

## DATA AND MODEL SET-UP FOR THE 2020 UPDATE STOCK ASSESSMENT OF THE EASTERN AND MEDITERRANEAN ATLANTIC BLUEFIN TUNA STOCK

T. Rouyer<sup>1</sup>, A. Kimoto<sup>2</sup>, R. Zarrad<sup>3</sup>, M. Ortiz<sup>2</sup>, C. Palma<sup>2</sup>, C. Mayor<sup>2</sup>, M. Lauretta<sup>4</sup>, A. Gordo<sup>5</sup> and J. Walter<sup>4</sup>

### SUMMARY

*This document presents the data and model set-up for the 2020 update of the 2017 stock assessment for the Eastern and Mediterranean Atlantic Bluefin tuna stock. During the 2017 data preparatory meetings, several changes in the data used for previous assessments have been presented, among which the revision of the task I and task II statistics and the selection of the indices of abundance. This led to completely revisit the catch at age matrix and the model specifications for the 2017 assessment. For the present analysis, the data over the historical period (1968-2015) were nearly identical, whereas the data for the years 2016-2018 and abundance indices were updated. As agreed in previous meetings, the model specifications were kept identical to the 2017 assessment.*

### RÉSUMÉ

*Ce document présente les données et la configuration du modèle pour la mise à jour en 2020 de l'évaluation du stock de thon rouge de l'Atlantique Est et de la Méditerranée de 2017. Lors des réunions de préparation des données de 2017, plusieurs modifications des données utilisées dans les évaluations précédentes ont été présentées, parmi lesquelles la révision des statistiques de la tâche 1 et de la tâche 2 et la sélection des indices d'abondance. Cela a entraîné la révision complète de la matrice de prise par âge et des spécifications du modèle pour l'évaluation de 2017. Pour la présente analyse, les données de la période historique (1968-2015) étaient presque identiques, tandis que les données des années 2016-2018 et les indices d'abondance ont été mis à jour. Comme convenu lors des réunions précédentes, les spécifications du modèle étaient identiques à celles de l'évaluation de 2017.*

### RESUMEN

*La fusión del stock occidental y el oriental de atún rojo del Atlántico en una evaluación de estrategias de n este documento se presentan los datos y la configuración del modelo para la actualización de 2020 de la evaluación de 2017 del stock de atún rojo del Atlántico este y Mediterráneo. Durante la reunión de preparación de datos de 2017 se presentaron varios cambios en los datos utilizados para las evaluaciones anteriores, entre ellos la revisión de las estadísticas de Tareas 1 y 2, así como la selección de los índices de abundancia. Esto llevó a revisar completamente la matriz de captura por edad y las especificaciones del modelo para la evaluación de 2017. Para el presente análisis, los datos del período histórico (1968-2015) fueron casi idénticos, mientras que se actualizaron los datos de los años 2016-2018 y los índices de abundancia. Como se acordó en reuniones anteriores, las especificaciones iniciales del modelo se mantuvieron idénticas a las de la evaluación de 2017.*

### KEYWORDS

*Atlantic bluefin tuna; stock assessment*

---

1 IFREMER, UMR MARBEC, Sète, France

MARBEC, Univ Montpellier, CNRS, IFREMER, IRD, Sète, France

2 ICCAT Secretariat, C/Corazon de Maria, 8, 28002, Madrid, Spain

3 Institut National des Sciences et Technologies de la Mer (INSTM-Mahdia), BP 138 Mahdia 5199T, Tunisia

4 National Oceanic and Atmospheric Administration, Southeast Fisheries Science Center, 75 Virginia Beach Dr. Miami, FL, 33149

5 CSIC (Spanish National Research Council), CEAB, Acc. Cala St. Francesc 14, 17300 Blanes. Girona. Spain.

## 1. Introduction

ICCAT SCRS has decided to conduct the strict update of 2017 Atlantic Bluefin tuna (BFT) stock assessments in 2020 (ICCAT 2019). This document summarizes the data and model settings for VPA analysis for Eastern and Mediterranean bluefin BFT stock. The data update builds upon decisions made during the 2017 data preparatory meeting (ICCAT 2017a), as well as upon decisions made during the 2017 stock assessment meeting (ICCAT 2017b), and 2017 BFT Species Group meeting (Bluefin Tuna Species Group 2017). The perimeter of the present update was specified during the 2019 BFT Species Group meeting (ICCAT 2019), which covered the indices used, updated and revised and the deadlines associated. Regarding the model set-up, ICCAT (2019) specifies that “A strict update is to follow as closely as possible to the exact specifications of the 2017 advice models”. The request was made to the Secretariat that the catch-at-size data (CAS) was processed with the same method used for the 2017 stock assessment, whereas model specifications followed exactly those of the 2017 stock assessment base case. This document provides the comparisons of data sets in 2017 and 2020 as well as model specification.

## 2. Materials and method

### 2.1 Data inputs

#### 2.1.1 Catch at age

The updated catch-at-size (CAS) takes into account only the new/revised series submitted before the deadline of April 5th 2020 (Annex 1). Since 2017, in addition to the regular update of statistics, historical task I (only in 1995) and task II statistics of Spanish baitboat have been revised, and the size data from stereo-video cameras has been incorporated.

The substitution rules were the same as used for the 2017 assessment and can be found in the BFT assessment meeting reports (ICCAT 2017a and 2017b), except the fleet “other purse seine” (PS) in 2017 and 2018. The newly updated size data of other PS (all Mediterranean PS countries except EU.France, EU.Spain and EU.Croatia) in 2017 and 2018 showed very different patterns from previous years (2015/16) and from 2019 (**Figure 1**). The available size data from stereo-video cameras in 2017 and 2018 showed that most of the catches were of small fish and substantially less of larger fish. The source of these differences will require time to check and evaluate if there are correct data. In the meanwhile, it was decided to create the CAS of “other PS” fleet for 2017 and 2018, using respectively the size data from 2015 and 2016.

The catch at age (CAA) was obtained from the catch at size (CAS) using an age-slicing method (ageIt). The age structure of the 2020 CAA was found to be very consistent to the CAA used in 2017 (**Figure 2**). Comparing the catch for the different ages over time displayed main differences for ages 1 and 2 in 1995, and for all ages in 2015 (**Figure 3**). Sensitivity tests with those updates before 2015 in the VPA showed that it did not affect the general trends (not shown). Finally, the catch for age 7 through to age 10+ showed a substantial increase consistent with the TAC increase and the size-limit regulations.

#### 2.1.2 Catch per unit of effort and indices

As specified in ICCAT (2019), the indices were the same as used in the 2017 assessment. Some of them were slightly revised. Whereas the indices covering the historical period such as the Moroccan and Spanish trap index (MOR\_SP\_TP), the Japanese eastern Mediterranean longline index (JPN\_LL\_EastMed) and the Spanish Baitboat indices (SP\_BB1 and SP\_BB2) did not change, the other indices were updated (**Figure 4**). Some were strictly updated, no substantial change in methodology, such as the Japanese longliner indices (JPN\_LL1\_NEA and JPN\_LL2\_NEA) and the French aerial survey (FR\_AER1 and FR\_AER2), whereas some changes were made for the Moroccan and Portuguese trap index and the Western Mediterranean Larval index (WMED\_LARV) since 2017. Details about the discussion on their selection and their construction can be found in the report of the 2017 data preparatory meeting (ICCAT 2017a). The summary of changes for the indices compared to 2017 is the following:

- Moroccan and Spanish trap index (MOR\_SP\_TP): 1981-2011. No change.
- Moroccan and Portuguese trap index (MOR\_POR\_TP): 2012-2018. Accepted revision presented during the 2019 SCRS, daily catch per trap are now used as it improves how the index reflects the relative abundance of the stock.
- Japanese Eastern Mediterranean longline index (JPN\_LL\_EastMed): 1975-2009. No change.

- Japanese longliner indices (JPN\_LL1\_NEA and JPN\_LL2\_NEA): 1990-2009 and 2010-2018. Strict update, no change in methodology.
- Spanish Baitboats in the Bay of Biscay (SP\_BB1) and Spanish-French Baitboats in the Bay of Biscay (SP\_BB2): 1968-2006 and 2007-2014. No change
- French aerial survey (FR\_AER1 and FR\_AER2): 2000-2003 and 2009-2018. Strict update, no change in methodology.
- Western Mediterranean larval index (WMED\_LARV): 2001-2017. Data up to 2016 presented at the 2019 SCRS, the year 2017 provided in January 2020 was included. Although the methodology of this index, used in the BFT MSE, has been improved (Alvarez-Berastegui *et al.*, 2019), this index was based on delta log-normal linear models used in 2017 for the purpose of “strict update”. However the available data for the analysis in 2020 was not exactly the same as the one in 2017 due to revision in the larval database length calibrations and the software used in 2017. The BFTSG accepted these changes.

### 2.1.3 Weight at age

In the 2017 assessment, the weight at age (WAA) was computed as the total yield at age divided by numbers at age. In the present assessment, the same method was employed to compute the WAA for the indices of abundance and for the spawning stock biomass (SSB). Small differences were found for age 1 over 2010-2015, for age 10+ and in 2015 for all ages (**Figure 5**).

### 2.1.4 Partial catch at age

The partial catch at age (PCAA) was constructed using exactly the same R code and rules as in 2017. The few differences between the updated PCAA and the 2017 data were found to be small and only for the SP\_BB1 and JPN\_LL2\_NEA (**Figure. 5**), due to the revision or the regular update of the data (See 2.1.1).

## 2.2 Model set-up

The model used was VPA-2Box (Porch 1998). The model was run from a suite of R codes modifying the 2017 VPA input files to produce the updated 2020 input files for the different runs, therefore minimizing the chances of error while documenting every modification made and making it reproducible.

Compared to 2017, the base case hypotheses were not numerous as the main objective was to conduct an update of the 2017 assessment, therefore minimizing as much as possible the changes to the model specifications used in 2017. In particular ICCAT (2019) provides the guidelines to the update “*The same model parameter settings (F-ratio) and variance scaling will be used for VPA and the same model structure will be used for Stock Synthesis. The BFT Species Group will also do standard diagnostic of models and if problems arise they will be dealt with appropriately. This gives the modelers the ability to handle problems/issues that can arise when things are changed. For continuity a model with data up to 2015 (mimic 2017 end date) and then up-to 2018 (new time)*”.

The model set-up was therefore based on the 2017 base case (Run 0). Run 83 used exactly the same model specifications and the updated data (CAA, WAA, PCAA, indices) over 1968-2015, whereas Run 84 used the updated data over 1968-2018.

The model specifications of these 3 Runs are:

- Age 10 as plus group
- Maturity ogive (Ages 1-10): 0; 0; 0.25; 0.5; 1; 1; 1; 1; 1
- Constraint on vulnerability: penalty of 0.4 on the last 3 years for ages 1 to 9
- No penalty on recruitment
- No constraint on spawner-recruit relationship
- Terminal age structure of population freely estimated
- F-ratio estimated by time blocks for 1968-1980, 1981-1995, 1996-2007 and fixed to one for 2008-2018.
- Natural mortality (Ages 1-10): 0.38; 0.30; 0.24; 0.20; 0.18; 0.16; 0.14; 0.13; 0.12; 0.1
- The variance scaling for the indices (i.e. weighting) freely estimated, but same variance for both Trap indices, same variance for the three Japanese longline indices, same variance for the two Baitboat indices

### *Acknowledgement*

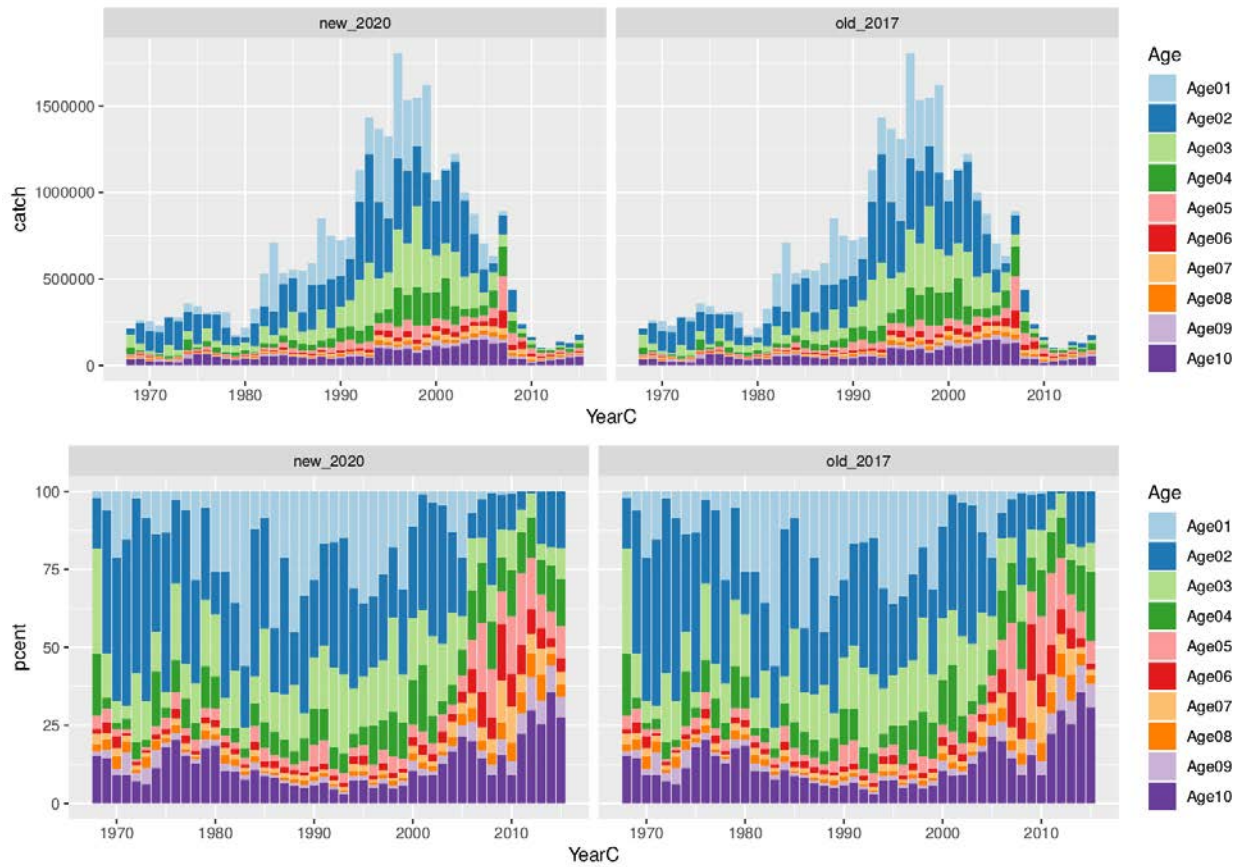
This work has been carried out with the support of members of the ICCAT Secretariat (in particular Juan Luis, Alberto Parrilla and Valérie Samedy) and the GBYP Programme (in particular Alfonso Pagá and Francisco Alemany), who have contributed extensively to prepare the base information (CAS) on which this work is built.

## References

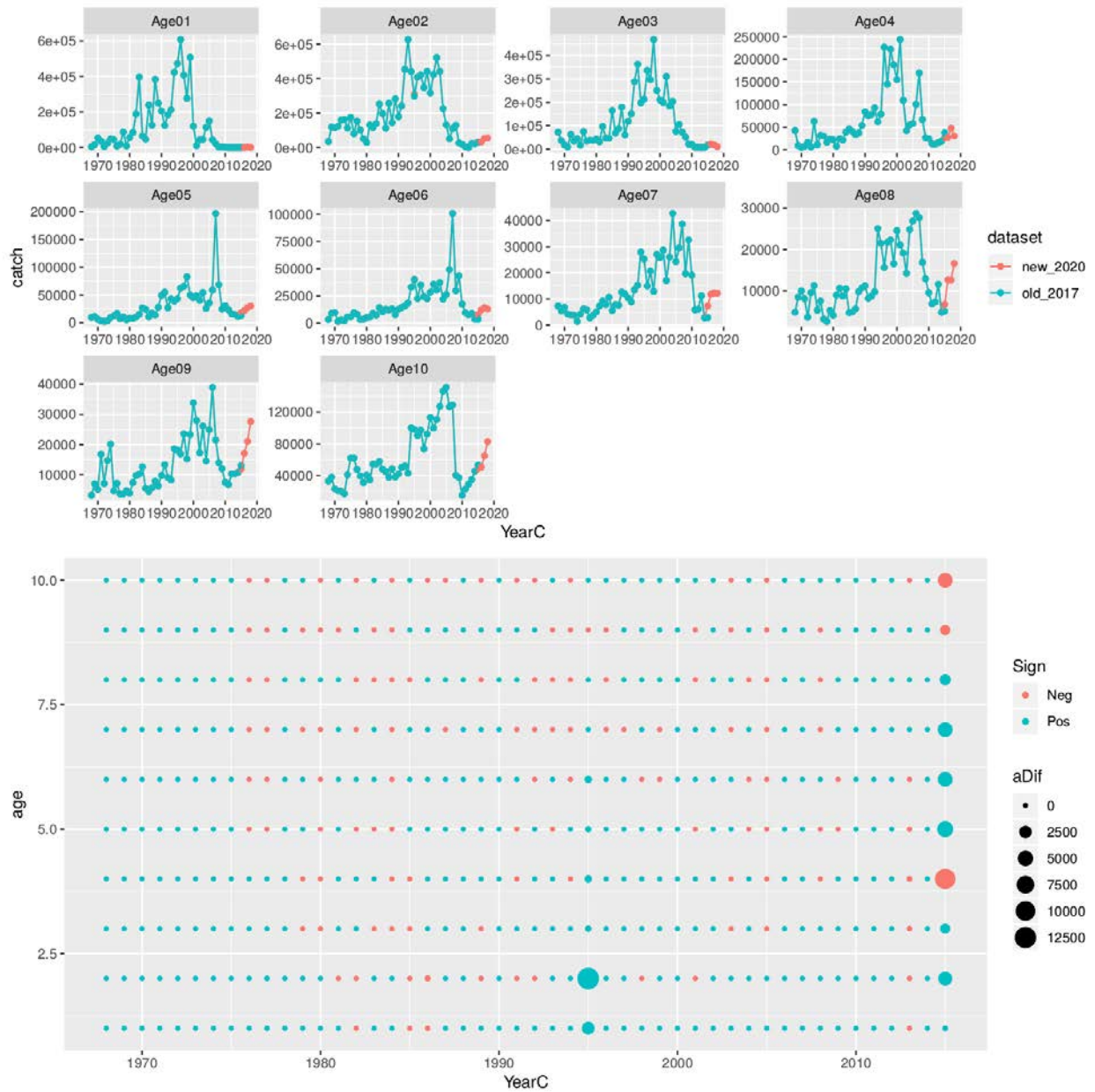
- Alvarez-Berastegui D., Martín M., Ingram W., Balbín R. and Reglero P. 2019. Updating the Balearic larval indices of bluefin tuna, advances in the integration of environmental variability and pelagic habitats in the calculation of abundance indices. SCRS/P/2019/055.
- Bluefin Tuna Species Group. 2017. Addendum to the detailed report of the 2017 Bluefin tuna stock assessment session. Updates to Bluefin Tuna Stock Assessment Models adopted during the 2017 Bluefin Tuna species group meeting. ICCAT, Collect. Vol. Sci. Pap. ICCAT. SCRS/2017/188.
- ICCAT. 2017a. REPORT OF THE 2017 ICCAT BLUEFIN TUNA DATA PREPARATORY MEETING. ICCAT, Madrid, Spain 6-11 March, 2017
- ICCAT. 2017b. REPORT OF THE 2017 ICCAT BLUEFIN STOCK ASSESSMENT MEETING. ICCAT, Madrid, Spain 20-28 July, 2017
- ICCAT. 2019. Report of the Standing Committee on Research and Statistics. Annex 5. Detailed specifications for 2020 BFT stock assessment advice. Pp 329-331.



**Figure 1.** Size distributions for BFT caught by the Mediterranean purse seine fleets Spain-France (PS\_FRASPA) and others (PS\_Others) by year and flag.



**Figure 2.** Main characteristics of the 2017 and updated catch-at-age. The top panel presents the age structure of the 2017 (right) and 2020 (left) catch-at-age in number. The bottom panel presents the age structure of the 2017 (right) and 2020 (left) in %.

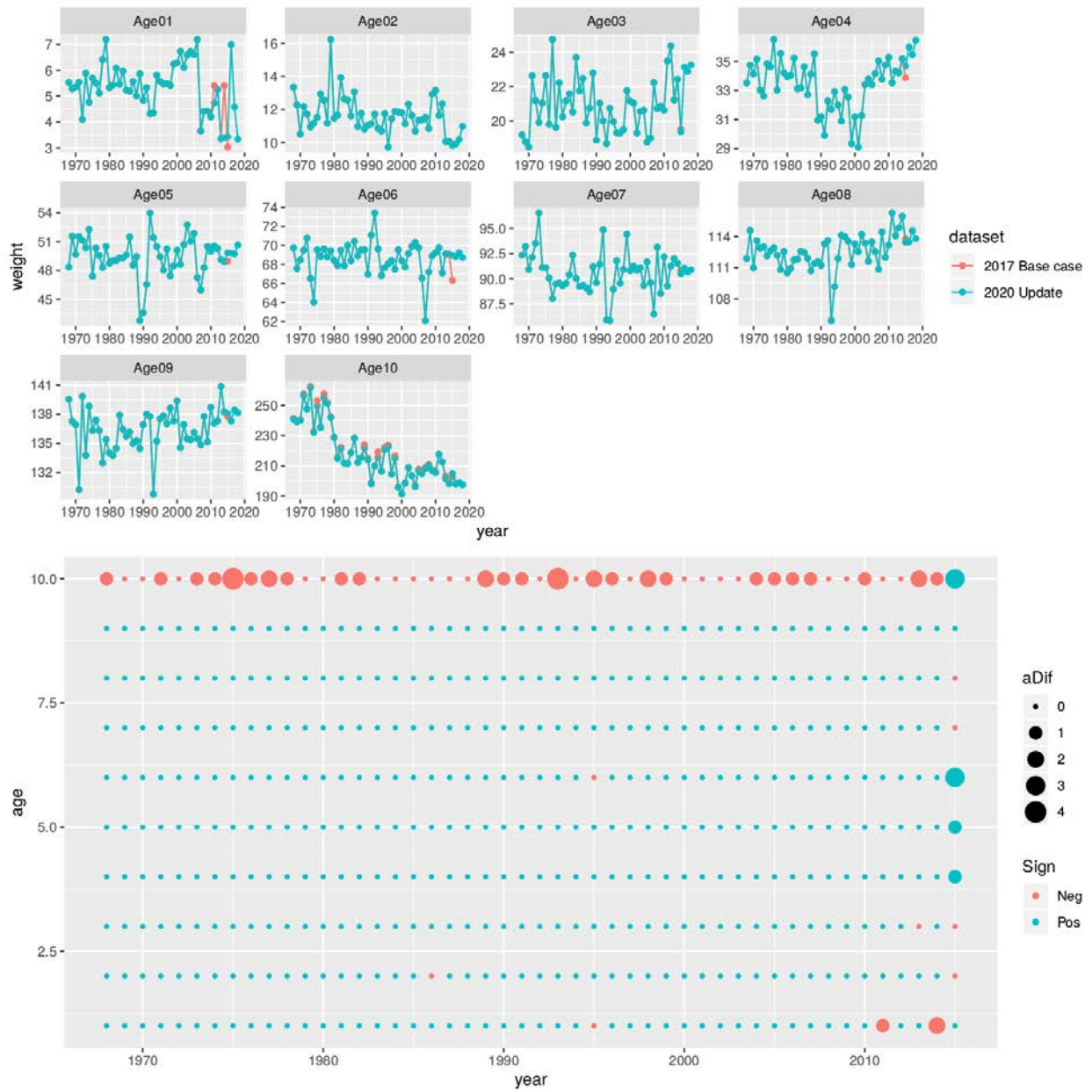


**Figure 3.** Comparison of the 2020 and the 2017 catch-at-age. The top panel presents the comparison for each age. The bottom panel presents the anomalies between both data over their common period.

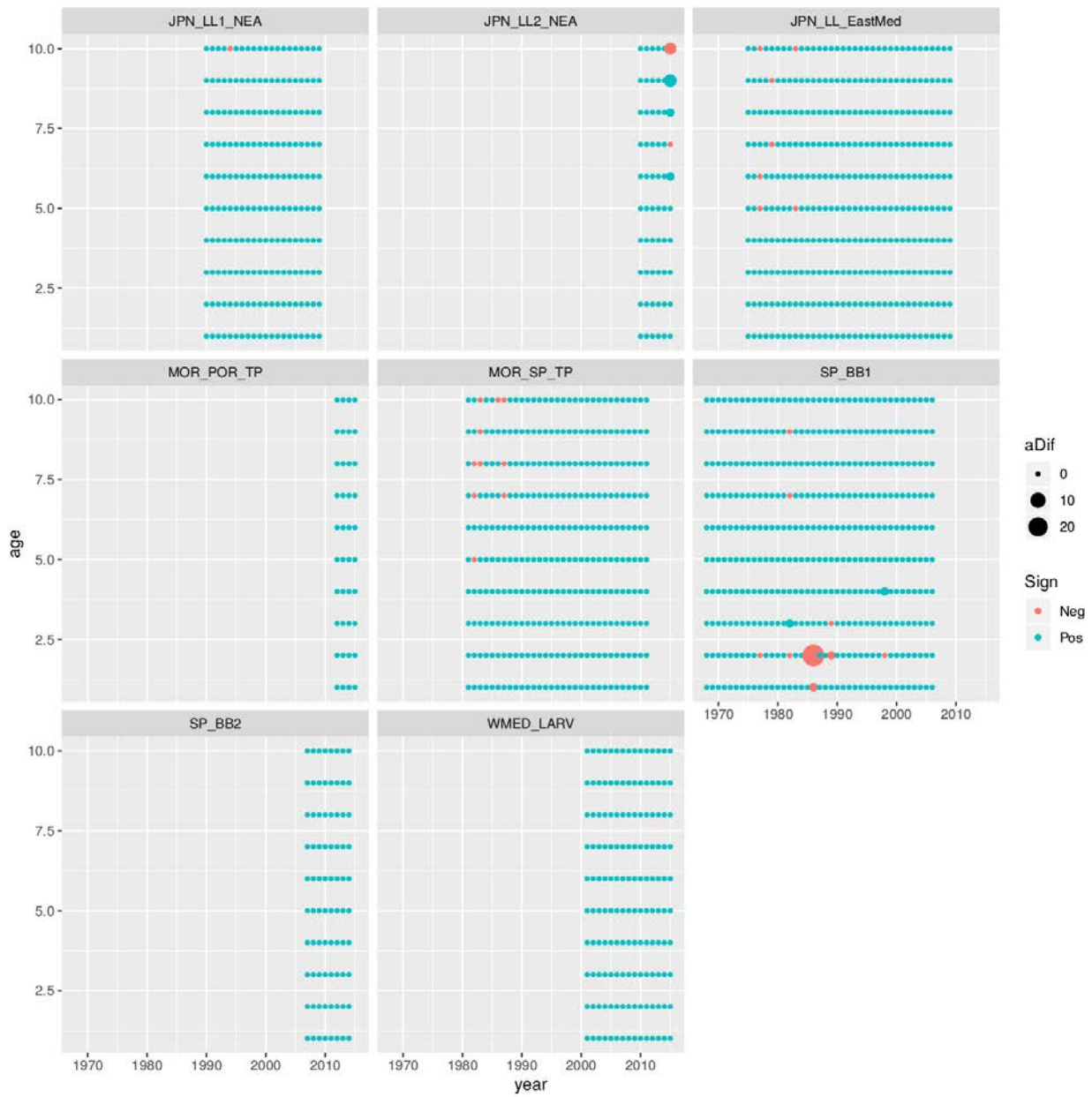




**Figure 4.** Comparison of the indices used in the 2017 BFT stock assessment and the CPUEs for the 2020 update assessment. The indices are the Moroccan Spanish trap index (MOR\_SP\_TP), Moroccan Portuguese trap index (MOR\_POR\_TP), Japanese longline in East Atlantic (south of 40N) and Mediterranean index (JPN\_LL\_EastMed), Japanese longline index in the Northeast Atlantic (early and late, JPN\_LL1\_NEA and JPN\_LL2\_NEA, respectively), Spanish Baitboat in the Bay of Biscay (early and late, SP\_BB1 and SP\_BB2, respectively), French aerial survey (early and late, FR\_AER1 and FR\_AER2, respectively) and Western Mediterranean Larval index (WMED\_LARV).



**Figure 5.** Weight at age data. The top panel presents the comparison of the 2017 weight at age and the 2020 weight at age data. The bottom panel represents differences in kg between the 2017 and the 2020 weight-at-age.



**Figure 6.** Difference between the partial catch-at-age for the 2017 and 2020 assessments for the different indices the Moroccan Spanish trap index (MOR\_SP\_TP), Moroccan Portuguese trap index (MOR\_POR\_TP), Japanese longline eastern Mediterranean index (JPN\_LL\_EastMed), Japanese longline index in the Northeast Atlantic (early and late, JPN\_LL1\_NEA and JPN\_LL2\_NEA, respectively), Spanish Baitboat in the Bay of Biscay (early and late, SP\_BB1 and SP\_BB2, respectively) and Western Mediterranean Larval index (WMED\_LARV)

**Annex 1**  
**Catch-at-Age (CAA) Matrix**

Year	Age1	Age2	Age3	Age4	Age5	Age6	Age7	Age8	Age9	Age10+
1968	4238	35220	72828	42601	9370	3377	7303	4791	3150	32907
1969	16105	119385	37067	9230	11283	9141	5452	8470	6937	37921
1970	54268	116394	17771	5010	5764	9738	6794	9995	5077	22981
1971	35312	122193	9665	7580	3039	1642	4180	8064	16772	20800
1972	6154	158919	62718	15748	2131	3051	3864	3594	7059	20062
1973	23588	162990	34494	5969	2998	2235	3748	9561	14694	16945
1974	48640	112723	45470	63284	9030	5723	1378	11267	20150	40894
1975	45130	175240	17287	11143	12202	5849	4163	5279	4615	61925
1976	8403	81637	74982	31728	16487	9665	6188	7544	7107	61921
1977	18762	153927	34994	30218	6877	8219	5831	3124	3602	47626
1978	87245	101706	39150	16482	10505	3458	2741	2581	3637	39425
1979	9347	51442	37240	23408	5180	3635	3733	5241	4719	30989
1980	56538	29648	43421	22459	7998	5215	5019	4041	3838	40548
1981	85165	131964	31586	7878	7589	5681	7286	8988	7364	34545
1982	188722	116117	96917	24830	10051	9167	9259	10593	9688	54268
1983	397318	139548	47518	21681	15087	7284	7827	8747	10179	54318
1984	64407	252948	46407	39127	26691	14307	10651	10436	12565	57645
1985	46720	196754	165416	46050	23977	10434	5534	4668	5461	48074
1986	239952	112323	68713	40757	10259	12869	7736	4862	4390	44919
1987	125799	257424	86756	33731	17327	12224	7569	5602	5653	37693
1988	384438	144732	179456	37270	13767	13187	12599	9792	7831	48332
1989	250077	282293	61073	53856	27628	7692	11868	10673	6271	37936
1990	205617	179407	118920	84223	49383	12775	10345	11193	9747	41851
1991	125237	242156	150865	75322	54860	14395	8831	8152	13277	49928
1992	184589	453575	288267	78141	26743	15735	13488	8719	9070	51947
1993	212791	626549	362744	92818	42943	18556	15252	9743	8238	42721
1994	423325	440338	198031	61790	38728	33174	27971	25084	18645	100020
1995	474475	310169	213040	78837	43128	40251	25290	21496	18138	98032
1996	608295	409166	336316	226973	62133	22608	14956	15653	16869	90409
1997	408588	421348	296290	144844	65473	35254	20675	21745	23555	97075
1998	276347	347911	468393	222328	82833	24529	12866	22311	15198	73434

1999	507884	442234	251139	187936	49926	22390	27058	16565	23232	92171
2000	119803	316223	210086	154853	44660	28410	25835	24573	33804	113181
2001	10639	423048	199388	243839	48874	35858	28716	21058	27933	99897
2002	44625	521257	310738	109438	40134	30765	17057	19159	17202	110505
2003	45596	441653	184735	42366	54260	37411	26059	14214	26110	126942
2004	113667	225895	203336	55291	25561	22077	42779	24818	14501	146285
2005	150122	132263	75778	58042	35475	26370	24322	26905	24872	151146
2006	43839	51196	105991	100638	58834	49257	29562	28738	38962	126453
2007	21964	110067	72256	169895	197168	100912	38723	27715	21515	128946
2008	2434	129548	51539	67073	68421	29971	19667	16877	13968	40227
2009	2550	26678	21714	26425	24638	43536	32594	12905	12011	37282
2010	1190	19306	20795	24742	30245	17482	19064	9535	7420	14980
2011	0	5907	7438	13427	23419	9613	5856	6842	6693	22787
2012	16	510	7468	12705	15798	7652	6087	7283	10277	28877
2013	43	23157	6870	15351	14800	9022	11234	11571	10248	34900
2014	0	22783	7444	18882	10862	3735	2746	4770	10730	45460
2015	17	32000	17407	26839	17935	7968	7289	6664	11881	48584
2016	17	32254	22095	27418	21609	12267	11835	12651	17037	50506
2017	1774	53312	17972	47607	27065	14319	12304	12623	21021	64905
2018	591	56222	10798	30291	29815	13128	12197	16598	27575	82698

**Annex 2**  
**Abundance indices and CPUEs**

Index	Year	Value	CV
MOR_SP_TP	1981	768.36	0.572
MOR_SP_TP	1982	1038.12	0.346
MOR_SP_TP	1983	1092.05	0.346
MOR_SP_TP	1984	1200.27	0.346
MOR_SP_TP	1985	814.46	0.346
MOR_SP_TP	1986	394.33	0.281
MOR_SP_TP	1987	433.53	0.281
MOR_SP_TP	1988	1014.56	0.28
MOR_SP_TP	1989	531.45	0.261
MOR_SP_TP	1990	614.37	0.226
MOR_SP_TP	1991	727.86	0.226
MOR_SP_TP	1992	313.95	0.226
MOR_SP_TP	1993	325.36	0.226
MOR_SP_TP	1994	341.9	0.226
MOR_SP_TP	1995	223.43	0.227
MOR_SP_TP	1996	375.22	0.246
MOR_SP_TP	1997	992.41	0.246
MOR_SP_TP	1998	925.14	0.246
MOR_SP_TP	1999	1137.45	0.246
MOR_SP_TP	2000	739.23	0.226
MOR_SP_TP	2001	1284.62	0.226
MOR_SP_TP	2002	1130.42	0.226
MOR_SP_TP	2003	662.66	0.237
MOR_SP_TP	2004	332.36	0.226
MOR_SP_TP	2005	677.39	0.226
MOR_SP_TP	2006	633.94	0.226
MOR_SP_TP	2007	1000.6	0.226
MOR_SP_TP	2008	634.18	0.226
MOR_SP_TP	2009	876.71	0.226

MOR_SP_TP	2010	1042.24	0.237
MOR_SP_TP	2011	674.97	0.226
MOR_POR_TP	2012	117.23	0.46
MOR_POR_TP	2013	144.7	0.52
MOR_POR_TP	2014	79.79	0.51
MOR_POR_TP	2015	115.06	0.54
MOR_POR_TP	2016	116.96	0.57
MOR_POR_TP	2017	126.09	0.57
MOR_POR_TP	2018	87.34	0.55
JPN_LL_EastMed	1975	1.9	0.15
JPN_LL_EastMed	1976	2.15	0.12
JPN_LL_EastMed	1977	3.53	0.14
JPN_LL_EastMed	1978	1.5	0.15
JPN_LL_EastMed	1979	2.7	0.14
JPN_LL_EastMed	1980	1.69	0.16
JPN_LL_EastMed	1981	1.63	0.17
JPN_LL_EastMed	1982	3.32	0.13
JPN_LL_EastMed	1983	2.12	0.13
JPN_LL_EastMed	1984	1.62	0.12
JPN_LL_EastMed	1985	1.75	0.15
JPN_LL_EastMed	1986	1.32	0.14
JPN_LL_EastMed	1987	2.16	0.13
JPN_LL_EastMed	1988	1.35	0.14
JPN_LL_EastMed	1989	1.05	0.16
JPN_LL_EastMed	1990	1.41	0.14
JPN_LL_EastMed	1991	1.21	0.13
JPN_LL_EastMed	1992	1.03	0.14
JPN_LL_EastMed	1993	1.04	0.14
JPN_LL_EastMed	1994	1.12	0.16
JPN_LL_EastMed	1995	1.42	0.15
JPN_LL_EastMed	1996	0.5	0.22

JPN_LL_EastMed	1997	0.53	0.21
JPN_LL_EastMed	1998	0.71	0.17
JPN_LL_EastMed	1999	0.64	0.22
JPN_LL_EastMed	2000	0.74	0.2
JPN_LL_EastMed	2001	0.96	0.17
JPN_LL_EastMed	2002	2.05	0.15
JPN_LL_EastMed	2003	1.7	0.13
JPN_LL_EastMed	2004	0.82	0.18
JPN_LL_EastMed	2005	0.88	0.15
JPN_LL_EastMed	2006	1.91	0.15
JPN_LL_EastMed	2007	0.94	0.19
JPN_LL_EastMed	2008	1.22	0.17
JPN_LL_EastMed	2009	1.04	0.24
JPN_LL1_NEA	1990	0.456	0.312
JPN_LL1_NEA	1991	0.539	0.259
JPN_LL1_NEA	1992	0.83	0.163
JPN_LL1_NEA	1993	0.761	0.136
JPN_LL1_NEA	1994	1.005	0.145
JPN_LL1_NEA	1995	1.017	0.141
JPN_LL1_NEA	1996	2.473	0.119
JPN_LL1_NEA	1997	1.572	0.126
JPN_LL1_NEA	1998	0.853	0.147
JPN_LL1_NEA	1999	1.207	0.139
JPN_LL1_NEA	2000	1.102	0.114
JPN_LL1_NEA	2001	1.418	0.117
JPN_LL1_NEA	2002	0.96	0.127
JPN_LL1_NEA	2003	1.07	0.149
JPN_LL1_NEA	2004	0.928	0.128
JPN_LL1_NEA	2005	0.722	0.132
JPN_LL1_NEA	2006	0.853	0.124
JPN_LL1_NEA	2007	0.911	0.133



JPN_LL1_NEA	2008	1.042	0.129
JPN_LL1_NEA	2009	1.607	0.114
JPN_LL2_NEA	2010	2.34	0.12
JPN_LL2_NEA	2011	4.05	0.15
JPN_LL2_NEA	2012	8.62	0.19
JPN_LL2_NEA	2013	7.25	0.16
JPN_LL2_NEA	2014	8.19	0.2
JPN_LL2_NEA	2015	6.41	0.21
JPN_LL2_NEA	2016	5.72	0.18
JPN_LL2_NEA	2017	7.32	0.21
JPN_LL2_NEA	2018	8.79	0.21
SP_BB1	1968	447	0.422
SP_BB1	1969	610.62	0.401
SP_BB1	1970	594.66	0.431
SP_BB1	1971	744.71	0.403
SP_BB1	1972	525.63	0.413
SP_BB1	1973	535.63	0.396
SP_BB1	1974	245.39	0.439
SP_BB1	1975	484.22	0.41
SP_BB1	1976	483.96	0.414
SP_BB1	1977	547.56	0.407
SP_BB1	1978	705.26	0.412
SP_BB1	1979	623.01	0.409
SP_BB1	1980	634.81	0.446
SP_BB1	1981	510.66	0.422
SP_BB1	1982	503.78	0.418
SP_BB1	1983	625.14	0.432
SP_BB1	1984	331.71	0.449
SP_BB1	1985	1125.74	0.407
SP_BB1	1986	751.21	0.419
SP_BB1	1987	1008.43	0.415

SP_BB1	1988	1394.68	0.419
SP_BB1	1989	1285.6	0.4
SP_BB1	1990	986.51	0.407
SP_BB1	1991	901.2	0.422
SP_BB1	1992	695.16	0.427
SP_BB1	1993	2093.55	0.403
SP_BB1	1994	1007.03	0.419
SP_BB1	1995	1235.91	0.405
SP_BB1	1996	1739.29	0.398
SP_BB1	1997	2246.41	0.404
SP_BB1	1998	879.51	0.409
SP_BB1	1999	339.77	0.436
SP_BB1	2000	960.44	0.402
SP_BB1	2001	704.49	0.447
SP_BB1	2002	687.42	0.423
SP_BB1	2003	444.91	0.482
SP_BB1	2004	1210.46	0.417
SP_BB1	2005	2383.57	0.4
SP_BB1	2006	850.09	0.48
SP_BB2	2007	2179.982	0.312
SP_BB2	2008	2154.014	0.302
SP_BB2	2009	955.377	0.303
SP_BB2	2010	2126.197	0.307
SP_BB2	2011	2785.474	0.304
SP_BB2	2012	2306.988	0.387
SP_BB2	2013	1569.126	0.443
SP_BB2	2014	678.287	0.411
FR_AER1	2000	0.02	0.38
FR_AER1	2001	0.01	0.37
FR_AER1	2002	0.01	0.49
FR_AER1	2003	0.01	0.31

FR_AER2	2009	0.05	0.34
FR_AER2	2010	0.02	0.51
FR_AER2	2011	0.06	0.29
FR_AER2	2012	0.03	0.29
FR_AER2	2014	0.12	0.3
FR_AER2	2015	0.07	0.32
FR_AER2	2016	0.31	0.26
FR_AER2	2017	0.11	0.19
FR_AER2	2018	0.04	0.14
WMED_LARV	2001	3.48	0.4
WMED_LARV	2002	3.12	0.5
WMED_LARV	2003	2.38	0.46
WMED_LARV	2004	5.8	0.41
WMED_LARV	2005	2.32	0.35
WMED_LARV	2012	29.62	0.19
WMED_LARV	2013	16.29	0.23
WMED_LARV	2014	14.8	0.29
WMED_LARV	2015	40.2	0.22
WMED_LARV	2016	16.95	0.26
WMED_LARV	2017	74.05	0.23

**Annex 3**

**Weight-at-Age (WAA) in kg used for the spawning stock biomass**

Year	Age1	Age2	Age3	Age4	Age5	Age6	Age7	Age8	Age9	Age10+
1968	5.528	13.35	19.178	33.527	48.362	69.747	92.36	111.871	139.522	240.881
1969	5.287	12.297	18.785	34.761	51.578	67.563	93.221	114.565	137.239	239.254
1970	5.36	10.539	18.456	34.136	49.687	68.472	90.945	110.958	136.908	240.006
1971	5.534	12.188	22.649	35.164	51.529	69.517	92.153	113.599	130.197	256.537
1972	4.097	11.73	21.182	33.036	51.123	70.797	93.535	112.87	139.834	247.609
1973	5.891	10.962	19.904	32.619	50.366	66.523	96.561	113.012	133.733	261.639
1974	4.761	11.19	21.041	34.845	52.273	64.016	91.123	112.114	138.804	232.083
1975	5.7	11.524	22.661	34.623	47.408	69.546	91.115	112.623	136.284	249.598
1976	5.51	12.945	19.8	36.524	50.341	68.853	90.086	112.898	137.368	235.246
1977	5.119	12.571	24.771	33.028	49.556	69.64	88.047	112.184	136.309	255.329
1978	6.419	11.18	19.616	35.551	48.294	68.793	89.491	110.789	132.962	251.249
1979	7.195	16.227	22.225	34.222	50.512	69.461	89.583	112.556	135.378	242.017
1980	5.33	11.477	20.237	33.961	48.759	68.421	89.32	110.491	134	228.728
1981	5.431	11.661	21.159	34.046	49.041	67.902	89.542	110.906	133.744	214.745
1982	6.083	13.933	21.583	35.236	49.052	69.509	90.402	111.729	134.454	221.231
1983	5.464	12.64	20.514	33.12	49.324	67.87	92.37	111.787	137.885	211.811
1984	5.973	12.576	23.714	33.175	49.312	70.002	90.037	112.555	136.408	211.433
1985	5.236	11.611	21.761	34.649	49.625	68.397	89.243	112.465	135.726	218.777
1986	5.191	13.073	22.481	32.708	51.5	70.443	89.356	111.879	136.157	228.257
1987	5.565	10.986	19.877	34.13	48.578	68.901	89.105	110.686	134.934	212.131
1988	5.014	11.777	20.742	35.525	49.448	69.537	88.72	111.382	135.258	215.421
1989	5.87	10.834	22.809	30.958	42.799	69.55	91.212	111.548	134.427	221.735
1990	4.842	11.062	18.863	31.193	43.622	66.954	89.611	111.215	136.905	213.911
1991	5.329	11.145	21.032	29.907	46.555	71.104	91.452	113.281	137.986	198.099
1992	4.326	11.731	19.995	32.282	53.989	73.439	94.883	113.613	137.756	209.86
1993	4.357	10.871	18.663	31.693	51.433	69.644	85.904	105.876	129.742	215.536
1994	5.817	10.71	20.74	32.932	50.491	66.825	85.845	109.162	135.218	206.476
1995	5.569	11.76	19.95	32.017	49.449	67.672	88.965	111.869	137.521	220.913
1996	5.471	9.738	19.301	30.889	48.043	68.074	91.801	114.119	137.822	222.62
1997	5.484	11.454	19.284	33.079	50.238	68.399	89.562	113.989	137.016	204.583
1998	5.419	11.894	19.482	32.543	47.439	67.494	90.955	113.542	138.606	215.022

1999	6.244	11.857	21.776	29.331	48.484	69.558	94.436	111.294	137.274	195.628
2000	6.29	11.819	21.144	31.188	50.12	68.405	90.817	113.278	139.368	191.378
2001	6.74	11.144	21.033	29.091	48.657	67.744	91.263	112.534	134.531	198.654
2002	6.108	12.327	19.29	31.263	50.683	69.144	90.851	114.193	136.92	208.836
2003	6.59	11.637	20.551	33.405	52.74	69.898	91.108	113.363	135.466	203.352
2004	6.735	10.703	20.622	33.805	51.044	70.346	89.334	111.589	135.334	196.223
2005	6.607	11.356	18.748	33.405	51.858	69.759	91.684	113.477	136.127	206.944
2006	7.198	11.381	18.987	34.168	47.272	66.563	89.627	112.532	135.475	204.92
2007	3.653	11.525	22.243	35.045	45.976	62.074	86.494	110.836	134.835	208.337
2008	4.417	10.864	20.716	33.771	48.3	67.211	93.141	114.433	137.757	210.476
2009	4.421	12.933	20.863	34.762	50.511	68.899	88.553	111.977	135.133	207.151
2010	4.202	13.161	20.624	35.285	50.029	69.231	92.204	113.154	138.687	205.471
2011	4.732	11.642	23.512	33.53	50.541	69.764	89.296	116.271	137.047	217.626
2012	5.261	12.352	24.394	34.336	50.293	67.102	91.281	114.07	137.289	212.612
2013	3.349	10.082	21.219	34.233	49.125	69.114	92.004	114.838	140.854	201.447
2014	3.387	10.084	22.44	35.189	48.921	69.07	91.556	115.931	138.202	198.294
2015	3.426	9.844	19.364	34.694	49.836	68.954	90.496	113.423	138.046	205.057
2016	6.999	9.933	23.15	36.002	49.795	68.834	91.065	113.465	137.265	198.079
2017	4.58	10.206	22.897	35.469	49.732	69.237	90.68	114.542	138.412	199.048
2018	3.338	10.992	23.279	36.455	50.647	68.745	90.902	113.784	138.134	197.648

**Annex 4**  
**Partial Catch-at-Age for each index**

Index	Year	Age1	Age2	Age3	Age4	Age5	Age6	Age7	Age8	Age9	Age10+
MOR_SP_TP	1981	0	0	0	0.153	183.824	1138.811	1668.342	2250.847	748.874	3153.915
MOR_SP_TP	1982	0	0	0	3.375	151.78	552.774	1977.342	1963.327	2079.277	7953.703
MOR_SP_TP	1983	0	0	0	1.892	7.568	18.447	45.975	299.658	501.253	8247.22
MOR_SP_TP	1984	0	0	0	31.755	240.008	436.721	1223.596	1777.706	3167.885	10810.641
MOR_SP_TP	1985	0	0	0	0	91.599	410.728	358.042	502.173	709.299	7633.485
MOR_SP_TP	1986	0	2.663	0	0	2.719	76.366	251.493	242.431	359.729	5122.521
MOR_SP_TP	1987	0	2.62	0	0	4.91	102.232	329.847	332.523	474.749	5662.596
MOR_SP_TP	1988	168.57	38.536	55.524	40.123	115.979	833.762	934.979	965.362	803.613	10743.396
MOR_SP_TP	1989	707.102	0	2.163	9.633	190.339	884.389	1461.493	1601.73	1070.756	6714.265
MOR_SP_TP	1990	1903.927	0	0	62.151	377.902	876.364	1583.073	3383.174	4174.974	13189.316
MOR_SP_TP	1991	0	0	0	227.856	4415.834	3863.604	2140.406	1962.691	2120.192	5826.326
MOR_SP_TP	1992	0	0	2.677	33.995	369.867	830.22	1385.732	1417.613	1161.934	5015.73
MOR_SP_TP	1993	0	0	0	65.364	171.62	349.767	366.752	374.97	502.812	6161.034
MOR_SP_TP	1994	3524.408	0	28.195	84.586	1924.678	2672.691	2073.4	962.664	848.332	6697.656
MOR_SP_TP	1995	0	0	18.652	182.959	281.304	299.281	215.905	315.187	879.157	4548.496
MOR_SP_TP	1996	0	0	4.767	111.143	278.901	222.144	227.122	260.023	599.794	6577.087
MOR_SP_TP	1997	0	0	29.853	485.183	1942.057	2184.649	1382.756	2175.491	2359.506	13667.321
MOR_SP_TP	1998	0	0	13.018	269.498	713.435	1153.735	1544.784	1759.425	2955.474	12191.202
MOR_SP_TP	1999	0	0	4.397	41.805	122.318	631.203	826.029	1501.085	1639.524	15189.168
MOR_SP_TP	2000	0	0	5.531	24.92	365.659	461.457	1043.057	2127.494	2618.378	10958.549
MOR_SP_TP	2001	0	0	43.542	189.549	184.631	529.664	1225.929	2628.962	3951.97	13948.648
MOR_SP_TP	2002	0	0	0	5.817	67.376	183.708	542.398	1549.154	2140.509	12510.051
MOR_SP_TP	2003	0	0	0	4.88	224.919	531.767	602.408	1457.676	3106.414	6733.798
MOR_SP_TP	2004	0	0	0.031	0.609	55.947	156.354	164.979	413.007	1538.032	8063.14
MOR_SP_TP	2005	0	0	11.291	2.258	49.118	232.04	597.885	1211.013	1295.135	9865.947
MOR_SP_TP	2006	0	0	0	164.881	544.106	2561.463	2703.067	3254.014	2197.788	7683.823
MOR_SP_TP	2007	0	0	0	197.403	651.43	3050.972	3090.517	3321.886	2255.91	10538.457
MOR_SP_TP	2008	0	0	1.468	3.524	61.688	136.293	325.876	941.343	2226.716	11926.596
MOR_SP_TP	2009	0	0	0	21.954	369.181	630.993	564.92	1365.665	2061.5	11257.452

MOR_SP_TP	2010	0	0	1.957	4.35	47.195	247.571	811.92	1197.879	2317.744	7865.557
MOR_SP_TP	2011	0	0	0	9.338	16.978	40.336	77.924	263.39	635.999	8126.116
MOR_POR_TP	2012	0	0	0	0	2.882	25.935	76.709	128.995	456.717	5189.648
MOR_POR_TP	2013	0	0	1.863	1.397	1.397	27.94	152.829	234.365	536.557	5133.673
MOR_POR_TP	2014	0	0	1.029	0	1.029	3.086	19.547	56.903	193.935	4862.566
MOR_POR_TP	2015	0	0	0	5.76	7.679	23.998	42.237	91.493	152.628	5227.842
MOR_POR_TP	2016	0	0	5.344	0	4.276	22.446	30.997	111.163	158.493	6789.475
MOR_POR_TP	2017	0	0	4.244	10.61	27.586	76.393	246.154	314.059	498.675	8089.835
MOR_POR_TP	2018	0	0	3.755	3.755	11.265	116.409	123.919	146.45	326.689	9716.787
JPN_LL_EastMed	1975	0	15.696	27.2	107.76	26.159	106.719	86.832	326.88	470.237	15476.414
JPN_LL_EastMed	1976	9.357	111.646	367.065	307.351	294.862	299.965	202.457	214.884	299.121	10978.542
JPN_LL_EastMed	1977	0.001	0.018	30.397	23.786	43.315	276.953	581.917	1015.313	1503.21	7569.379
JPN_LL_EastMed	1978	0.258	16.09	119.666	238.874	288.047	239.566	100.701	62.622	31.076	1920.861
JPN_LL_EastMed	1979	0.412	4.279	28.348	60.494	133.538	918.769	1247.704	2035.641	1237.239	690.182
JPN_LL_EastMed	1980	0	0.203	68.9	55.271	91.435	262.377	461.66	730.618	619.769	3678.91
JPN_LL_EastMed	1981	3.548	26.42	68.966	62.726	68.54	120.037	249.529	608.835	463.625	1940.824
JPN_LL_EastMed	1982	23.14	558.367	1127.25	1442.211	1189.842	3086.739	2704.287	2922.582	1591.186	9516.696
JPN_LL_EastMed	1983	0.001	26.299	172.996	298.508	1082.837	1306.64	1728.094	2158.963	2019.838	11137.461
JPN_LL_EastMed	1984	0.012	0.847	45.735	189.736	355.145	737.186	1109.651	2037.362	3797.158	7984.152
JPN_LL_EastMed	1985	8.587	57.288	174.777	127.388	285.698	346.039	580.863	373.789	523.898	5226.916
JPN_LL_EastMed	1986	0.21	18.49	51.629	100.665	364.244	366.975	328.036	427.918	431.379	3880.382
JPN_LL_EastMed	1987	0.001	0.006	14.492	43.675	136.133	505.664	839.556	760.227	677.248	4023.02
JPN_LL_EastMed	1988	0.263	8.766	47.978	142.973	99.958	389.38	841.835	1037.647	987.82	4815.388
JPN_LL_EastMed	1989	0	0.256	20.534	114.26	157.605	256.52	634.524	512.289	397.646	1945.53
JPN_LL_EastMed	1990	0.041	6.538	34.221	72.837	375.185	529.128	742.468	1014.233	1057.62	2980.4
JPN_LL_EastMed	1991	7.906	3.935	28.066	24.198	55.36	141.047	588.858	1446.04	2567.844	3630.974
JPN_LL_EastMed	1992	0.129	0.183	80.19	276.337	71.272	195.138	275.906	541.258	1618.131	8727.312
JPN_LL_EastMed	1993	0	34.093	36.53	75.826	84.638	244.9	153.144	170.515	638.904	8275.44
JPN_LL_EastMed	1994	0	0	78.724	247.575	189.27	180.112	537.037	663.69	759.728	5801.075
JPN_LL_EastMed	1995	2.917	6.172	13.308	327.762	178.264	324.462	955.64	1130.741	1087.685	10504.403
JPN_LL_EastMed	1996	0	0	78.435	101.094	321.946	252.469	195.178	354.158	503.174	6147.222

JPN_LL_EastMed	1997	0	75.331	298.74	292.202	184.106	59.073	132.746	318.227	649.108	3835.898
JPN_LL_EastMed	1998	0	0	10.563	18.014	65.176	121.233	175.212	301.92	644.135	5685.048
JPN_LL_EastMed	1999	0	0	0	2.258	162.59	272.589	351.904	474.871	1001.131	3301.18
JPN_LL_EastMed	2000	0	0	0	13.902	688.762	520.095	493.063	287.845	427.663	1986.402
JPN_LL_EastMed	2001	0.331	0	2.308	44.342	94.768	782.369	930.181	1287.599	743.128	980.448
JPN_LL_EastMed	2002	0.84	0.84	3.822	59.149	598.742	439.561	1938.549	1225.198	686.167	2945.967
JPN_LL_EastMed	2003	0	0	55.901	184.385	206.185	123.514	327.039	542.082	983.023	3591.918
JPN_LL_EastMed	2004	0	0	11.777	65.771	204.511	233.321	578.77	542.621	1274.806	2873.871
JPN_LL_EastMed	2005	1.485	34.124	56.117	68.034	105.613	161.004	459.862	561.25	827.737	3125.108
JPN_LL_EastMed	2006	52.964	0	312.561	105.795	465.049	526.577	1655.002	1927.258	1728.15	4584.968
JPN_LL_EastMed	2007	5.073	59.37	670.249	505.706	294.872	274.201	413.808	1043.599	838.763	2147.156
JPN_LL_EastMed	2008	0	9.742	70.756	51.272	10.596	0	30.507	101.263	81.779	244.057
JPN_LL_EastMed	2009	0	0	1.076	3.65	11.329	12.28	3.188	19.14	44.598	224.576
JPN_LL1_NEA	1990	0.002	19.188	99.013	106.166	371.501	584.962	559.232	586.257	1002.325	1481.688
JPN_LL1_NEA	1991	0.021	141.538	515.242	749.845	923.114	1551.807	2070.247	1173.635	1472.377	4275.442
JPN_LL1_NEA	1992	0.17	18.545	117.083	815.714	1609.782	1165.905	1057.938	1236.216	1573.716	2909.612
JPN_LL1_NEA	1993	0	22.009	434.629	1920.685	2482.628	2816.781	2029.454	1176.162	740.523	1545.831
JPN_LL1_NEA	1994	9.255	14.378	306.004	687.391	1123.074	1003.74	2060.314	1948.372	1318.71	1450.733
JPN_LL1_NEA	1995	1.967	13.104	305.642	1264.649	2060.099	4702.686	3495.901	3068.165	2483.528	1924.928
JPN_LL1_NEA	1996	0	0	162.039	628.789	843.625	1216.874	2568.593	3405.594	3670.455	5716.054
JPN_LL1_NEA	1997	1.773	11.823	17.776	100.94	608.052	1589.412	2279.007	3544.973	3949.507	4132.672
JPN_LL1_NEA	1998	1.252	0.099	149.617	246.85	388.693	1387.243	2751.122	2338.417	3218.176	5614.214
JPN_LL1_NEA	1999	0	109.054	122.911	1434.834	2756.708	2784.733	4252.734	3473.901	2204.936	3450.18
JPN_LL1_NEA	2000	0	11.071	17.4	51.622	917.201	3779.25	2560.516	4035.25	4708.553	3987.605
JPN_LL1_NEA	2001	50.233	23.679	3.33	104.592	1078.158	5218.086	5284.12	3799.436	2033.794	2294.144
JPN_LL1_NEA	2002	0.004	6.48	33.826	55.435	27.961	206.706	1083.164	4638.48	4481.506	3421.957
JPN_LL1_NEA	2003	10.035	104.364	351.147	1105.856	1529.097	1904.714	1690.184	2116.456	2802.213	5623.928
JPN_LL1_NEA	2004	18.018	303.551	137.94	358.274	407.73	702.347	2682.677	2302.453	1202.53	5267.181
JPN_LL1_NEA	2005	7.064	162.301	266.903	323.585	502.314	765.764	2187.187	2475.445	3378.247	5580.285
JPN_LL1_NEA	2006	44.297	0	233.878	83.732	388.95	408.122	1029.02	1159.863	873.688	2275.398
JPN_LL1_NEA	2007	21.205	10.84	1077.931	864.798	974.408	1146.118	986.51	1895.328	1513.781	3029.618



JPN_LL1_NEA	2008	0	3.222	8.487	663.605	3971.146	1663.235	6060.392	4077.177	2798.77	2766.862
JPN_LL1_NEA	2009	0	1.062	14.271	16.351	137.117	6477.691	3089.95	3086.708	3007.281	1551.535
JPN_LL2_NEA	2010	0	0	0	0	8.288	232.807	4875.241	3778.466	518.317	702.671
JPN_LL2_NEA	2011	0	0	0	0	2.144	37.412	181.058	3595.002	3814.115	602.24
JPN_LL2_NEA	2012	0	0	0	0	0	92.947	481.131	757.691	3472.589	2673.202
JPN_LL2_NEA	2013	0	0	0	0	1.086	5.431	339.554	2052.205	1849.081	3398.255
JPN_LL2_NEA	2014	0	0	0	0	0	3.279	45.913	678.851	2106.514	4092.781
JPN_LL2_NEA	2015	0	0	0	0	0	11.516	139.64	902.322	2640.67	4905.723
JPN_LL2_NEA	2016	0	0	0	0	0	0	43.549	692.467	2312.404	6179
JPN_LL2_NEA	2017	0	0	0	0	2.201	3.302	36.951	902.253	3396.328	6978.79
JPN_LL2_NEA	2018	0	0	0	0	2.201	39.564	264.399	1280.978	3889.251	8122.051
SP_BB1	1968	2181.058	4766.437	8097.817	13513.446	3257.35	233.481	51.252	34.168	22.779	841.474
SP_BB1	1969	11211.942	70060.263	9410.654	2143.979	446.94	91.002	10.193	0	0	952.965
SP_BB1	1970	35184.816	75829.887	10156.383	3699.429	3014.001	1143.962	204.912	563.156	0	1934.914
SP_BB1	1971	23820.183	83281.365	3528.737	5074.609	1981.643	492.552	110.006	16.523	0	2311.224
SP_BB1	1972	1545.732	88179.08	2184.888	750.95	891.369	796.664	583.251	210.252	26.292	2859.026
SP_BB1	1973	12125.293	129129.401	2146.555	490.262	323.524	568.571	699.477	795.957	662.171	2621.069
SP_BB1	1974	18331.986	70421.139	3819.176	639.872	1334.762	44.484	279.843	0	0	1549.19
SP_BB1	1975	20496.675	75885.792	3582.306	1400.119	1400.008	124.312	269.713	0	0	3325.176
SP_BB1	1976	1491.315	28152.945	9525.093	1687.909	1419.815	940.133	373.553	41.588	0	2739.855
SP_BB1	1977	6613.61	55150.207	12510.315	6728.479	643.709	242.016	173.427	71.2	0	3957.47
SP_BB1	1978	52977.921	45839.777	8044.893	12076.816	6016.011	1537.381	160.79	33.475	70.148	5602.732
SP_BB1	1979	2882.386	9706.954	14641.055	12802.447	3318.529	1295.966	488.196	260.21	644.551	2197.244
SP_BB1	1980	32918.116	18248.193	6874.019	2019.946	2767.01	2423.379	1369.727	207.06	83.812	1522.834
SP_BB1	1981	53134.133	34441.032	2924.223	1515.015	847.162	524.559	325.264	176.274	7.978	1896.796
SP_BB1	1982	15491.584	25338.412	5846.576	2333.486	1470.735	498.996	463.808	246.031	17.752	161.809
SP_BB1	1983	260315.645	57094.705	5106.403	1569.293	215.928	102.641	15.819	21.894	0	1335.517
SP_BB1	1984	12440.684	123616.774	22020.995	3898.224	2071.759	374.301	173.028	117.192	17.048	8.757
SP_BB1	1985	15214.505	85475.602	27987.595	5193.554	1311.967	596.945	98.43	8.314	12.342	567.71
SP_BB1	1986	142510.458	51166.138	6060.84	5629.801	1095.988	441.722	55.835	1.417	15.877	333.421
SP_BB1	1987	23534.759	98350.878	1906.691	2945.813	1687.745	1165.567	142.143	18.435	0	121.163

SP_BB1	1988	217220.004	58762.008	6414.609	1196.114	1380.811	744.976	348.135	9.963	0	445.88
SP_BB1	1989	145376.613	95504.975	4326.028	2335.453	422.044	304.046	120.253	8.927	2.626	1284.329
SP_BB1	1990	57094.756	34513.457	16284.873	3353.038	4346.88	615.179	43.381	277.182	135.698	398.883
SP_BB1	1991	34542.464	48838.342	3546.074	3677.421	1813.768	645.626	357.943	159.516	63.979	194.497
SP_BB1	1992	21716.658	51766.216	5920.862	1624.567	608.048	171.353	23.952	69.88	32.733	95.6
SP_BB1	1993	28871.685	157853.48	47785.222	14582.551	3243.721	1280.599	156.697	79.002	33.616	102.193
SP_BB1	1994	84039.313	31449.314	15752.819	7392.12	3961.062	364.294	5.204	23.754	20.586	212.724
SP_BB1	1995	155047.28	78036.842	34811.828	3946.193	398.958	193.826	6	5.078	1.47	15.195
SP_BB1	1996	242427.528	73522.498	68450.873	26614.201	8286.554	439.203	46.021	27.508	53.496	641.37
SP_BB1	1997	232586.396	119134.844	116331.1	25327.805	8416.306	472.63	32.922	23.695	39.128	1347.848
SP_BB1	1998	49751.677	53718.451	26785.784	23450.168	1217.114	875.47	571.415	201.346	28.016	725.889
SP_BB1	1999	4844.727	4374.066	3299.429	10396.332	10710.615	2232.505	577.013	94.203	60.293	170.832
SP_BB1	2000	41477.775	22673.833	12149.339	4341.027	5862.376	3415.653	956.978	1277.226	778.819	596.302
SP_BB1	2001	2349.005	98275.493	24419.592	5217.017	1529.907	1837.213	1085.981	283.209	614.469	867.881
SP_BB1	2002	30757.774	81019.683	39021.222	4163.217	1030.961	239.219	172.797	411.184	435.101	840.849
SP_BB1	2003	7042.124	32260.438	11175.112	974.482	1547.608	877.075	170.751	387.543	1301.243	1287.329
SP_BB1	2004	65715.097	57991.083	8486.855	5715.55	1453.018	678.649	323.694	100.525	205.211	1296.042
SP_BB1	2005	133943.015	44372.151	23971.974	3461.694	2685.263	520.792	155.707	64.819	39.897	529.299
SP_BB1	2006	30906.8	23325.203	13921.525	6359.722	1204.216	967.034	434.236	80.744	59.407	440.325
SP_BB2	2007	18803.04	38677.457	27817.417	17969.568	6343.453	1891.277	665.17	156.56	98.956	894.008
SP_BB2	2008	298.838	52587.281	35478.609	16611.151	2351.542	102.99	397.691	233.18	300.226	1070.88
SP_BB2	2009	44.467	12772.378	14152.141	5763.972	2068.793	3064.159	936.386	331.164	301.775	533.189
SP_BB2	2010	122.767	16606.885	7517.981	4134.842	901.151	285.71	608.584	116.543	99.611	206.712
SP_BB2	2011	0	5604.526	4193.105	2763.694	3140.259	1237.593	224.208	267.327	86.397	289.384
SP_BB2	2012	0	0	3120.407	2506.08	861.316	103.985	55.007	25.393	55.699	211.347
SP_BB2	2013	0	7.861	90.975	564.728	399.639	224.428	37.459	118.274	17.651	732.131
SP_BB2	2014	0	37.156	110.068	268.796	141.636	37.876	14.088	9.873	15.951	326.441
WMED_LARV	2001	0	0	0.25	0.5	1	1	1	1	1	1
WMED_LARV	2002	0	0	0.25	0.5	1	1	1	1	1	1
WMED_LARV	2003	0	0	0.25	0.5	1	1	1	1	1	1
WMED_LARV	2004	0	0	0.25	0.5	1	1	1	1	1	1

WMED_LARV	2005	0	0	0.25	0.5	1	1	1	1	1	1
WMED_LARV	2006	0	0	0.25	0.5	1	1	1	1	1	1
WMED_LARV	2007	0	0	0.25	0.5	1	1	1	1	1	1
WMED_LARV	2008	0	0	0.25	0.5	1	1	1	1	1	1
WMED_LARV	2009	0	0	0.25	0.5	1	1	1	1	1	1
WMED_LARV	2010	0	0	0.25	0.5	1	1	1	1	1	1
WMED_LARV	2011	0	0	0.25	0.5	1	1	1	1	1	1
WMED_LARV	2012	0	0	0.25	0.5	1	1	1	1	1	1
WMED_LARV	2013	0	0	0.25	0.5	1	1	1	1	1	1
WMED_LARV	2014	0	0	0.25	0.5	1	1	1	1	1	1
WMED_LARV	2015	0	0	0.25	0.5	1	1	1	1	1	1
WMED_LARV	2016	0	0	0.25	0.5	1	1	1	1	1	1
WMED_LARV	2017	0	0	0.25	0.5	1	1	1	1	1	1