



Australian Government

Australian Fisheries Management Authority

ETBF Harvest Strategy Simplified

What is a harvest strategy?

A harvest strategy is a formal decision making process that sets out the management actions necessary to achieve defined biological and economic objectives in a given fishery. The harvest strategy outlines rules for setting the catch level and criteria on which decisions will be based in order to achieve the agreed long term fishery objectives.

The rules and criteria of the harvest strategy adopted for the ETBF have been agreed by industry, fisheries managers and scientists over a series of meetings first held in 2006 and the harvest strategy has been approved by the AFMA commission.

Amendments to the rules and criteria can be made during the life of the harvest strategy if there are significant changes to the fishery or new information becomes available, provided the key stakeholder groups are involved in any changes.

Why are we implementing the harvest strategy?

The harvest strategy provides a mechanism for determining a Recommended Biological Commercial Catch (RBCC) which will assist AFMA set a Total Allowable Commercial Catch (TACC) for each of the five key species in the ETBF (Yellowfin tuna, Bigeye tuna, Broadbill swordfish, Albacore tuna and Striped marlin). This will:

- produce assessments of the domestic fishery for the key target species that abide by a consistent process designed to ensure these species are exploited at a sustainable level;
- allow for the gradual rebuilding of fish stocks that are currently being overfished;
- allow for the sustainable development of emerging fisheries such as the Albacore tuna fishery; and
- provide stability to industry by reducing the variation in species TACCs from year to year so that operators know how much they can catch each year and plan their fishing operation accordingly.

ETBF Harvest strategy objective

The Eastern Tuna & Billfish Fishery harvest strategy was developed in line with the Commonwealth Fisheries Harvest Strategy Policy (2007) (CHSP). The objective of the CHSP is the sustainable and profitable utilisation of Australia's Commonwealth fisheries in perpetuity ***through the implementation of harvest strategies that maintain key commercial stocks at ecologically sustainable levels and within this context, maximise the economic returns to the Australian community.***

To meet the objective of the CHSP, the ETBF harvest strategy aims to pursue an exploitation rate that keeps fish stocks at a level equal to maximum economic yield (MEY) and ensure stocks remain above a limit biomass level (B_{LIM}) at least 90% of the time.

The ETBF harvest strategy aims to achieve and maintain catch rates of the five key target species similar to 1997-2001 levels over a long period of time. Catch over this period is thought to provide a good estimate for Maximum Economic Yield.

The Target Reference Point was set by taking the level of depletion of the stock during 1997 from the model used in the stock assessment and relating it to the standardised CPUE in the ETBF during that year. Using this relationship, together with the standardised CPUE during each year, the associated level of depletion of the stock was determined for each year of the reference period (1997-2001) and then averaged to provide an average stock depletion over the reference period. The historical catch rate that corresponded to the Maximum Economic Yield (proxy of 48% of the average stock depletion) was then calculated. This value was then recommended as the Target CPUE Reference Point.

What data does the harvest strategy use?

The harvest strategy uses empirical data collected from the fishery such as catch rates and size measurements of fish caught by the domestic fleet when operating in the AFZ. The catch will be broken down into 3 fish size categories so that years of high recruitment or low spawning potential can be detected and reflected in the harvest strategy. The size data will come from the size monitoring program conducted by WW Fisheries so any changes in fish availability or size in the domestic fishery should be rapidly reflected in the harvest strategy.

How does the harvest strategy work?

In order to achieve its objective, the ETBF Harvest Strategy collects data from the fishery and uses these data in a series of decision rules to determine the Recommended Biological Commercial Catch (RBCC). In particular, the RBCC is updated in response to the following key indicators of existing fishing conditions:

- i) trends in the biomass of prime-size (or optimal-sized) fish available to the fishery,
- ii) the proportion of large-sized fish in the catch, and
- iii) trends in the availability of small-sized fish in the fishery.

When fishing conditions are favourable for a given species, the RBCC will increase and when conditions are unfavourable the RBCC will decrease. Over the long term, however, the harvest strategy aims to achieve the agreed target of 1997-2001 catch rates..

Trends in the availability of the given size class in the fishery are based on the annual time-series of standardised catch rates. Catch rates are standardised to account for differences in the fishing strategies and fishing gears deployed when targeting different species as well as for changes in oceanographic conditions. Incorporating information on the size structure of the catch into the harvest strategy also allows changes in the structure of the fish population under different levels of exploitation to be monitored, such as declines in spawning stock and/or recruitment.

In this way the harvest strategy attempts to mimic a more comprehensive stock assessment.

Management Strategy Evaluation

Management Strategy Evaluation (MSE) is an approach that allows the likely performance of harvest strategies to be tested in a virtual world (via simulation modelling) before implementing them in the fishery. The FRDC, AFMA and CSIRO funded a MSE project to further develop and test the harvest strategy for the ETBF. This has allowed Eastern Tuna MAC and AFMA to select a form of the harvest strategy that is most likely to meet the economic, operational and stock objectives for the fishery.

Implementation

The ETBF Harvest Strategy has been developed over a number of years by ETRAG, in consultation with ETMAC and AFMA, and supported by a technical team from CSIRO. It was used to inform the setting of the TAE for the 2009-11 fishing season and will be used to inform the RBCC for each of the target species for the 2011/12 season.

Harvest strategies are designed to be used with a single year total allowable catch levels and Eastern Tuna MAC agreed that changes to catch levels (TACCs) should be assessed annually until the harvest strategy settles down. Once the harvest strategy is well established it is possible for the MAC to consider a longer period between TACC changes if appropriate.

The MAC also agreed to limit the magnitude of annual change to the overall catch to 10% up or down in the initial period of harvest strategy implementation. This can also be reassessed once the harvest strategy is established and has a history of predictable results.

Figure 1.

Level 1: Adjust RBC based on status of CPUE-Prime Indicator

$$RBC(t+1) = TAC(t) * [1 + \beta \cdot \text{Slope-to-Target}(CPUE-Prime)]$$

Level 2: Assess status of rate of change in CPUE-Prime

RISING

STABLE

FALLING

Level 3: Assess status of Old Fish relative to SPR_{40} Thresholds

A. If *CPUE-Old* above & *Proportion-Old* above

B. If *CPUE-Old* above & *Proportion-Old* below

C. If *CPUE-Old* below & *Proportion-Old* above

D. If *CPUE-Old* below & *Proportion-Old* below

Level 4: Assess status of Recruits

A. Stock ↑ or Effort Creep

Is *CPUE-Recruits* high?

Yes: No change No: Reduce RBC

B. SPR ↓ (effort creep) and/or Stock ↑

Is *CPUE-Recruits* high?

Yes: No change No: Reduce RBC

C. Unusual Transient Dynamics

No change

D. SPR ↓ (effort creep) or

Recruitment ↑

Is *CPUE-Recruits* high?

Yes: No change No: Reduce RBC

Level 4: Assess status of Recruits

A. All Stable or Lightly Fished

No Change

B. SPR ↓ (effort creep)

Is *CPUE-Recruits* decreasing?

Yes: 2x Reduce RBC No: Reduce RBC

C. Recruitment ↓ or transition state

Is *CPUE-Recruits* decreasing?

Yes: Reduce RBC No: No Change

D. SPR ↓ (effort creep) and/or

Recruitment ↓

Is *CPUE-Recruits* decreasing?

Yes: Reduce RBC δ^2 No: Reduce RBC

Level 4: Assess status of Recruits

A. Failing Recruitment?

Is *CPUE-Recruits* decreasing?

Yes: 2x Reduce RBC No: Reduce RBC

B. Unusual Transient Dynamics

2x Reduce

C. Failing Recruitment?

Is *CPUE-Recruits* decreasing?

Yes: Reduce RBC δ^2 No: Reduce RBC

D. General Stock Decline

Is *CPUE-Recruits* decreasing?

Yes: Reduce RBC δ^3

No: Reduce RBC δ^2