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WESTERN ATLANTIC BLUEFIN TUNA VIRTUAL POPULATION ANALYSIS UPDATED DATA INPUTS AND MODEL SPECIFICATIONS

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SUMMARY

This report documents the western Atlantic bluefin tuna updated data inputs and virtual population analysis parameterization for the 2020 update assessment. The assessment team reviewed the catches-at-size, estimated the catches-at-age, and revised the model input files in accordance with the specifications of the Species Group work plan. The updated assessment files are available on the bluefin tuna work group meeting cloud and attached here as appendices.

RÉSUMÉ

Ce rapport documente les entrées de données actualisées sur le thon rouge de l'Atlantique Ouest et le paramétrage de l'analyse de la population virtuelle pour la mise à jour de l'évaluation de 2020. L'équipe d'évaluation a examiné les prises par taille, a estimé les prises par âge et a révisé les fichiers d'entrée des modèles conformément aux spécifications du plan de travail du Groupe d'espèces. Les fichiers d'évaluation actualisés sont disponibles sur le cloud de la réunion du Groupe d'espèces sur le thon rouge et sont joints ici en appendices.

RESUMEN

Este informe documenta las entradas de datos actualizadas del atún rojo del Atlántico occidental y la parametrización del análisis de población virtual para la evaluación actualizada de 2020. El equipo de evaluación revisó las capturas por talla, estimó las capturas por edad y revisó los archivos de entrada del modelo de conformidad con las especificaciones del plan de trabajo del Grupo de especies. Los archivos de la evaluación actualizada están disponibles en la nube de la reunión del grupo de especies de atún rojo y se adjuntan aquí como apéndices.

KEYWORDS

Stock assessment, bluefin tuna, West Atlantic

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1. Introduction

The stock assessment of West Atlantic bluefin tuna (WBFT) applied a virtual population analysis (VPA) as one of two principal models for estimating fishery status and providing catch projections. The most recent WBFT benchmark assessment occurred during 2017. Bluefin tuna biological knowledge, available datasets, and data processing methods were evaluated by the Bluefin Tuna Species Workgroup (herein Group) of the Standing Committee on Research and Statistics (SCRS) to select base model parameterization and compile a list of sensitivity analyses. Recently, the Group outlined a set of specifications for updating the base VPA in the 2020 work plan. Specifically, ICCAT (2019) provided 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)*". This report summarizes the data updates and VPA settings for methods documentation of the assessment update.

2. Methods

2.1 VPA methods overview

The assessment team implemented the following updates to the VPA of WBFT:

- Updated catch-at-age, partial catch-at-age and indices of abundance data inputs up to and including 2018
- Corrected partial-catch-at-age of the Japanese longline fleet
- Conducted a sensitivity run removing the 2018 data point of the Gulf of St Lawrence acoustic survey

Base model configuration summary:

- Model years ranged 1974 to 2018
- Catch-at-age (CAA) derived by cohort slicing the total catch-at-size (CAS) estimates (provided by the Secretariat) using the Richards growth model (Ailloud *et al.* 2017)
- plusgroup included ages 16 and older
- Natural mortality assumed a weight-based Lorenzen model scaled to equal 0.1 for oldest ageclass:
  Age1 M = 0.38, Age2 M = 0.30, Age3 M = 0.24, Age4 M = 0.20, Age5 M = 0.18, Age6 M = 0.16, Age7 M = 0.14, Age8 M = 0.13, Age9 M = 0.12, Age10 M = 0.12, Age11 M = 0.11, Age12 M = 0.11, Age13 M = 0.11, Age 14+ M = 0.10
- Fisheries-dependent indices of abundance included:
  - US rod and reel <145 cm, 1980-1992
  - US rod and reel 66 to 114 cm, 1993-2018
  - US rod and reel 115 to 144 cm, 1993-2018
  - US rod and reel >195 cm, 1983-1992
  - US longline Gulf of Mexico, 1992-2018
  - Japan longline Gulf of Mexico, 1974-1981
  - Japan longline Area 2 West, 1976-2009
  - Japan longline recent, 2010-2018
- Fisheries-independent surveys included:
  - Gulf of St Lawrence acoustic survey, 1994-2018
  - Gulf of Mexico larval survey, 1977-2018
- Index variance settings included input CV weighting of fishery-dependent indices of abundance with additive variance parameters estimated in the VPA, and fixed input CV=0.3 for fishery-independent indices of abundance
- Random-walk estimation of Japanese longline annual selectivity and catchability
- F-ratio (annual F of plusgroup/F of age 15) set equal to 1.0
- No constraints on recruitment or spawn-recruitment relationship

The team outlined the following sensitivity analyses for model diagnostics, consistent with the previous assessment and 2020 workplan:

- an index of abundance jackknife where each index series is iteratively removed from the VPA
- a 10-year retrospective analysis to evaluate the effects of removing recent years data
- parametric bootstrap of the index data based on defined variances
- jitter analysis of model parameter starting seed
- age-plusgroup F-ratio parameter profiling

The Secretariat provided the CAS data during April, and the CAA was estimated based on cohort slicing using the AgeIT R-script, consistent with the 2017 assessment. CAA and mean weight-at-age estimates were compared with the 2017 base model inputs for validation of estimation methods replication (**Figures 1 and 2**). The aged output file from AgeIT was summarized by fleet and gear to generate partial CAA corresponding to the indices of abundance, following the restrictions on sizes, areas, and month specified during the 2017 assessment. The indices of abundance were reviewed and adopted for inclusion in the VPA during the 2019 SCRS Species Group meeting, and no revisions occurred to the indices since that time. The filter criteria applied to the Japan longline partial CAA was corrected to exclude catches from other flags in the BFT Area 52W. The final CAA and partial CAA matrices are provided with the other data inputs to the VPA in **Appendix A**.

A continuity model was constructed using the same set of indices and model specifications used in the 2017 VPA base-case assessment. The data, parameter, and control files for the continuity model (young and older spawning assumptions) were posted to the assessment server and are provided here (young spawn scenario) in **Appendices A, B,** and **C**, respectively.

2.2 VPA general specifications

The oldest age class represented a plus group (ages 16 and older) and the fishing mortality rate on that age is specified as the product of the fishing mortality rate on the next younger age (F_{15}) and an 'F-ratio' parameter that represents the ratio of F_{16} to F_{15}. For the 2017 base models, the F-ratio was fixed equal to 1.0 for the entire period. This assumption was maintained in this update.

The fishing mortality rates for each age in the last year of the VPA (except the oldest age) were estimated as free parameters, but subject to a constraint restricting the amount of change in the vulnerability pattern during the terminal three years with a standard deviation of 0.5 (see SCRS/2008/089 for more details).

The indices of abundance were fitted assuming a lognormal error structure and input CV weighting (i.e., the coefficient of variation estimated from each index standardization model). Additive variance coefficients were estimated by fleet/gear group for fishery dependent indices of abundance. The catchability coefficients for each index, with exception of the Japan longline index, were assumed constant over the series duration, and estimated by the corresponding concentrated likelihood formula. A random walk of Japan longline selectivity was applied to allow for cohort targeting, consistent with the 2017 base model.

3. Acknowledgements

We thank the ICCAT Secretariat staff for excellent data services, including Juan Luis, Alberto Parrilla, and, Valerie Samedi. We thank a diverse group of biologists responsible for data collection and management across CPC research and monitoring programs.

References

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Walter, J. and Porch, C., 2008. Three Different Strategies for Modeling the Terminal-Year Fishing Mortality Rates in Virtual Population Analyses of Western Bluefin Tuna: Retrospective Patterns and Consequences for Projections. SCRS/2008/089. NOAA Fisheries.

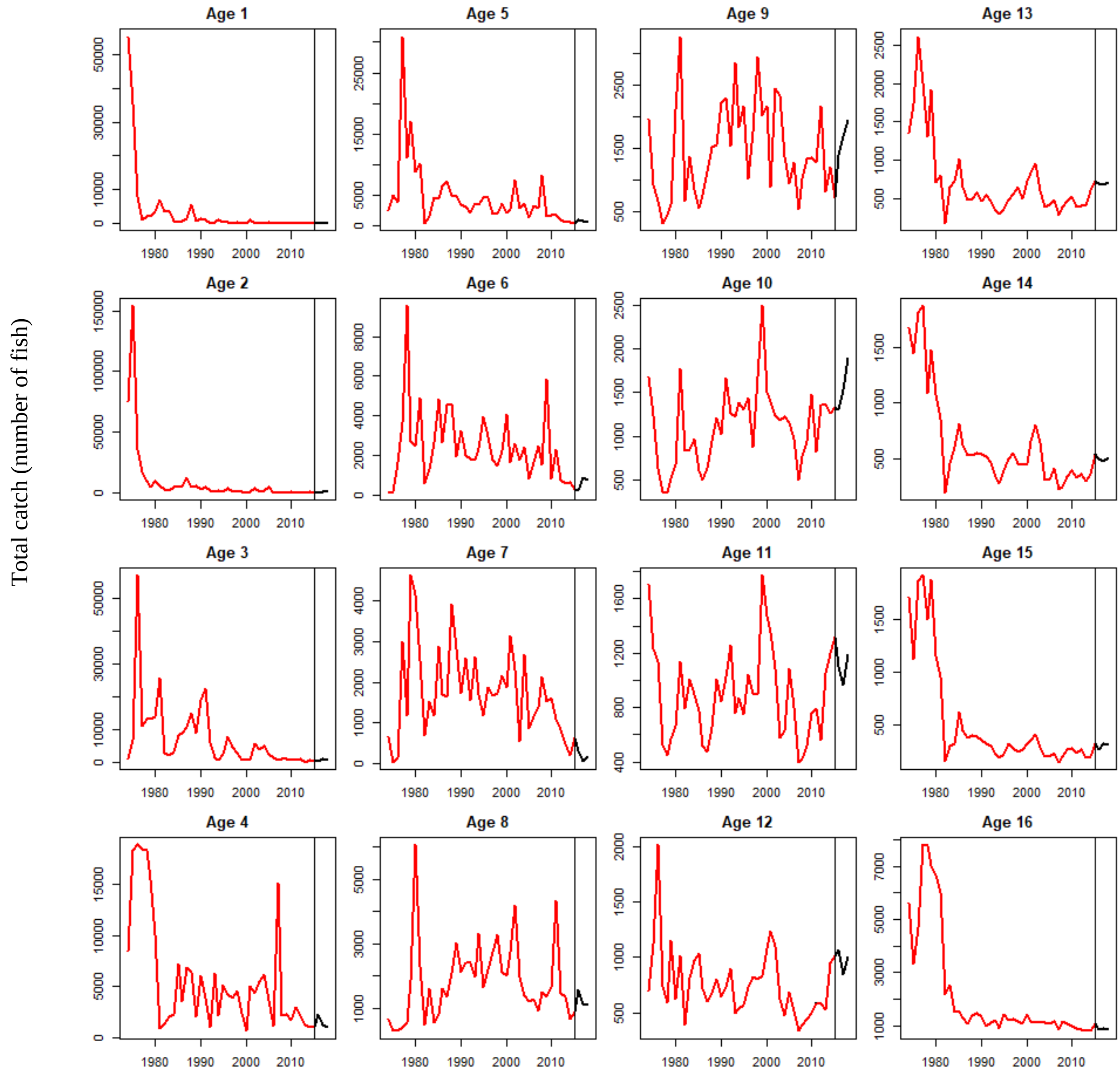

Figure 1. Comparison of catch-at-age estimates between the 2017 base model input (red lines) and the 2020 update (black lines). The vertical line marks the terminal year of the 2017 assessment data.

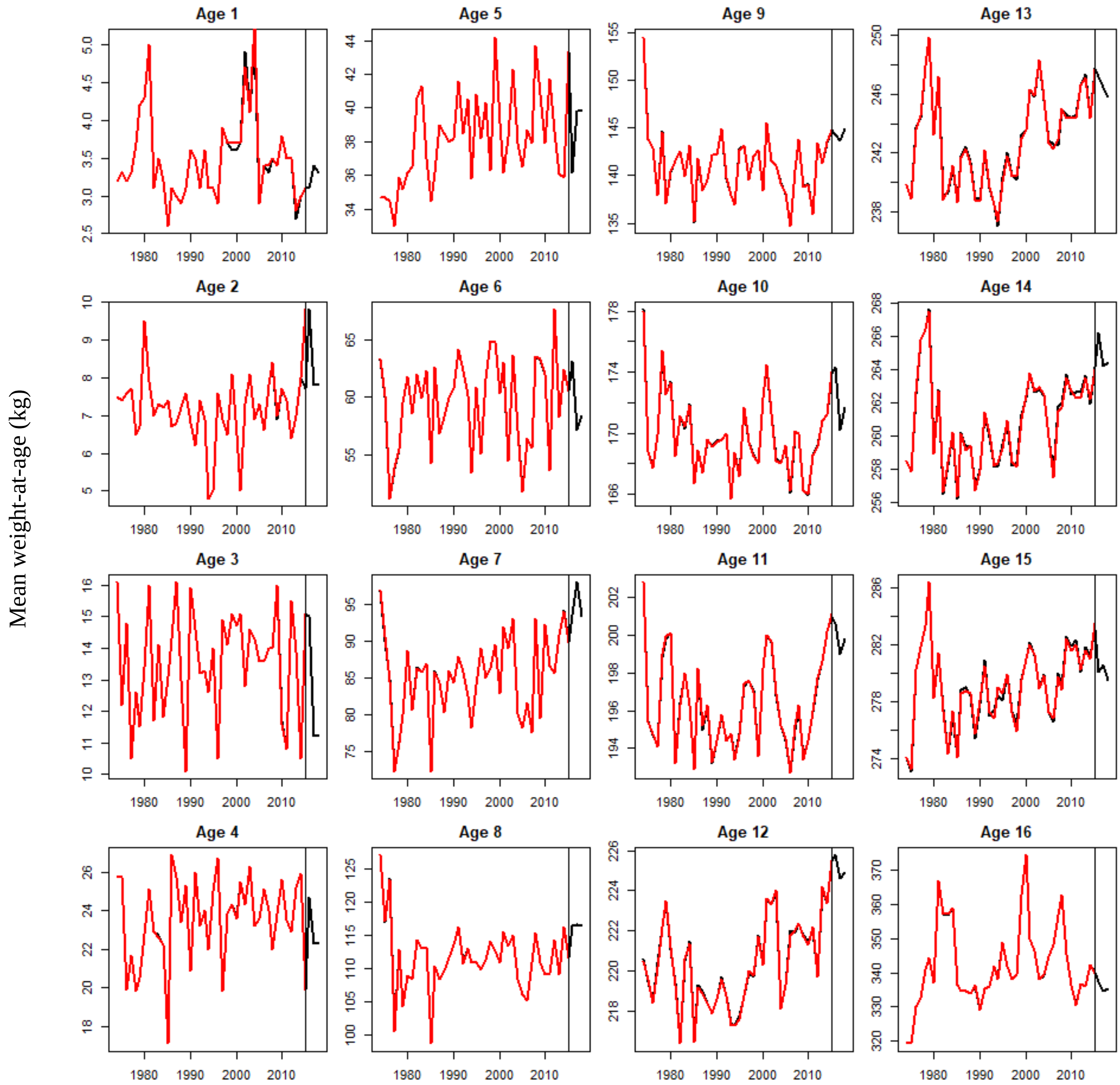

Figure 2. Comparison of weight-at-age estimates between the 2017 base model input (red lines) and the 2020 update (black lines). The vertical line marks the terminal year of the 2017 assessment data.

Appendix A
VPA 2-box data file

```
##############################################################################
#  DATA FILE FOR PROGRAM VPA-2BOX, Version 4.1
#                    The data and specifications are entered in the order indicated
#      by the existing comments. Additional comments must be preceded by a # symbol
#      in the first column, otherwise the line is perceived as free format input.
##############################################################################
1974     2018     FIRST     AND     LAST     YEAR
1        16       16        16      FIRST AGE, LAST AGE, PLUSGROUP AGE, Expanded plusgroup
##############################################################################
# BEGIN INPUT FOR ZONE/STOCK 1
##############################################################################
17
 6          SPAWNING SEASON (elapsed months, 0 is beginning of year)
# Age 1    Age 2    Age 3    Age 4    Age 5    Age 6    Age 7    Age 8    Age 9    Age 10    Age 11    Age 12    Age    13
           Age 14   Age 15   Age 16
0          0        0.25     0.5      1        1        1        1        1        1         1         1         1
           1        1        1        FECUNDITY MODIFIER (MATURITY) AT AGE
# 50 CHARACTER TITLE WITHIN SINGLE QUOTES ‘ ’ ----->]  PDF OF CATCH
# |                                   |     SIGMA CATCH
 'Western Bluefin Tuna Assessment'          0     .1
#============================================================================
# NOW ENTER THE CATCH-AT-AGE DATA. ROW=YEAR, COLUMN=AGE
#============================================================================
```

#YEAR	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
1974	55308	75711	1124	8430	2431	149	677	660	1975	1681	1711	701	1348	1685	1712	5592
1975	35540	154198	6787	18397	4959	212	51	288	919	1232	1237	1122	1741	1455	1123	3317
1976	8142	35472	56881	18979	3770	1651	164	297	666	634	1137	2018	2608	1818	1867	4692
1977	1124	17522	11287	18561	30915	3675	2997	414	312	367	529	742	2011	1882	1924	7818
1978	2021	9634	13353	18337	11148	9538	1179	553	450	351	446	587	1307	1092	1506	7774
1979	2148	4739	13367	15475	17152	2722	4621	1858	604	516	568	1152	1918	1479	1877	7002
1980	3480	9732	14048	10043	8728	2467	4139	6087	2111	665	667	621	718	1077	1162	6691
1981	6891	5572	25807	886	10073	4902	2545	2302	3275	1771	1142	1011	807	857	957	6006
1982	3637	2421	3093	1343	377	594	697	497	668	830	789	396	181	189	156	2159
1983	3876	1889	2249	2071	1488	1343	1517	1606	1364	843	1007	815	657	452	299	2541
1984	554	5049	3418	2239	4512	2697	1174	572	860	972	899	968	732	597	329	1533
1985	482	4261	8317	7189	4478	4843	2886	812	564	608	777	1039	1021	817	627	1517
1986	582	5518	8910	3535	6462	2654	1713	1602	756	503	520	716	648	624	450	1278
1987	1385	12118	10915	6860	7266	4562	1654	1363	1133	637	473	607	485	523	381	1088
1988	5675	4847	14914	6402	4998	4595	3901	2084	1517	945	654	676	506	523	404	1381
1989	673	5248	9080	2046	4753	1985	2826	3011	1552	1205	1010	805	583	549	396	1472
1990	1513	2968	19122	6091	3409	3255	1732	2124	2223	1024	848	647	476	539	354	1334
1991	1022	4978	22367	3891	3111	1995	2582	2411	2297	1668	1024	734	551	519	331	1008
1992	42	2045	6319	1026	2055	1831	1568	2420	1531	1266	1259	893	479	466	305	1103
1993	226	628	1392	6264	3677	1761	2630	1973	2858	1216	761	502	351	341	229	1194
1994	1017	1706	837	2081	3502	2349	1710	3315	1842	1378	868	534	310	275	189	916
1995	450	643	2555	5080	4625	3968	1183	1657	2167	1306	746	571	368	391	228	1424
1996	256	4110	7838	4184	4555	2991	1869	2206	1020	1443	1047	731	492	496	331	1218
1997	152	377	4665	3866	1916	1793	1679	2728	1765	878	902	828	567	544	283	1251
1998	219	489	2877	4512	1968	1521	1740	3277	2956	1681	898	802	656	452	249	1152
1999	35	413	997	2403	3586	2244	2163	2106	2024	2492	1775	838	499	439	273	1079
2000	54	240	860	602	2093	4088	1865	1993	2175	1507	1473	1079	734	449	326	1450
2001	1042	686	1011	5062	2631	1684	3143	2720	890	1393	1352	1241	840	657	360	1159
2002	5	4165	5749	4324	7388	2637	2305	4190	2448	1240	1083	1096	955	801	413	1139
2003	79	1257	3931	5443	2794	1779	552	1956	2340	1182	574	622	609	643	289	1142
2004	13	1728	5070	6217	3625	2452	2672	1377	1364	1222	625	474	393	309	204	1125
2005	400	4721	2721	3597	1298	826	856	1197	954	1156	1087	686	420	302	203	1090
2006	88	250	1451	1133	3277	1691	1155	1285	1286	965	803	514	482	408	235	1167
2007	58	76	986	15160	2814	2478	1380	918	542	499	400	335	287	224	153	859
2008	66	212	1379	2193	8243	1535	2132	1518	1027	765	422	396	389	238	203	1158
2009	25	81	1141	2212	1465	5871	1526	1372	1337	945	521	440	477	332	273	1058
2010	30	524	991	1694	1670	824	1615	1655	1352	1476	755	500	536	390	287	999

2011	0	92	683	2893	1729	2291	1096	4324	1275	819	797	587
	394	325	240	920								
2012	46	167	1050	2169	1036	815	837	1455	2163	1362	560	577
	416	356	268	867								
2013	9	155	300	1259	564	585	511	1363	819	1357	1048	531
	407	290	190	826								
2014	10	572	709	1038	534	658	209	659	1210	1268	1198	948
	609	361	202	801								
2015	0	2	650	938	418	339	627	886	720	1332	1317	1013
	732	535	327	1064								
2016	0	9	486	2290	1043	254	332	1585	1393	1307	1100	1062
	695	494	269	847								
2017	12	1105	1177	1246	732	883	66	1120	1698	1528	963	849
	677	479	323	895								
2018	10	891	952	1005	588	773	180	1108	1946	1891	1187	1002
	714	508	312	869								

-1 end of catch data

#==

NOW ENTER IN THE ABUNDANCE INDEX SPECIFICATIONS

#==

#INDEX PDF (0= do not use,1=lognormal, 2=normal)

#| | UNITS (1=numbers, 2=biomass, 3=relative_F, 4=relative_Z, 5=absolute_F, 6=absolute_Z)

#| | | VULNERABILITY (1=fixed, 2=frac.catches, 3=part. catches, 4=Butt. & Gero.

#| | | | TIMING (-1=average, +integer = number of months elapased}

#| | | | | FIRST TO LAST AGE INDEX TITLE (IN SINGLE QUOTES)

1	0	1	4	-1	7	16	CAN_Combined_RR
2	1	1	4	-1	8	16	CAN_GSL_Acoustic
3	1	1	4	-1	1	5	US_RR<145
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5	1	1	4	-1	4	6	US_RR_115_144
6	0	1	4	-1	6	8	US_RR_145_177
7	1	1	4	-1	9	16	US_RR>195
8	0	1	4	-1	9	16	US_RR>195_COMB
9	0	1	4	-1	8	16	US_RR>177
10	1	1	4	0	2	16	JLL_AREA_2_(WEST)
11	0	1	4	0	2	16	JLL_AREA_3_(31+32)
12	0	1	4	0	2	16	JLL_AREAS_17+18
13	1	2	4	-1	8	16	LARVAL_ZERO_INFLATED
14	1	1	4	0	8	16	GOM_PLL_1-6
15	1	1	4	0	8	16	JLL_GOM
16	0	4	1	-1	1	3	TAGGING
17	1	1	3	0	5	16	JLL_RECENT

-1 end index specifications

#==

NOW ENTER IN THE INDICES OF ABUNDANCE

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#ID	YEAR	INDEX	CV	INDEX_NAME
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2	1991	-999	-999	'CAN_GSL_Acoustic'
2	1992	-999	-999	'CAN_GSL_Acoustic'
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2	2011	0.050	0.3	'CAN_GSL_Acoustic'
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2	2013	0.056	0.3	'CAN_GSL_Acoustic'
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3	1975	-999	-999	'US_RR<145'
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3	1978	-999	-999	'US_RR<145'
3	1979	-999	-999	'US_RR<145'
3	1980	0.80	0.43	'US_RR<145'
3	1981	0.40	0.52	'US_RR<145'
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3	1983	1.11	0.26	'US_RR<145'
3	1984	-999	-999	'US_RR<145'
3	1985	0.63	0.64	'US_RR<145'
3	1986	0.78	0.43	'US_RR<145'
3	1987	1.22	0.40	'US_RR<145'
3	1988	0.99	0.38	'US_RR<145'
3	1989	0.99	0.43	'US_RR<145'
3	1990	0.90	0.34	'US_RR<145'
3	1991	1.26	0.35	'US_RR<145'
3	1992	0.82	0.42	'US_RR<145'
3	1993	-999	-999	'US_RR<145'
3	1994	-999	-999	'US_RR<145'
3	1995	-999	-999	'US_RR<145'
3	1996	-999	-999	'US_RR<145'
3	1997	-999	-999	'US_RR<145'
3	1998	-999	-999	'US_RR<145'
3	1999	-999	-999	'US_RR<145'
3	2000	-999	-999	'US_RR<145'
3	2001	-999	-999	'US_RR<145'
3	2002	-999	-999	'US_RR<145'
3	2003	-999	-999	'US_RR<145'
3	2004	-999	-999	'US_RR<145'
3	2005	-999	-999	'US_RR<145'
3	2006	-999	-999	'US_RR<145'
3	2007	-999	-999	'US_RR<145'
3	2008	-999	-999	'US_RR<145'
3	2009	-999	-999	'US_RR<145'
3	2010	-999	-999	'US_RR<145'
3	2011	-999	-999	'US_RR<145'
3	2012	-999	-999	'US_RR<145'
3	2013	-999	-999	'US_RR<145'
3	2014	-999	-999	'US_RR<145'
3	2015	-999	-999	'US_RR<145'
3	2016	-999	-999	'US_RR<145'
3	2017	-999	-999	'US_RR<145'
3	2018	-999	-999	'US_RR<145'
4	1974	-999	-999	'US_RR_66_114'
4	1975	-999	-999	'US_RR_66_114'
4	1976	-999	-999	'US_RR_66_114'
4	1977	-999	-999	'US_RR_66_114'
4	1978	-999	-999	'US_RR_66_114'
4	1979	-999	-999	'US_RR_66_114'
4	1980	-999	-999	'US_RR_66_114'
4	1981	-999	-999	'US_RR_66_114'
4	1982	-999	-999	'US_RR_66_114'
4	1983	-999	-999	'US_RR_66_114'
4	1984	-999	-999	'US_RR_66_114'
4	1985	-999	-999	'US_RR_66_114'
4	1986	-999	-999	'US_RR_66_114'
4	1987	-999	-999	'US_RR_66_114'
4	1988	-999	-999	'US_RR_66_114'
4	1989	-999	-999	'US_RR_66_114'
4	1990	-999	-999	'US_RR_66_114'
4	1991	-999	-999	'US_RR_66_114'
4	1992	-999	-999	'US_RR_66_114'
4	1993	1.67	0.19	'US_RR_66_114'
4	1994	0.32	0.31	'US_RR_66_114'
4	1995	1.53	0.17	'US_RR_66_114'
4	1996	1.85	0.17	'US_RR_66_114'
4	1997	3.55	0.13	'US_RR_66_114'
4	1998	1.34	0.15	'US_RR_66_114'
4	1999	1.44	0.26	'US_RR_66_114'
4	2000	1.02	0.35	'US_RR_66_114'
4	2001	0.57	0.18	'US_RR_66_114'
4	2002	1.03	0.15	'US_RR_66_114'
4	2003	0.64	0.10	'US_RR_66_114'
4	2004	2.46	0.10	'US_RR_66_114'
4	2005	2.09	0.10	'US_RR_66_114'
4	2006	0.78	0.23	'US_RR_66_114'
4	2007	0.52	0.08	'US_RR_66_114'
4	2008	0.35	0.09	'US_RR_66_114'
4	2009	0.29	0.09	'US_RR_66_114'
4	2010	0.52	0.09	'US_RR_66_114'
4	2011	0.59	0.10	'US_RR_66_114'
4	2012	0.47	0.11	'US_RR_66_114'
4	2013	0.60	0.12	'US_RR_66_114'
4	2014	0.47	0.14	'US_RR_66_114'
4	2015	0.32	0.13	'US_RR_66_114'
4	2016	0.35	0.12	'US_RR_66_114'
4	2017	0.56	0.12	'US_RR_66_114'
4	2018	0.66	0.13	'US_RR_66_114'
5	1974	-999	-999	'US_RR_115_144'
5	1975	-999	-999	'US_RR_115_144'
5	1976	-999	-999	'US_RR_115_144'

5	1977	-999	-999	'US_RR_115_144'
5	1978	-999	-999	'US_RR_115_144'
5	1979	-999	-999	'US_RR_115_144'
5	1980	-999	-999	'US_RR_115_144'
5	1981	-999	-999	'US_RR_115_144'
5	1982	-999	-999	'US_RR_115_144'
5	1983	-999	-999	'US_RR_115_144'
5	1984	-999	-999	'US_RR_115_144'
5	1985	-999	-999	'US_RR_115_144'
5	1986	-999	-999	'US_RR_115_144'
5	1987	-999	-999	'US_RR_115_144'
5	1988	-999	-999	'US_RR_115_144'
5	1989	-999	-999	'US_RR_115_144'
5	1990	-999	-999	'US_RR_115_144'
5	1991	-999	-999	'US_RR_115_144'
5	1992	-999	-999	'US_RR_115_144'
5	1993	2.80	0.21	'US_RR_115_144'
5	1994	0.60	0.37	'US_RR_115_144'
5	1995	1.05	0.22	'US_RR_115_144'
5	1996	1.44	0.21	'US_RR_115_144'
5	1997	0.23	0.34	'US_RR_115_144'
5	1998	0.84	0.17	'US_RR_115_144'
5	1999	1.37	0.31	'US_RR_115_144'
5	2000	1.09	0.38	'US_RR_115_144'
5	2001	2.14	0.20	'US_RR_115_144'
5	2002	2.36	0.17	'US_RR_115_144'
5	2003	0.85	0.13	'US_RR_115_144'
5	2004	0.72	0.15	'US_RR_115_144'
5	2005	0.68	0.16	'US_RR_115_144'
5	2006	1.16	0.16	'US_RR_115_144'
5	2007	0.99	0.11	'US_RR_115_144'
5	2008	1.52	0.11	'US_RR_115_144'
5	2009	0.36	0.14	'US_RR_115_144'
5	2010	1.07	0.12	'US_RR_115_144'
5	2011	0.64	0.16	'US_RR_115_144'
5	2012	0.60	0.17	'US_RR_115_144'
5	2013	1.30	0.15	'US_RR_115_144'
5	2014	0.50	0.21	'US_RR_115_144'
5	2015	0.23	0.24	'US_RR_115_144'
5	2016	0.75	0.16	'US_RR_115_144'
5	2017	0.64	0.18	'US_RR_115_144'
5	2018	0.07	0.41	'US_RR_115_144'
6	1974	-999	-999	'US_RR_145_177'
6	1975	-999	-999	'US_RR_145_177'
6	1976	-999	-999	'US_RR_145_177'
6	1977	-999	-999	'US_RR_145_177'
6	1978	-999	-999	'US_RR_145_177'
6	1979	-999	-999	'US_RR_145_177'
6	1980	-999	-999	'US_RR_145_177'
6	1981	-999	-999	'US_RR_145_177'
6	1982	-999	-999	'US_RR_145_177'
6	1983	-999	-999	'US_RR_145_177'
6	1984	-999	-999	'US_RR_145_177'
6	1985	-999	-999	'US_RR_145_177'
6	1986	-999	-999	'US_RR_145_177'
6	1987	-999	-999	'US_RR_145_177'
6	1988	-999	-999	'US_RR_145_177'
6	1989	-999	-999	'US_RR_145_177'
6	1990	-999	-999	'US_RR_145_177'
6	1991	-999	-999	'US_RR_145_177'
6	1992	-999	-999	'US_RR_145_177'
6	1993	-999	-999	'US_RR_145_177'
6	1994	-999	-999	'US_RR_145_177'
6	1995	-999	-999	'US_RR_145_177'
6	1996	-999	-999	'US_RR_145_177'
6	1997	-999	-999	'US_RR_145_177'
6	1998	-999	-999	'US_RR_145_177'
6	1999	-999	-999	'US_RR_145_177'
6	2000	-999	-999	'US_RR_145_177'
6	2001	-999	-999	'US_RR_145_177'
6	2002	-999	-999	'US_RR_145_177'
6	2003	-999	-999	'US_RR_145_177'
6	2004	-999	-999	'US_RR_145_177'
6	2005	-999	-999	'US_RR_145_177'
6	2006	-999	-999	'US_RR_145_177'
6	2007	-999	-999	'US_RR_145_177'
6	2008	-999	-999	'US_RR_145_177'
6	2009	-999	-999	'US_RR_145_177'
6	2010	-999	-999	'US_RR_145_177'
6	2011	-999	-999	'US_RR_145_177'
6	2012	-999	-999	'US_RR_145_177'
6	2013	-999	-999	'US_RR_145_177'
6	2014	-999	-998	'US_RR_145_177'
6	2015	-999	-997	'US_RR_145_177'
7	1974	-999	-999	'US_RR>195'
7	1975	-999	-999	'US_RR>195'
7	1976	-999	-999	'US_RR>195'
7	1977	-999	-999	'US_RR>195'
7	1978	-999	-999	'US_RR>195'
7	1979	-999	-999	'US_RR>195'
7	1980	-999	-999	'US_RR>195'
7	1981	-999	-999	'US_RR>195'
7	1982	-999	-999	'US_RR>195'
7	1983	2.81	0.10	'US_RR>195'
7	1984	1.25	0.19	'US_RR>195'
7	1985	0.86	0.30	'US_RR>195'
7	1986	0.50	1.10	'US_RR>195'
7	1987	0.53	0.48	'US_RR>195'
7	1988	0.94	0.36	'US_RR>195'
7	1989	0.76	0.36	'US_RR>195'
7	1990	0.63	0.34	'US_RR>195'
7	1991	0.82	0.28	'US_RR>195'
7	1992	0.91	0.28	'US_RR>195'
7	1993	-999	-999	'US_RR>195'
7	1994	-999	-999	'US_RR>195'
7	1995	-999	-999	'US_RR>195'
7	1996	-999	-999	'US_RR>195'
7	1997	-999	-999	'US_RR>195'
7	1998	-999	-999	'US_RR>195'
7	1999	-999	-999	'US_RR>195'
7	2000	-999	-999	'US_RR>195'
7	2001	-999	-999	'US_RR>195'
7	2002	-999	-999	'US_RR>195'
7	2003	-999	-999	'US_RR>195'
7	2004	-999	-999	'US_RR>195'
7	2005	-999	-999	'US_RR>195'
7	2006	-999	-999	'US_RR>195'
7	2007	-999	-999	'US_RR>195'
7	2008	-999	-999	'US_RR>195'
7	2009	-999	-999	'US_RR>195'
7	2010	-999	-999	'US_RR>195'

7	2011	-999	-999	'US_RR>195'
7	2012	-999	-999	'US_RR>195'
7	2013	-999	-999	'US_RR>195'
7	2014	-999	-999	'US_RR>195'
7	2015	-999	-999	'US_RR>195'
8	1974	-999	-999	'US_RR>195_COMB'
8	1975	-999	-999	'US_RR>195_COMB'
8	1976	-999	-999	'US_RR>195_COMB'
8	1977	-999	-999	'US_RR>195_COMB'
8	1978	-999	-999	'US_RR>195_COMB'
8	1979	-999	-999	'US_RR>195_COMB'
8	1980	-999	-999	'US_RR>195_COMB'
8	1981	-999	-999	'US_RR>195_COMB'
8	1982	-999	-999	'US_RR>195_COMB'
8	1983	-999	-999	'US_RR>195_COMB'
8	1984	-999	-999	'US_RR>195_COMB'
8	1985	-999	-999	'US_RR>195_COMB'
8	1986	-999	-999	'US_RR>195_COMB'
8	1987	-999	-999	'US_RR>195_COMB'
8	1988	-999	-999	'US_RR>195_COMB'
8	1989	-999	-999	'US_RR>195_COMB'
8	1990	-999	-999	'US_RR>195_COMB'
8	1991	-999	-999	'US_RR>195_COMB'
8	1992	-999	-999	'US_RR>195_COMB'
8	1993	-999	-999	'US_RR>195_COMB'
8	1994	-999	-999	'US_RR>195_COMB'
8	1995	-999	-999	'US_RR>195_COMB'
8	1996	-999	-999	'US_RR>195_COMB'
8	1997	-999	-999	'US_RR>195_COMB'
8	1998	-999	-999	'US_RR>195_COMB'
8	1999	-999	-999	'US_RR>195_COMB'
8	2000	-999	-999	'US_RR>195_COMB'
8	2001	-999	-999	'US_RR>195_COMB'
8	2002	-999	-999	'US_RR>195_COMB'
8	2003	-999	-999	'US_RR>195_COMB'
8	2004	-999	-999	'US_RR>195_COMB'
8	2005	-999	-999	'US_RR>195_COMB'
8	2006	-999	-999	'US_RR>195_COMB'
8	2007	-999	-999	'US_RR>195_COMB'
8	2008	-999	-999	'US_RR>195_COMB'
8	2009	-999	-999	'US_RR>195_COMB'
8	2010	-999	-999	'US_RR>195_COMB'
8	2011	-999	-999	'US_RR>195_COMB'
8	2012	-999	-999	'US_RR>195_COMB'
8	2013	-999	-999	'US_RR>195_COMB'
8	2014	-999	-999	'US_RR>195_COMB'
8	2015	-999	-999	'US_RR>195_COMB'
9	1974	-999	-999	'US_RR>177'
9	1975	-999	-999	'US_RR>177'
9	1976	-999	-999	'US_RR>177'
9	1977	-999	-999	'US_RR>177'
9	1978	-999	-999	'US_RR>177'
9	1979	-999	-999	'US_RR>177'
9	1980	-999	-999	'US_RR>177'
9	1981	-999	-999	'US_RR>177'
9	1982	-999	-999	'US_RR>177'
9	1983	-999	-999	'US_RR>177'
9	1984	-999	-999	'US_RR>177'
9	1985	-999	-999	'US_RR>177'
9	1986	-999	-999	'US_RR>177'
9	1987	-999	-999	'US_RR>177'
9	1988	-999	-999	'US_RR>177'
9	1989	-999	-999	'US_RR>177'
9	1990	-999	-999	'US_RR>177'
9	1991	-999	-999	'US_RR>177'
9	1992	-999	-999	'US_RR>177'
9	1993	0.59	0.17	'US_RR>177'
9	1994	0.77	0.17	'US_RR>177'
9	1995	0.94	0.12	'US_RR>177'
9	1996	2.97	0.11	'US_RR>177'
9	1997	1.19	0.25	'US_RR>177'
9	1998	1.26	0.13	'US_RR>177'
9	1999	1.68	0.15	'US_RR>177'
9	2000	0.49	0.16	'US_RR>177'
9	2001	1.16	0.19	'US_RR>177'
9	2002	2.23	0.08	'US_RR>177'
9	2003	0.51	0.15	'US_RR>177'
9	2004	0.71	0.15	'US_RR>177'
9	2005	0.61	0.16	'US_RR>177'
9	2006	0.37	0.25	'US_RR>177'
9	2007	0.30	0.25	'US_RR>177'
9	2008	0.36	0.22	'US_RR>177'
9	2009	0.54	0.20	'US_RR>177'
9	2010	1.20	0.12	'US_RR>177'
9	2011	0.81	0.14	'US_RR>177'
9	2012	0.74	0.12	'US_RR>177'
9	2013	0.41	0.17	'US_RR>177'
9	2014	0.56	0.16	'US_RR>177'
9	2015	0.88	0.10	'US_RR>177'
9	2016	1.03	0.09	'US_RR>177'
9	2017	1.86	0.07	'US_RR>177'
9	2018	1.83	0.07	'US_RR>177'
10	1974	-999	-999	'JLL_AREA_2_(WEST)'
10	1975	-999	-999	'JLL_AREA_2_(WEST)'
10	1976	0.39	0.41	'JLL_AREA_2_(WEST)'
10	1977	0.89	0.32	'JLL_AREA_2_(WEST)'
10	1978	0.73	0.34	'JLL_AREA_2_(WEST)'
10	1979	0.81	0.28	'JLL_AREA_2_(WEST)'
10	1980	1.39	0.28	'JLL_AREA_2_(WEST)'
10	1981	1.11	0.26	'JLL_AREA_2_(WEST)'
10	1982	0.79	0.28	'JLL_AREA_2_(WEST)'
10	1983	0.46	0.35	'JLL_AREA_2_(WEST)'
10	1984	0.67	0.29	'JLL_AREA_2_(WEST)'
10	1985	0.83	0.27	'JLL_AREA_2_(WEST)'
10	1986	0.01	1.66	'JLL_AREA_2_(WEST)'
10	1987	0.38	0.34	'JLL_AREA_2_(WEST)'
10	1988	0.34	0.37	'JLL_AREA_2_(WEST)'
10	1989	0.68	0.30	'JLL_AREA_2_(WEST)'
10	1990	0.48	0.32	'JLL_AREA_2_(WEST)'
10	1991	0.60	0.30	'JLL_AREA_2_(WEST)'
10	1992	1.09	0.27	'JLL_AREA_2_(WEST)'
10	1993	0.98	0.27	'JLL_AREA_2_(WEST)'
10	1994	0.90	0.27	'JLL_AREA_2_(WEST)'
10	1995	0.59	0.34	'JLL_AREA_2_(WEST)'
10	1996	2.21	0.27	'JLL_AREA_2_(WEST)'
10	1997	1.61	0.26	'JLL_AREA_2_(WEST)'
10	1998	0.75	0.30	'JLL_AREA_2_(WEST)'
10	1999	1.12	0.26	'JLL_AREA_2_(WEST)'
10	2000	1.11	0.27	'JLL_AREA_2_(WEST)'
10	2001	0.91	0.27	'JLL_AREA_2_(WEST)'
10	2002	0.77	0.28	'JLL_AREA_2_(WEST)'

10	2003	1.20	0.29	'JLL_AREA_2_(WEST)'
10	2004	1.10	0.31	'JLL_AREA_2_(WEST)'
10	2005	0.98	0.26	'JLL_AREA_2_(WEST)'
10	2006	1.51	0.29	'JLL_AREA_2_(WEST)'
10	2007	0.96	0.41	'JLL_AREA_2_(WEST)'
10	2008	1.34	0.45	'JLL_AREA_2_(WEST)'
10	2009	2.30	0.35	'JLL_AREA_2_(WEST)'
10	2010	-999	-999	'JLL_AREA_2_(WEST)'
10	2011	-999	-999	'JLL_AREA_2_(WEST)'
10	2012	-999	-999	'JLL_AREA_2_(WEST)'
10	2013	-999	-999	'JLL_AREA_2_(WEST)'
10	2014	-999	-999	'JLL_AREA_2_(WEST)'
10	2015	-999	-999	'JLL_AREA_2_(WEST)'
10	2016	-999	-999	'JLL_AREA_2_(WEST)'
10	2017	-999	-999	'JLL_AREA_2_(WEST)'
10	2018	-999	-999	'JLL_AREA_2_(WEST)'
11	1974	-999	-999	'JLL_AREA_3_(31+32)'
11	1975	-999	-999	'JLL_AREA_3_(31+32)'
11	1976	-999	-999	'JLL_AREA_3_(31+32)'
11	1977	-999	-999	'JLL_AREA_3_(31+32)'
11	1978	-999	-999	'JLL_AREA_3_(31+32)'
11	1979	-999	-999	'JLL_AREA_3_(31+32)'
11	1980	-999	-999	'JLL_AREA_3_(31+32)'
11	1981	-999	-999	'JLL_AREA_3_(31+32)'
11	1982	-999	-999	'JLL_AREA_3_(31+32)'
11	1983	-999	-999	'JLL_AREA_3_(31+32)'
11	1984	-999	-999	'JLL_AREA_3_(31+32)'
11	1985	-999	-999	'JLL_AREA_3_(31+32)'
11	1986	-999	-999	'JLL_AREA_3_(31+32)'
11	1987	-999	-999	'JLL_AREA_3_(31+32)'
11	1988	-999	-999	'JLL_AREA_3_(31+32)'
11	1989	-999	-999	'JLL_AREA_3_(31+32)'
11	1990	-999	-999	'JLL_AREA_3_(31+32)'
11	1991	-999	-999	'JLL_AREA_3_(31+32)'
11	1992	-999	-999	'JLL_AREA_3_(31+32)'
11	1993	-999	-999	'JLL_AREA_3_(31+32)'
11	1994	-999	-999	'JLL_AREA_3_(31+32)'
11	1995	-999	-999	'JLL_AREA_3_(31+32)'
11	1996	-999	-999	'JLL_AREA_3_(31+32)'
11	1997	-999	-999	'JLL_AREA_3_(31+32)'
11	1998	-999	-999	'JLL_AREA_3_(31+32)'
11	1999	-999	-999	'JLL_AREA_3_(31+32)'
11	2000	-999	-999	'JLL_AREA_3_(31+32)'
11	2001	-999	-999	'JLL_AREA_3_(31+32)'
11	2002	-999	-999	'JLL_AREA_3_(31+32)'
11	2003	-999	-999	'JLL_AREA_3_(31+32)'
11	2004	-999	-999	'JLL_AREA_3_(31+32)'
11	2005	-999	-999	'JLL_AREA_3_(31+32)'
11	2006	-999	-999	'JLL_AREA_3_(31+32)'
11	2007	-999	-999	'JLL_AREA_3_(31+32)'
11	2008	-999	-999	'JLL_AREA_3_(31+32)'
11	2009	-999	-999	'JLL_AREA_3_(31+32)'
11	2010	-999	-999	'JLL_AREA_3_(31+32)'
11	2011	-999	-999	'JLL_AREA_3_(31+32)'
11	2012	-999	-999	'JLL_AREA_3_(31+32)'
11	2013	-999	-999	'JLL_AREA_3_(31+32)'
11	2014	-999	-999	'JLL_AREA_3_(31+32)'
11	2015	-999	-999	'JLL_AREA_3_(31+32)'
12	1974	-999	-999	'JLL_AREAS_17+18'
12	1975	-999	-999	'JLL_AREAS_17+18'
12	1976	-999	-999	'JLL_AREAS_17+18'
12	1977	-999	-999	'JLL_AREAS_17+18'
12	1978	-999	-999	'JLL_AREAS_17+18'
12	1979	-999	-999	'JLL_AREAS_17+18'
12	1980	-999	-999	'JLL_AREAS_17+18'
12	1981	-999	-999	'JLL_AREAS_17+18'
12	1982	-999	-999	'JLL_AREAS_17+18'
12	1983	-999	-999	'JLL_AREAS_17+18'
12	1984	-999	-999	'JLL_AREAS_17+18'
12	1985	-999	-999	'JLL_AREAS_17+18'
12	1986	-999	-999	'JLL_AREAS_17+18'
12	1987	-999	-999	'JLL_AREAS_17+18'
12	1988	-999	-999	'JLL_AREAS_17+18'
12	1989	-999	-999	'JLL_AREAS_17+18'
12	1990	-999	-999	'JLL_AREAS_17+18'
12	1991	-999	-999	'JLL_AREAS_17+18'
12	1992	-999	-999	'JLL_AREAS_17+18'
12	1993	-999	-999	'JLL_AREAS_17+18'
12	1994	-999	-999	'JLL_AREAS_17+18'
12	1995	-999	-999	'JLL_AREAS_17+18'
12	1996	-999	-999	'JLL_AREAS_17+18'
12	1997	-999	-999	'JLL_AREAS_17+18'
12	1998	-999	-999	'JLL_AREAS_17+18'
12	1999	-999	-999	'JLL_AREAS_17+18'
12	2000	-999	-999	'JLL_AREAS_17+18'
12	2001	-999	-999	'JLL_AREAS_17+18'
12	2002	-999	-999	'JLL_AREAS_17+18'
12	2003	-999	-999	'JLL_AREAS_17+18'
12	2004	-999	-999	'JLL_AREAS_17+18'
12	2005	-999	-999	'JLL_AREAS_17+18'
12	2006	-999	-999	'JLL_AREAS_17+18'
12	2007	-999	-999	'JLL_AREAS_17+18'
12	2008	-999	-999	'JLL_AREAS_17+18'
12	2009	-999	-999	'JLL_AREAS_17+18'
12	2010	-999	-999	'JLL_AREAS_17+18'
12	2011	-999	-999	'JLL_AREAS_17+18'
12	2012	-999	-999	'JLL_AREAS_17+18'
12	2013	-999	-999	'JLL_AREAS_17+18'
12	2014	-999	-999	'JLL_AREAS_17+18'
12	2015	-999	-999	'JLL_AREAS_17+18'
13	1974	-999	-999	'LARVAL_ZERO_INFLATED'
13	1975	-999	-999	'LARVAL_ZERO_INFLATED'
13	1976	-999	-999	'LARVAL_ZERO_INFLATED'
13	1977	2.49	0.45	'LARVAL_ZERO_INFLATED'
13	1978	4.55	0.30	'LARVAL_ZERO_INFLATED'
13	1979	-999	-999	'LARVAL_ZERO_INFLATED'
13	1980	-999	-999	'LARVAL_ZERO_INFLATED'
13	1981	0.78	0.44	'LARVAL_ZERO_INFLATED'
13	1982	1.31	0.30	'LARVAL_ZERO_INFLATED'
13	1983	1.12	0.35	'LARVAL_ZERO_INFLATED'
13	1984	0.38	0.53	'LARVAL_ZERO_INFLATED'
13	1985	-999	-999	'LARVAL_ZERO_INFLATED'
13	1986	0.38	0.43	'LARVAL_ZERO_INFLATED'
13	1987	0.31	0.48	'LARVAL_ZERO_INFLATED'
13	1988	1.13	0.32	'LARVAL_ZERO_INFLATED'
13	1989	0.78	0.37	'LARVAL_ZERO_INFLATED'
13	1990	0.30	0.34	'LARVAL_ZERO_INFLATED'
13	1991	0.37	0.56	'LARVAL_ZERO_INFLATED'
13	1992	0.45	0.35	'LARVAL_ZERO_INFLATED'
13	1993	0.42	0.64	'LARVAL_ZERO_INFLATED'
13	1994	0.60	0.33	'LARVAL_ZERO_INFLATED'

13	1995	0.27	0.55	'LARVAL_ZERO_INFLATED'
13	1996	0.79	0.49	'LARVAL_ZERO_INFLATED'
13	1997	0.33	0.39	'LARVAL_ZERO_INFLATED'
13	1998	0.12	0.53	'LARVAL_ZERO_INFLATED'
13	1999	0.44	0.48	'LARVAL_ZERO_INFLATED'
13	2000	0.29	0.53	'LARVAL_ZERO_INFLATED'
13	2001	0.40	0.32	'LARVAL_ZERO_INFLATED'
13	2002	0.26	0.65	'LARVAL_ZERO_INFLATED'
13	2003	0.67	0.38	'LARVAL_ZERO_INFLATED'
13	2004	0.49	0.67	'LARVAL_ZERO_INFLATED'
13	2005	0.18	0.30	'LARVAL_ZERO_INFLATED'
13	2006	0.55	0.37	'LARVAL_ZERO_INFLATED'
13	2007	0.42	0.37	'LARVAL_ZERO_INFLATED'
13	2008	0.33	0.38	'LARVAL_ZERO_INFLATED'
13	2009	0.55	0.32	'LARVAL_ZERO_INFLATED'
13	2010	0.31	0.52	'LARVAL_ZERO_INFLATED'
13	2011	1.06	0.40	'LARVAL_ZERO_INFLATED'
13	2012	0.29	0.48	'LARVAL_ZERO_INFLATED'
13	2013	1.05	0.35	'LARVAL_ZERO_INFLATED'
13	2014	0.25	0.37	'LARVAL_ZERO_INFLATED'
13	2015	0.39	0.30	'LARVAL_ZERO_INFLATED'
13	2016	2.27	0.30	'LARVAL_ZERO_INFLATED'
13	2017	0.99	0.30	'LARVAL_ZERO_INFLATED'
13	2018	2.05	0.30	'LARVAL_ZERO_INFLATED'
14	1974	-999	-999	'GOM_PLL_1_6'
14	1975	-999	-999	'GOM_PLL_1_6'
14	1976	-999	-999	'GOM_PLL_1_6'
14	1977	-999	-999	'GOM_PLL_1_6'
14	1978	-999	-999	'GOM_PLL_1_6'
14	1979	-999	-999	'GOM_PLL_1_6'
14	1980	-999	-999	'GOM_PLL_1_6'
14	1981	-999	-999	'GOM_PLL_1_6'
14	1982	-999	-999	'GOM_PLL_1_6'
14	1983	-999	-999	'GOM_PLL_1_6'
14	1984	-999	-999	'GOM_PLL_1_6'
14	1985	-999	-999	'GOM_PLL_1_6'
14	1986	-999	-999	'GOM_PLL_1_6'
14	1987	-999	-999	'GOM_PLL_1_6'
14	1988	-999	-999	'GOM_PLL_1_6'
14	1989	-999	-999	'GOM_PLL_1_6'
14	1990	-999	-999	'GOM_PLL_1_6'
14	1991	-999	-999	'GOM_PLL_1_6'
14	1992	1.14	0.35	'GOM_PLL_1_6'
14	1993	0.64	0.36	'GOM_PLL_1_6'
14	1994	0.47	0.39	'GOM_PLL_1_6'
14	1995	0.44	0.39	'GOM_PLL_1_6'
14	1996	0.25	0.40	'GOM_PLL_1_6'
14	1997	0.47	0.36	'GOM_PLL_1_6'
14	1998	0.50	0.37	'GOM_PLL_1_6'
14	1999	0.84	0.33	'GOM_PLL_1_6'
14	2000	1.25	0.33	'GOM_PLL_1_6'
14	2001	0.71	0.38	'GOM_PLL_1_6'
14	2002	0.66	0.39	'GOM_PLL_1_6'
14	2003	1.20	0.32	'GOM_PLL_1_6'
14	2004	1.09	0.32	'GOM_PLL_1_6'
14	2005	0.82	0.34	'GOM_PLL_1_6'
14	2006	0.58	0.39	'GOM_PLL_1_6'
14	2007	0.78	0.38	'GOM_PLL_1_6'
14	2008	1.79	0.33	'GOM_PLL_1_6'
14	2009	1.46	0.35	'GOM_PLL_1_6'
14	2010	1.23	0.34	'GOM_PLL_1_6'
14	2011	1.10	0.48	'GOM_PLL_1_6'
14	2012	3.41	0.37	'GOM_PLL_1_6'
14	2013	1.23	0.42	'GOM_PLL_1_6'
14	2014	0.96	0.44	'GOM_PLL_1_6'
14	2015	1.02	0.47	'GOM_PLL_1_6'
14	2016	1.11	0.47	'GOM_PLL_1_6'
14	2017	0.82	0.48	'GOM_PLL_1_6'
14	2018	1.04	0.51	'GOM_PLL_1_6'
15	1974	0.97	0.27	'JLL_GOM'
15	1975	0.53	0.21	'JLL_GOM'
15	1976	0.67	0.21	'JLL_GOM'
15	1977	0.91	0.22	'JLL_GOM'
15	1978	0.88	0.23	'JLL_GOM'
15	1979	1.29	0.28	'JLL_GOM'
15	1980	1.16	0.27	'JLL_GOM'
15	1981	0.55	0.24	'JLL_GOM'
15	1982	-999	-999	'JLL_GOM'
15	1983	-999	-999	'JLL_GOM'
15	1984	-999	-999	'JLL_GOM'
15	1985	-999	-999	'JLL_GOM'
15	1986	-999	-999	'JLL_GOM'
15	1987	-999	-999	'JLL_GOM'
15	1988	-999	-999	'JLL_GOM'
15	1989	-999	-999	'JLL_GOM'
15	1990	-999	-999	'JLL_GOM'
15	1991	-999	-999	'JLL_GOM'
15	1992	-999	-999	'JLL_GOM'
15	1993	-999	-999	'JLL_GOM'
15	1994	-999	-999	'JLL_GOM'
15	1995	-999	-999	'JLL_GOM'
15	1996	-999	-999	'JLL_GOM'
15	1997	-999	-999	'JLL_GOM'
15	1998	-999	-999	'JLL_GOM'
15	1999	-999	-999	'JLL_GOM'
15	2000	-999	-999	'JLL_GOM'
15	2001	-999	-999	'JLL_GOM'
15	2002	-999	-999	'JLL_GOM'
15	2003	-999	-999	'JLL_GOM'
15	2004	-999	-999	'JLL_GOM'
15	2005	-999	-999	'JLL_GOM'
15	2006	-999	-999	'JLL_GOM'
15	2007	-999	-999	'JLL_GOM'
15	2008	-999	-999	'JLL_GOM'
15	2009	-999	-999	'JLL_GOM'
15	2010	-999	-999	'JLL_GOM'
15	2011	-999	-999	'JLL_GOM'
15	2012	-999	-999	'JLL_GOM'
15	2013	-999	-999	'JLL_GOM'
15	2014	-999	-999	'JLL_GOM'
15	2015	-999	-999	'JLL_GOM'
16	1974	0.64	0.21	'TAGGING'
16	1975	0.52	0.22	'TAGGING'
16	1976	0.48	0.23	'TAGGING'
16	1977	0.86	0.2	'TAGGING'
16	1978	0.62	0.22	'TAGGING'
16	1979	0.62	0.22	'TAGGING'
16	1980	0.82	0.2	'TAGGING'
16	1981	0.9	0.2	'TAGGING'
16	1982	-999	-999	'TAGGING'
16	1983	-999	-999	'TAGGING'

16	1984	-999	-999	'TAGGING'
16	1985	-999	-999	'TAGGING'
16	1986	-999	-999	'TAGGING'
16	1987	-999	-999	'TAGGING'
16	1988	-999	-999	'TAGGING'
16	1989	-999	-999	'TAGGING'
16	1990	-999	-999	'TAGGING'
16	1991	-999	-999	'TAGGING'
16	1992	-999	-999	'TAGGING'
16	1993	-999	-999	'TAGGING'
16	1994	-999	-999	'TAGGING'
16	1995	-999	-999	'TAGGING'
16	1996	-999	-999	'TAGGING'
16	1997	-999	-999	'TAGGING'
16	1998	-999	-999	'TAGGING'
16	1999	-999	-999	'TAGGING'
16	2000	-999	-999	'TAGGING'
16	2001	-999	-999	'TAGGING'
16	2002	-999	-999	'TAGGING'
16	2003	-999	-999	'TAGGING'
16	2004	-999	-999	'TAGGING'
16	2005	-999	-999	'TAGGING'
16	2006	-999	-999	'TAGGING'
16	2007	-999	-999	'TAGGING'
16	2008	-999	-999	'TAGGING'
16	2009	-999	-999	'TAGGING'
16	2010	-999	-999	'TAGGING'
16	2011	-999	-999	'TAGGING'
16	2012	-999	-999	'TAGGING'
16	2013	-999	-999	'TAGGING'
16	2014	-999	-999	'TAGGING'
16	2015	-999	-999	'TAGGING'
17	1974	-999	-999	'JLL_AREA_2_RECENT'
17	1975	-999	-999	'JLL_AREA_2_RECENT'
17	1976	-999	-999	'JLL_AREA_2_RECENT'
17	1977	-999	-999	'JLL_AREA_2_RECENT'
17	1978	-999	-999	'JLL_AREA_2_RECENT'
17	1979	-999	-999	'JLL_AREA_2_RECENT'
17	1980	-999	-999	'JLL_AREA_2_RECENT'
17	1981	-999	-999	'JLL_AREA_2_RECENT'
17	1982	-999	-999	'JLL_AREA_2_RECENT'
17	1983	-999	-999	'JLL_AREA_2_RECENT'
17	1984	-999	-999	'JLL_AREA_2_RECENT'
17	1985	-999	-999	'JLL_AREA_2_RECENT'
17	1986	-999	-999	'JLL_AREA_2_RECENT'
17	1987	-999	-999	'JLL_AREA_2_RECENT'
17	1988	-999	-999	'JLL_AREA_2_RECENT'
17	1989	-999	-999	'JLL_AREA_2_RECENT'
17	1990	-999	-999	'JLL_AREA_2_RECENT'
17	1991	-999	-999	'JLL_AREA_2_RECENT'
17	1992	-999	-999	'JLL_AREA_2_RECENT'
17	1993	-999	-999	'JLL_AREA_2_RECENT'
17	1994	-999	-999	'JLL_AREA_2_RECENT'
17	1995	-999	-999	'JLL_AREA_2_RECENT'
17	1996	-999	-999	'JLL_AREA_2_RECENT'
17	1997	-999	-999	'JLL_AREA_2_RECENT'
17	1998	-999	-999	'JLL_AREA_2_RECENT'
17	1999	-999	-999	'JLL_AREA_2_RECENT'
17	2000	-999	-999	'JLL_AREA_2_RECENT'
17	2001	-999	-999	'JLL_AREA_2_RECENT'
17	2002	-999	-999	'JLL_AREA_2_RECENT'
17	2003	-999	-999	'JLL_AREA_2_RECENT'
17	2004	-999	-999	'JLL_AREA_2_RECENT'
17	2005	-999	-999	'JLL_AREA_2_RECENT'
17	2006	-999	-999	'JLL_AREA_2_RECENT'
17	2007	-999	-999	'JLL_AREA_2_RECENT'
17	2008	-999	-999	'JLL_AREA_2_RECENT'
17	2009	-999	-999	'JLL_AREA_2_RECENT'
17	2010	0.59	0.38	'JLL_AREA_2_RECENT'
17	2011	2.00	0.26	'JLL_AREA_2_RECENT'
17	2012	2.50	0.27	'JLL_AREA_2_RECENT'
17	2013	1.89	0.26	'JLL_AREA_2_RECENT'
17	2014	2.34	0.28	'JLL_AREA_2_RECENT'
17	2015	1.43	0.27	'JLL_AREA_2_RECENT'
17	2016	3.58	0.29	'JLL_AREA_2_RECENT'
17	2017	3.57	0.31	'JLL_AREA_2_RECENT'
17	2018	6.50	0.30	'JLL_AREA_2_RECENT'

-1 end index data

#==

NOW ENTER IN THE VulnerabilitIES OR PARTIAL CATCHES FOR THE INDICES OF ABUNDANCE

#==

#INDEX	Year	Age 1	Age 2	Age 3	Age 4	Age 5	Age 6	Age 7	Age 8	Age 9	Age 10	Age 11
	Age 12	Age 13	Age 14	Age 15	Age 16							
1	1984	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	665							
1	1985	0	0	0	0	0	0	0	0	0	0	0
	1	0	0	0	316							
1	1986	0	0	0	0	0	0	0	0	0	0	1
	1	1	0	0	105							
1	1987	0	0	0	0	0	0	5	46	30	22	13
	9	5	5	2	31							
1	1988	0	0	0	0	0	1	45	385	250	183	108
	74	45	40	21	257							
1	1989	0	0	0	0	0	1	97	832	539	392	228
	148	91	84	43	529							
1	1990	0	0	0	0	1	6	148	673	621	191	125
	83	92	75	69	314							
1	1991	0	0	0	0	0	1	191	484	724	444	164
	135	121	82	61	263							
1	1992	0	0	0	0	1	7	102	258	275	363	292
	185	104	106	72	326							
1	1993	0	0	0	0	0	1	20	99	287	232	190
	146	99	61	73	494							
1	1994	0	0	0	0	0	7	52	158	193	269	180
	121	70	53	35	302							
1	1995	0	0	0	0	1	27	27	64	373	362	224
	143	97	85	64	638							
1	1996	0	0	0	0	0	1	39	85	109	244	259
	198	153	147	123	578							
1	1997	0	0	0	0	2	17	59	224	236	150	137
	152	125	101	82	574							
1	1998	0	0	0	0	0	11	25	218	534	413	221
	184	137	93	57	472							
1	1999	0	0	0	0	1	2	39	145	288	457	408
	218	94	56	36	484							
1	2000	0	0	0	0	0	2	5	32	156	153	146
	138	160	88	82	827							

1	2001	0	0	0	0	0	10	285	306	130	286	237
	144	129	112	68	558							
1	2002	0	0	0	0	0	5	38	504	467	131	164
	166	138	106	108	678							
1	2003	0	0	0	0	0	1	11	343	789	323	67
	39	52	75	48	518							
1	2004	0	0	0	0	0	5	33	73	261	319	190
	114	66	86	92	705							
1	2005	0	0	0	0	11	35	31	124	153	269	310
	236	135	109	76	758							
1	2006	0	0	0	0	5	21	138	165	279	337	361
	288	202	141	97	831							
1	2007	0	0	0	0	0	25	59	153	175	152	126
	150	123	82	74	586							
1	2008	0	0	0	0	0	31	73	187	213	184	154
	184	150	101	92	710							
1	2009	0	0	0	0	1	88	68	187	209	142	159
	176	189	149	131	461							
1	2010	0	0	0	0	0	6	79	56	143	149	128
	137	163	123	106	518							
1	2011	0	0	0	0	0	5	86	205	127	148	144
	131	102	117	88	409							
1	2012	0	0	0	0	0	6	35	185	283	184	158
	121	146	148	123	424							
1	2013	0	0	0	0	0	1	25	56	87	200	230
	148	111	100	96	535							
1	2014	0	0	0	0	1	8	16	62	134	176	257
	245	136	116	74	369							
1	2015	0	0	0	0	0	2	14	31	61	163	196
	196	174	169	128	560							
1	2016	0	0	0	0	0	2	27	81	71	153	224
	264	188	147	81	283							
1	2017	0	0	0	0	1	3	9	31	121	144	142
	177	180	142	108	441							
1	2018	0	0	0	0	0	1	12	29	182	320	251
	225	186	146	93	319							
2	1994	0	0	0	0	0	6	50	158	192	269	181
	125	83	63	49	485							
2	1995	0	0	0	0	1	32	28	67	373	362	230
	159	98	99	80	784							
2	1996	0	0	0	0	1	2	45	91	103	248	273
	200	152	105	112	606							
2	1997	0	0	0	1	4	78	83	238	243	153	139
	150	127	109	89	660							
2	1998	0	0	0	0	0	11	25	221	536	419	236
	206	150	119	69	542							
2	1999	0	0	0	0	1	2	39	147	295	474	428
	224	113	68	50	577							
2	2000	0	0	63	0	0	66	5	32	170	153	145
	140	157	87	93	661							
2	2001	0	0	0	0	0	18	289	311	137	286	239
	148	130	108	78	468							
2	2002	0	0	0	0	12	52	152	602	480	129	164
	173	144	110	109	560							
2	2003	0	0	0	0	0	49	59	392	798	339	86
	70	83	119	70	562							
2	2004	0	0	0	1	6	32	140	135	289	366	208
	125	78	93	115	753							
2	2005	0	0	0	3	24	83	49	140	166	275	336
	249	154	118	77	710							
2	2006	0	0	0	0	17	103	232	194	292	360	379
	293	211	147	106	818							
2	2007	0	0	0	1	11	146	170	204	187	160	137
	163	140	96	90	581							
2	2008	0	0	0	1	6	93	130	213	219	189	157
	186	158	111	122	732							
2	2009	0	0	0	0	7	305	110	252	251	181	184
	192	199	154	131	484							
2	2010	0	0	0	0	1	29	175	120	197	206	213
	177	226	146	115	540							
2	2011	0	0	0	0	21	81	177	340	184	185	175
	168	125	134	101	484							
2	2012	0	0	0	0	0	108	126	269	367	226	173
	133	146	144	116	402							
2	2013	0	0	0	0	0	6	50	114	122	269	289
	158	120	103	103	497							
2	2014	0	0	0	0	3	27	55	116	199	218	289
	265	146	121	75	345							
2	2015	0	0	0	0	1	7	55	63	91	206	235
	222	191	178	127	520							
2	2016	0	0	0	0	0	4	51	160	132	218	270
	292	207	153	89	283							
2	2017	0	0	0	0	2	25	19	102	193	186	187
	204	192	149	118	398							
2	2018	0	0	0	0	0	54	105	51	289	400	280
	255	204	153	94	286							
3	1980	847	3622	1541	299	156	8	0	0	0	0	0
	0	0	0	0	0							
3	1981	2752	328	1528	101	32	6	0	0	0	0	0
	0	0	0	0	0							
3	1982	2889	1897	2186	472	77	0	0	0	0	0	0
	0	0	0	0	0							
3	1983	1750	1814	1148	518	56	5	0	0	0	0	0
	0	0	0	0	0							
3	1984	505	4534	2365	1004	297	22	0	0	0	0	0
	0	0	0	0	0							
3	1985	469	4198	5987	1616	121	0	0	0	0	0	0
	0	0	0	0	0							
3	1986	574	5231	7355	874	479	0	0	0	0	0	0
	0	0	0	0	0							
3	1987	1382	11969	9365	2934	1947	0	0	0	0	0	0
	0	0	0	0	0							
3	1988	5565	4654	12716	1787	173	0	0	0	0	0	0
	0	0	0	0	0							
3	1989	663	5116	8728	1456	2890	3	0	0	0	0	0
	0	0	0	0	0							
3	1990	1042	1982	12781	4165	878	0	0	0	0	0	0
	0	0	0	0	0							
3	1991	903	4703	18676	2545	1082	1	0	0	0	0	0
	0	0	0	0	0							
3	1992	40	1891	5786	347	262	0	0	0	0	0	0
	0	0	0	0	0							
4	1993	0	532	1239	4146	0	0	0	0	0	0	0
	0	0	0	0	0							
4	1994	0	304	679	1186	0	0	0	0	0	0	0
	0	0	0	0	0							
4	1995	0	394	2346	2870	0	0	0	0	0	0	0
	0	0	0	0	0							
4	1996	0	3744	7462	1418	0	0	0	0	0	0	0
	0	0	0	0	0							

4	1997	0	281	4418	3589	0	0	0	0	0	0	0
	0	0	0	0	0							
4	1998	0	382	2601	2698	0	0	0	0	0	0	0
	0	0	0	0	0							
4	1999	0	343	844	1603	0	0	0	0	0	0	0
	0	0	0	0	0							
4	2000	0	129	622	249	0	0	0	0	0	0	0
	0	0	0	0	0							
4	2001	0	100	957	2610	0	0	0	0	0	0	0
	0	0	0	0	0							
4	2002	0	3795	5682	2173	0	0	0	0	0	0	0
	0	0	0	0	0							
4	2003	0	909	3055	2500	0	0	0	0	0	0	0
	0	0	0	0	0							
4	2004	0	1365	4873	4778	0	0	0	0	0	0	0
	0	0	0	0	0							
4	2005	0	4695	2569	1535	0	0	0	0	0	0	0
	0	0	0	0	0							
4	2006	0	207	1094	429	0	0	0	0	0	0	0
	0	0	0	0	0							
4	2007	0	68	440	6088	0	0	0	0	0	0	0
	0	0	0	0	0							
4	2008	0	179	1230	1730	0	0	0	0	0	0	0
	0	0	0	0	0							
4	2009	0	57	981	1438	0	0	0	0	0	0	0
	0	0	0	0	0							
4	2010	0	413	886	730	0	0	0	0	0	0	0
	0	0	0	0	0							
4	2011	0	70	494	1957	0	0	0	0	0	0	0
	0	0	0	0	0							
4	2012	0	101	996	1790	0	0	0	0	0	0	0
	0	0	0	0	0							
4	2013	0	119	294	720	0	0	0	0	0	0	0
	0	0	0	0	0							
4	2014	0	496	691	508	0	0	0	0	0	0	0
	0	0	0	0	0							
4	2015	0	2	631	858	0	0	0	0	0	0	0
	0	0	0	0	0							
4	2016	0	9	483	1470	0	0	0	0	0	0	0
	0	0	0	0	0							
4	2017	0	1006	1130	1055	0	0	0	0	0	0	0
	0	0	0	0	0							
4	2018	0	811	911	851	0	0	0	0	0	0	0
	0	0	0	0	0							
5	1993	0	0	0	1068	1472	0	0	0	0	0	0
	0	0	0	0	0							
5	1994	0	0	0	315	776	46	0	0	0	0	0
	0	0	0	0	0							
5	1995	0	0	0	1268	2616	341	0	0	0	0	0
	0	0	0	0	0							
5	1996	0	0	0	2248	2949	547	0	0	0	0	0
	0	0	0	0	0							
5	1997	0	0	0	63	823	0	0	0	0	0	0
	0	0	0	0	0							
5	1998	0	0	0	1188	914	0	0	0	0	0	0
	0	0	0	0	0							
5	1999	0	0	0	415	684	129	0	0	0	0	0
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5	2000	0	0	0	143	460	49	0	0	0	0	0
	0	0	0	0	0							
5	2001	0	0	0	2411	2458	82	0	0	0	0	0
	0	0	0	0	0							
5	2002	0	0	0	2077	6927	776	0	0	0	0	0
	0	0	0	0	0							
5	2003	0	0	0	916	1416	45	0	0	0	0	0
	0	0	0	0	0							
5	2004	0	0	0	977	2505	0	0	0	0	0	0
	0	0	0	0	0							
5	2005	0	0	0	1169	655	60	0	0	0	0	0
	0	0	0	0	0							
5	2006	0	0	0	532	2598	131	0	0	0	0	0
	0	0	0	0	0							
5	2007	0	0	0	4719	1974	258	0	0	0	0	0
	0	0	0	0	0							
5	2008	0	0	0	345	5786	180	0	0	0	0	0
	0	0	0	0	0							
5	2009	0	0	0	441	1216	97	0	0	0	0	0
	0	0	0	0	0							
5	2010	0	0	0	729	1280	14	0	0	0	0	0
	0	0	0	0	0							
5	2011	0	0	0	509	855	5	0	0	0	0	0
	0	0	0	0	0							
5	2012	0	0	0	316	850	19	0	0	0	0	0
	0	0	0	0	0							
5	2013	0	0	0	524	549	0	0	0	0	0	0
	0	0	0	0	0							
5	2014	0	0	0	399	482	0	0	0	0	0	0
	0	0	0	0	0							
5	2015	0	0	0	62	413	84	0	0	0	0	0
	0	0	0	0	0							
5	2016	0	0	0	664	965	3	0	0	0	0	0
	0	0	0	0	0							
5	2017	0	0	0	141	698	91	0	0	0	0	0
	0	0	0	0	0							
5	2018	0	0	0	114	563	73	0	0	0	0	0
	0	0	0	0	0							
7	1983	0	0	0	0	0	0	0	10	119	128	164
	141	193	117	79	355							
7	1984	0	0	0	0	0	0	0	0	84	143	180
	189	169	141	110	172							
7	1985	0	0	0	0	0	0	0	0	68	101	120
	162	172	122	87	179							
7	1986	0	0	0	0	0	0	0	0	47	50	61
	51	62	58	36	96							
7	1987	0	0	0	0	0	0	0	0	66	68	48
	64	40	53	40	123							
7	1988	0	0	0	0	0	0	0	0	76	72	39
	51	38	62	43	140							
7	1989	0	0	0	0	0	0	0	0	72	64	65
	47	38	60	34	163							
7	1990	0	0	0	0	0	0	0	0	131	56	68
	53	53	104	74	256							
7	1991	0	0	0	0	0	0	0	0	80	107	125
	93	67	99	66	163							
7	1992	0	0	0	0	0	0	0	0	51	77	104
	107	49	75	51	178							
9	1993	0	0	0	0	0	0	3	225	325	202	125
	94	59	119	44	239							
9	1994	0	0	0	0	0	0	0	778	302	192	209
	134	76	84	31	161							

9	1995 158	0 145	0 168	0 88	0 350	0	0	0	314	498	324	203
9	1996 135	0 85	0 114	0 71	0 177	0	0	45	859	190	200	213
9	1997 308	0 202	0 265	0 102	0 308	0	0	28	949	596	255	291
9	1998 227	0 275	0 196	0 98	0 287	0	0	19	1153	344	333	193
9	1999 285	0 192	0 250	0 140	0 254	0	0	5	587	364	604	467
9	2000 361	0 271	0 180	0 108	0 177	0	0	0	152	338	458	449
9	2001 642	0 455	0 373	0 171	0 354	0	0	35	379	212	619	600
9	2002 518	0 538	0 499	0 198	0 313	0	0	16	633	185	386	383
9	2003 271	0 319	0 330	0 123	0 232	0	0	18	319	216	209	143
9	2004 66	0 112	0 85	0 37	0 149	0	0	12	147	113	176	85
9	2005 78	0 65	0 34	0 33	0 118	0	0	3	98	114	111	112
9	2006 38	0 21	0 45	0 26	0 109	0	0	13	61	25	42	43
9	2007 30	0 12	0 29	0 15	0 73	0	0	1	96	33	53	38
9	2008 27	0 25	0 24	0 19	0 86	0	0	75	110	41	29	18
9	2009 49	0 36	0 66	0 61	0 319	0	0	3	149	107	98	43
9	2010 115	0 108	0 129	0 83	0 169	0	0	120	694	370	389	155
9	2011 166	0 95	0 58	0 60	0 179	0	0	46	711	315	185	208
9	2012 126	0 64	0 47	0 34	0 123	0	0	20	380	565	294	124
9	2013 40	0 32	0 42	0 20	0 74	0	0	3	175	72	108	81
9	2014 168	0 91	0 75	0 38	0 158	0	0	9	137	326	231	160
9	2015 255	0 182	0 149	0 64	0 214	0	0	75	370	215	432	331
9	2016 401	0 249	0 205	0 91	0 300	0	0	53	692	467	369	322
9	2017 178	0 127	0 116	0 61	0 163	0	0	12	590	834	671	296
9	2018 209	0 149	0 136	0 71	0 191	0	0	11	690	977	786	346
10	1976 10	12 15	42 20	239 9	407 27	82	214	92	169	324	5	27
10	1977 11	0 66	0 20	114 8	165 45	340	54	51	35	46	59	19
10	1978 14	0 38	18 7	42 19	60 30	110	369	202	194	166	149	38
10	1979 7	0 52	63 36	92 23	592 38	309	616	1311	584	218	180	32
10	1980 162	0 71	63 63	24 45	274 60	939	775	2167	1705	880	307	247
10	1981 131	103 45	224 32	1058 26	125 131	1428	1649	925	802	644	324	221
10	1982 40	0 14	3 12	35 18	103 8	111	195	266	103	107	79	57
10	1983 64	23 45	13 20	38 17	95 21	281	147	274	335	230	77	127
10	1984 77	6 102	7 37	56 23	94 56	586	963	475	119	173	79	60
10	1985 40	1 5	8 2	222 0	543 4	372	373	190	97	75	34	17
10	1986 40	5 34	4 30	0 6	31 41	51	207	193	254	207	92	76
10	1987 27	0 31	3 13	36 0	159 16	340	392	226	187	99	67	43
10	1988 28	0 28	20 44	169 12	385 68	789	567	691	351	206	79	41
10	1989 30	0 27	1 11	13 18	90 31	414	711	971	675	208	82	62
10	1990 7	0 1	0 12	401 10	485 26	694	957	490	410	335	66	43
10	1991 43	0 14	0 0	149 0	590 7	586	1009	1058	499	373	205	83
10	1992 66	0 16	7 10	64 22	503 21	899	1011	852	1094	506	126	184
10	1993 22	0 25	0 6	59 0	510 4	1158	1411	1016	469	348	117	46
10	1994 40	0 4	0 2	24 0	416 0	996	749	466	575	312	84	52
10	1995 6	0 0	7 1	47 0	838 11	1168	1222	531	644	88	30	16
10	1996 32	3 43	181 29	145 5	416 38	736	1692	740	401	210	170	84
10	1997 41	0 61	0 2	39 8	49 52	475	571	788	588	254	122	78
10	1998 53	8 40	2 16	135 16	394 27	467	1087	855	878	933	331	142
10	1999 39	0 23	1 5	19 1	135 11	839	488	656	360	200	254	215
10	2000 51	0 46	0 24	13 10	52 99	761	1953	762	895	459	119	160
10	2001 73	0 62	27 47	13 37	0 73	30	374	1787	1331	245	74	74
10	2002 5	0 1	9 6	9 3	56 0	50	13	456	1002	799	176	61
10	2003 8	0 0	0 0	10 0	58 1	139	146	78	52	56	33	18
10	2004 19	12 27	25 2	61 2	67 34	842	1588	1026	425	261	153	61
10	2008 56	0 18	0 8	0 3	6 15	1678	647	1311	661	382	179	84
10	2009 10	0 7	0 7	0 0	0 6	1	8	5	14	28	24	10
10	2010 51	0 33	0 18	0 18	0 49	116	29	231	98	42	86	66
10	2011 137	0 65	0 50	0 30	0 49	293	1105	454	1862	419	160	194
10	2012 80	0 49	0 42	0 26	1 39	131	304	197	158	585	281	112
10	2013 200	0 111	0 54	0 27	0 45	0	12	38	112	166	451	421
10	2014 291	0 140	0 41	0 24	0 40	2	13	38	68	183	276	393

10	2015 335	0 171	0 81	0 40	0 36	0	0	3	26	135	336	461
10	2016 193	0 109	0 48	0 11	0 17	0	4	35	281	434	477	288
10	2017 252	0 170	0 90	0 50	0 37	0	2	12	111	303	365	311
10	2018 322	0 168	0 84	0 38	0 50	0	15	38	94	388	442	392
13	1975 774	0 970	0 719	0 411	6 825	11	0	23	200	702	1005	1022
13	1976 1548	0 2037	0 1285	0 1247	0 2045	2	5	24	70	180	383	760
13	1977 532	0 1532	0 1381	0 1426	0 4056	0	16	8	32	97	125	377
13	1978 448	0 998	0 741	0 1153	0 4612	0	2	4	4	35	90	320
13	1979 919	0 1501	0 940	0 1346	2 3787	3	13	0	4	30	90	393
13	1980 262	0 475	0 861	0 937	0 4228	0	0	0	5	11	32	121
13	1981 529	0 564	0 651	0 802	0 3874	8	8	5	65	134	86	252
13	2004 63	0 26	0 20	0 4	0 30	0	0	0	18	20	18	19
13	2005 0	0 0	0 0	0 0	0 0	0	0	0	0	0	0	0
13	2006 18	0 108	0 58	0 3	0 21	0	0	0	0	27	69	14
13	2007 33	0 37	0 36	0 14	0 40	2	12	0	24	14	62	37
13	2008 13	0 70	0 25	0 17	0 52	1	1	0	42	56	92	31
13	2009 29	0 68	0 34	0 37	0 64	2	3	0	25	12	55	46
13	2010 19	0 32	0 21	0 25	0 52	0	13	0	6	0	23	25
13	2011 5	0 4	0 9	0 1	0 11	0	0	0	2	1	8	2
13	2012 52	0 51	0 47	0 26	0 84	0	1	0	33	13	76	10
13	2013 16	0 8	0 7	0 13	0 11	0	1	1	10	22	18	4
13	2014 18	0 16	0 0	0 5	0 8	0	8	0	19	13	32	17
13	2015 3	0 2	0 0	0 0	0 0	0	0	5	9	0	9	4
13	2016 1	0 3	0 1	0 0	0 5	2	22	0	12	1	8	7
13	2017 11	0 7	0 0	5 0	0 2	0	14	0	5	1	7	3
13	2018 12	0 8	0 0	7 0	0 2	0	20	0	7	1	8	3
14	2004 63	0 26	0 20	0 4	0 30	0	0	0	18	20	18	19
14	2005 0	0 0	0 0	0 0	0 0	0	0	0	0	0	0	0
14	2006 18	0 108	0 58	0 3	0 21	0	0	0	0	27	69	14
14	2007 33	0 37	0 36	0 14	0 40	2	12	0	24	14	62	37
14	2008 13	0 70	0 25	0 17	0 52	1	1	0	42	56	92	31
14	2009 29	0 68	0 34	0 37	0 64	2	3	0	25	12	55	46
14	2010 19	0 32	0 21	0 25	0 52	0	13	0	6	0	23	25
14	2011 5	0 4	0 9	0 1	0 11	0	0	0	2	1	8	2
14	2012 52	0 51	0 47	0 26	0 84	0	1	0	33	13	76	10
14	2013 16	0 8	0 7	0 13	0 11	0	1	1	10	22	18	4
14	2014 18	0 16	0 0	0 5	0 8	0	8	0	19	13	32	17
14	2015 3	0 2	0 0	0 0	0 0	0	0	5	9	0	9	4
14	2016 1	0 3	0 1	0 0	0 5	2	22	0	12	1	8	7
14	2017 11	0 7	0 0	5 0	0 2	0	14	0	5	1	7	3
14	2018 12	0 8	0 0	7 0	0 2	0	20	0	7	1	8	3
15	1975 774	0 970	0 719	0 411	6 825	11	0	23	200	702	1005	1022
15	1976 1548	0 2037	0 1285	0 1247	0 2045	2	5	24	70	180	383	760
15	1977 532	0 1532	0 1381	0 1426	0 4056	0	16	8	32	97	125	377
15	1978 448	0 998	0 741	0 1153	0 4612	0	2	4	4	35	90	320
15	1979 919	0 1501	0 940	0 1346	2 3787	3	13	0	4	30	90	393
15	1980 262	0 475	0 861	0 937	0 4228	0	0	0	5	11	32	121
15	1981 529	0 564	0 651	0 802	0 3874	8	8	5	65	134	86	252
16	1974 0	1 0	1 0	1 0	0 0	0	0	0	0	0	0	0
16	1975 0	1 0	1 0	1 0	0 0	0	0	0	0	0	0	0
16	1976 0	1 0	1 0	1 0	0 0	0	0	0	0	0	0	0
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16	1978 0	1 0	1 0	1 0	0 0	0	0	0	0	0	0	0
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16	1980 0	1 0	1 0	1 0	0 0	0	0	0	0	0	0	0
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16	1982 0	1 0	1 0	1 0	0 0	0	0	0	0	0	0	0
16	1983 0	1 0	1 0	1 0	0 0	0	0	0	0	0	0	0
16	1984 0	1 0	1 0	1 0	0 0	0	0	0	0	0	0	0
16	1985 0	1 0	1 0	1 0	0 0	0	0	0	0	0	0	0

16	1986	1	1	1	0	0	0	0	0	0	0	0
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16	1987	1	1	1	0	0	0	0	0	0	0	0
	0	0	0	0	0							
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	0	0	0	0	0							
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	0	0	0	0	0							
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	0	0	0	0	0							
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	0	0	0	0	0							
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	0	0	0	0	0							
16	1998	1	1	1	0	0	0	0	0	0	0	0
	0	0	0	0	0							
16	1999	1	1	1	0	0	0	0	0	0	0	0
	0	0	0	0	0							
16	2000	1	1	1	0	0	0	0	0	0	0	0
	0	0	0	0	0							
16	2001	1	1	1	0	0	0	0	0	0	0	0
	0	0	0	0	0							
16	2002	1	1	1	0	0	0	0	0	0	0	0
	0	0	0	0	0							
16	2003	1	1	1	0	0	0	0	0	0	0	0
	0	0	0	0	0							
16	2004	1	1	1	0	0	0	0	0	0	0	0
	0	0	0	0	0							
16	2005	1	1	1	0	0	0	0	0	0	0	0
	0	0	0	0	0							
16	2006	1	1	1	0	0	0	0	0	0	0	0
	0	0	0	0	0							
16	2007	1	1	1	0	0	0	0	0	0	0	0
	0	0	0	0	0							
16	2008	1	1	1	0	0	0	0	0	0	0	0
	0	0	0	0	0							
16	2009	1	1	1	0	0	0	0	0	0	0	0
	0	0	0	0	0							
16	2010	1	1	1	0	0	0	0	0	0	0	0
	0	0	0	0	0							
16	2011	1	1	1	0	0	0	0	0	0	0	0
	0	0	0	0	0							
16	2012	1	1	1	0	0	0	0	0	0	0	0
	0	0	0	0	0							
16	2013	1	1	1	0	0	0	0	0	0	0	0
	0	0	0	0	0							
16	2014	1	1	1	0	0	0	0	0	0	0	0
	0	0	0	0	0							
16	2015	1	1	1	0	0	0	0	0	0	0	0
	0	0	0	0	0							
16	2016	1	1	1	0	0	0	0	0	0	0	0
	0	0	0	0	0							
16	2017	1	1	1	0	0	0	0	0	0	0	0
	0	0	0	0	0							
16	2018	1	1	1	0	0	0	0	0	0	0	0
	0	0	0	0	0							
17	1976	12	42	239	407	82	214	92	169	324	5	27
	10	15	20	9	27							
17	1977	0	0	114	165	340	54	51	35	46	59	19
	11	66	20	8	45							
17	1978	0	18	42	60	110	369	202	194	166	149	38
	14	38	7	19	30							
17	1979	0	63	92	592	309	616	1311	584	218	180	32
	7	52	36	23	38							
17	1980	0	63	24	274	939	775	2167	1705	880	307	247
	162	71	63	45	60							
17	1981	103	224	1058	125	1428	1649	925	802	644	324	221
	131	45	32	26	131							
17	1982	0	3	35	103	111	195	266	103	107	79	57
	40	14	12	18	8							
17	1983	23	13	38	95	281	147	274	335	230	77	127
	64	45	20	17	21							
17	1984	6	7	56	94	586	963	475	119	173	79	60
	77	102	37	23	56							
17	1985	1	8	222	543	372	373	190	97	75	34	17
	40	5	2	0	4							
17	1986	5	4	0	31	51	207	193	254	207	92	76
	40	34	30	6	41							
17	1987	0	3	36	159	340	392	226	187	99	67	43
	27	31	13	0	16							
17	1988	0	20	169	385	789	567	691	351	206	79	41
	28	28	44	12	68							
17	1989	0	1	13	90	414	711	971	675	208	82	62
	30	27	11	18	31							
17	1990	0	0	401	485	694	957	490	410	335	66	43
	7	1	12	10	26							
17	1991	0	0	149	590	586	1009	1058	499	373	205	83
	43	14	0	0	7							
17	1992	0	7	64	503	899	1011	852	1094	506	126	184
	66	16	10	22	21							
17	1993	0	0	59	510	1158	1411	1016	469	348	117	46
	22	25	6	0	4							
17	1994	0	0	24	416	996	749	466	575	312	84	52
	40	4	2	0	0							
17	1995	0	7	47	838	1168	1222	531	644	88	30	16
	6	0	1	0	11							
17	1996	3	181	145	416	736	1692	740	401	210	170	84
	32	43	29	5	38							
17	1997	0	0	39	49	475	571	788	588	254	122	78
	41	61	2	8	52							
17	1998	8	2	135	394	467	1087	855	878	933	331	142
	53	40	16	16	27							
17	1999	0	1	19	135	839	488	656	360	200	254	215
	39	23	5	1	11							
17	2000	0	0	13	52	761	1953	762	895	459	119	160
	51	46	24	10	99							
17	2001	0	27	13	0	30	374	1787	1331	245	74	74
	73	62	47	37	73							
17	2002	0	9	9	56	50	13	456	1002	799	176	61
	5	1	6	3	0							

17 2003 0 0 10 58 139 146 78 52 56 33 18
8 0 0 0 1
17 2004 12 25 61 67 842 1588 1026 425 261 153 61
19 27 2 2 34
17 2008 0 0 0 6 1678 647 1311 661 382 179 84
56 18 8 3 15
17 2009 0 0 0 0 1 8 5 14 28 24 10
10 7 7 0 6
17 2010 0 0 0 0 116 29 231 98 42 86 66
51 33 18 18 49
17 2011 0 0 0 0 293 1105 454 1862 419 160 194
137 65 50 30 49
17 2012 0 0 0 1 131 304 197 158 585 281 112
80 49 42 26 39
17 2013 0 0 0 0 0 12 38 112 166 451 421
200 111 54 27 45
17 2014 0 0 0 0 2 13 38 68 183 276 393
291 140 41 24 40
17 2015 0 0 0 0 0 0 3 26 135 336 461
335 171 81 40 36
17 2016 0 0 0 0 0 4 35 281 434 477 288
193 109 48 11 17
17 2017 0 0 0 0 0 2 12 111 303 365 311
252 170 90 50 37
17 2018 0 0 0 0 0 15 38 94 388 442 392
322 168 84 38 50
-1 end index selectivities

#==

NOW ENTER IN THE WEIGHTS AT AGE FOR THE INDICES OF ABUNDANCE (row=year, col=age)

#==

13 1974 3.2 7.5 16.1 25.8 34.7 63.2 96.8 127.1 154.5 178.1 202.8
220.6 239.8 258.5 274.1 319.6
13 1975 3.3 7.4 12.2 25.7 34.7 60.0 90.0 116.9 143.9 168.8 195.5
219.5 238.9 257.8 273.1 319.2
13 1976 3.2 7.6 14.8 19.9 34.5 51.2 84.8 123.6 142.9 167.8 194.7
218.5 243.7 262.5 280.2 330.1
13 1977 3.3 7.7 10.5 21.7 33.0 53.8 72.4 100.7 138.0 169.9 194.2
220.4 244.4 265.8 281.8 332.6
13 1978 3.7 6.5 12.6 19.8 35.9 55.5 76.3 112.9 144.6 175.2 198.8
222.2 247.9 266.4 283.3 340.8
13 1979 4.2 6.7 11.5 20.5 35.2 59.5 80.1 104.3 137.1 172.5 199.8
223.5 249.9 267.6 286.4 344.5
13 1980 4.3 9.5 13.4 22.8 36.2 61.8 88.7 109.0 140.3 173.4 200.1
221.1 243.2 258.9 278.2 337.2
13 1981 5.0 7.9 16.0 25.1 36.5 58.6 80.7 108.3 141.5 168.5 193.2
219.4 247.1 262.8 281.3 366.9
13 1982 3.1 7.0 11.7 22.9 40.6 62.0 86.4 114.3 142.5 171.1 196.4
216.4 239.1 256.5 277.5 357.1
13 1983 3.5 7.3 14.1 22.7 41.3 59.9 85.8 113.1 139.9 170.3 198.0
220.5 239.3 258.2 274.3 357.0
13 1984 3.2 7.2 11.8 22.2 37.0 62.3 87.0 113.2 143.1 171.9 196.3
221.5 241.0 260.2 276.9 358.9
13 1985 2.6 7.4 13.1 17.1 34.5 54.3 72.4 98.7 135.1 166.7 192.9
216.5 238.6 256.2 274.1 336.2
13 1986 3.1 6.7 14.3 26.9 36.2 62.6 86.0 110.3 141.7 168.9 198.2
219.3 241.8 260.2 278.8 334.7
13 1987 3.0 6.8 16.1 25.7 39.0 56.8 84.4 108.3 138.4 167.5 195.0
219.0 242.4 259.3 279.0 334.6
13 1988 2.9 7.2 13.0 23.4 38.5 58.3 80.3 109.7 139.6 169.5 196.2
218.4 241.4 259.3 278.4 334.1
13 1989 3.1 7.6 10.1 25.3 38.0 59.9 86.0 111.5 142.2 169.2 193.2
217.9 238.9 256.9 275.4 336.1
13 1990 3.6 6.8 15.9 20.9 38.2 60.7 84.3 113.5 142.2 169.5 194.4
218.6 238.9 258.0 277.8 329.1
13 1991 3.5 6.2 14.6 26.0 41.6 64.1 87.9 116.2 144.9 169.6 195.7
219.7 242.0 261.3 280.9 335.4
13 1992 3.1 7.4 13.2 23.2 38.5 62.3 85.9 110.8 139.7 170.0 194.4
218.8 239.6 259.9 277.0 336.1
13 1993 3.6 6.9 13.3 24.0 40.5 60.1 82.6 113.0 138.0 165.7 194.8
217.4 238.5 258.1 277.4 341.6
13 1994 3.1 4.8 12.6 22.0 35.8 53.4 78.3 110.9 136.9 168.7 193.5
217.3 237.0 258.1 278.4 338.3
13 1995 3.1 5.0 14.0 25.0 40.8 60.9 84.1 110.9 142.8 167.3 194.8
217.8 240.3 259.5 278.1 348.8
13 1996 2.9 7.6 10.5 26.7 38.2 55.1 89.0 109.8 143.1 171.6 197.3
218.8 242.0 260.8 279.9 342.0
13 1997 3.9 6.9 14.9 19.8 40.3 61.6 85.0 111.2 139.6 169.4 197.6
219.9 240.5 258.2 277.3 338.0
13 1998 3.7 6.5 14.1 23.8 36.3 64.9 86.3 114.1 142.0 168.6 197.1
219.7 240.2 258.4 276.4 339.5
13 1999 3.6 8.1 15.1 24.3 44.2 64.8 89.5 112.6 142.7 168.0 193.6
221.8 243.2 261.3 279.6 362.8
13 2000 3.6 6.5 14.7 23.7 39.1 60.3 83.0 110.9 138.4 172.3 198.2
220.3 243.6 262.3 281.0 374.7
13 2001 3.7 5.0 15.1 25.5 36.2 62.9 92.0 115.5 145.5 174.4 200.0
223.5 246.2 263.8 282.2 349.9
13 2002 4.9 7.3 12.8 24.3 38.3 54.5 89.1 113.4 141.5 171.3 199.6
223.4 245.8 262.6 281.2 346.5
13 2003 4.1 8.1 14.6 26.3 42.3 63.6 93.1 115.0 141.1 168.3 196.8
223.8 248.3 262.8 279.0 338.1
13 2004 5.1 6.9 14.3 23.2 37.9 57.2 80.2 108.3 139.3 168.0 195.2
218.2 245.6 262.4 279.9 339.3
13 2005 2.9 7.3 13.6 23.6 36.5 51.9 78.2 106.0 138.1 169.2 194.4
219.3 242.8 259.9 277.2 344.6
13 2006 3.4 6.6 13.6 25.1 38.7 56.3 81.6 105.1 134.7 166.1 192.8
222.0 242.6 257.8 276.6 348.3
13 2007 3.3 7.8 14.0 24.0 37.9 55.6 77.6 110.8 140.6 170.0 195.0
221.9 242.5 261.8 280.0 356.8
13 2008 3.5 8.4 14.0 22.0 43.7 63.5 93.1 115.3 143.7 170.0 196.1
222.4 244.9 262.0 279.1 362.7
13 2009 3.4 6.9 16.0 23.8 40.8 63.2 79.5 110.8 138.8 166.2 193.5
221.8 244.6 263.7 282.6 345.5
13 2010 3.8 7.7 11.7 25.6 37.9 62.0 92.2 109.1 139.2 165.9 194.4
221.5 244.4 262.5 281.9 336.4
13 2011 3.5 7.4 10.8 23.5 41.7 53.7 86.6 109.3 135.9 168.6 195.9
222.0 244.6 262.6 282.3 330.8
13 2012 3.5 6.4 15.5 22.9 38.6 67.6 85.6 114.3 143.4 169.2 197.6
219.8 246.6 262.6 280.1 336.8
13 2013 2.7 7.0 13.9 25.2 36.1 58.3 90.8 109.1 141.3 170.8 198.6
224.0 247.4 263.6 281.8 336.0
13 2014 3.0 8.0 10.5 25.9 35.9 62.4 94.1 116.2 143.4 171.2 200.2
223.4 244.4 261.9 281.2 342.4
13 2015 3.1 7.7 15.1 19.9 43.3 60.5 89.9 111.6 144.8 173.9 201.0
225.5 247.8 264.1 283.1 340.2
13 2016 3.1 9.8 15.0 24.7 36.2 63.1 93.5 116.4 144.3 174.3 200.6
225.8 247.2 266.2 280.1 337.3

13	2017	3.4	7.8	11.2	22.3	39.8	57.1	98.0	116.5	143.6	170.2	199.0	224.6	246.5	264.2	280.6	334.5
13	2018	3.3	7.8	11.2	22.3	39.8	58.4	93.4	116.4	144.9	171.7	199.8	224.9	245.8	264.4	279.5	335.4

-1

#==

NOW ENTER IN THE FECUNDITY AT AGE FOR THE SPAWNING STOCK BIOMASS (row=year, col=age)

#==

# Year	Age 1	Age 2	Age 3	Age 4	Age 5	Age 6	Age 7	Age 8	Age 9	Age 10	Age 11	Age 12	Age 13	Age 14	Age 15	Age 16
1974	3.2	7.5	16.1	25.8	34.7	63.2	96.8	127.1	154.5	178.1	202.8	220.6	239.8	258.5	274.1	319.6
1975	3.3	7.4	12.2	25.7	34.7	60.0	90.0	116.9	143.9	168.8	195.5	219.5	238.9	257.8	273.1	319.2
1976	3.2	7.6	14.8	19.9	34.5	51.2	84.8	123.6	142.9	167.8	194.7	218.5	243.7	262.5	280.2	330.1
1977	3.3	7.7	10.5	21.7	33.0	53.8	72.4	100.7	138.0	169.9	194.2	220.4	244.4	265.8	281.8	332.6
1978	3.7	6.5	12.6	19.8	35.9	55.5	76.3	112.9	144.6	175.2	198.8	222.2	247.9	266.4	283.3	340.8
1979	4.2	6.7	11.5	20.5	35.2	59.5	80.1	104.3	137.1	172.5	199.8	223.5	249.9	267.6	286.4	344.5
1980	4.3	9.5	13.4	22.8	36.2	61.8	88.7	109.0	140.3	173.4	200.1	221.1	243.2	258.9	278.2	337.2
1981	5.0	7.9	16.0	25.1	36.5	58.6	80.7	108.3	141.5	168.5	193.2	219.4	247.1	262.8	281.3	366.9
1982	3.1	7.0	11.7	22.9	40.6	62.0	86.4	114.3	142.5	171.1	196.4	216.4	239.1	256.5	277.5	357.1
1983	3.5	7.3	14.1	22.7	41.3	59.9	85.8	113.1	139.9	170.3	198.0	220.5	239.3	258.2	274.3	357.0
1984	3.2	7.2	11.8	22.2	37.0	62.3	87.0	113.2	143.1	171.9	196.3	221.5	241.0	260.2	276.9	358.9
1985	2.6	7.4	13.1	17.1	34.5	54.3	72.4	98.7	135.1	166.7	192.9	216.5	238.6	256.2	274.1	336.2
1986	3.1	6.7	14.3	26.9	36.2	62.6	86.0	110.3	141.7	168.9	198.2	219.3	241.8	260.2	278.8	334.7
1987	3.0	6.8	16.1	25.7	39.0	56.8	84.4	108.3	138.4	167.5	195.0	219.0	242.4	259.3	279.0	334.6
1988	2.9	7.2	13.0	23.4	38.5	58.3	80.3	109.7	139.6	169.5	196.2	218.4	241.4	259.3	278.4	334.1
1989	3.1	7.6	10.1	25.3	38.0	59.9	86.0	111.5	142.2	169.2	193.2	217.9	238.9	256.9	275.4	336.1
1990	3.6	6.8	15.9	20.9	38.2	60.7	84.3	113.5	142.2	169.5	194.4	218.6	238.9	258.0	277.8	329.1
1991	3.5	6.2	14.6	26.0	41.6	64.1	87.9	116.2	144.9	169.6	195.7	219.7	242.0	261.3	280.9	335.4
1992	3.1	7.4	13.2	23.2	38.5	62.3	85.9	110.8	139.7	170.0	194.4	218.8	239.6	259.9	277.0	336.1
1993	3.6	6.9	13.3	24.0	40.5	60.1	82.6	113.0	138.0	165.7	194.8	217.4	238.5	258.1	277.4	341.6
1994	3.1	4.8	12.6	22.0	35.8	53.4	78.3	110.9	136.9	168.7	193.5	217.3	237.0	258.1	278.4	338.3
1995	3.1	5.0	14.0	25.0	40.8	60.9	84.1	110.9	142.8	167.3	194.8	217.8	240.3	259.5	278.1	348.8
1996	2.9	7.6	10.5	26.7	38.2	55.1	89.0	109.8	143.1	171.6	197.3	218.8	242.0	260.8	279.9	342.0
1997	3.9	6.9	14.9	19.8	40.3	61.6	85.0	111.2	139.6	169.4	197.6	219.9	240.5	258.2	277.3	338.0
1998	3.7	6.5	14.1	23.8	36.3	64.9	86.3	114.1	142.0	168.6	197.1	219.7	240.2	258.4	276.4	339.5
1999	3.6	8.1	15.1	24.3	44.2	64.8	89.5	112.6	142.7	168.0	193.6	221.8	243.2	261.3	279.6	362.8
2000	3.6	6.5	14.7	23.7	39.1	60.3	83.0	110.9	138.4	172.3	198.2	220.3	243.6	262.3	281.0	374.7
2001	3.7	5.0	15.1	25.5	36.2	62.9	92.0	115.5	145.5	174.4	200.0	223.5	246.2	263.8	282.2	349.9
2002	4.9	7.3	12.8	24.3	38.3	54.5	89.1	113.4	141.5	171.3	199.6	223.4	245.8	262.6	281.2	346.5
2003	4.1	8.1	14.6	26.3	42.3	63.6	93.1	115.0	141.1	168.3	196.8	223.8	248.3	262.8	279.0	338.1
2004	5.1	6.9	14.3	23.2	37.9	57.2	80.2	108.3	139.3	168.0	195.2	218.2	245.6	262.4	279.9	339.3
2005	2.9	7.3	13.6	23.6	36.5	51.9	78.2	106.0	138.1	169.2	194.4	219.3	242.8	259.9	277.2	344.6
2006	3.4	6.6	13.6	25.1	38.7	56.3	81.6	105.1	134.7	166.1	192.8	222.0	242.6	257.8	276.6	348.3
2007	3.3	7.8	14.0	24.0	37.9	55.6	77.6	110.8	140.6	170.0	195.0	221.9	242.5	261.8	280.0	356.8
2008	3.5	8.4	14.0	22.0	43.7	63.5	93.1	115.3	143.7	170.0	196.1	222.4	244.9	262.0	279.1	362.7
2009	3.4	6.9	16.0	23.8	40.8	63.2	79.5	110.8	138.8	166.2	193.5	221.8	244.6	263.7	282.6	345.5
2010	3.8	7.7	11.7	25.6	37.9	62.0	92.2	109.1	139.2	165.9	194.4	221.5	244.4	262.5	281.9	336.4
2011	3.5	7.4	10.8	23.5	41.7	53.7	86.6	109.3	135.9	168.6	195.9	222.0	244.6	262.6	282.3	330.8
2012	3.5	6.4	15.5	22.9	38.6	67.6	85.6	114.3	143.4	169.2	197.6	219.8	246.6	262.6	280.1	336.8
2013	2.7	7.0	13.9	25.2	36.1	58.3	90.8	109.1	141.3	170.8	198.6	224.0	247.4	263.6	281.8	336.0
2014	3.0	8.0	10.5	25.9	35.9	62.4	94.1	116.2	143.4	171.2	200.2	223.4	244.4	261.9	281.2	342.4
2015	3.1	7.7	15.1	19.9	43.3	60.5	89.9	111.6	144.8	173.9	201.0	225.5	247.8	264.1	283.1	340.2
2016	3.1	9.8	15.0	24.7	36.2	63.1	93.5	116.4	144.3	174.3	200.6	225.8	247.2	266.2	280.1	337.3
2017	3.4	7.8	11.2	22.3	39.8	57.1	98.0	116.5	143.6	170.2	199.0	224.6	246.5	264.2	280.6	334.5
2018	3.3	7.8	11.2	22.3	39.8	58.4	93.4	116.4	144.9	171.7	199.8	224.9	245.8	264.4	279.5	335.4

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@end of the data input file

Appendix B
VPA 2-box parameter file

```
#-----------------------------------------------------------------------------
# PARAMETER FILE FOR PROGRAM VPA_2BOX, Version 4.1
#          The specifications are entered in the order indicated
#          by the existing comments. Additional comments must be preceded by a # symbol
#          in the first column, otherwise the line is perceived as free format input.
#
#          Each parameter in the model must have its own specification line unless a $
#          symbol is placed in the first column followed by an integer value (n), which
#          tells the program that the next n parameters abide by the same specifications.
#
#          The format of each specification line is as follows
#
#          column 1
#          |  number of parameters to which these specifications apply
#          |  |   lower bound
#          |  |   |   best estimate (prior expectation)
#          |  |   |    |    upper bound
#          |  |   |    |    |    method of estimation
#          |  |   |    |    |    |   standard deviation of prior
#          $  5   0   1.2  2.0   1   0.1
#
#          The methods of estimation include:
#          0          set equal to the value given for the best estimate (a fixed constant)
#          1          estimate in the usual frequentist (non-Bayesian) sense
#          2(0.1)     estimate as a random deviation from the previous parameter
#          3(0.2)     estimate as a random deviation from the previous constant or type 1 parameter
#          4(0.3)     estimate as random deviation from the best estimate.
#          -0.1       set equal to the value of the closest previous estimated parameter
#          -n         set equal to the value of the nth parameter in the list (estimated or not)
#-----------------------------------------------------------------------------
#=============================================================================
# TERMINAL F PARAMETERS: (lower bound, best estimate, upper bound, indicator, reference age)
#          Note 1: the method indicator for the terminal F parameters is unique in that if it is
#          zero but the best estimate is set to a value < 9, then the 'best estimate'
#          is taken to be the vulnerability relative to the reference age in the last
#          (fifth) column.  Otherwise these parameters are treated the same as the
#          others below and the fifth column is the standard deviation of the prior.
#          Note 2: the last age is represented by an F-ratio parameter (below), so the number
#          of entries here should be 1 fewer than the number of ages
#-----------------------------------------------------------------------------
1e-06      0.01       4          1          0.1
1e-04      0.1        4          1          0.1
1e-04      0.1        4          1          0.1
1e-04      0.1        4          1          0.1
1e-04      0.1        4          1          0.1
1e-04      0.2        4          1          0.1
1e-04      0.2        4          1          0.1
1e-04      0.2        4          1          0.1
1e-04      0.2        4          1          0.1
1e-04      0.2        4          1          0.1
1e-04      0.2        4          1          0.1
1e-04      0.2        4          1          0.1
1e-04      0.2        4          1          0.1
1e-04      0.2        4          1          0.1
1e-04      0.1        4          1          0.1
#=============================================================================
# F-RATIO PARAMETERS F{oldest}/F{oldest-1} one parameter (set of specifications) for each year
#-----------------------------------------------------------------------------
$ 1        0.0        1.0        4.0        0          0.2
$ 44       0.00       1.0        4.0        0          0.2
#=============================================================================
# NATURAL MORTALITY PARAMETERS: one parameter (set of specifications) for each age
#-----------------------------------------------------------------------------
 0  0.38 1.0  0  0.1
 0  0.30 1.0  0  0.1
 0  0.24 1.0  0  0.1
 0  0.20 1.0  0  0.1
 0  0.18 1.0  0  0.1
 0  0.16 1.0  0  0.1
 0  0.14 1.0  0  0.1
 0  0.13 1.0  0  0.1
 0  0.12 1.0  0  0.1
 0  0.12 1.0  0  0.1
 0  0.11 1.0  0  0.1
 0  0.11 1.0  0  0.1
 0  0.11 1.0  0  0.1
 0  0.10 1.0  0  0.1
 0  0.10 1.0  0  0.1
 0  0.10 1.0  0  0.1
#=============================================================================
# MIXING PARAMETERS: one parameter (set of specifications) for each age
#-----------------------------------------------------------------------------
$ 16 0  0.0  1.0  0  .1
#=============================================================================
# STOCK-RECRUITMENT PARAMETERS: five parameters so 5 sets of specifications
#-----------------------------------------------------------------------------
 0  220982.5   1.D20           0  0.4                              maximum recruitment
 0  16441.44   1.D20           0  0.0                              spawning biomass scaling parameter
 0  0.000                      0.9            0  0.0                              extra parameter (not used yet)
 0  0.5      1                 0  0                                autocorrelation parameter
 0  10       1000  0  0   (0.3464)   variance of random component (discounting the autocorrelation)
#=============================================================================
# VARIANCE SCALING PARAMETER (lower bound, best estimate, upper bound, indicator, std. dev.)
#   this parameter scales the input variance up or down as desired
#   In principal, if you estimate this you should obtain more accurate estimates of the
#   magnitude of the parameter variances-- all other things being equal.
#-----------------------------------------------------------------------------
0          0.4        4          0          0.2
0          0          4          0          0.2
0          0.4        4          1          0.2
0          0.4        4          -0.1       0.2
0          0.4        4          -0.1       0.2
0          0.4        4          -0.1       0.2
0          0.4        4          1          0.2
0          0.4        4          -0.1       0.2
0          0.4        4          -0.1       0.2
0          0.4        4          1          0.2
0          0.4        4          -0.1       0.2
0          0.4        4          -0.1       0.2
0          0          4          0          0.2
0          0.4        4          1          0.2
0          0.4        4          -107       0.2
0          0.4        4          0          0.2
0          0.4        4          -107       0.2
#=============================================================================
#CATCHABILITY PARAMETERS
#-----------------------------------------------------------------------------
```

```
#1_CAN_HL
$ 10    1D-20    1D-04    1    0       0.2
$ 1     1D-20    1D-04    1    0       0.2
$ 34    1D-20    1D-04    1    -0.1    0.2
#2_CAN_GSL_Acoustic
$ 20    1D-20    1D-04    1    0       0.2
$ 1     1D-20    1D-04    1    1       0.2
$ 24    1D-20    1D-04    1    -0.1    0.2
#3_US_RR_<145
$ 1     1D-20    1D-04    1    1       0.2
$ 44    1D-20    1D-04    1    -0.1    0.2
#4_US_RR_66_114
$ 1     1D-20    1D-04    1    1       0.2
$ 44    1D-20    1D-04    1    -0.1    0.2
#5_US_RR_115_144
$ 1     1D-20    1D-04    1    1       0.2
$ 44    1D-20    1D-04    1    -0.1    0.2
#6_US_RR_145_177
$ 45    1D-20    1D-04    1    0       0.2
#7_US_RR>195
$ 1     1D-20    1D-04    1    1       0.2
$ 44    1D-20    1D-04    1    -0.1    0.2
#8_US_RR>195_COMB
$ 45    1D-20    1D-04    1    0       0.2
# 9_US_RR>177
$ 19    1D-20    1D-04    1    0       0.2
$ 1     1D-20    1D-04    1    0       0.2
$ 25    1D-20    1D-04    1    -0.1    0.2
#10_JLL_AREA_2_(WEST)
$ 2     1D-20    1D-04    1    0       0.2
$ 1     1D-20    1D-04    1    1       0.2
$ 33    1D-20    1D-04    1    -0.1    0.2
$ 9     1D-20    1D-04    1    0       0.2
#11_JLL_AREA_3_(31+32)
$ 45    1D-20    1D-04    1    0       0.2
#12_JLL_AREAS_17+18
$ 45    1D-20    1D-04    1    0       0.2
#13_LARVAL_ZERO_INFLATED
$ 1     1D-20    1D-04    1    1       0.2
$ 44    1D-20    1D-04    1    -0.1    0.2
#14_GOM_PLL_1-6
$ 1     1D-20    1D-04    1    1       0.2
$ 44    1D-20    1D-04    1    -0.1    0.2
#15_JLL_GOM
$ 1     1D-20    1D-04    1    1       0.2
$ 44    1D-20    1D-04    1    -0.1    0.2
#16_TAGGING
$ 1     1D-20    1D-04    1    0       0.2
$ 44    1D-20    1D-04    1    -0.1    0.2
#17_JLL_AREA_2_RECENT
$ 36    1D-20    1D-04    1    0       0.2
$ 1     1D-20    1D-04    1    1       0.2
$ 8     1D-20    1D-04    1    3       0.2
@ END PARAMETER INPUT
```

Appendix C
VPA 2-box control file

```
#-----------------------------------------------------------------------------
#--            CONTROL FILE FOR PROGRAM VPA-2BOX, Version 4.1          ---
#-----------------------------------------------------------------------------
#  INSTRUCTIONS: the control options are entered in the order specified.
#              Additional comment lines may be inserted anywhere in this
#              file provided they are preceded by a # symbol in the FIRST
#              column, otherwise the line is perceived as free-format data.
#-----------------------------------------------------------------------------
#
#-----------------------------------------------------------------------------
# TITLES AND FILE NAMES (MUST BE PLACED WITHIN SINGLE QUOTES)
#-----------------------------------------------------------------------------
#|--------must be 50 characters or less----------|
'BFT West 1974 to 2018 Continuity 16+'TITLE OF RUN
'BFTW2020.D01'                     DATA FILE NAME (INPUT)
'BFTW2020.P01'                     PARAMETER SPECIFICATION FILE (INPUT)
'BFTW2020.R01'                     RESULTS FILE NAME (OUTPUT)
'BFTW2020.E01'                     PARAMETER ESTIMATE FILE NAME (OUTPUT)
'BFTW2020.SPD'                     SPREADSHEET FRIENDLY RESULTS (OUTPUT)
'none'                         TAGGING DATA FILE (INPUT)
#-----------------------------------------------------------------------------
# MODEL TYPE OPTIONS
#-----------------------------------------------------------------------------
 1                NUMBER OF ZONES (1 OR 2)
 1                MODEL_TYPE (1=DIFFUSION, 2=OVERLAP)
#-----------------------------------------------------------------------------
# TAGGING DATA SWITCH
#-----------------------------------------------------------------------------
# tagging data switch (0=do not use tagging data, 1=use tagging data)
# |  weighting factor for modifying importance of tagging data in objective function
# |  |     tag timing factors
# |  |     |
  0  1.0   0     0        TAGGING MODEL CONTROLS
#-----------------------------------------------------------------------------
# SEARCH ALGORITHM CONTROLS
#-----------------------------------------------------------------------------
-178   RANDOM NUMBER SEED
600    MAXIMUM NUMBER OF AMOEBA SIMPLEX SEARCH RESTARTS
 10    NUMBER OF CONSECUTIVE RESTARTS THAT MUST VARY BY LESS THAN 1% TO STOP SEARCH
 0.4   PDEV (standard deviation controlling vertices for Initial simplex of each restart)
#-----------------------------------------------------------------------------
# INDEX WEIGHTING CONTROLS
#-----------------------------------------------------------------------------
 1     SCALE (DIVIDE INDEX VALUES BY THEIR MEAN)- ANY VALUE > 0 = YES
 0     INDEX WEIGHTING:(0)INPUT CV's, (+)DEFAULT CV, (-)DEFAULT STD. DEV., (999)MLE
 1     (0) MULTIPLICATIVE VARIANCE SCALING FACTOR or (1) ADDITIVE VARIANCE SCALING FACTOR
#-----------------------------------------------------------------------------
# CONSTRAINT ON VulnerabilitY (PARTIAL RECRUITMENT)
#-----------------------------------------------------------------------------
# apply this penalty to the last N years (SET N = 0 TO IGNORE)
# |  standard deviation controlling the severity of the penalty
# |  |  first age affected
# |  |  |  last age affected
# |  |  |  |
  3 .5  1  15    LINKS THE VULNERABILITIES IN THE LAST N YEARS
#-----------------------------------------------------------------------------
# CONSTRAINTS ON RECRUITMENT
#-----------------------------------------------------------------------------
# apply this penalty to the last N years (SET N = 0 TO IGNORE)
# |  standard deviation controlling the severity of the penalty
  0 .1        LINKS THE RECRUITMENTS IN THE LAST N YEARS
  0 .1   1      LINKS THE RECRUITMENTS OF THE TWO STOCKS
#        |
#       ratio of stock (sex) 1 to stock (sex) 2 {a value of 1 means a 1:1 ratio}
#-----------------------------------------------------------------------------
# CONSTRAINT ON SPAWNER-RECRUIT RELATIONSHIP
#-----------------------------------------------------------------------------
# PDF of spawner-recruit penalty: 0=none, 1=lognormal, 2=normal (-)=estimate sigma by MLE
# |  first and last years to use in fitting (in terms of recruits)
# |  |
  0  1974 1998  PENALIZES DEPARTURES FROM BEVERTON AND HOLT STOCK-RECRUIT CURVE
#                          (note: check the parameter file to make sure you are estimating the S/R
#                     parameters when pdf not 0, or not estimating them when pdf=0))
#-----------------------------------------------------------------------------
# PARAMETER ESTIMATION OPTIONS
#-----------------------------------------------------------------------------
 1           OPTION TO USE (1) F'S OR (2) N'S AS TERMINAL YEAR PARAMETERS
1           ESTIMATE Q IN (+) SEARCH or (<0) by concentrated MLE's
#-----------------------------------------------------------------------------
# BOOTSTRAP ANALYSES
#-----------------------------------------------------------------------------
# Number of bootstraps to run (negative value = do a parametric bootstrap)
# |   Use Stine correction to inflate bootstrap residuals (0=NO)
# |   |   File Output Toggle (- number ASCII, + number BIN)
# |   |   |
  0   1   1        BOOTSTRAP OPTION
#-----------------------------------------------------------------------------
# RETROSPECTIVE ANALYSES (CANNOT DO RETROSPECTIVE ANALYSES AND BOOTSTRAPS AT SAME TIME)
#-----------------------------------------------------------------------------
 0             NUMBER OF YEARS TO GO BACK FOR RETROSPECTIVE ANALYSES
@@EOF@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@
```