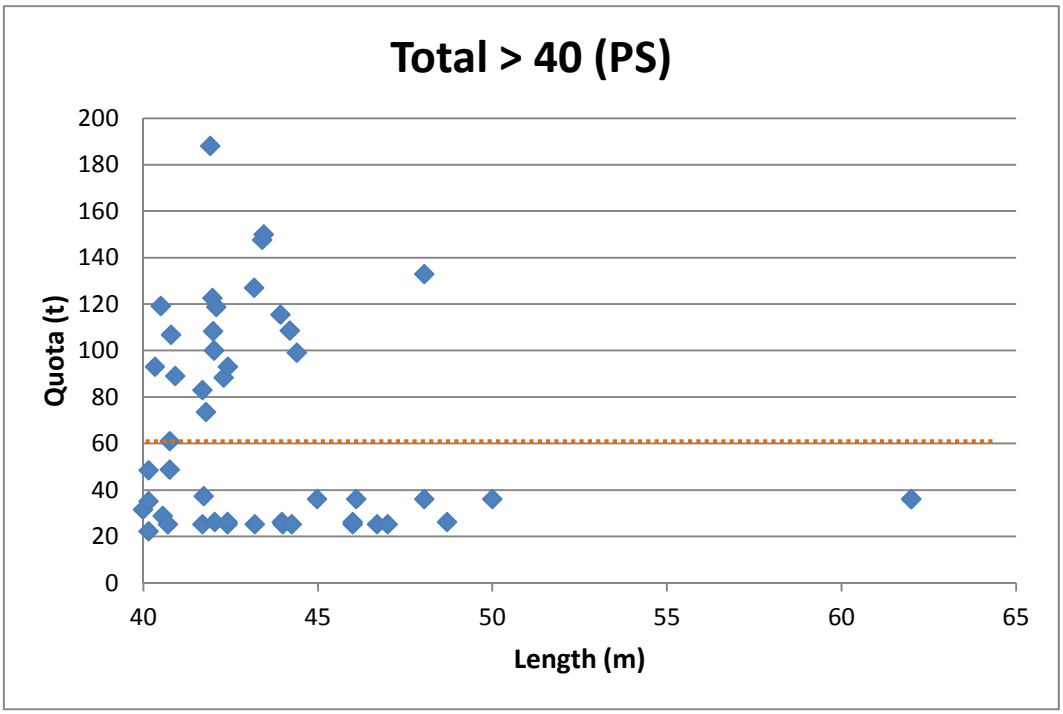

Figure 1. Individual quotas as reported in ICCAT fleet database corrresponding to purse seine vessels over 40-m of desk lentgh targetting Atlantic bluefin tuna. Data for 2010 and 2011 fishing seasons (with same duration of authorised fishing season) is pooled. Red dotted line shows the best catch rate for this vessel category adopted by SCRS in 2010 (61 t./vessel).

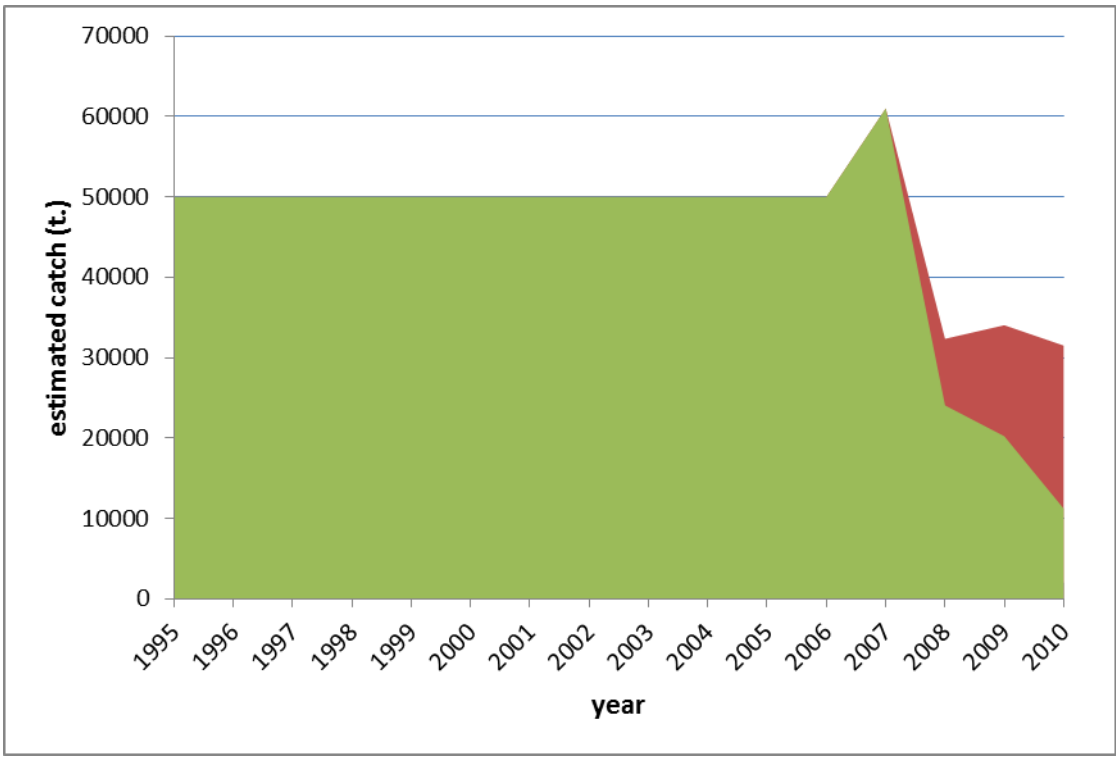

Figure 2. Realistic recent trends in Atlantic bluefin tuna catches in the East Atlantic and the Mediterranean. This display assumes catches at 50,000 t. per year between 1995 and 2006, with a peak at 61,000 t for 2007, based on SCRS (2008). Catches in the past 3 years would be within the range showed in red, upper values being defined by potential catches based on active capacity estimated in this study and lower ones corresponding to reported catches (24,057 t. in 2008, 20,228 t. in 2009 and 11,228 t in 2010).