The Best Available Science on Western Atlantic Bluefin Tuna

The International Commission for the Conservation of Atlantic Tunas, or ICCAT, is preparing to overhaul and improve its Atlantic bluefin tuna stock assessment in 2015. For this process, it is critical that only the best available science be used to produce an accurate picture of the health of the bluefin population. The reputation of ICCAT, which manages the Atlantic bluefin fishery, as well as the future sustainability of Atlantic bluefin tuna, depends on fishery managers holding strong and continuing their commitment to precautionary, science-based decision-making.

Put simply, ICCAT cannot allow unsupported hypotheses to undermine the credibility of its scientific process and management decisions. Yet some stakeholders are questioning the established science and proposing that new, untested theories regarding western bluefin biology and behaviour be included in future stock assessments.

In recent years, ICCAT members have committed to making decisions based on the best-available science. Due to strong evidence showing that Atlantic bluefin tuna populations are severely depleted, ICCAT members have begun to set both eastern and western bluefin tuna fishing quotas at levels based on this scientific evidence. Using unproven theories in bluefin population assessments could provide unfounded justification for increasing the fishing quota for western Atlantic bluefin at great risk to the current and future health of the population.

The following table outlines some of the key scientific issues under discussion and debate, the unsupported hypotheses being proposed, and an explanation of what the best available science really indicates.

THE ISSUE	UNSUPPORTED HYPOTHESES	BEST AVAILABLE SCIENCE
Stock-recruitment relationship The stock-recruitment relationship is the relationship between the number of adult fish (stock) and the number of young fish they can produce (recruitment). It is critical to properly account for recruitment in stock assessments as it informs the best estimates of sustainable quotas and rebuilding targets. ICCAT currently uses two divergent hypotheses to model how many young the stock will produce - the high recruitment scenario and the low recruitment scenario.	**That western bluefin tuna should be managed using only the low recruitment hypothesis.** The low recruitment hypothesis says that due to an undetermined change in the environment in the late 1970s, recruitment will never be much higher than it is today, even if the number of adult fish is allowed to increase. Therefore, under a low recruitment scenario, there would be no effect on the number of young in the next generation if more adult fish were caught and the stock would be considered already healthy. Thus, ICCAT could increase the western bluefin fishing quota.	**The best available science indicates that the high recruitment scenario is the more likely stock-recruitment relationship for the western bluefin tuna stock.** The best available science indicates that recruitment for western Atlantic bluefin was high until the mid-1970s, when the adult population declined, and so too did recruitment. However, there is no evidence of an environmental change that would have caused a permanent reduction in recruitment. Instead, the recent low recruitments are to be expected because the population is severely depleted, at just 36 percent of the 1970 level.[1] Furthermore, the range of available data conforms more closely to what would be expected under high recruitment.[2]
Strength of the 2003 year class of western bluefin tuna The western Atlantic bluefin tuna stock assessment and catch data indicate that the 2003 year class was strong, meaning that a comparatively large number of western bluefin tuna were born in the region that year.	**That the 2003 year class is composed primarily of eastern Atlantic bluefin tuna, not western, as currently assumed.** This incorrect hypothesis posits that the bluefin counted as part of the 2003 year class are primarily eastern bluefin that have migrated from the Mediterranean Sea. The implication is that the 2003 year class of western bluefin was not strong and that this year class therefore does not provide evidence of high recruitment of western bluefin. Taken further, this would imply that western bluefin recruitment is and will always be low and that the population is already above its target size, so the quota could be increased without risk to the status of the population.	**The best available science indicates that the 2003 year class is made up almost entirely of western Atlantic bluefin tuna.** A recent analysis of ear bones of bluefin caught off North Carolina shows that 98 percent of the 2003 year class members were born in the western Atlantic, indicating very strong western recruitment that year.[3] This strong western bluefin year class is evidence that recruitment could be high again if the population were given a chance to recover. The implication here is that the quota should be kept low to allow the number of adults in the population to increase, thus increasing recruitment and leading to an increased population size capable of withstanding greater fishing effort in the future.

THE ISSUE	UNSUPPORTED HYPOTHESES	BEST AVAILABLE SCIENCE
Western bluefin tuna abundance in the 1970s The population of western bluefin, as well as recruitment, was much higher through the mid-1970s than it is today.[4] ICCAT's rebuilding target, based on the high recruitment scenario, assumes that the western stock recruitment can return to the early 1970s levels if the western quota is set at an appropriate level and the number of adult fish is allowed to increase.	**That 1970s western bluefin tuna population and recruitment estimates were artificially inflated because they included eastern bluefin tuna that were in western waters.** This unsupported hypothesis states that in the 1970s, an unusually large contingent of eastern fish was present in the western Atlantic, and that because those estimates in the 1970s incorrectly counted these eastern bluefin as western, the western bluefin population count was inflated. The implication here is that the western population should not be expected to be able to rebuild to those levels because western bluefin had never been - and never could be - that abundant. This could be used to argue that the population is already at a healthy level to justify an increase in quota.	**The best available science demonstrates that western bluefin abundance in the 1970's was high and based on accurate information** Analysis of the ear bones of bluefin tuna caught in U.S. and Canadian waters between 1975 and 1980 shows that nearly 100 percent of the fish were from the western stock.[5] There is no evidence that eastern fish were more predominant in the western Atlantic in the 1970s than they are today, when eastern fish are estimated to account for upwards of 50 percent of catch in some areas.[6] This means the western bluefin stock was in fact at high levels in the 1970s, and would be able to rebuild to those levels in the future with the help of sustainable management.
One vs. two stocks Since 1981, ICCAT has managed Atlantic bluefin as two separate stocks that intermix on North Atlantic feeding (and fishing) grounds—a western population that spawns in the Gulf of Mexico and an eastern population that spawns in the Mediterranean Sea. The fishing quota is 1,750 tonnes for the western Atlantic and 13,400 tonnes for the eastern Atlantic and Mediterranean Sea.	**That Atlantic bluefin tuna should be managed as one stock.** This unproven hypothesis states that the life histories (growth rates, age of maturity) of eastern and western bluefin are more similar than assumed in the current stock assessment, and that due to observed mixing between the two stocks it would be more practical to manage the Atlantic bluefin population as one stock. The implication would be that in the Atlantic, there would be only one quota and one rebuilding timeline, rather than separate eastern and western fishing quotas and management rules and regulations. This would result in a situation where the overall species could still be considered healthy—even if the higher fishing quota resulted in the western population of Atlantic bluefin going extinct.	**The best available science indicates that the Atlantic bluefin tuna is composed of at least two genetically distinct stocks and should be managed accordingly.** Solid genetic evidence shows conclusively that the Atlantic bluefin species is composed of at least two genetically distinct stocks, or populations—including one in the eastern Atlantic and one in the western Atlantic.[7] While eastern and western bluefin mix when feeding in the North Atlantic, the populations separate to return to spawn in the areas where they were born, ensuring that the populations do not interbreed. The implication here is that managing the whole of the Atlantic bluefin tuna fishery as one population would subject the western population, which is an order of magnitude smaller than the eastern population, to dangerously high fishing levels that could result in extinction of this distinct western population.
Age to first maturity The age to first maturity is the average age when individual fish begin to reproduce. Populations with a later age to maturity grow more slowly because it takes longer for these fish to reproduce compared to earlier maturing fish. Age to maturity is a critical component of stock assessments since it determines how quickly a population can reach a rebuilding target and how resilient it may be to fishing pressure. Further, in the case of bluefin tuna, the amount of mature fish is used as the measure of stock status.	**That western bluefin tuna begin to reproduce at an earlier age than is currently assumed.** This unproven hypothesis states that western bluefin reproduce younger (perhaps as young as age 5) than currently modelled in the stock assessment, and that therefore the population is bigger and can grow more quickly than is assumed. This implies that the western bluefin fishing quota could be increased without harming the population.	**The best available science indicates that western bluefin tuna reproduce much later than those in the eastern Atlantic.** The science currently applied by ICCAT in assessing the population assumes that western bluefin mature at age 9. The best available science shows that the majority of western bluefin reproduce at age 9 or older, much later than the eastern stock that spawns in the Mediterranean Sea.[8] Some western bluefin mature earlier than 9 years, but the important measure for stock assessment and management is the age at which the majority of fish mature. The risks inherent in assuming an earlier age are very high and could lead to continued overfishing and a further decline in population status.

Endnotes

[1] Standing Committee on Research and Statistics (SCRS). 2012. "Report of the 2012 Atlantic bluefin tuna stock assessment session." (Madrid, Sept. 4-11, 2012). ICCAT Doc No. SCI-033: 1-124. iccat.int/Documents/Meetings/Docs/2012_BFT_ASSESS.pdf.

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[3] Secor DH, B Gahagan, and JR Rooker. 2013. "Atlantic bluefin tuna stock mixing within the U.S. North Carolina recreational fishery, 2011-2012." SCRS/2013/088.

[4] SCRS. "Report of the 2012 Atlantic bluefin tuna stock assessment session."

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