Concerns about unreported dead discards

• Only six of 28 ICCAT cooperating parties have reported dead discards of WHM since 2000 (the United States is one of the reporting CPCs).

• The discard rates of other CPCs may be lower than that of the U.S. (which prohibits sales) because retention/sale is allowed, but some dead discards would be expected.

• Dead discards from longline for CPCs which do not report dead discards were estimated based on the dead discard rate of reporting CPCs (other than the U.S). This rate ranged from 0-2.4% of reported landings.

• The Working Group agreed to include these estimated dead discards in the estimate of total removals.
Two stock assessment models were used:

- **Stock Synthesis**
  a fully integrated length-based age-structured model

- **JABBA**
  Bayesian surplus production model in which the prior distribution on population growth rate was approximated with the life history parameters selected for Stock Synthesis (for consistency across models)
Standardized CPUE series used in the 2019 White Marlin stock assessment

*EU_Spain longline index was used only for sensitivity analysis by JABBA
Scaled standardized CPUE

Year

USARR

USALL
Combined Kobe plots of current (2017) stock status for base cases of JABBA and Stock Synthesis for Atlantic White Marlin.
Combined trends of projected relative biomass (left panel, $B/B_{\text{MSY}}$) and fishing mortality (right panel, $F/F_{\text{MSY}}$) of Atlantic white marlin under different TAC scenarios (0 – 1600 t) from JABBA final base model (S3) and SS3 (model 6, no catch multiplier) for the period 2019-2029. Each line represents the median of combined 5000 Markov chain Monte Carlo (JABBA) or multivariate normal (SS3) iterations at the beginning of each calendar year. The projection used 458 t which corresponds to the carryover of the catch in 2017 for the catches in 2018 and 2019.
Kobe phase plot showing estimated trajectories (1959-2017) of $B/B_{MSY}$ and $F/F_{MSY}$ for the JABBA base case model (S3) for the Atlantic white marlin. Different grey shaded areas denote the 50%, 80%, and 95% credibility interval for the terminal assessment year. The probability of terminal year points falling within each quadrant is indicated in the figure legend.
Kobe phase plot showing estimated trajectories (1959-2017) of $B/B_{MSY}$ and $F/F_{MSY}$ for the Stock Synthesis model 6 (no catch multiplier) for the Atlantic white marlin. The probability of terminal year points falling within each quadrant is indicated in the figure legend.
Management recommendations:

• The Working Group considered that the projections, and resulting probabilities of rebuilding/ending overfishing (i.e. Kobe Strategy Matrices) may be overly optimistic, and stressed that these projections should be interpreted with caution.

• Catches have exceeded the 400 t TAC in every year since its initial implementation and the WG warned that if catches continue to exceed the TAC, the rebuilding of the stock will proceed more slowly, or be put at risk of further declines.

• Measures should be taken to ensure that monitoring and reporting of all landings and discards, including live releases, are appropriate, accurate, and complete. This will likely require improvements to the observer programs of many CPCs, as well as the implantation of discard estimation methods using those data.
Management recommendations (cont.):

- Efforts should be made, building on previous work, to fully account for the catches of artisanal and all recreational fisheries.

- Given the overfished status of the stock and the uncertainties in the data, including for both total removals and indices of abundance: The Commission, at a minimum, should ensure that catches do not exceed the current TAC (400 t) until the stock has fully recovered.
Management recommendations (cont.):

- To reduce the chance of exceeding any established TAC, the Commission should require:
  - The release of all marlins that are alive at haul back in ways that maximize their survival.
  - The use of circle hooks as terminal gear. Experimental research has demonstrated that in longline fisheries the use of circle hooks resulted in a reduction of marlin catch rates and haulback mortality. Four ICCAT Contracting Parties (Brazil, Canada, Mexico, and the United States) already mandate the use of circle hooks on their pelagic longline fleets.
2019 Stock Assessment of Atlantic Yellowfin Tuna
• 3 Major Gears (PS, BB, LL)
• Total Landings increased to 194,000 t by 1990, but had decreased to 100,000 t by 2007
• Catches have generally increased since 2007
• A TAC of 110,000 t was adopted in 2012. Since 2015, landings have exceeded TAC significantly.
New Data: Ghanaian Landings

- Ghanaian landings 2012-2018 were re-estimated for the 2019 stock assessment.
- The estimates are lower than in 2018.
New Data: Age and Growth

- New data from the USA (Pacicco et al., 2019) and Ascension Island suggested a maximum age = 18 years. Previous assessments assumed maximum age = 11.
- This had implications for natural mortality.
New Data: Natural Mortality

- The new growth and maximum age resulted in a revised estimate of the natural mortality-at-age function.
A joint LL index was constructed for the fleets of USA, Korea, Chinese-Taipei, Uruguay and Japan.

New indices for the surface fleets were also used, including an “echosounder buoy derived” index of juveniles associated with FADs.
Uncertainties

- Joint Index: The years before 1979 were removed due to changes in targeting. These years generally showed a declining trend. This could bias estimates of initial depletion.

- Purse Seine: It remains a challenge to adequately standardize surface fleet indices due to uncertain units of effort and changes in catchability.

- The buoy index uses target strength as a proxy for abundance of tropical tunas. There is a need to improve species composition used to create species-specific indices. This may only be an index of the biomass of the most abundant species.

- Also there is little additional data in the model (e.g. length/age comp) to inform recruitment, so the index may have undue influence on recruitment estimates.
Stock Assessment Models

• Production Models (JABBA and MPB):
  1. JABBA with joint longline index of tropical area (region 2), and \( r \) prior consistent with Stock Synthesis 2019 estimates
  2. JABBA same as #1 with \( r \) prior based on inputs from FISHLIFE
  3. JABBA same as #1 but add joint index from northern area (region 1) and purse seine free school index
  4. JABBA same as #3 with \( r \) prior based on inputs from FISHLIFE
  5. MPB with joint longline index region 2 and purse seine free school index

• Age Structured Model: Stock Synthesis:
  1. without buoy index of abundance (BAI) and with steepness 0.8
  2. without buoy index of abundance and with steepness 0.9
  3. with buoy index of abundance and with steepness 0.8
  4. with buoy index of abundance and with steepness 0.9
Stock Assessment Results: Spawning Stock Biomass

B/B_{MSY} or SSB/SSB_{MSY}
Stock Assessment Results: Fishing Mortality
Stock Status

- Combined Results of Stock Synthesis, JABBA and MPB
  - $B/B_{MSY} = 1.17$ – Not Overfished
  - $F/F_{MSY} = 0.96$ – Not Overfishing
- $MSY = 127,558$ t
Estimates of current MSY may be below what was achieved in past decades because overall selectivity has shifted to smaller fish since 1980s.
Provisional Outlook*

- Combined Results of Stock Synthesis, JABBA and MPB
- Maintaining a TAC of 120,000 t is expected to maintain healthy stock status (no overfishing, not overfished) through 2033 with at least 63% probability

Joint Probability that $B > B_{MSY}$ and $F < F_{MSY}$

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* Results to be adopted before SCRS Species Groups (Sept. 2019)
Acknowledgements:

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