

The Hidden Science behind the Quota or – What They Don't Want You to Know

Seven fishery scientists signed their names to the discussion paper “The Commonwealth Small Pelagic Fishery: general background to the scientific issues” which can be downloaded from the AFMA (the Australian Fisheries Management Authority) website at <http://www.afma.gov.au/wp-content/uploads/2010/06/SPF-discussion-paper-FINAL.pdf>.

What the authors don't say is that one of them was also the principal author of a paper published in the prestigious journal *Reviews in Fisheries Science*; this paper has the rather long name “*Use of the Daily Egg Production Method for Stock Assessment of Sardine, Sardinops sagax; Lessons Learned over a Decade of Application off Southern Australia*” (Volume 19 No 1 (2011) pp 1-20).

What's the relevance? This paper was referred to by the authors to support their position that the jack mackerel quota of 10,100t is OK, but acknowledge there are uncertainties in the analysis of the egg samples which is part of the *science* leading to the setting of this quota. In particular, they use the paper to make the point that estimates of spawning biomass are poor regardless of the statistical analysis technique used to analyse egg abundance data: these techniques go by math names such as *exponential model*, *non-linear least squares regression*, *log-linear model* or *generalized linear models (GLMs)*.

Having introduced the math followed by further discussion, they conclude that potential effects of this uncertainty on estimates of spawning biomass are *low* compared to what they call *negative bias*. What's this? Well, they think their *best-estimate* of 140,000t of jack mackerel is lower than what it should be because samples were taken in only part of the fishery (~600km down the NSW coast out of a total of ~1500 km if we go all the way down to Tasmania), and that October, when the samples were taken in 2002, wasn't the best spawning time for mackerel.

Back to the paper with the long name: the hard “*lesson learned*” was that the *log-linear model* gives better results than either *exponential models* or *generalized linear models* because, and we quote, “*it ... provides more logically consistent and precautionary estimates*”. So what's the point? Well, if applied to the jack mackerel egg data collected in October 2002, the recommended *log-linear model* leads to an estimate of jack mackerel spawning mass of only 24,000t, far and away lower than 140,000t. In fact, 83% lower, just 1/6th of their *best-estimate*!

That's the recommended and precautionary estimate that the authors of the “*general background*” didn't want you to calculate for yourselves. This is the value they ignored, the value they don't want you to know.

What's the impact? The AFMA used the 140,000t to set a *recommended biological catch* of 10,600t of jack mackerel (that 7.5% of the spawning mass) – the total allowable catch (TAC), aka quota, is 10,100t.

This quota, supported by the 7 scientists, is 42% of the precautionary estimate of 24,000t of jack mackerel spawning biomass. That's double the maximum 20% exploitation rate internationally recognised as sustainable and set by the AFMA's Harvest Rules.