



## Australian Management Protocols for Alfonsino (from Shotton 2016) The Tier Management Method

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The following is taken from pages 121 – 123 of Shotton, R. 2016. Global Review of Alfonsino (*Beryx* spp), Their Fisheries, Biology and Management. FAO Fish. & Aquaculture. Circ. No. C1084. FIRF/C1084 (En). 147pp. It may well be out-dated by now but should be of some relevance.

### 11.5 Australian Management Protocols for Alfonsino

#### 11.5.1 Management procedures

The Australian fishery for alfonsino is managed as part of the Southern and Eastern Scalefish and Shark Fishery. Overall management of this fishery is mainly through annual total allowable catches allocated as statutory fishing rights. Since 2005 a 'tiered harvest strategy framework' has been applied that has evolved over time (AFMA 2009, DAFF 2003).

The harvest strategy has three tiers (there were four) that cater for the different levels of uncertainty about the [status] of the stocks and each stock is assigned to a tier based on how much knowledge exists as to its status (Smith & Smith 2005).

*Tier 1* is the highest level and applies to stocks that have 'high quality' information available. A quantitative model-based stock assessment is undertaken in these cases. These provide estimates of current biomass levels and fishing mortality relative to target and reference points. The target biomass is that which can produce maximum economic yield; where this is none known, then 1.2 times the biomass producing maximum sustainable yield. The proxy for  $B_{MSY}$  is 40% of the unfished biomass; for  $B_{MEY}$  it is 48% of  $B_0$ . The limit reference point is  $0.2B_0$  i.e.,  $0.5 B_{MSY}$ . Fishing mortality for a fish stock is set to zero when biomass is less than the limit reference point. If the biomass is less than  $0.35B_0$ , the level of fishing mortality is decreased to enable the biomass to rebuild. They use the term 'recommended biological catch' (RBC), which may or may not be the TAC.

Tier 3 fisheries are managed using a catch-curve analysis (Wayte & Klaer 2010) to estimate the average recent fishing mortality, based on the age structure of the catch, biology of the species, total catch weight and selectivity of the fishing gear. The limit reference point is the level of fishing mortality that would lead, in the long term, to a biomass equal to  $0.5B_{MSY}$  or a proxy. The target reference point is fishing mortality that would lead to a biomass equal to  $B_{MEY}$  or its proxies. The reference B catch is set as a proportion of average recent catch, where the proportion depends on the relationship between the estimate of current fishing mortality and the reference points.

*Tier 4* fisheries consist of those about which least is known, e.g. only catch rate trends. (In principle) Tier 4 uses catch per unit effort (CPUE) reference points as proxies for  $B_{LIM}$  and  $B_{TARG}$ , and assumes that the CPUE reflects the trend in biomass of a species. The target CPUE is the average for a period of years (the reference period) when the species was considered to be fully fished, CPUE and catch were relatively stable, and the fishery was considered to be both profitable and sustainable. For species that do not have a long history of

exploitation, the average CPUE for a reference period early in the fishery is considered to represent a relatively unfished state, and the target CPUE is set at half this level (approximating the default proxy for  $B_{MEY}$  of  $0.48B_0$ ). In both cases, the limit reference point is set at 40% of the target (approximating  $0.2B_0$ ). The RBC is set as a proportion of the average catch in the reference period (or half this value for relatively unfished species), where the proportion depends on the relationship between the current standardised CPUE and the reference points.

The *Target* and *Limit* reference points reflect the tier to which the fishery has been assigned: the level of “precaution” in the TACs is intended to increase from Tier 1 to Tier 4 reflecting the greater uncertainty in assessments at higher levels. Each tier has specific harvest control rules to determine a recommended biological catch. The Tier 3 and 4 assessments do not include any inherent level of increasing precaution to offset increasing uncertainty. Therefore, ‘precaution’ is introduced through a default discount factor that reduces the RBCs by 5% for Tier 3 species and 15% for Tier 4 species. The Resource Assessment Group can recommend that the discount factors are not required if there is evidence that adequate precaution was already afforded through other management measures (e.g. closures) or that the fishery had exhibited stability at current catch levels. Application of appropriate discount factors for Tier 3 and 4 stocks is needed to ensure that these stocks are not at increased risk as a result.

The discount factors that are applied to Tier 3 and 4 fisheries are fundamental to the tier system as they are the main mechanism for increasing precaution with increasing uncertainty in the assessments; however, the discount factors remain a source of debate within the Regional Advisory Groups.

#### *Post-assessment modifiers*

In addition to the above harvest control rules, additional rules have been developed in response to industry concerns and are applied by AFMA in recommending TACs to the AFMA Commission:

- Recent catch-rate multiplier: This incorporates the recent industry catch-rate data in recognition of the time lags inherent in the assessment process. TACs are adjusted up or down according to whether the standardised CPUE for the most recent year is higher or lower than in the previous year.
- Maximum change: Increases in TACs are limited to no more than 50%, to avoid rapid large changes.
- Minimum change: To avoid variation in TACs that may reflect minor inter-annual variation, no change is made if the recommended change in TAC is less than 10% or 50 t (whichever is less). However, if a trend in the RBC figure within the 10% or 50 t limit (either up or down) continues over successive years, the recommended increase or decrease in the TAC will be adopted.

#### *Species below the biomass limit reference point*

In the case of overfished stocks, where the current biomass is estimated to be less than 20% of unfished biomass, the RBC is set to zero and there should be no targeted fishing, in line with the harvest strategy plan. For these species, AFMA sets ‘bycatch TACs’ at low levels to allow for unavoidable catch taken during targeted fishing for other species. The process for setting bycatch TACs is not detailed in the HSF.

#### *Carryover and change to fishing year*

Operators can carry over a limited credit of uncaught quota or a debit of catch in excess of their quota to the following fishing year. For most stocks in the SESSF this amount is generally set at a maximum of 10%. There is no carryover of uncaught quota for bycatch TACs. AFMA also sets a ‘determined amount’, which is the maximum amount, in addition to the percentage of ‘overcatch’ that an operator may take under certain conditions without committing an offence. However, twice the quantity of any catch above the quota, but below the determined amount, that applies for a stock is deducted from the operator’s statutory fishing rights for the following season.

ABAR notes that there are stocks for which none of the tier levels are appropriate: There are stocks for which the Regional Advisory Group has limited or no confidence in the available assessment approaches and an alternative approach should be considered to guide RBCs for these species.

Vessel level management is by statutory fishing rights for alfonsino and TACs (orange roughy and boarfish). Consultative forums are the South East Management Advisory Committee (SouthEastMAC) and the Slope/Deep Resource Assessment Group (Slope/Deep Regional Advisory Group), who advise on management (Slope/DeepRAG 2011).

Effort in the ECDTS has been very low since 2007. A single trip took place in the 2009–10 fishing season, landing 14 t, and there were no trips in the 2010–11 fishing season. Since 2000, 1298 t of alfonsino has been landed in the ECDTS and 249 t in the Commonwealth Trawl Fishery, which is not covered by quota.

### 11.5.2 Harvest Strategy

The ECDTS is managed under the SESSF harvest strategy framework (AFMA 2009). A TAC of 500 t has been in place since 2005, and was applied for the 2010–11 fishing season. The sporadic fishing has made data collection and assessment difficult. The standardised catch per unit effort series does not provide informative trends, primarily due to the small number of vessels and records in the fishery. The 2009 Tier 3 assessment was based on age frequency data from otoliths collected in 2003 and 2007 as there were no length frequency data. Use of these data assumes that the samples for ageing were a ‘robust’ representation of the age frequency. The current catch was estimated based on the SESSF and high-seas catch since 2000. The catch-curve analysis (Klaer 2008) suggested that the current fishing mortality was above the target fishing mortality ( $F_{48}$ —the fishing mortality that would result in a biomass of 48 per cent of unfished levels,  $0.48B_0$ ) but below the limit ( $F_{20}$ ), and the harvest control rules resulted in a recommended biological catch (RBC) of 82 t. As the data have been collected from a restricted area (100 km<sup>2</sup>) south-west of Lord Howe Island, AFMA recommended a TAC of 500 t for the broader area to encourage fishing and further data collection (SEMAC 2010). A trigger of 100 t was put in place for the area south-west of Lord Howe Island; the area would be closed if this trigger were reached.

The 2010 updated Tier 3 assessment used age-frequency data from otoliths collected in 2007 and 2009 (Klaer 2011) and the current catch was calculated from the ECDTS and adjacent high-seas catch since 2000. The catch curves for both years were relatively consistent, and the average slope of the curve was used. The catch-curve analysis estimated a lower total mortality than the previous assessment and, assuming a constant natural mortality, a much lower current fishing mortality.

The current fishing mortality is less than  $F_{48}$ , and so the Tier 3 harvest control rules resulted in an RBC of 1160 t (Klaer 2011). The 50% change limiting rule would constrain the increase in TAC for the 2011–12 fishing season to 750 t (Slope/DeepRAG 2011). The fact that two years of ageing data are now available and the age structure is relatively consistent between the years gave Slope/DeepRAG (2011) confidence in the robustness of the catch-curve analysis and assessment. No fishing took place in the 2010–11 fishing season. The most recent assessment indicates that the fishing mortality is below the target fishing mortality, and so the stock is considered not subject to overfishing.

Generally, Tier 3 assessments cannot be used to provide an indication of biomass status. However, the Tier 3 assessment in this case includes the entire history of the fishery since 2000. As the Tier 3 assessment determined that fishing mortality was not large enough to be considered overfishing, and this has been the case for the entire history of the fishery, the stock is considered not overfished. There is uncertainty due to the limited data available, as well as the catch-curve analysis being based on the age-frequency data from fish collected for otoliths, which may not be representative of the actual age frequency.