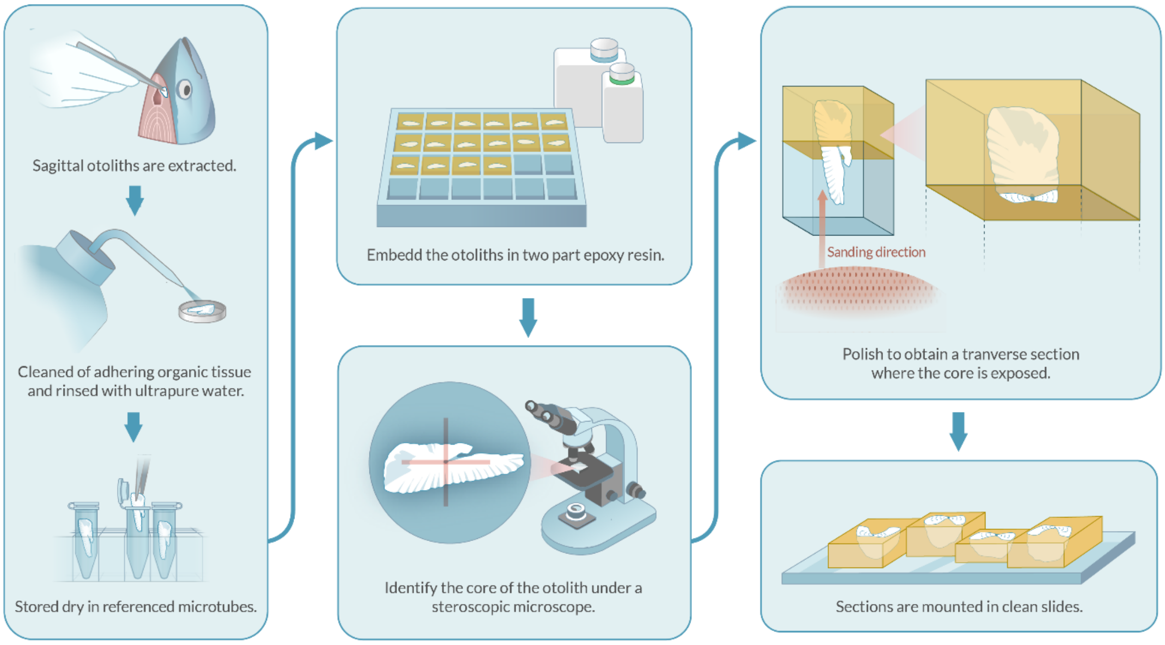

Fig. S1. Illustration of otolith preparation processes for posterior microchemical analyses.

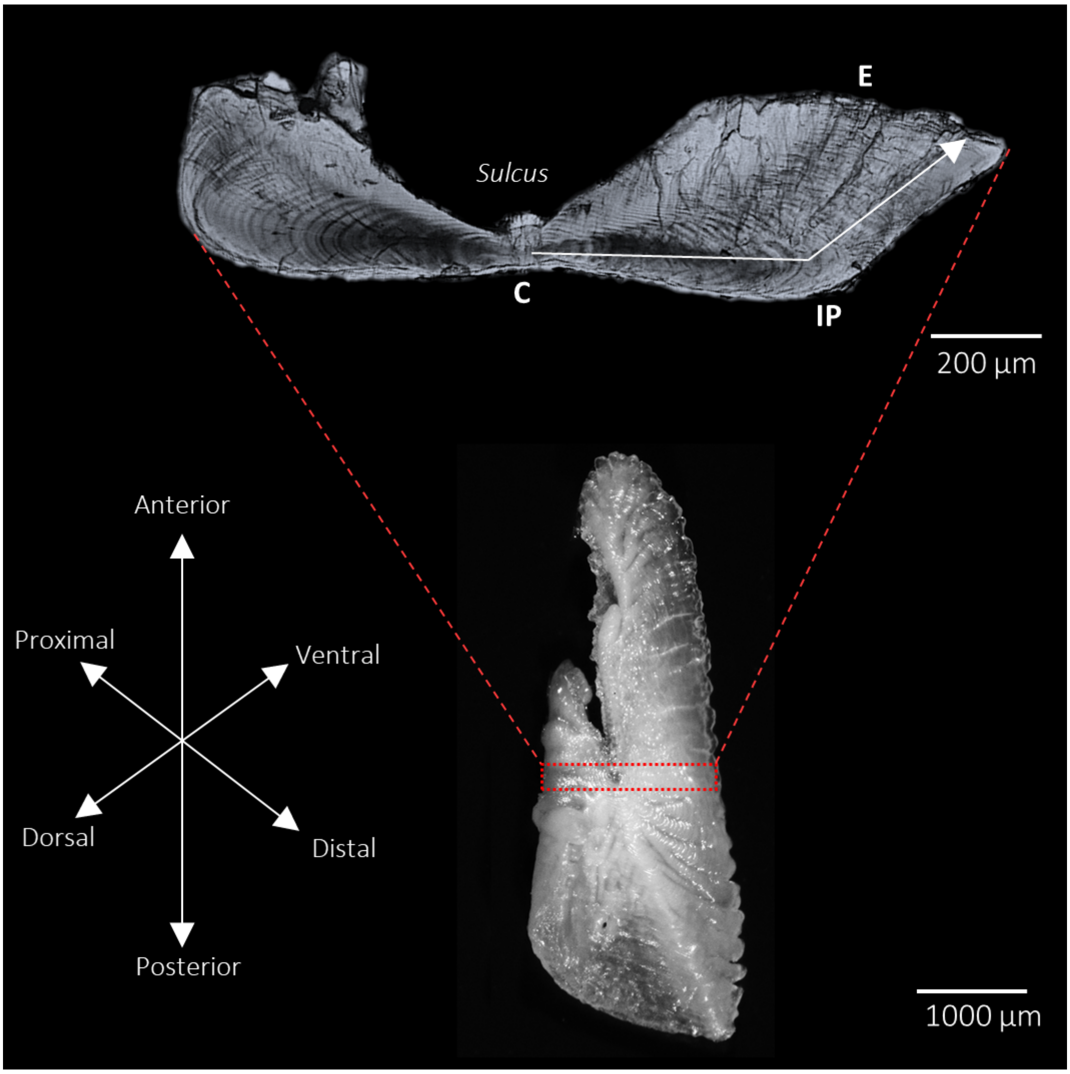

Fig. S2. Transverse section (top image) of a 30 cm FL yellowfin tuna (*Thunnus albacares*) otolith (bottom image). Position of the core (C), inflection point (IP) and edge (E) are indicated, while white arrow in the transverse section depicts the otolith growth axis. The approximate dorsal/ventral, anterior/posterior and proximal/distal axes and sulcus position are given for orientation.

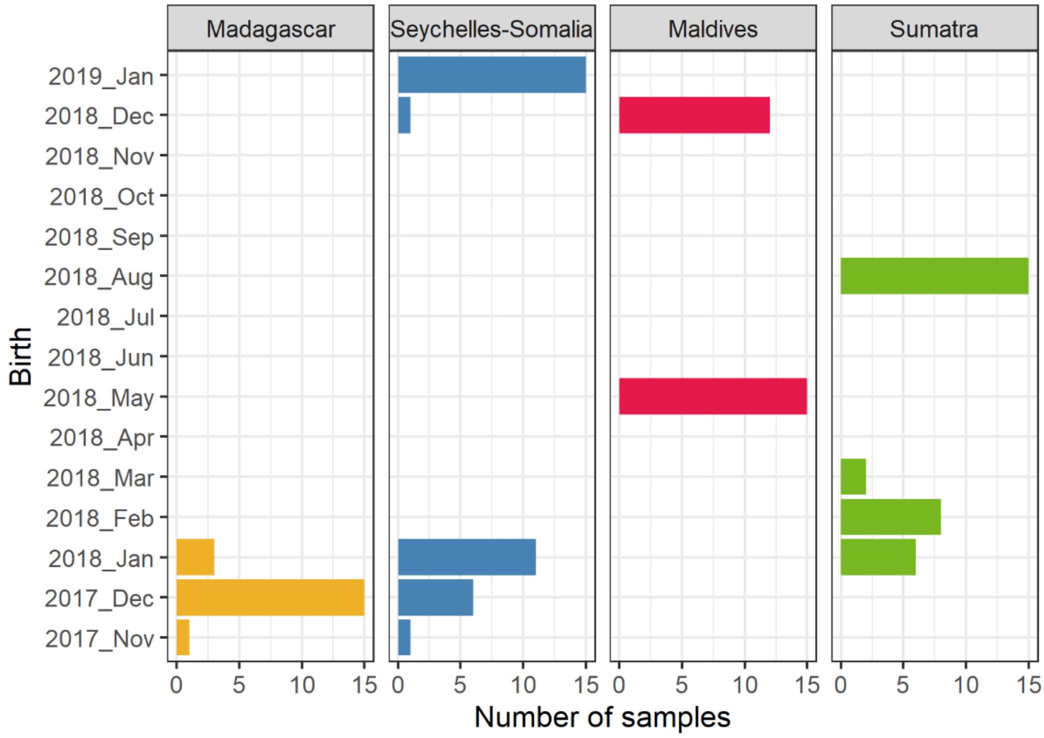

Fig. S3. Frequency histograms showing the distribution of estimated spawning dates (year and month) of young-of-the-year (YOY) yellowfin tuna (*Thunnus albacares*) collected in four nursery areas Madagascar (yellow), Seychelles-Somalia (blue), Maldives (pink) and Sumatra (green) of the Indian Ocean.

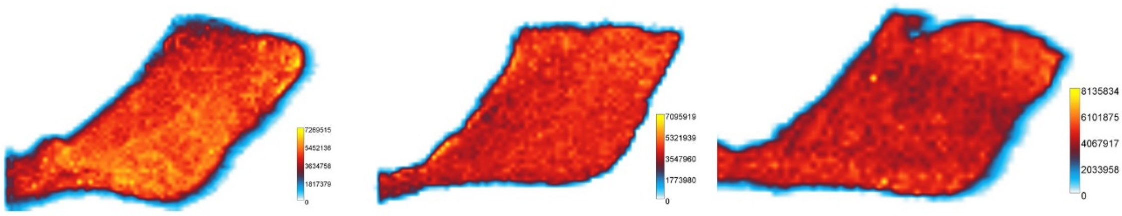

Fig. S4. Raw ^{43}Ca composition within otolith transverse sections.

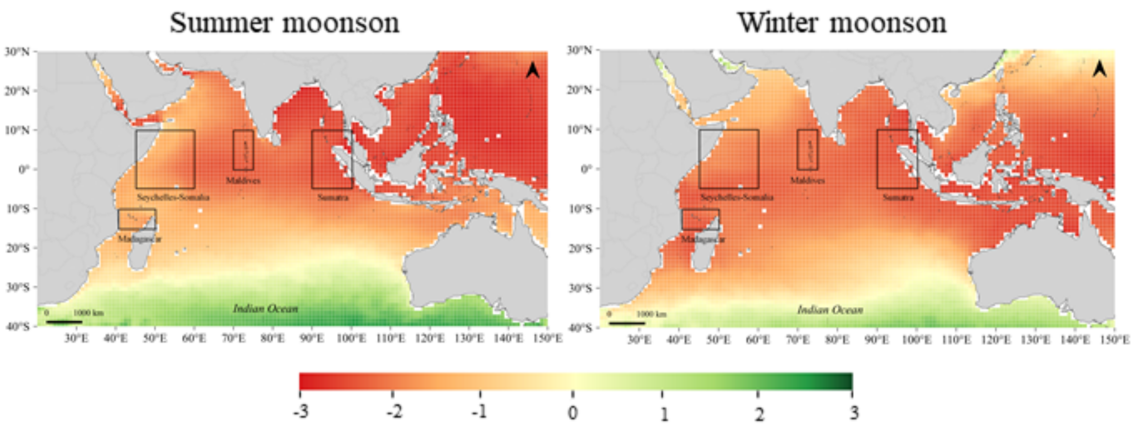

Fig. S5. Predicted spatial variations in isotopic composition of oxygen in otoliths ($\delta^{18}O_{oto}$) following Trueman and MacKenzie (2012) and based on global surface water (0-50 m) measured $\delta^{18}O_{w}$ values (LeGrande & Schmidt 2006), and parameters γ and β from Kitagawa et al., (2013). Maps are differentiated for summer monsoon (Jun-Sept 2017) and winter monsoon (Dec-Apr 2016-2017). Monthly data of Sea Surface Temperature (SST, ºC) was obtained from the "global-reanalysis-phy-001-031-grepv2-montlhy" dataset available in the EU Copernicus Marine Service Information. Note that this simplistic model assumes constant parameters for the otolith fractionation equation and is based on coupled measurements of $\delta^{18}O_{w}$ values and SST at a spatial resolution of 1×1° grid.

Table S1. Summary of yellowfin tuna (*Thunnus albacares*) individuals used for young-of-the-year (YOY) age estimation. Size is fork length (FL) in cm.

FL	Age (days)	Sampling date	Sampling location	Approach	Study
39	107	30/04/2013	Eastern Indian Ocean	Otolith microincrement counts	Proctor et al. (2019)
40	108	29/04/2013	Eastern Indian Ocean	Otolith microincrement counts	Proctor et al. (2019)
40	137	30/04/2013	Eastern Indian Ocean	Otolith microincrement counts	Proctor et al. (2019)
40	113	30/04/2013	Eastern Indian Ocean	Otolith microincrement counts	Proctor et al. (2019)
40	116	24/06/2014	Eastern Indian Ocean	Otolith microincrement counts	Proctor et al. (2019)
40	115	25/06/2014	Eastern Indian Ocean	Otolith microincrement counts	Proctor et al. (2019)
40	122	24/06/2014	Eastern Indian Ocean	Otolith microincrement counts	Proctor et al. (2019)
40	117	17/06/2014	Eastern Indian Ocean	Otolith microincrement counts	Proctor et al. (2019)
40	130	17/06/2014	Eastern Indian Ocean	Otolith microincrement counts	Proctor et al. (2019)
29.5	80	06/08/2017	Western Indian Ocean	Otolith microincrement counts	This study
36.5	95	27/06/2017	Western Indian Ocean	Otolith microincrement counts	This study
36.5	98	25/08/2017	Western Indian Ocean	Otolith microincrement counts	This study
38	112	26/08/2017	Western Indian Ocean	Otolith microincrement counts	This study
34	89	26/08/2017	Western Indian Ocean	Otolith microincrement counts	This study
3.12	30	-	-	Direct measures of tank reared fish	Kobayashi et al. (2015)
2.46	27	-	-	Direct measures of tank reared fish	Kobayashi et al. (2015)
2.16	24	-	-	Direct measures of tank reared fish	Kobayashi et al. (2015)

Table S2. Summary of data distribution by nursery region. Normality was obtained performing the Shapiro-Wilk test of normality, *shapiro.test* {stats} function implemented in R. Significant deviations from normality are highlighted as follows *P<0.05, **P<0.01. Skewness was calculated following the formula from (Joanes & Gill 1998) with the *skewness* {e1071} function implemented in R.

Element	Test measure	Madagascar	Seychelles-Somalia	Maldives	Sumatra	All
Ba	Normality	0.002**	0.132	0.012*	0.038*	<0.001**
	Skewness	1.391	0.512	1.180	0.976	1.622
Li	Normality	0.484	0.755	0.581	0.930	0.511
	Skewness	0.259	0.165	0.459	0.0626	0.273
Mg	Normality	0.003**	<0.001**	0.003**	0.002**	<0.001**
	Skewness	1.453	1.636	1.179	1.393	1.816
Mn	Normality	0.334	0.257	<0.001**	<0.001**	<0.001**
	Skewness	0.624	0.333	1.359	1.172	1.961
Sr	Normality	0.012*	0.616	0.128	0.054	<0.001**
	Skewness	1.273	0.179	0.185	0.818	0.807
Zn	Normality	0.002**	0.002**	<0.001**	<0.001**	<0.001**
	Skewness	0.980	1.139	1.603	1.731	1.515
δ13C	Normality	0.785	0.853	0.095	0.532	0.848
	Skewness	-0.216	0.123	-0.551	0.205	-0.040
δ18O	Normality	0.153	0.791	0.531	0.549	0.212
	Skewness	-0.533	0.010	-0.854	0.375	-0.333

Table S3. Homogeneity of variances between nursery regions. Homoscedasticity was calculated performing *fligner.test* {stats} function implemented in R. Significant differences in nursery variances are highlighted as follows *P<0.05, **P<0.01.

Ba	Li	Mg	Mn	Sr	Zn	δ13C	δ18O
0.242	0.334	0.101	<0.001**	0.058	0.289	0.976	0.017*

Table S4. Within nursery interannual variability (2017vs 2018) in otolith trace element and stable isotope composition of young-of-the-year (YOY) yellowfin tuna (*Thunnus albacares*) from the Indian Ocean. Yuen test was used for comparisons, *yuen* {WRS2}, which performs independent samples t-tests on robust location measures including effect sizes. Test value (t), degrees of freedom (df) and P values are reported. Significant differences are highlighted as follows *P<0.05, **P<0.01

Element		Seychelles-Somalia	Maldives	Sumatra
Li	*t*	1.005	2.369	1.815
	df	12.56	13.11	15.35
	P	0.334	0.034*	0.089
Mg	*t*	0.193	3.441	0.696
	df	17.55	11.75	14.03
	P	0.850	0.005**	0.496
Sr	*t*	1.202	2.49	0.272
	df	16.43	12.76	16.5
	P	0.246	0.027*	0.789
Ba	*t*	0.773	1.131	0.343
	df	17.88	15.23	11.45
	P	0.449	0.276	0.738
Mn	*t*	1.483	4.29	1.678
	df	10.86	9.67	13.16
	P	0.167	0.002**	0.117
$\delta^{13}C$	*t*	0.792	1.195	0.879
	df	19.78	16.59	16.82
	P	0.438	0.249	0.392
$\delta^{18}O$	*t*	1.618	0.478	0.129
	df	19.26	16.1	14.65
	P	0.122	0.639	0.899

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