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**Annex 3 Assessment sheet template and audit trail: blueﬁn tuna**

**Annex 3. Assessment sheet template: BDC2024/Bluefin\_tuna**

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| Sheet reference | BDC2024/Bluefin\_tuna | | | |
| Area assessed | OSPAR regions where species occurs: I, II, III, IV, V  OSPAR regions where species is under threat and/ or decline: n/a | | | |
| Title | Atlantic bluefin tuna: 2024 status assessment | | | |
| Key message | Based on International Commission for the Conservation of Atlantic Tunas (ICCAT) assessments and scientific literature, Atlantic bluefin tuna (*Thunnus thynnus*) is in good status. Spawning stock biomass has increased substantially since the 2003 OSPAR listing and is now at the highest levels since the 1960s. Spatial distribution has expanded. There are effective management measures in place and there is no overfishing.  **Table A3.1a** Assessment of status for Atlantic bluefin tuna (*Thunnus thynnus*) within OSPAR Region V.  Assessment of status Region V  Distribution ↑4,5  Population size ↑4,5  Demographics ↑4,5  Previous OSPAR status assessment ●  **Status (overall assessment) Good**  **↑**  **Table A3.1b** Assessment of key pressures influencing Atlantic bluefin tuna (*Thunnus thynnus*) within OSPAR Region V. | | | |
|  | Assessment of key pressures | Region V |  |
| Fishing pressure | ↓4,5 |  |
| Climate change | ? |  |
| **Threat or impact** | **↓**4,5 |  |
| Confidence | High | | | |

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| Background information | * Year added to OSPAR List: [2003.](https://www.ospar.org/documents?v=6974) * The original evaluation of bluefin tuna against the Texel-Faial criteria referred to decline and sensitivity criteria, with information also provided on threat. * OSPAR regions II−V constitute a key feeding ground for Atlantic bluefin tuna, which distributes throughout the Atlantic and adjacent seas. * Decline: the eastern Atlantic stock was evaluated as significantly declined at the time of listing. * Sensitivity: the species was considered sensitive at the time of listing due to its relatively slow growth, long life span and late age at maturity. * Anthropogenic pressures and biological factors: fishing was the most important anthropogenic pressure and fishery data was uncertain, affecting management advice and management action. * Last status assessment: 2003. A background document was published in [2014.](https://www.ospar.org/documents?v=7363) |
| Geographical range and distribution | Atlantic bluefin tuna are widely distributed mostly across the north Atlantic and adjacent seas with two populations, a larger eastern population, spawning in the Mediterranean Sea, and a smaller western population, spawning largely in the Gulf of Mexico. Atlantic bluefin tuna are most abundant in the Mediterranean and temperate waters of the North Atlantic. Recently they recolonised Nordic waters (where they had been very rare for at least 50 years) and this may be due to the increased population size, environmental change, or both (MacKenzie *et al*., 2014; Failletaz *et al.,* 2019; Nottestad *et al*., 2020; Aarestrup *et al*., 2022). The two populations mix when not spawning, mostly on the western side of the Atlantic. |
| Population/ abundance | Most bluefin tuna in OSPAR regions belong to the eastern population (Fraile *et al*., 2015; Rodriguez-Ezpeleta *et al*., 2019). The western population is an order of magnitude smaller than the eastern one (ICCAT, 2023a) and remains mostly in the western Atlantic (to the west of OSPAR Region V), as indicated by tagging and genetic evidence (Dedman *et al*., 2003; Rodriguez-Ezpeleta *et al*., 2019). |

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|  | The latest (2022) ICCAT assessment of the eastern population indicates a strongly increasing population with Spawning Stock Biomass (SSB) at the highest value since the 1960s (**Figure 1**). No biomass reference points are determined. The fishing mortality for juveniles and adults has decreased substantially and is now below fishing mortality reference points.  Histograma  Descripción generada automáticamente  Histograma  Descripción generada automáticamente  **Figure A3.1** East Atlantic and Mediterranean spawning-stock biomass (SSB, upper panel) and fishing mortality (*F*, lower panel) trends estimated by three different stock assessment models: VPA (blue lines), Stock Synthesis (green lines), and ASAP (orange lines). Source: ICCAT (2023a). |
| Condition | Recruitment estimates for East Atlantic and Mediterranean Atlantic bluefin tuna are uncertain and show considerable variability, especially over the recent period. In general, however, there are two distinct periods, one with low recruitments before 1990 and the other with higher recruitments thereafter (ICCAT, 2023a). |
| Threats and impacts | Historically, fishing has been the main threat to the Atlantic bluefin tuna. This generated high and largely uncontrolled fishing rates causing population declines. Following the implementation of the recovery plan in 2006, fishing mortality was reduced and has remained within sustainable levels since the early 2010s.  Climate change effects on bluefin tuna are not fully understood. The preferred feeding grounds are expected to move to higher latitudes (Erauskin-Extramiana *et al*., 2019). Conversely, important spawning and nursery areas in the Mediterranean might become thermally limiting, implying that spawning in the open Atlantic (as western bluefin already do, Trueman *et al*., 2023) would need to occur to sustain the eastern population. |

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| Measures that address key pressures from human activities or conserve the species/habitat | ICCAT adopted a Recovery Plan in 2006 and, as the stock recovered, this evolved into the current Management Plan (ICCAT, 2022) that includes a wide range of measures, including TACs and quotas, closed seasons, minimum sizes, and diverse control measures.  In addition, a management procedure was adopted in 2022 (ICCAT, 2023b). This procedure explicitly considers the mixing of the eastern and western bluefin tuna populations and is robust to main uncertainties, including alternative productivity regimes. |
| Conclusion (including management considerations) | Although the current management plan accounts for mixing between the eastern and western populations, within the OSPAR regions bluefin tuna are expected to originate almost exclusively from the eastern population.  Based on the last ICCAT assessment, the status of eastern Atlantic bluefin tuna has clearly improved, and SSB for the last year (2020) in the current assessment is the largest since the 1960s. Bluefin tuna has expanded their distribution to recolonise Nordic waters after more than 50 years.  The large reduction in fishing mortality and a shift in the pattern of selectivity to large fish is expected to have increased the mean age of the population.  The assessment is considered data rich, as it includes many sources of information including some fisheries independent surveys. Still, some key data sources (e.g. historical total catch and its size composition) are uncertain, and assessment results are sensitive to many assumptions. However, the management procedure has been tested to be robust to the main uncertainties, so there is good confidence in that the catch levels based on this management procedure will keep both populations in good status. |
| Knowledge gaps | Further research on stock structure and the location of spawning grounds will improve the understanding of stock mixing and potential climate resilience.  The persistence and relative importance of newly found spawning grounds in the Slope Sea warrants further investigation (Hernandez *et al*., 2022; Diaz-Arce *at al*., 2024).  The current management procedure is expected to be revised in 2028. Further research on the effects of climate change on the productivity of the stock, would be an important consideration during the next review of the management procedure. The maturity schedule and natural mortality are important biological parameters for improving the assessments that deserve additional research. |
| References | Aarestrup, K., Baktoft, H., Birnie-Gauvin, K., Sundelöf, A., Cardinale, M., Quilez-Badia, G., Onandia, I., *et al*. 2022. First tagging data on large Atlantic bluefin tuna returning to Nordic waters suggest repeated behaviour and skipped spawning. Scientific Reports 12: 11772. <https://doi.org/10.1038/s41598-022-15819-x>  Dedman, S., Aalto, E. A., Stokesbury, M. J., Schallert, R. J., Castleton, M. R. and Block, B. A. 2023. Assignment of tracks from tagged Atlantic bluefin tuna *Thunnus thynnus* to potential stocks using behavioural differences and habitat partitioning. Frontiers in Marine Science 10: 1165910. <https://doi.org/10.3389/fmars.2023.1165910>  Díaz-Arce, N., Gagnaire, P-A., Richardson, D. E., Walter III, J. F., Arnaud-Haond, S., Fromentin,  J. M., Brophy, D., *et al*. 2024. Unidirectional trans-Atlantic gene flow and a mixed spawning area shape the genetic connectivity of Atlantic bluefin tuna. Molecular Ecology 33: e17188. <https://doi.org/10.1111/mec.17188> |

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| Method used | The assessment is based on ICCAT stock assessment reports, scientific literature and expert judgement. |

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| **AUDIT TRAIL** | **Additional evidence and information** |
| Assessment methods (additional information, in particular how the  overall assessment in the summary table was reached) | Region V is the main area of distribution for Atlantic bluefin tuna, but they also visit all other OSPAR regions.  For all OSPAR regions, the proportion of bluefin of western origin (assumed to spawn in the Gulf of Mexico) is expected to be very low, if not negligible (because of low mixing rates of the western population, and because the eastern population is an order of magnitude larger (see Fraile *et al*., 2015; Rodriguez-Ezpeleta e*t al*., 2019; ICCAT, 2023). Thus, this assessment focuses on the last stock assessment for the eastern population (spawning in the Mediterranean).  In relation to the assessment of the impacts of climate change, Arrizabalaga *et al*. (2015) suggest that adult bluefin tuna could easily adapt to changes in physical habitat (as they can tolerate a wide range of temperatures and other environmental variables). However, Trueman *et al*. (2023) identified that climate change could play a key role in their first year of life, and adaptation may depend on the extent of plasticity in the life cycle, including the possibility to spawn in the open Atlantic. |
| Geographical range and distribution (additional evidence and information) | A map of the north america  Description automatically generated  **Figure A3.2** Distribution of Atlantic bluefin tuna. Source: FAO [Aquatic Species Distribution Map](https://www.fao.org/fishery/geoserver/factsheets/species.html) [Viewer](https://www.fao.org/fishery/geoserver/factsheets/species.html) (2024) |
| Population/abundance (species; additional evidence and  information) | No additional information provided. |
| Condition (additional evidence and information) | Information on recruitment trends is provided in ICCAT assessments (Figure A3.3). |

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|  | A group of graphs with numbers and lines  Description automatically generated  **Figure A3.3** East Atlantic and Mediterranean recruitment trends estimated by three different stock assessment models: VPA (blue lines), Stock Synthesis (green lines), and ASAP (orange lines). Source: ICCAT (2023).  The mean catch weight of Atlantic bluefin tuna has increased substantially since the early 1990s (ICCAT, 2022). This is expected to result from changes in fishery selectivity to target larger individuals as well as any change in the size composition of the stock. |
| Threats and impacts (additional evidence and information) | A Recovery Plan for Atlantic bluefin tuna was implemented by ICCAT in 2006. Peak historical unsustainable and illegal catches of 61 000 t in 2007 were reduced to catches of 9774 t by 2011. As overfishing ended, the stock substantially recovered and catches increased again, reaching 35706 t in 2022. For the period 2023−2025, even higher catch levels were permitted in the east Atlantic and Mediterranean (total allowable catch [TAC] for 2023−2025 is 40 570 t). These current TAC values are the highest in history, but they are supported by the new management procedure adopted by ICCAT in 2022, which was tested to be robust to main uncertainties considered (in productivity, biological parameters, population size and data sources). |
| Measures that address key pressures from human activities or conserve the species/habitat (additional information) | No additional information provided. |
| Knowledge gaps (additional information) | No additional information provided. |
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