

EXPLORATORY STOCK ASSESSMENT OF EASTERN AND WESTERN POPULATION-OF-ORIGIN ATLANTIC BLUEFIN TUNA ACCOUNTING FOR STOCK COMPOSITION

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SUMMARY

Input data from the most recent stock assessments of Atlantic bluefin tuna fisheries were revised to account for estimates of stock composition. Assessments of eastern and western fisheries were compared to assessments of eastern-origin and western-origin fish to evaluate the sensitivity of results to stock mixing, as well as to demonstrate a practical approach to operational assessments to account for stock mixing. Estimates of stock size and fishing mortality from the VPAs of both eastern- and western-origin Atlantic bluefin were generally similar to the 2014 ICCAT estimates based on eastern and western Atlantic mixed-stock fisheries, but the western VPA estimates were more sensitive to the assumption of no stock mixing than the eastern VPA.

RÉSUMÉ

Les données d'entrée des plus récentes évaluations des stocks des pêcheries de thon rouge de l'Atlantique ont été révisées pour tenir compte des estimations de la composition des stocks. Les évaluations des pêcheries de l'Est et de l'Ouest ont été comparées aux évaluations des poissons d'origine orientale et d'origine occidentale pour évaluer la sensibilité des résultats au mélange des stocks, et pour démontrer une méthode pratique d'évaluation opérationnelle qui tient compte du mélange des stocks. Les estimations de la taille du stock et de la mortalité par pêche à partir des VPA des thons rouges originaires de l'Atlantique Est et de l'Atlantique Ouest étaient généralement similaires aux estimations de l'ICCAT de 2014 basées sur les pêcheries de stocks mixtes de l'Atlantique Ouest et Est, mais les estimations de la VPA de l'Ouest étaient plus sensibles au postulat d'absence de mélange des stocks que la VPA de l'Est.

RESUMEN

Se revisaron los datos de entrada de las evaluaciones de stock más recientes de las pesquerías de atún rojo del Atlántico para tener en cuenta las estimaciones de composición de stock. Se compararon las evaluaciones de las pesquerías del este y el oeste con las evaluaciones de los peces de origen oriental y de origen occidental para evaluar la sensibilidad de los resultados a la mezcla del stock, así como para mostrar un enfoque práctico de las evaluaciones operativas para tener en cuenta la mezcla del stock. En general, las estimaciones del tamaño del stock y de la mortalidad por pesca obtenidas a partir del VPA para el atún rojo Atlántico de origen occidental y de origen oriental fueron similares a las estimaciones de ICCAT de 2014 basadas en pesquerías de stock mezclados del Atlántico occidental y oriental, pero las estimaciones VPA occidentales fueron más sensibles al supuesto de no mezcla del stock que las estimaciones VPA orientales.

KEYWORDS

Stock assessment, population dynamics, population structure, stock identification, migrations, Atlantic bluefin tuna, tuna fisheries, fishery statistics,

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1. Background

Mismatches in the scale of bluefin tuna life history and the scale of management (i.e., the stock unit) may have profound implications to sustainable management of the species (Kerr *et al.* 2016). Two distinct spawning populations are recognized for Atlantic bluefin tuna (an eastern population originating in the Mediterranean and a western population originating in the Gulf of Mexico), but stock assessments are based on fisheries east and west of the 45° W stock boundary and do not account for stock mixing (ICCAT 2014). Therefore, characterizing stock composition and the effects of stock mixing is a priority for improving assessment and management of Atlantic bluefin tuna.

Stock mixing violates the ‘unit stock’ assumption underlying the current assessment framework which applies virtual population analysis to separate eastern and western stocks (ICCAT 2014). This violated assumption can result in fundamental inaccuracies in the stock assessment and confound characterization of stock status as well as our understanding of the life history parameters of these populations. Recent stock assessments estimate significant differences in the relative abundance of bluefin tuna stocks, with the eastern population estimated to be an order of magnitude greater than the western population (ICCAT 2014). Because of relative differences in abundance, even low movement rates of eastern origin fish into western Atlantic waters could exert significant influence on the abundance and stock composition of bluefin tuna in the region.

An alternative approach to stock assessment would be to use stock composition analysis to assign fishery catches to their population of origin and integrating this information into the stock assessment and management process. Otolith chemistry of archived bluefin tuna otolith samples has been used to estimate historical and recent stock mixing rates (Rooker *et al.* 2008, 2014; Schloesser *et al.* 2010; Secor *et al.* 2014). Results indicate that stock composition of bluefin depends on the region sampled within the Atlantic, fish size/life-stage, and year-class (Siskey *et al.* 2016). Stock mixing is not a static process and likely reflects inherent variability in trans-Atlantic movements, recruitment success, environmental and forage conditions, life history traits (such as growth and maturity), and the energetic demand of the individual fish. Tag and recapture data suggest that “pulses” of bluefin tuna move across the Atlantic and become vulnerable to fisheries across management boundaries (Mather *et al.* 1995). Recent otolith chemistry data supports the idea of a strong year class effect on stock composition (Secor *et al.* 2014). The operational use of otolith chemistry to inform assessment of bluefin tuna that includes stock mixing would represent a significant advancement.

The objectives of our research are to apply bluefin tuna stock composition information to parse data inputs (i.e., catch, catch-per-unit-effort CPUE, and age composition) to stock assessment and to demonstrate the operational application of otolith chemistry techniques for characterizing the stock composition of bluefin tuna.

2. Methods

The 2014 stock assessments of eastern and western Atlantic Bluefin tuna (ICCAT 2014) were revised based on estimates of stock composition for Atlantic fisheries (Busawon *et al.* 2014, Fraile 2014, Rooker *et al.* 2014, Secor *et al.* 2014, Siskey 2015). To incorporate stock composition into the input data for the 2014 assessments, we assumed the following for the western Atlantic fisheries:

- 100% western-origin (0% eastern-origin) fish in Gulf of St. Lawrence and Gulf of Mexico fisheries;
- 100% western-origin (0% eastern-origin) fish for early year classes (up to the 1974 year class) in southwest Nova Scotia and US Rod and Reel fisheries;
- 51% western-origin (49% eastern-origin) for more recent year classes (after the 1974 year class) in southwest Nova Scotia and US Rod and Reel fisheries since 1975 until 2010;
- 92% western-origin (8% eastern-origin) fish in southwest Nova Scotia and US Rod and Reel fisheries sampled since 2010; and
- 56% western-origin (44% eastern-origin) fish in the Japanese longline fishery in the central Atlantic (west of 45°).

We assumed the following for the eastern Atlantic fisheries:

- 15.1% western-origin (84.9% eastern-origin) fish in the Japanese longline fishery in the northeast Atlantic (east of 45°);
- 6% western-origin (94% eastern-origin) fish in the Moroccan/Spanish trap fisheries; and

- 0% western-origin (100% eastern origin) fish in all other eastern Atlantic fisheries.

The 2014 eastern assessment was revised by removing the proportion of western-origin fish from catch-at-age, partial catch-at-age (i.e., catch-at-age by fleet), and CPUE, as well as adding eastern-origin fish caught in western fisheries to the catch-at-age. The eastern assessment included year classes 1 to 10+ for the time period 1950 to 2013.

Catch-at-age of eastern-origin fish was derived from 2014 assessment input data and stock composition estimates. Catch-at-age of eastern-origin fish ($C_{eo,t,a}$) was calculated as

$$1) \quad C_{eo,t,a} = C_{ef,t,a} - \sum_f (C_{ef,t,a}(P_{f,t,a})) + \sum_f (C_{wf,t,a}(1 - P_f)),$$

which is equivalent to deriving catch-at-age from all fisheries that caught eastern-origin fish:

$$2) \quad C_{eo,t,a} = \sum_f (C_{f,t,a}(1 - P_{f,t,a})),$$

where ef is eastern fisheries, wf is western fisheries, and P is proportion of western-origin fish by fishery (f), across years (t), and age classes (a).

CPUE of mixed stocks (U_{ms}) was adjusted downward to derive CPUE of eastern-origin fish ($U_{eo,t,f}$) for each fishery over time, using proportion of eastern-origin fish for catch-at-age and weight-at-age ($w_{t,a}$):

$$3) \quad U_{eo,t,f} = U_{ms,t} \frac{\sum_a (1 - P_{f,t,a}) C_{f,t,a} w_{t,a}}{\sum_a C_{f,t,a} w_{t,a}}.$$

The 2014 western assessment was revised by removing the proportion of eastern-origin fish from catch-at-age, partial catch-at-age (i.e., catch-at-age by fleet), and CPUE, as well as adding western-origin fish caught in eastern fisheries to the catch-at-age. The western assessment included year classes 1 to 16+ for the time period 1970 to 2013.

Catch-at-age of western-origin fish was derived from 2014 assessment input data and stock composition estimates. Catch-at-age of western-origin fish ($C_{wo,t,a}$) was calculated as

$$4) \quad C_{wo,t,a} = C_{wf,t,a} - \sum_f (C_{wf,t,a}(1 - P_{f,t,a})) + \sum_f (C_{ef,t,a}(P_{f,t,a})),$$

which is equivalent to deriving catch-at-age from all fisheries that caught western-origin fish:

$$5) \quad C_{wo,t,a} = \sum_f (C_{f,t,a}(P_{f,t,a})).$$

CPUE of mixed stocks ($U_{ms,t}$) over time was adjusted downward to derive CPUE of western-origin fish ($U_{wo,t,f}$) for each fishery, using proportion of western-origin fish for catch-at-age and weight-at-age ($w_{t,a}$):

$$6) \quad U_{wo,t,f} = U_{ms,t} \frac{\sum_a P_{f,t,a} C_{f,t,a} w_{t,a}}{\sum_a C_{f,t,a} w_{t,a}}.$$

The revised catch-at-age, partial catch-at-age, and CPUE for both the eastern- and western-origin input datasets were assessed separately with calibrated virtual population analysis (VPA) using the VPA-2BOX program (Version 3.0; Porch 1995, 2003) maintaining all settings from the respective 2014 assessments (ICCAT 2014).

3. Results

General patterns in catch-at-age of eastern-origin fish were nearly identical to the mixed stock catch-at-age from eastern Atlantic fisheries (**Figure 1**). General patterns in catch-at-age of western-origin fish were similar to the mixed stock catch-at-age from western Atlantic fisheries, except that catches of old fish (age-16+) in the 1970s and young fish from the late 1980s to the 2000s were less in the western-origin catch-at-age (**Figure 2**).

CPUE of eastern-origin fish was approximately the same as the eastern mixed stock (**Figure 3**). CPUE trends were identical for mixed stock and eastern-origin fish, but CPUE values were lower for eastern-origin fish in the northeast Atlantic Japanese longline fishery. CPUE of western-origin fish was less than that of western mixed stocks (**Figure 4**). CPUE trends were identical for western fisheries that were assumed to have constant stock composition (e.g., Japanese longline in the central Atlantic), but trends were different for fisheries that had assumed changes in stock composition (e.g., US rod and reel). The VPA-2BOX input file for the eastern-origin VPA is reported in Appendix A, the western-origin VPA is reported in Appendix B, and the input file for the western Atlantic fishery VPA is reported by ICCAT (2014).

Estimates of stock size and fishing mortality from the VPAs of both eastern- and western-origin Atlantic bluefin were generally similar to the ICCAT (2014) estimates based on eastern and western Atlantic mixed-stock fisheries, respectively (**Figures 5 and 6**). However, estimates of SSB for the 1970s were approximately 14% less, and estimates of spawning stock biomass (SSB) for 2000-2013 were approximately 11% greater from the western-origin VPA, as compared to the ICCAT (2014) mixed-stock VPA of western Atlantic fisheries. The stock-recruitment relationships are also similar (**Figures 7 and 8**), but the western-origin VPA suggests that there were some intermediate-sized year classes between the high recruitment of the 1970s and the low subsequent recruitment (**Figure 8**). The VPA-2BOX output file for the eastern-origin VPA is reported in Appendix C, and for the western-origin VPA is reported in Appendix D, and the output file for the western Atlantic fishery VPA is reported by ICCAT (2014).

4. Discussion

We present a relatively simple alternative to assessment of mixed-stock Atlantic bluefin tuna fisheries as a demonstration of one alternative for considering stock composition and assessing the eastern- and western-origin stocks. The population-of-origin VPAs revealed some practical aspects of incorporating stock composition in the Atlantic bluefin stock assessment. Our approach uses information on stock composition in a deterministic way (i.e., assuming no error in the estimates of stock composition). Our approach also maintains the VPA assumption of no error in the estimates of catch-at-age, which are derived from cohort slicing. Research on otolith chemistry has increased our understanding of stock mixing, with estimates of stock composition. However, assuming no error in the catch-at-age requires greater representativeness than the existing information can support.

Ideally, stock composition should be sampled for each fishery every year to estimate stock composition. In lieu of annual samples by fishery, the data protocol we used produces the same catch-at-age as if we were using pooled-year age-length-stock keys. Our approach is consistent with the sensitivity analysis using a pooled-year age-length key in the ICCAT (2014) and is an advancement from the separate VPAs of eastern and western Atlantic fisheries. However, sampling was somewhat opportunistic, and there are spatiotemporal gaps in sampling, resulting in subjective decisions for stock composition assumptions. For example, exploratory analysis of stock composition samples may be needed to determine the most likely periods of homogeneous stock composition as well as the nature of shifting stock composition.

Operational consideration of stock mixing would apply stock composition estimates at the data preparation stage of the stock assessment process (e.g., derivation of fishery catch-at-age) to avoid the complex derivation of catch-at-age and CPUE from mixed stock estimates.

These results should be considered to be preliminary. The 2014 VPA settings were maintained to facilitate comparison and to evaluate sensitivity to revised stock-based input data. The alternative analysis based on population-of-origin fish could be improved by further modeling to improve model fit and performance. For example, estimates of recent stock size are based on mixing estimates from Moroccan and eastern central Atlantic fisheries. However, the estimated western stock contribution to the Moroccan fishery was 6% with a relatively large standard error (5%). The eastern central Atlantic estimate of western stock contribution was moderate (mean=15%) but was unstable between years: 39% and 2% for 2010 and 2011, respectively (Rooker *et al.* 2014). Because model outputs were somewhat sensitive to small contributions of the western stock to eastern fisheries, errors in these estimates can lead to biased results. The ICCAT (2014) VPA assessment results are also sensitive to abundance indices. For example, large increases in Canadian abundance indices in the 2014 assessment strongly influenced the most recent trends in SSB (ICCAT 2014). The deterministic application of stock composition estimates and changes in stock composition to CPUE influences the recent trends (e.g., producing more of an increase in catch rates from US Rod and Reel and southwest Nova Scotia). ICCAT (2014) concluded that “*the outputs of the VPA remain highly unstable due to poor fits and such outputs need to be confirmed by further analyses that would use other modeling approaches than the current VPA.*” Further investigations into model

diagnostics of the eastern Atlantic Bluefin tuna assessment suggest that the 2014 assessment had problems with fitting data, model convergence, and retrospective patterns, and these problems can be addressed using alternative configurations (Walter 2017, Zarrad *et al.* 2017). The alternative configuration of VPA-2BOX presents a considerably different perspective of stock development. Zarrad *et al.* (2017) conclude that the method of estimating fishing mortality for the oldest age ('F-ratio') should be estimated for 5-year blocks rather than assumed as fixed values. This method provides better fit and retrospective consistency using the available data and also provides a more robust configuration for automated application to simulated pseudo-data.

Alternative approaches to incorporating stock composition in the Atlantic bluefin stock assessments would allow for error in the catch-at-age and the available stock composition information. For example, the VPA-2BOX 'overlap model' of eastern and western Atlantic fisheries accounts for stock mixing and movement by using fishery, survey, tagging and stock composition data to estimate transfer rates (ICCAT 2008). Recent developments in statistical catch at length (Butterworth & Rademeyer 2015) and other integrated models (Taylor *et al.* 2011) offer more advanced approaches for considering stock composition data derived from multiple approaches. Current and alternative approaches to stock assessment of Atlantic bluefin tuna should be simulation tested to evaluate performance for informing fishery management decisions and achieving management objectives.

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References

- Busawon, D.S., J.D. Neilson, I. Andrushchenko, A. Hanke, D.H. Secor, and G. Melvin. 2014. Evaluation of Canadian sampling program for bluefin tuna, assessment of length-weight conversions, and results of natal origin studies 2011-2012. *Collect. Vol. Sci. Pap. ICCAT* 70(1): 202-219.
- Butterworth, D.S. and Rademeyer, R.A. 2015. An Updated Statistical Catch-At-Length Assessment for Eastern Atlantic Bluefin Tuna. *Collect. Vol. Sci. Pap. ICCAT* 71(4): 1690-1709.
- Fraile, I., Arrizabalaga, H., and Rooker, J.R. 2014. Origin of Atlantic bluefin tuna (*Thunnus thynnus*) in the Bay of Biscay. *ICES J. Marine Science* 73: 625-634.
- Hanke, A., D. Busawon, and D.H. Secor. 2016. Estimates of stock origin for bluefin tuna caught in Western Atlantic fisheries from 1975 to 2013. *Collect. Vol. Sci. Pap. ICCAT* 72(6): 1376-1393.
- ICCAT. 2009. Report of the 2008 Atlantic Bluefin Tuna Stock Assessment Session. Madrid, Spain–June 23 to July 4, 2008. *Collect. Vol. Sci. Pap. ICCAT* 64(1): 1-352.
- ICCAT. 2014. Report of the 2014 Atlantic Bluefin Tuna Stock Assessment Session (Madrid, Spain – September 22 to 27, 2014). SCRS Plenary Sessions 9 TO 21.
- Kerr, L.A., Cadrin, S. X., Secor, D. H. Nathan G. Taylor. 2016. Modeling the implications of stock mixing and life history uncertainty of Atlantic bluefin tuna. *Canadian Journal of Fisheries and Aquatic Sciences*, DOI: 10.1139/cjfas-2016-0067.
- Mather, F.J., Mason, J.M., and Jones, A.C. 1995. Historical Document: Life history and fisheries of Atlantic bluefin tuna. NOAA, Technical Memorandum. NMFS-SEFSC-370. Available from:<http://ia802605.us.archive.org/0/items/historicaldocume00math/historicaldocume00math.pdf>
- Porch, C.E. 1995. A two-area VPA with discrete mixing: Can we discriminate between mixing rates given the present condition of the data? *ICCAT Coll. Vol. Sci. Pap.* 44(1): 198-208.
- Porch C.E. 2003. VPA-2BOX Version 3.01 User's guide. SEFSC Sustainable Fisheries Division Contribution SFD-01/02-151.
- Rooker, J.R., Arrizabalaga, H., Fraile, I., Secor, D.H., Dettman, D.L., Abid, N., Addis, P., Deguara, S., Saadet Karakulak, F., Kimoto, A., Sakai, O., Macías, D. and Neves Santos, M. 2014. Crossing the line: migratory and homing behaviors of Atlantic bluefin tuna. *Marine Ecology Progress Series* 504:265-276.
- Rooker, J.R., Secor, D.H., DeMetrio, G., Kaufman, A.J., Rios, A.B., Ticina, V., and Rodriguez-Marin, E. 2008. Evidence of trans-Atlantic movement and natal homing in bluefin tuna from stable isotopes in otoliths. *Mar. Ecol. Prog. Ser.* 368: 231–239.
- Schloesser, R.W., Neilson, J.D., Secor, D.H. and Rooker, J.R. 2010. Natal origin of Atlantic bluefin tuna (*Thunnus thynnus*) from the Gulf of St. Lawrence based on otolith $\delta^{13}\text{C}$ and $\delta^{18}\text{O}$. *Canadian Journal of Fisheries and Aquatic Sciences* 67:563–569.
- Secor, D.H., Gahagan, B.I., Siskey, M., Wingate R.A., and J.R. Rooker. 2014. Depressed resilience of bluefin tuna in the Western Atlantic and age truncation. *Conservation Biology* 29 (2):400-408.
- Siskey, M.R., Wilberg, M.J., Allman, R.J., Barnett, B.K. and Secor D.H. 2016. Forty years of fishing: Changes in age structure and stock mixing in Northwestern Atlantic bluefin tuna (*Thunnus thynnus*) associated with size-selective and long-term exploitation. *ICES Journal of Marine Science*, 73 (10): 2518-2528.
- Taylor N., McAllister, M., Lawson, G., Carruthers, T. and Block, B. 2011. Atlantic Bluefin Tuna: A Novel Multistock Spatial Model for Assessing Population Biomass. *PLoS ONE* 6(12):e27693.doi:10.1371/journal.pone.0027693.

Walter, J. (2017). Proposals for Atlantic bluefin tuna stock assessment models for 2017. ICCAT Document SCRS/2017/036 (withdrawn).

Zarrad R., Walter, J., and Laretta, M. 2017. VPA-2BOX model diagnostics used in the 2014 assessment of eastern Atlantic bluefin tuna. ICCAT SCRS/2016/037.

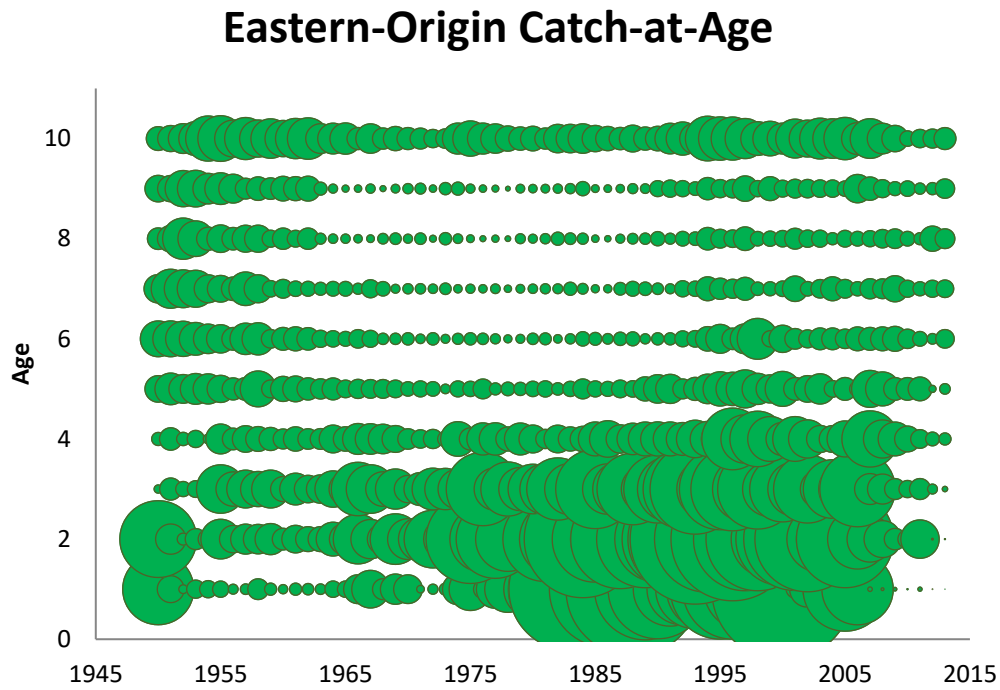
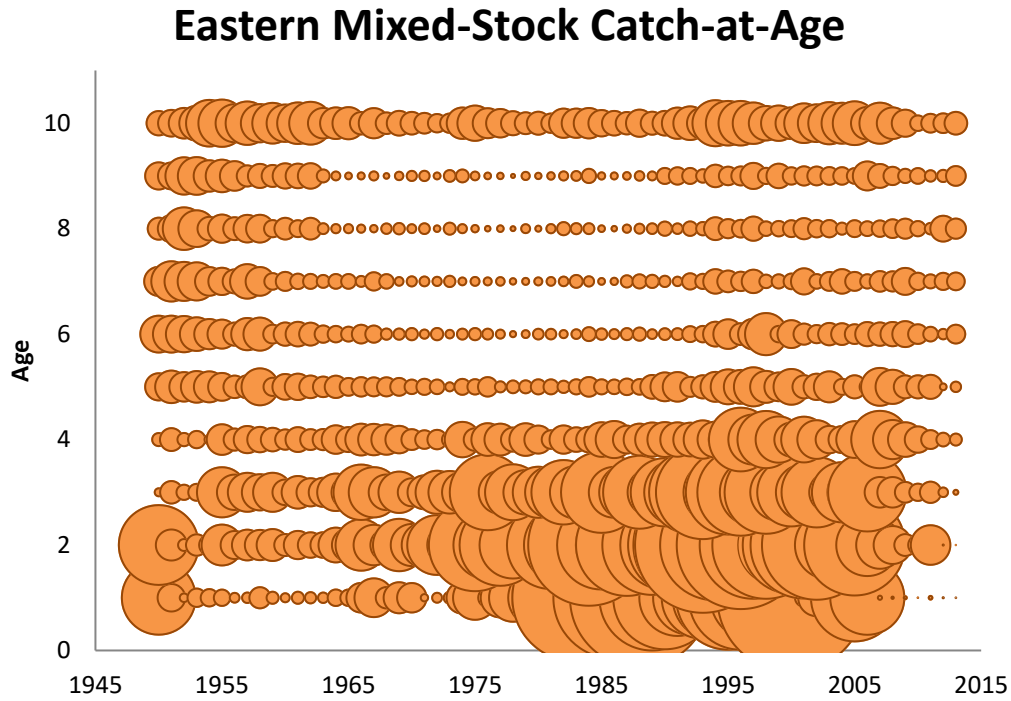


Figure 1. Catch at age of bluefin tuna from mixed-stock fisheries in the eastern Atlantic and of eastern-origin Atlantic bluefin tuna (circle size is scaled similarly for both).

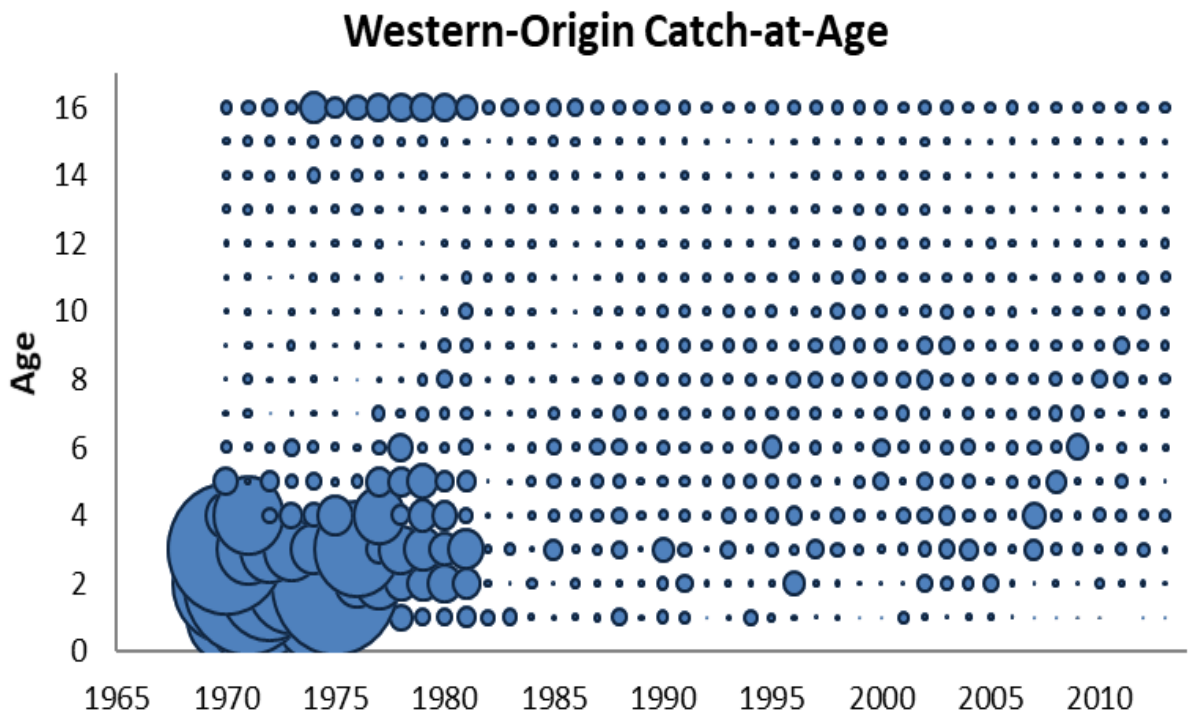
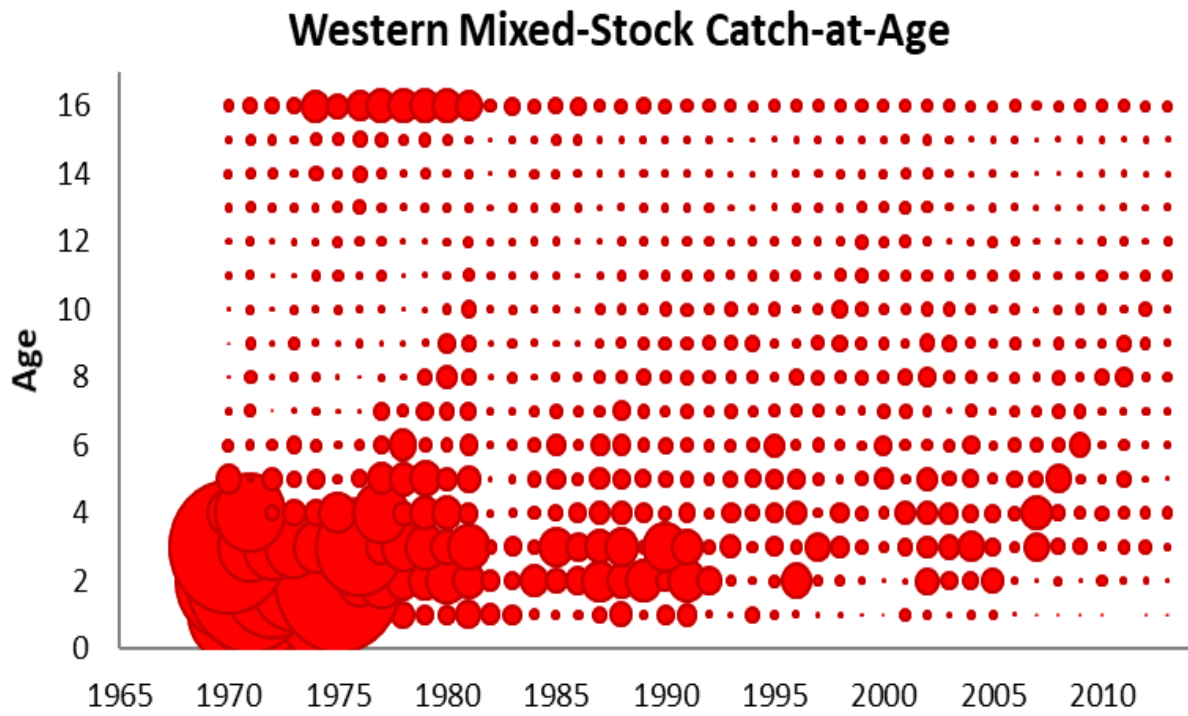


Figure 2. Catch at age of bluefin tuna from mixed-stock fisheries in the western Atlantic and of western-origin Atlantic bluefin tuna.

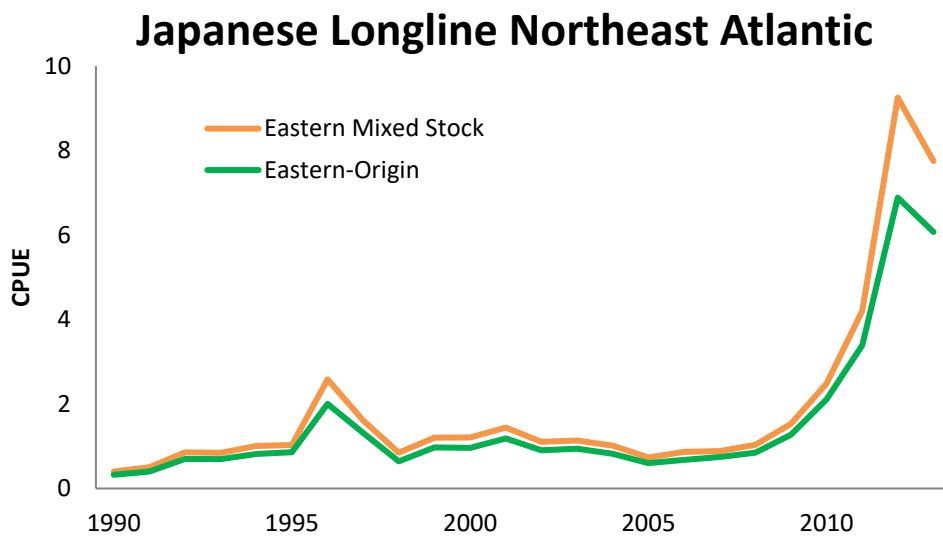
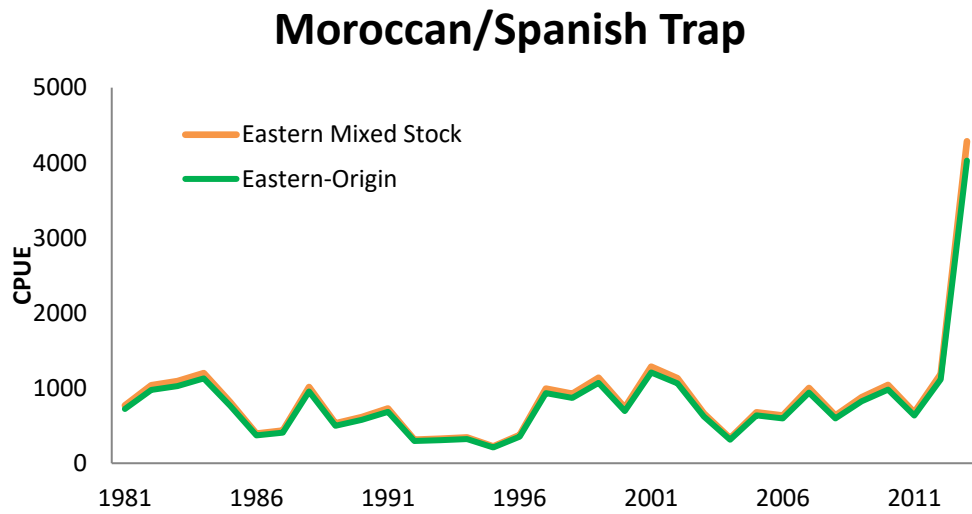


Figure 3. CPUE of bluefin tuna from mixed-stock fisheries in the eastern Atlantic and of eastern-origin bluefin tuna.

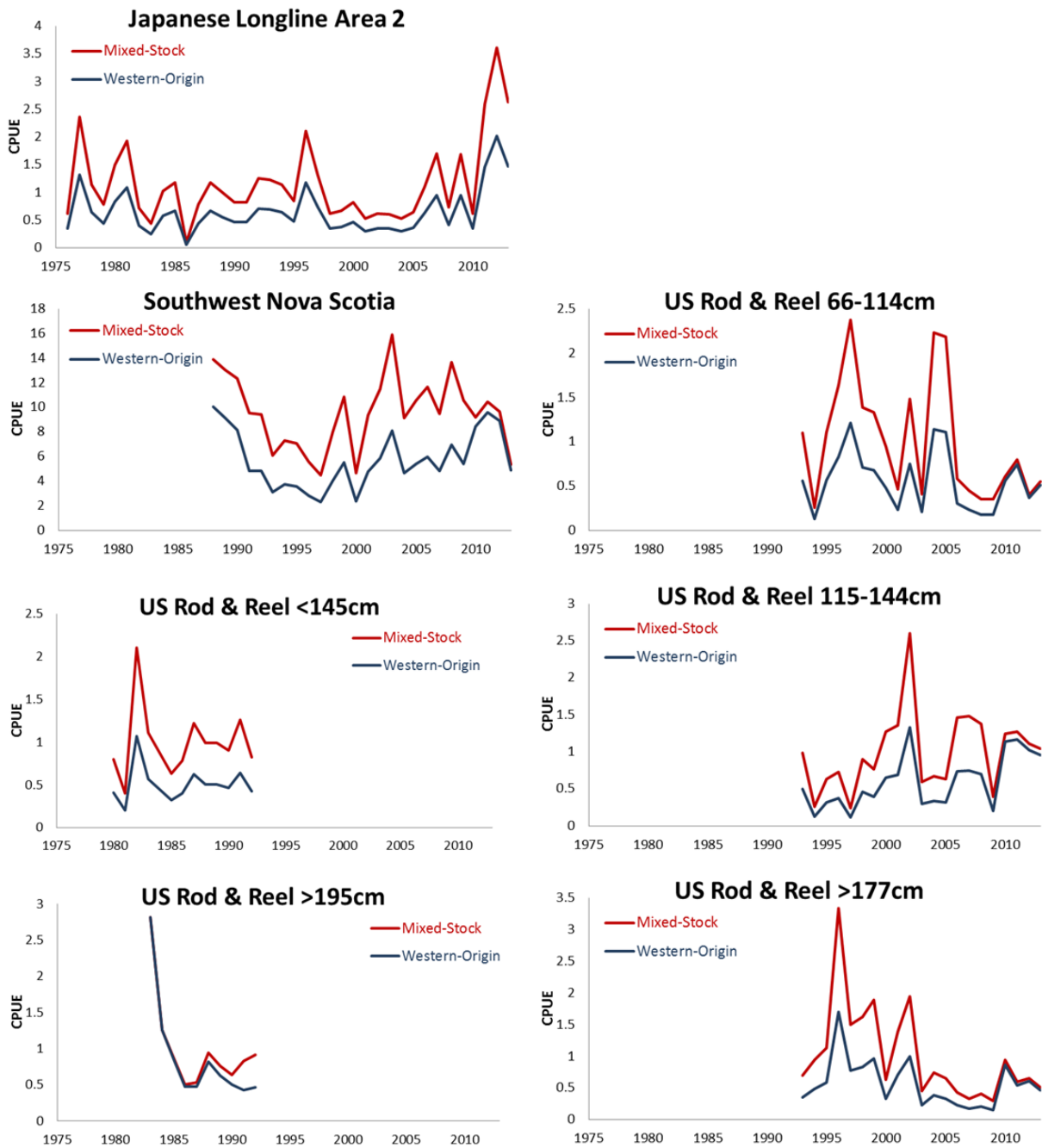


Figure 4. CPUE of bluefin tuna from mixed-stock fisheries in the western Atlantic and of western-origin bluefin tuna.

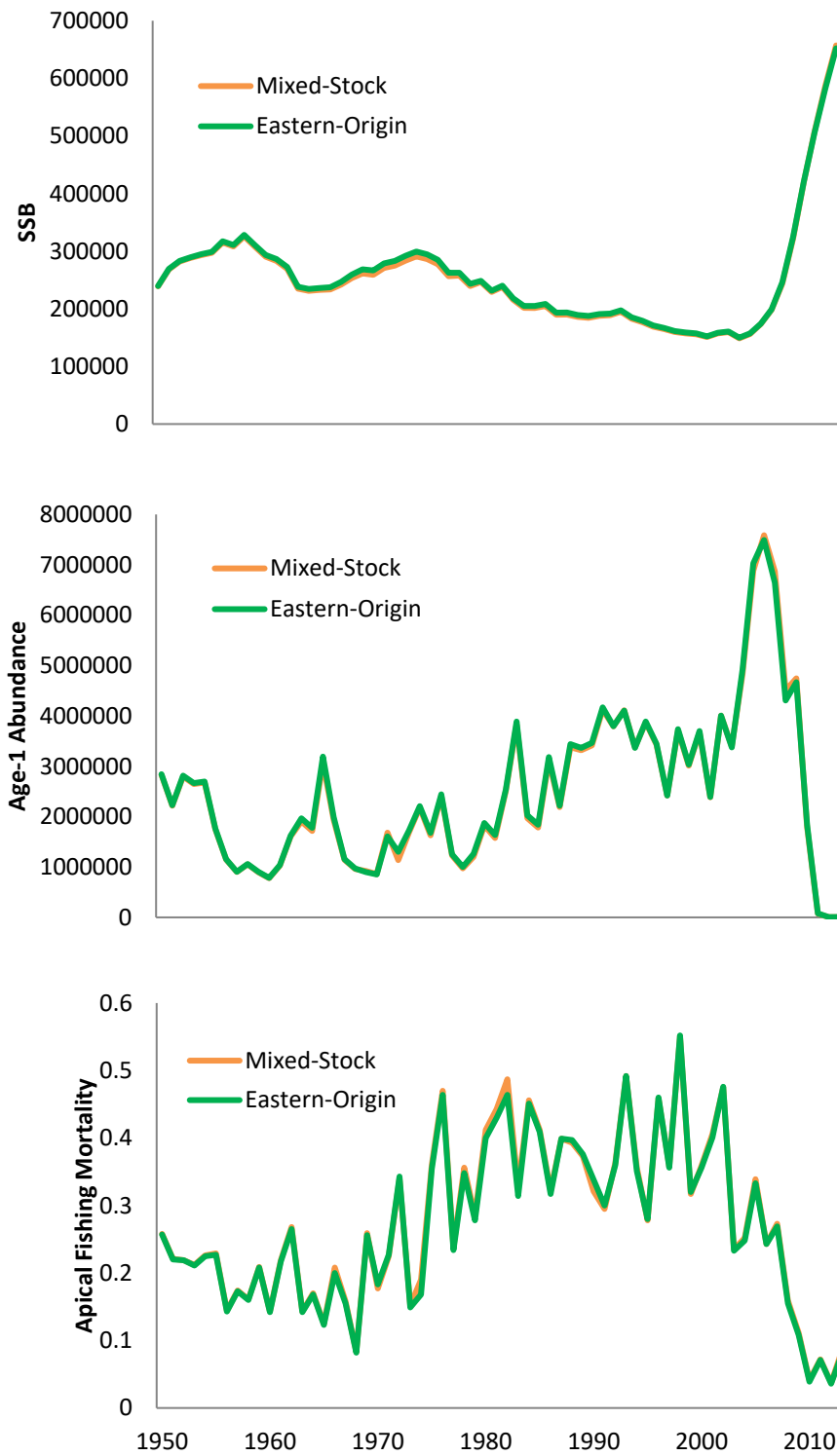


Figure 5. Estimates of eastern Atlantic bluefin tuna spawning biomass (SSB), age-1 recruitment, and apical fishing mortality from the ICCAT (2014) VPA of eastern Atlantic mixed-stock fisheries and the VPA of eastern-origin Atlantic bluefin.

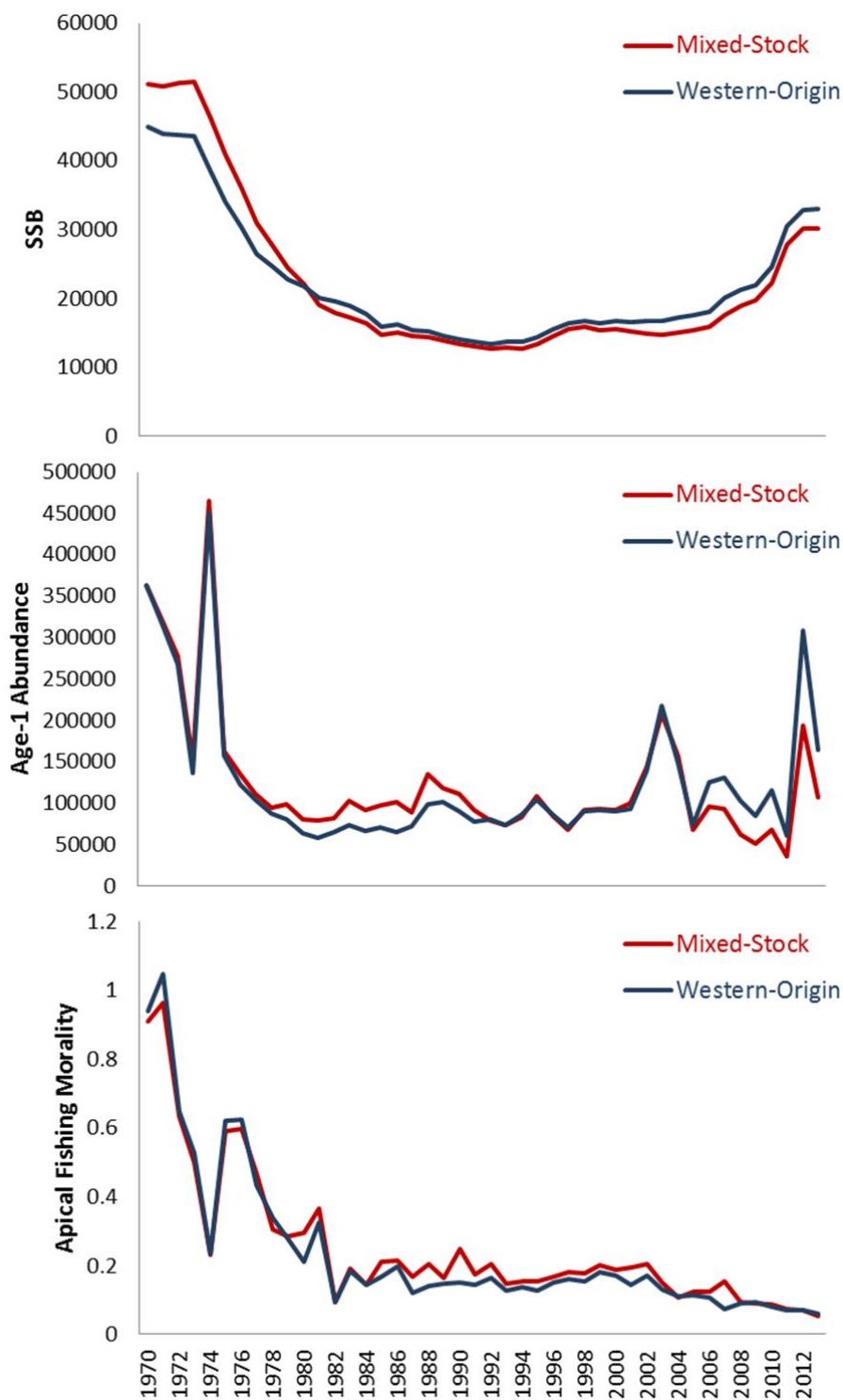
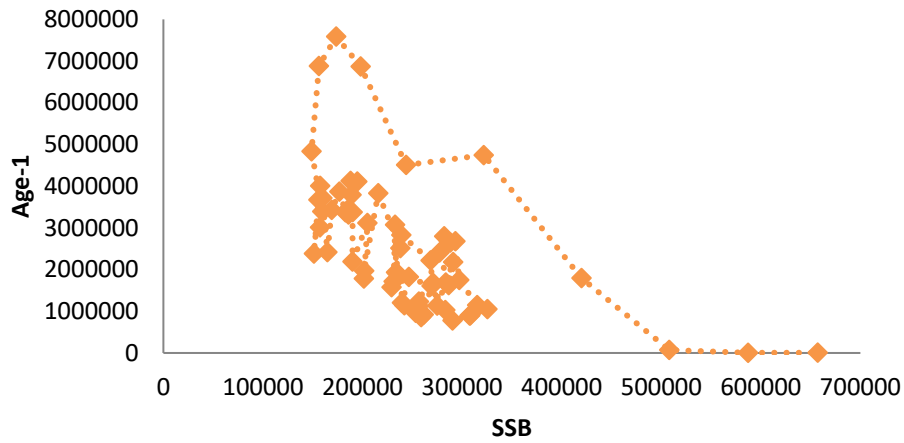


Figure 6. Estimates of western Atlantic bluefin tuna spawning biomass (SSB), age-1 recruitment and apical fishing mortality from the ICCAT (2014) VPA of western Atlantic mixed-stock fisheries and the VPA of western-origin Atlantic bluefin.

Eastern Mixed-Stock



Eastern-Origin

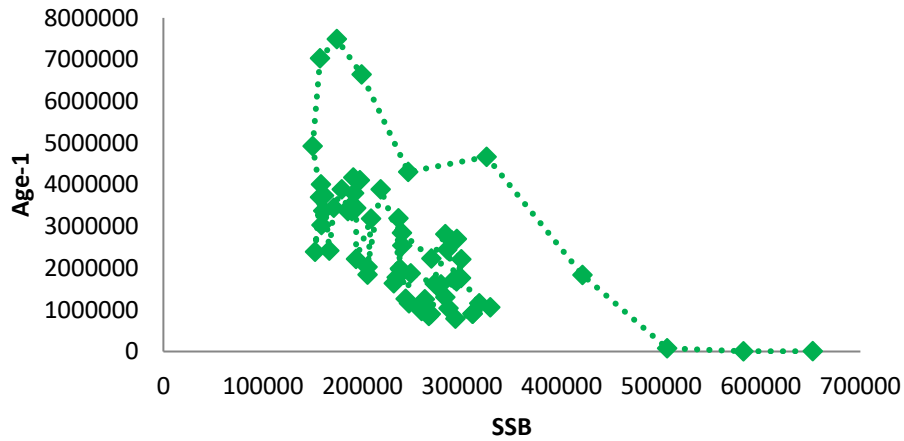


Figure 7. Estimates of eastern Atlantic bluefin tuna spawning biomass (SSB) and age-1 recruitment from the ICCAT (2014) VPA of eastern Atlantic mixed-stock fisheries and the VPA of eastern-origin Atlantic bluefin.

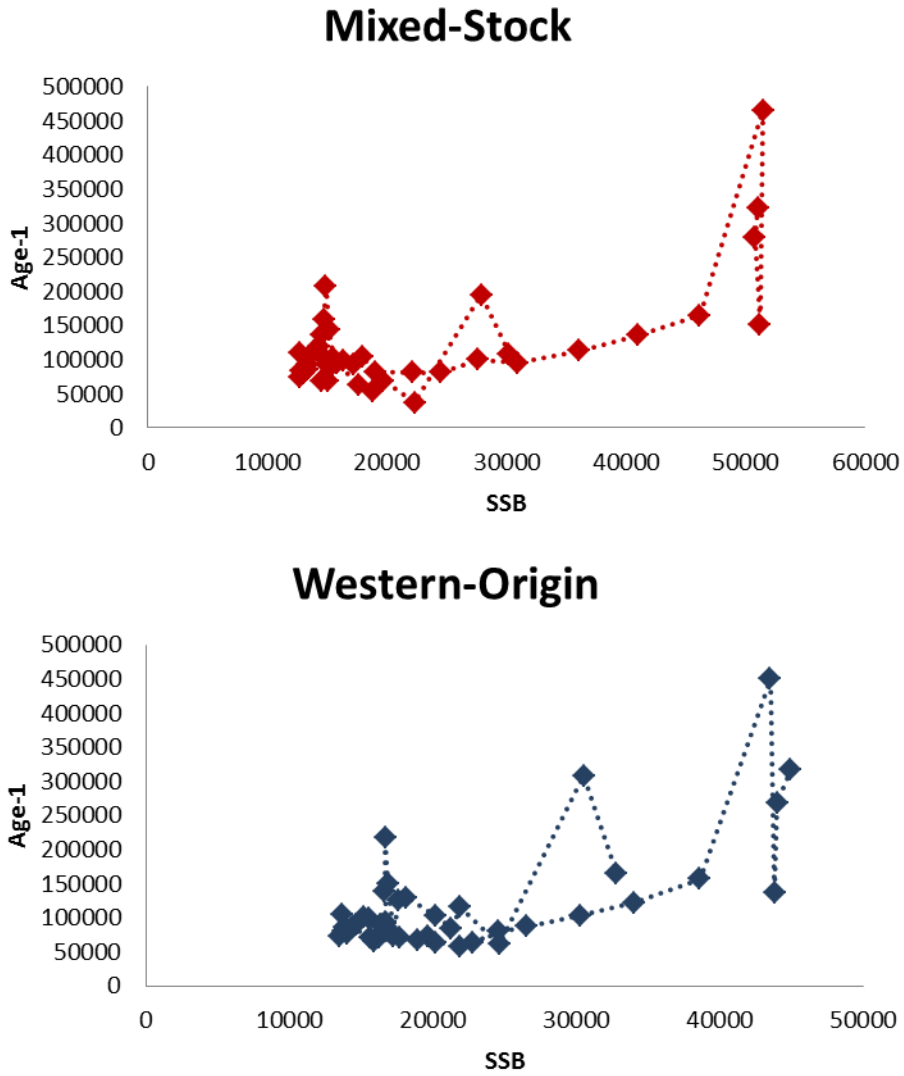


Figure 8. Estimates of western Atlantic bluefin tuna spawning biomass (SSB) and age-1 recruitment from the ICCAT (2014) VPA of western Atlantic mixed-stock fisheries and the VPA of western-origin Atlantic bluefin.

Appendix A. VPA2Box input file for eastern-origin Atlantic bluefin tuna.

```
#####
# DATA FILE FOR PROGRAM VPA-2BOX, Version 3.01"
#
# 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.
#
# This data file has been generated automatically from the writedVPA R function on Thu Jul 31 18:48:33 2014
#####
# DATA FILE FOR Continuity RUN XX
1950 2013
1 10 10 10
#####
# BEGIN INPUT FOR ZONE/STOCK 1
#####
7
6
0 0 0 0.5 1 1 1 1 1 1
# 50 CHARACTER TITLE WITHIN SINGLE QUOTES -----] PDF OF CATCH
# | | SIGMA CATCH
'BFTE test' 0 0.1
#-----
# NOW ENTER THE CATCH-AT-AGE DATA. ROW=YEAR, COLUMN=AGE
#-----
#YEAR 1 2 3 4 5 6 7 8 9 10 + <--AGE
1950 227221 264498 3926 8984 33578 59513 38101 22709 33515 27330
1951 34493 43234 23622 24377 47004 59748 70418 33534 32856 32403
1952 4421 7682 11665 9197 38989 57831 66408 78472 60929 41914
1953 16403 21593 14130 14728 44604 50110 63493 58955 62224 53658
1954 14798 19900 2612 5405 42788 41008 37064 26001 43927 93313
1955 13292 72607 107287 41942 35018 37857 33831 35982 47166 95779
1956 5455 35668 55304 22788 23589 24829 26572 24377 39251 63567
1957 6090 42315 66203 33614 24986 46228 52604 34525 21086 81420
1958 21161 41049 57634 29588 59760 48488 37140 34886 26780 63842
1959 7803 45504 66430 25744 16179 17160 13577 14502 22619 71987
1960 4765 22822 30071 19572 30203 25135 17431 22141 29166 61076
1961 7810 36086 47258 28390 31705 27849 12017 14114 27817 74816
1962 6947 29693 35821 20586 23845 24378 11403 22140 29668 79161
1963 6052 29894 38038 21146 20055 14641 8764 6465 8772 41784
1964 13483 53407 61334 36574 23306 13436 11044 4904 4604 44458
1965 13433 48963 51094 28637 15434 11246 11086 4832 2980 45956
1966 39435 112262 130124 44909 18096 16945 6580 4015 3189 23646
1967 65607 71403 107837 43983 17335 14462 16219 3449 4776 40828
1968 21693 46196 55828 41113 17492 6842 10761 6080 2258 21866
1969 43105 116781 74227 34278 15471 6882 4455 7075 4268 28148
1970 38988 76923 35680 20582 10727 7999 5719 4622 5684 23504
1971 3457 89238 50874 16708 12952 4997 5844 7048 6421 21355
1972 5583 150816 80333 18139 10897 8052 4921 2883 3198 16525
1973 7779 87383 78907 12439 5064 4457 7040 7977 7908 18651
1974 45025 145399 73298 55906 12916 6598 3965 5052 8922 45116
1975 83784 352036 82506 24088 11945 7941 4672 3510 4624 57925
1976 17578 197403 242409 48551 19288 6924 3973 2232 3218 44955
1977 67445 276659 83337 49152 7658 5520 5108 3069 2836 40618
1978 98606 188251 133215 27946 9619 3717 3169 2009 1522 30424
1979 15989 46498 86104 47706 9093 4468 4251 5433 4242 26050
1980 153777 143835 112550 36720 12040 6920 4889 4495 4051 29131
1981 93860 322750 118504 18252 13255 7499 5567 5734 4211 21799
1982 436536 264548 175249 36209 8108 4112 5334 9039 4765 38264
1983 667675 199304 120178 28017 11818 5679 8987 7130 5669 38343
1984 163390 608977 81861 30688 19491 10670 6198 6647 10408 41111
1985 126807 332413 281545 53870 12998 8655 3747 3212 3476 32963
1986 606104 250245 116139 62112 11474 6094 3773 2405 3356 28222
1987 235380 437730 138079 38141 15505 9283 8368 4512 3975 24088
1988 789724 209643 230515 46687 13608 10129 11308 6105 5533 34138
1989 457614 421723 105084 53572 27992 5610 9371 6830 5144 25793
1990 438405 330784 208545 54609 38434 7843 7029 10445 12928 28911
1991 245891 413234 194319 53970 40096 7773 5477 6489 14768 44066
1992 229807 533589 281606 50589 19410 12814 13148 10984 13138 51258
1993 280586 748800 364005 65357 25730 13792 11933 9416 9583 45408
1994 304673 502642 172490 57523 41123 28693 27522 24466 23954 91563
1995 443247 323439 298047 66466 54804 39457 21972 17459 16376 86403
1996 444500 674473 313090 172424 52030 22390 17999 15335 16956 85249
1997 306627 474758 192384 107761 66842 42101 25424 26856 30922 74299
1998 345708 474934 287251 140093 45576 77041 9342 10759 13189 53223
1999 290424 272916 138257 92460 37501 13540 10149 11803 27580 55702
2000 889625 390123 195690 51727 56967 35312 12233 13612 14227 44786
2001 16011 470134 135586 92119 25310 20824 30974 21312 17459 69831
2002 60090 493957 208706 67648 33719 16090 10787 14850 16829 63012
2003 31090 199422 72188 34819 43074 23102 16967 14510 15244 76792
2004 158931 235163 156075 34092 14017 23017 27712 7767 14972 72302
2005 315924 421387 126753 60459 25156 18672 17261 14031 12052 82460
2006 228963 162758 256057 45682 12962 27348 10449 11083 38068 47879
2007 1510 97098 45024 143564 63458 25262 20004 13110 26179 72856
```


2008	763	63445	42721	67607	53833	27504	19349	16841	16151	44038
2009	1039	22607	21394	53274	24850	29896	32602	18877	10073	33106
2010	245	18312	14740	31726	24850	18430	14456	11025	12202	12209
2011	1287	68205	21512	17312	27201	11107	10234	7703	6782	16670
2012	15	421	5418	9828	3028	6135	14539	30435	7814	17817
2013	43	230	1901	7758	6070	17064	15337	19227	18469	23406

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#=====

NOW ENTER IN THE ABUNDANCE INDEX SPECIFICATIONS

#=====

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

| | UNITS (1 = numbers, 2 = biomass)"

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

| | | | TIMING (-1=average, +integer = number of months elapsed)"

| | | | | FIRST AGE LAST AGE TITLE (IN SINGLE QUOTES)

1	1	1	4	-1	6	10	'ESPMarTrap'
2	1	1	4	-1	6	10	'JLL EastMed'
3	1	2	1	-1	10	10	'Nor PS'
4	1	1	4	1	4	10	'JP LL NEA'
5	1	2	4	-1	5	6	'SP BB1'
6	1	2	4	-1	2	3	'SP BB2'
7	1	2	4	-1	3	6	'SP BB3'

-1
#=====

NOW ENTER IN THE INDICES OF ABUNDANCE

#=====

#INDEX

#ID	YEAR	VALUE	CV (or STD ERROR)	
1	1981	722.26	57.19	Mor_Spanish_trap
1	1982	975.83	34.63	
1	1983	1026.53	34.63	
1	1984	1128.25	34.63	
1	1985	765.59	34.64	
1	1986	370.67	28.05	
1	1987	407.52	28.05	
1	1988	953.69	28.03	
1	1989	499.56	26.09	
1	1990	577.51	22.6	
1	1991	684.19	22.59	
1	1992	295.11	22.63	
1	1993	305.84	22.62	
1	1994	321.39	22.62	
1	1995	210.02	22.65	
1	1996	352.71	24.62	
1	1997	932.87	24.59	
1	1998	869.63	24.59	
1	1999	1069.20	24.59	
1	2000	694.88	22.59	
1	2001	1207.54	22.58	
1	2002	1062.59	22.58	
1	2003	622.90	23.68	
1	2004	312.42	22.62	
1	2005	636.75	22.59	
1	2006	595.90	22.6	
1	2007	940.56	22.59	
1	2008	596.13	22.6	
1	2009	824.11	22.59	
1	2010	979.71	23.66	
1	2011	634.47	22.59	
1	2012	1116.49	23.66	
1	2013	4028.43	33.12	
2	1975	1.9	0.15	JLL EastMed
2	1976	2.15	0.12	
2	1977	3.53	0.14	
2	1978	1.5	0.15	
2	1979	2.7	0.14	
2	1980	1.69	0.16	
2	1981	1.63	0.17	
2	1982	3.32	0.13	
2	1983	2.12	0.13	
2	1984	1.62	0.12	
2	1985	1.75	0.15	
2	1986	1.32	0.14	
2	1987	2.16	0.13	
2	1988	1.35	0.14	
2	1989	1.05	0.16	
2	1990	1.41	0.14	
2	1991	1.21	0.13	
2	1992	1.03	0.14	
2	1993	1.04	0.14	
2	1994	1.12	0.16	
2	1995	1.42	0.15	
2	1996	0.5	0.22	
2	1997	0.53	0.21	

2	1998	0.71	0.17		
2	1999	0.64	0.22		
2	2000	0.74	0.2		
2	2001	0.96	0.17		
2	2002	2.05	0.15		
2	2003	1.7	0.13		
2	2004	0.82	0.18		
2	2005	0.88	0.15		
2	2006	1.91	0.15		
2	2007	0.94	0.19		
2	2008	1.22	0.17		
2	2009	1.04	0.24		
3	1955	36.1987973		1	Nor PS
3	1956	21.2539	1		
3	1957	28.60695556		1	
3	1958	24.125875	1		
3	1959	32.4077	1		
3	1960	46.83111111		1	
3	1961	51.83612121		1	
3	1962	64.66881481		1	
3	1963	1.6705	1		
3	1964	33.9777907		1	
3	1965	69.60416667		1	
3	1966	35.70464286		1	
3	1967	61.0569697		1	
3	1968	23.5315625		1	
3	1969	28.05583333		1	
3	1970	42.75545455		1	
3	1971	43.51866667		1	
3	1972	43.0475	1		
3	1973	42.148	1		
3	1974	45.71894737		1	
3	1975	38	1		
3	1976	21.16	1		
3	1977	42.44444444		1	
3	1978	12.27777778		1	
3	1979	3.75	1		
3	1980	20.14285714		1	
4	1990	0.324515041		0.317635755	JPLL_NEATL
4	1991	0.399148236		0.270789323	
4	1992	0.699811762		0.164387776	
4	1993	0.69531158		0.135881315	
4	1994	0.816950803		0.15914272	
4	1995	0.857875119		0.13447595	
4	1996	2.002727681		0.130074821	
4	1997	1.311614469		0.12821602	
4	1998	0.64260395		0.159994086	
4	1999	0.974367546		0.147085854	
4	2000	0.960959566		0.116077112	
4	2001	1.183748393		0.121674623	
4	2002	0.903663042		0.125738824	
4	2003	0.941879081		0.142368093	
4	2004	0.820509805		0.1175805	
4	2005	0.601062924		0.115172607	
4	2006	0.676692578		0.114693829	
4	2007	0.744687386		0.115600036	
4	2008	0.849181485		0.115308148	
4	2009	1.273484827		0.114315627	
4	2010	2.11059653		0.129453792	
4	2011	3.389783985		0.167868272	
4	2012	6.885266597		0.214156923	
4	2013	6.07403021		0.176859917	
5	1952	179.22	0.425	SPBB1	
5	1953	184.74	0.53		
5	1954	226.46	0.414		
5	1955	187.01	0.423		
5	1956	470.53	0.431		
5	1957	315.05	0.411		
5	1958	252.25	0.409		
5	1959	506.79	0.412		
5	1960	485.16	0.425		
5	1961	327.29	0.413		
5	1962	180.12	0.462		
6	1963	312.09	493	SPBB2	
6	1964	457.4	415		
6	1965	228.91	0.41		
6	1966	349.1	421		
6	1967	345.89	414		
6	1968	447	422		
6	1969	610.62	401		

6	1970	594.66	431
6	1971	744.71	403
6	1972	525.63	413
6	1973	535.63	396
6	1974	245.39	439
6	1975	484.22	0.41
6	1976	483.96	414
6	1977	547.56	407
6	1978	705.26	412
6	1979	623.01	409
6	1980	634.81	446
6	1981	510.66	422
6	1982	503.78	418
6	1983	625.14	432
6	1984	331.71	449
6	1985	1125.74	407
6	1986	751.21	419
6	1987	1008.43	415
6	1988	1394.68	419
6	1989	1285.6	0.4
6	1990	986.51	407
6	1991	901.2	422
6	1992	695.16	427
6	1993	2093.55	403
6	1994	1007.03	419
6	1995	1235.91	405
6	1996	1739.29	398
6	1997	2246.41	404
6	1998	879.51	409
6	1999	339.77	436
6	2000	960.44	402
6	2001	704.49	447
6	2002	687.42	423
6	2003	444.91	482
6	2004	1210.46	417
6	2005	2383.57	0.4
6	2006	850.09	0.48
7	2007	1177.62	419
7	2008	2144.54	304
7	2009	955.29	305
7	2010	2109.08	309
7	2011	2762.62	306
7	2012	2216.18	390
7	2013	1571.64	445

SPBB3

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NOW ENTER IN THE VULNERABILITIES OR PARTIAL CATCHES FOR THE INDICES OF ABUNDANCE
#####

#INDEX	YEAR	AGE 1-10									
1	1970	7	16	4	8	46	132	465	900	2001	8542
1	1971	0	0	0	1	4	31	39	79	271	3115
1	1972	7	18	39	53	16	75	90	162	217	2003
1	1973	297	9	15	17	9	63	52	201	341	2697
1	1974	0	0	2	2	2	6	5	9	19	140
1	1975	15	37	0	0	8	0	0	15	55	1932
1	1976	0	0	0	0	0	0	0	15	17	2096
1	1977	8	19	0	0	4	0	64	117	152	2463
1	1978	0	0	0	0	0	10	34	167	195	1790
1	1979	0	0	0	0	81	176	226	343	556	2337
1	1980	232	0	0	0	39	126	483	270	254	2814
1	1981	0	0	0	0	174	831	1271	1713	570	2401
1	1982	0	0	0	3	162	565	2069	2044	2170	8323
1	1983	0	0	0	0	1	2	2	291	529	9209
1	1984	0	0	0	84	139	177	616	1231	3140	11774
1	1985	0	0	70	481	263	651	537	541	720	7958
1	1986	2476	12363	595	0	0	48	171	139	229	4871
1	1987	0	3	0	0	10	125	317	290	447	5586
1	1988	186	39	59	59	188	859	990	819	745	11631
1	1989	236	0	2	31	253	1062	1684	1912	1419	6159
1	1990	0	0	0	40	706	1527	3371	5075	6426	8741
1	1991	352	2259	4194	1641	1774	2361	1113	1446	2340	7068
1	1992	31	146	77	78	316	984	2022	1482	1434	5296
1	1993	8	27	21	9	25	99	164	420	894	7016
1	1994	3178	0	25	76	1740	2947	1606	795	802	7259
1	1995	0	0	2	7	98	42	89	279	1080	5179
1	1996	0	0	5	108	273	235	258	287	664	7287
1	1997	0	0	30	465	2092	2347	1491	2390	2607	15078
1	1998	0	0	2	42	298	1072	1490	1755	2953	12081
1	1999	0	0	9	30	104	496	659	1198	1310	12132
1	2000	0	0	0	72	602	649	1225	2382	2904	11961
1	2001	0	0	0	449	1180	1624	1987	3159	4414	14184
1	2002	0	0	0	6	77	201	599	1711	2364	13815
1	2003	0	0	0	5	255	564	654	1576	3363	7289
1	2004	0	0	0	0	62	164	182	451	1700	8912
1	2005	0	0	13	3	60	252	668	1340	1438	10953
1	2006	0	0	0	131	434	2054	2259	2779	1884	8298
1	2007	0	0	0	216	713	3336	3341	3616	2449	9845
1	2008	0	0	1	2	73	147	362	1046	2477	13275
1	2009	0	0	0	24	461	653	629	1520	2295	12506
1	2010	0	0	2	5	56	271	902	1334	2579	8767
1	2011	0	0	0	10	20	43	86	291	703	9001
1	2012	0	0	0	3	160	704	146	446	1145	9389
1	2013	0	0	18	3	23	62	386	1092	731	10405
2	1970	0	0	0	0	2	4	7	34	30	48
2	1971	0	0	0	0	0	22	83	46	97	308
2	1972	0	0	5	1	2	7	13	64	161	502
2	1973	0	0	0	5	5	10	5	76	66	1212
2	1974	0	5	6	74	59	121	64	747	692	13121
2	1975	0	44	32	139	89	131	142	306	398	14833
2	1976	2	14	17	63	260	233	204	232	9120	

2	1977	0	16	32	39	33	182	388	975	1536	6270
2	1978	0	0	12	62	143	155	65	50	21	1731
2	1979	0	0	29	57	71	877	856	2072	1282	339
2	1980	0	0	70	38	83	146	259	486	504	2294
2	1981	1	3	7	4	12	56	137	388	325	1674
2	1982	0	0	4	37	14	57	398	4258	37	10954
2	1983	0	29	161	284	886	1124	1717	2101	1664	9448
2	1984	0	0	20	134	284	494	784	1678	3055	5658
2	1985	8	48	101	116	290	314	485	438	406	5478
2	1986	0	9	27	83	231	234	233	320	397	3989
2	1987	0	0	16	23	68	200	529	466	563	4049
2	1988	0	7	19	80	77	245	575	861	772	3998
2	1989	0	0	21	64	74	116	184	295	476	2524
2	1990	0	5	4	24	111	345	496	827	953	3140
2	1991	9	0	9	0	9	21	360	972	1985	3726
2	1992	0	0	36	111	58	205	136	422	1114	8468
2	1993	0	23	12	0	0	30	32	100	524	7293
2	1994	0	0	67	310	82	116	547	554	540	5077
2	1995	0	0	0	294	256	306	516	606	824	10661
2	1996	0	0	31	62	205	210	138	254	261	5026
2	1997	0	0	0	0	32	0	96	369	804	2783
2	1998	0	0	7	22	29	79	14	14	207	5140
2	1999	0	0	0	0	0	0	0	533	928	2725
2	2000	0	0	16	341	171	105	0	34	162	1006
2	2001	0	1	2	98	107	1604	2384	4478	1797	1925
2	2002	0	0	24	0	24	63	564	223	166	1198
2	2003	0	0	47	158	5	74	168	73	237	2098
2	2004	0	0	35	15	96	98	220	120	268	2991
2	2005	0	0	0	0	0	0	35	134	321	5841
2	2006	0	0	27	5	0	32	347	441	558	1522
2	2007	0	70	506	366	76	6	233	760	665	2712
2	2008	0	0	0	22	56	23	66	120	204	2565
2	2009	0	0	0	13	28	9	34	73	110	813
4	1990	0	0	15	16	181	251	374	468	719	1777
4	1991	0	180	262	720	485	1109	1567	928	1559	5147
4	1992	0	15	92	343	1577	946	523	623	766	2193
4	1993	0	15	96	681	1122	1146	1361	973	471	1122
4	1994	12	2	22	29	136	417	1376	1114	994	1094
4	1995	0	32	207	1018	1226	6268	3762	2167	2956	1854
4	1996	0	0	85	593	771	1473	2998	3740	4106	6649
4	1997	0	0	15	116	361	1205	2188	3425	4605	5162
4	1998	0	0	59	173	222	849	2047	2533	3827	6400
4	1999	0	184	189	1231	2814	1536	2546	4113	2448	5197
4	2000	0	7	27	59	557	2307	1970	3382	3907	5894
4	2001	0	0	0	0	0	1054	3688	1964	1724	1964
4	2002	0	13	30	37	47	117	1567	5760	5993	4936
4	2003	21	181	641	1655	1976	2506	2097	2303	2958	6591
4	2004	26	339	221	681	428	957	3098	2624	1458	5165
4	2005	6	133	219	266	380	614	1615	1965	2738	3497
4	2006	55	0	292	105	486	510	1286	1449	1092	2860
4	2007	26	13	225	793	488	1103	1182	1783	1623	2263
4	2008	11	78	114	1082	2877	1291	4176	3833	1987	3262
4	2009	0	0	0	0	178	5709	2877	2195	2568	1206
4	2010	0	0	0	0	4	72	1833	5333	1308	970
4	2011	0	0	0	0	1	19	68	948	4466	2177
4	2012	0	0	0	0	0	12	349	364	1186	4976
4	2013	0	0	0	0	0	5	48	1201	1477	4400
5	1952	0	878	597	1129	10863	8714	2479	391	0	0
5	1953	0	735	500	945	9093	7295	2075	327	0	0
5	1954	0	604	411	776	7468	5991	1704	269	0	0
5	1955	0	874	595	1123	10810	8671	2467	389	0	0
5	1956	0	825	561	1061	10207	8188	2329	367	0	0
5	1957	215	2323	1544	1006	12572	9498	2697	425	0	0
5	1958	441	3300	2807	1367	11628	8687	2461	388	0	0
5	1959	480	3062	2927	1236	7520	5538	1564	247	0	0
5	1960	442	2575	2635	1022	4555	3293	926	146	0	0
5	1961	516	2834	3034	1111	3656	2578	721	114	0	0
5	1962	724	3813	4214	1482	3573	2430	674	106	0	0
6	1963	1060	5413	6126	2089	3607	2319	635	100	0	0
6	1964	1482	7395	8525	2838	3342	1946	519	82	0	0
6	1965	2906	14232	16652	5438	3956	1835	454	72	0	893
6	1966	5148	25030	32503	11510	3301	733	36	2	1	973
6	1967	3674	7616	12700	8517	695	130	87	67	40	1060
6	1968	2823	9475	5787	10517	3776	661	21	25	22	1091
6	1969	15738	50469	13533	2860	533	257	17	0	0	1240
6	1970	7363	33519	12612	10849	6626	2891	1049	297	0	2554
6	1971	2110	33516	9920	9085	9841	2540	572	156	0	3039
6	1972	1106	31327	3695	2864	5303	4364	2136	824	210	3548
6	1973	863	19849	6375	1461	1658	2244	3611	3531	2649	3536
6	1974	1866	34683	22453	5370	1544	343	13	0	0	1966
6	1975	14764	47220	7913	4804	1105	357	19	0	0	3529
6	1976	1066	22785	8019	1289	1188	821	371	40	0	2908
6	1977	5765	45907	10657	6072	542	193	161	68	0	4209
6	1978	24358	36244	6461	9661	4797	1224	132	26	89	6387
6	1979	859	8120	13128	11422	3000	1166	477	94	673	2526
6	1980	27866	14888	5484	1723	2455	2139	1187	159	81	1555
6	1981	25515	26155	3357	975	625	554	398	159	6	1952
6	1982	12663	23182	5901	1967	1279	434	406	212	15	171
6	1983	106095	37487	3363	792	133	69	11	25	0	1391
6	1984	33295	122066	22513	6725	7187	3819	619	285	17	387
6	1985	57842	75283	23570	4250	1105	530	81	7	13	597
6	1986	61236	35360	4197	3919	790	333	41	1	19	345
6	1987	15938	84116	1510	2510	1479	1025	125	16	0	128
6	1988	140648	45289	5355	1878	1302	587	275	8	0	0
6	1989	118829	74124	5989	1843	792	381	96	7	2	0
6	1990	61853	29923	16791	2808	3747	470	11	3	4	0
6	1991	31529	46273	5855	3117	1619	582	322	164	68	206
6	1992	19515	47335	6557	1368	612	445	44	4	28	0
6	1993	29632	149526	44726	13700	3180	1351	182	8	0	0
6	1994	77627	27952	13680	6529	3542	343	5	24	22	223
6	1995	136553	74128	34586	4262	704	220	10	3	0	0
6	1996	240573	76785	72494	25533	7979	476	33	23	30	159
6	1997	91833	53275	51891	10919	3693	244	30	25	42	1447

6	1998	43350	50123	25423	20995	1099	800	528	106	19	41
6	1999	4374	4296	3470	10057	10592	2232	589	97	65	181
6	2000	35597	19042	11343	4005	5446	3196	997	1357	829	635
6	2001	1034	99107	22845	4894	1347	1894	1135	291	653	918
6	2002	29217	82806	41229	4054	1085	250	183	436	461	891
6	2003	4286	33018	11612	920	1617	928	167	415	1385	1386
6	2004	60040	58422	8822	5845	1529	683	355	106	221	1413
6	2005	121336	44510	25280	3449	2890	511	170	72	43	577
6	2006	25424	19146	14261	6766	1295	1051	472	88	64	479
7	2007	1	31210	16825	17105	6208	1854	660	151	105	957
7	2008	309	32334	23273	15258	2433	107	413	243	315	1123
7	2009	44	12742	14447	5373	2058	3040	937	333	313	559
7	2010	112	15245	7190	3648	842	273	567	113	103	216
7	2011	0	5149	3925	2567	2884	1138	208	249	84	306
7	2012	0	0	1279	952	336	29	9	3	8	3
7	2013	0	8	41	421	264	190	0	99	8	74

#=====

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

#=====

#Index	year	ages 1-10									
3	1955	5.178	11.596	19.388	37.625	56.114	72.266	94.819	120.26	144.135	205.357
3	1956	5.195	11.815	18.958	36.507	57.435	71.443	96.095	119.118	144.044	221.329
3	1957	5.135	11.488	22.879	35.494	53.147	75.831	93.137	118.408	143.617	200.587
3	1958	4.805	11.163	21.724	35.53	56.371	73.244	95.957	119.486	142.145	229.72
3	1959	5.145	11.991	22.407	32.291	54.414	75.049	94.262	118.99	144.017	215.628
3	1960	4.873	9.838	21.704	37.77	52.991	72.71	95.573	118.09	139.366	211.674
3	1961	4.864	9.863	21.387	36.724	52.469	72.516	93.508	119.729	141.283	218.94
3	1962	4.469	10.012	20.162	37.864	51.701	70.364	92.249	119.197	142.709	224.947
3	1963	4.838	9.71	20.576	38.519	51.138	70.862	92.046	118.28	140.228	203.268
3	1964	4.818	9.758	20.719	35.61	52.616	70.636	92.723	118.084	139.926	214.425
3	1965	4.823	9.626	21.591	37.302	50.403	70.755	91.797	118.392	142.646	231.092
3	1966	3.95	9.648	21.458	36.72	51.113	70.479	93.397	114.581	140.837	238.89
3	1967	3.882	9.877	21.509	35.431	51.692	72.106	91.874	118.081	141.34	251.892
3	1968	5.163	10.536	22.55	36.535	53.358	72.64	94.362	118.858	145.194	258.76
3	1969	4.613	9.4	19.238	37.515	53.701	70.48	95.915	119.248	142.487	250.393
3	1970	5.302	10.384	20.781	34.63	51.767	73.078	95.74	118.022	143.078	238.44
3	1971	6.053	10.974	21.958	35.595	51.94	71.946	94.377	117.99	142.735	249.753
3	1972	5.241	10.091	20.214	33.437	52.097	72.192	95.679	118.069	143.471	245.388
3	1973	5.396	10.43	20.597	35.153	51.709	72.644	97.334	121.829	146.904	255.624
3	1974	5.546	10.503	22.183	35.891	52.884	72.759	94.073	119.77	145.188	254.16
3	1975	5.271	10.421	20.976	36.393	50.731	72.595	94.409	120.17	143.851	258.185
3	1976	5.575	10.633	20.369	34.858	51.319	70.655	93.897	121.001	143.994	265.375
3	1977	4.759	10.234	20.513	34.659	52.172	71.693	95.402	117.898	144.03	252.646
3	1978	5.605	10.189	20.439	35.921	52.908	73.719	91.974	121.037	142.224	264.263
3	1979	5.885	11.526	21.265	35.473	52.111	72.86	94.348	117.287	142.138	242.484
3	1980	4.695	10.516	20.967	35.639	53.152	73.307	95.737	117.224	142.797	246.14
5	1952	5.068	10.319	20.531	38.599	55.634	75.608	95.096	119.086	143.044	200.913
5	1953	5.065	10.253	19.799	38.894	54.895	73.122	97.318	120.076	144.118	202.283
5	1954	5.06	10.212	19.915	39.892	56.842	74.533	96.596	119.459	142.796	195.958
5	1955	5.178	11.596	19.388	37.625	56.114	72.266	94.819	120.26	144.135	205.357
5	1956	5.195	11.815	18.958	36.507	57.435	71.443	96.095	119.118	144.044	221.329
5	1957	5.135	11.488	22.879	35.494	53.147	75.831	93.137	118.408	143.617	200.587
5	1958	4.805	11.163	21.724	35.53	56.371	73.244	95.957	119.486	142.145	229.72
5	1959	5.145	11.991	22.407	32.291	54.414	75.049	94.262	118.99	144.017	215.628
5	1960	4.873	9.838	21.704	37.77	52.991	72.71	95.573	118.09	139.366	211.674
5	1961	4.864	9.863	21.387	36.724	52.469	72.516	93.508	119.729	141.283	218.94
5	1962	4.469	10.012	20.162	37.864	51.701	70.364	92.249	119.197	142.709	224.947
5	1963	4.838	9.71	20.576	38.519	51.138	70.862	92.046	118.28	140.228	203.268
6	1964	4.818	9.758	20.719	35.61	52.616	70.636	92.723	118.084	139.926	214.425
6	1965	4.823	9.626	21.591	37.302	50.403	70.755	91.797	118.392	142.646	231.092
6	1966	3.95	9.648	21.458	36.72	51.113	70.479	93.397	114.581	140.837	238.89
6	1967	3.882	9.877	21.509	35.431	51.692	72.106	91.874	118.081	141.34	251.892
6	1968	5.163	10.536	22.55	36.535	53.358	72.64	94.362	118.858	145.194	258.76
6	1969	4.613	9.4	19.238	37.515	53.701	70.48	95.915	119.248	142.487	250.393
6	1970	5.302	10.384	20.781	34.63	51.767	73.078	95.74	118.022	143.078	238.44
6	1971	6.053	10.974	21.958	35.595	51.94	71.946	94.377	117.99	142.735	249.753
6	1972	5.241	10.091	20.214	33.437	52.097	72.192	95.679	118.069	143.471	245.388
6	1973	5.396	10.43	20.597	35.153	51.709	72.644	97.334	121.829	146.904	255.624
6	1974	5.546	10.503	22.183	35.891	52.884	72.759	94.073	119.77	145.188	254.16
6	1975	5.271	10.421	20.976	36.393	50.731	72.595	94.409	120.17	143.851	258.185
6	1976	5.575	10.633	20.369	34.858	51.319	70.655	93.897	121.001	143.994	265.375
6	1977	4.759	10.234	20.513	34.659	52.172	71.693	95.402	117.898	144.03	252.646
6	1978	5.605	10.189	20.439	35.921	52.908	73.719	91.974	121.037	142.224	264.263
6	1979	5.885	11.526	21.265	35.473	52.111	72.86	94.348	117.287	142.138	242.484
6	1980	4.695	10.516	20.967	35.639	53.152	73.307	95.737	117.224	142.797	246.14
6	1981	5.462	10.816	21.83	35.301	51.821	72.628	95.121	118.646	143.958	229.8
6	1982	5.525	11.47	22.174	36.456	52.384	73.438	97.776	114.474	139.11	249.454
6	1983	5.399	12.231	20.898	35.176	51.877	72.56	98.308	119.148	146.454	231.857
6	1984	5.473	12.014	22.514	35.87	53.643	72.826	96.546	122.216	145.593	225.754
6	1985	5.207	11.395	22.091	36.759	52.891	72.715	95.17	120.544	147.451	227.354
6	1986	5.366	11.908	21.238	36.163	54.799	73.739	95.364	121.887	147.308	235.071
6	1987	5.176	11.485	20.736	35.466	53.639	72.83	94.709	122.042	146.267	215.688
6	1988	4.838	11.613	21.406	37.034	54.902	76.157	95.348	119.82	147.553	220.835
6	1989	5.398	10.866	21.946	35.59	53.09	74.377	96.963	119.42	144.905	221.08
6	1990	4.915	10.916	20.03	35.769	51.767	73.138	94.5	118.755	145.129	220.646
6	1991	4.688	10.743	22.328	35.914	54.572	73.485	95.514	121.199	147.195	221.993
6	1992	4.555	11.327	20.832	35.878	53.253	73.546	97.7	118.778	145.996	225.702
6	1993	4.752	11.091	21.237	36.248	53.636	74.424	96.512	118.862	148.306	234.465
6	1994	5.616	11.768	21.448	35.197	54.279	72.529	95.947	118.381	144.1	224.098
6	1995	5.237	11.668	21.854	36.067	54.149	73.166	95.683	121.016	144.478	228.206
6	1996	5.046	10.191	21.5	34.643	52.683	73.322	95.834	120.134	147.253	219.927
6	1997	5.323	12.165	20.765	36.459	52.358	72.604	96.155	119.426	146.168	227.759
6	1998	4.69	11	20.426	36.245	53.803	73.953	96.92	120.772	147.224	212.518
6	1999	5.058	11.659	23.805	35.516	52.929	74.414	97.282	120.852	146.211	212.342
6	2000	5.357	10.389	20.589	36.231	53.702	71.794	93.238	119.93	142.175	216.117
6	2001	5.949	10.502	21.019	34.065	51.493	74.06	94.477	120.698	145.797	204.128
6	2002	5.843	11.154	20.543	35.534	53.306	73.14	98.358	123.106	148.539	206.749
6	2003	5.066	11.21	21.742	35.139	54.449	73.972	97.181	121.213	146.419	220.941
6	2004	5.984	10.738	20.805	34.907	52.949	72.727	96.546	118.83	144.629	208.427

6	2005	6.09	10.881	19.842	34.277	52.794	72.848	96.172	118.626	142.671	215.734
6	2006	6.393	11.383	20.254	33.978	53.266	73.074	93.295	116.636	141.088	207.975
7	2007	4.35	10.639	23.086	33.438	49.474	71.267	95.32	117.609	142.704	217.697
7	2008	6.32	11.577	23.234	36.842	53.013	73.651	94.677	117.974	142.097	207.474
7	2009	5.103	12.634	21.389	35.756	53.725	76.072	93.255	120.004	142.748	199.941
7	2010	4.504	11.396	24.467	37.389	52.481	75.255	99.576	121.747	142.063	198.568
7	2011	3.663	10.352	23.469	33.736	52.795	72.308	92.711	120.267	142.598	202.754
7	2012	5.09	10.176	24.756	35.533	54.373	73.307	96.791	119.512	144.854	191.86
7	2013	3.58	11.609	24.495	36.541	49.939	73.288	97.686	117.685	145.102	211.384

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

#####

1950	5.061	10.24	19.527	39.834	54.944	73.778	96.259	120.503	143.415	200.389
1951	5.061	10.292	19.564	37.722	54.781	74.378	96.43	118.343	142.642	209.394
1952	5.068	10.319	20.531	38.599	55.634	75.608	95.096	119.086	143.044	200.913
1953	5.065	10.253	19.799	38.894	54.895	73.122	97.318	120.076	144.118	202.283
1954	5.06	10.212	19.915	39.892	56.842	74.533	96.596	119.459	142.796	195.958
1955	5.178	11.596	19.388	37.625	56.114	72.266	94.819	120.26	144.135	205.357
1956	5.195	11.815	18.958	36.507	57.435	71.443	96.095	119.118	144.044	221.329
1957	5.135	11.488	22.879	35.494	53.147	75.831	93.137	118.408	143.617	200.587
1958	4.805	11.163	21.724	35.53	56.371	73.244	95.957	119.486	142.145	229.72
1959	5.145	11.991	22.407	32.291	54.414	75.049	94.262	118.99	144.017	155.628
1960	4.873	9.838	21.704	37.77	52.991	72.71	95.573	118.09	139.366	211.674
1961	4.864	9.863	21.387	36.724	52.469	72.516	93.508	119.729	141.283	218.94
1962	4.469	10.012	20.162	37.864	51.701	70.364	92.249	119.197	142.709	224.947
1963	4.838	9.71	20.576	38.519	51.138	70.862	92.046	118.28	140.228	203.268
1964	4.818	9.758	20.719	35.61	52.616	70.636	92.723	118.084	139.926	214.425
1965	4.823	9.626	21.591	37.302	50.403	70.755	91.797	118.392	142.646	231.092
1966	3.95	9.648	21.458	36.72	51.113	70.479	93.397	114.581	140.837	238.89
1967	3.882	9.877	21.509	35.431	51.692	72.106	91.874	118.081	141.34	251.892
1968	5.163	10.536	22.55	36.535	53.358	72.64	94.362	118.858	145.194	258.76
1969	4.613	9.4	19.238	37.515	53.701	70.48	95.915	119.248	142.487	250.393
1970	5.302	10.384	20.781	34.63	51.767	73.078	95.74	118.022	143.078	238.44
1971	6.053	10.974	21.958	35.595	51.94	71.946	94.377	117.99	142.735	249.753
1972	5.241	10.091	20.214	33.437	52.097	72.192	95.679	118.069	143.471	245.388
1973	5.396	10.43	20.597	35.153	51.709	72.644	97.334	121.829	146.904	255.624
1974	5.546	10.503	22.183	35.891	52.884	72.759	94.073	119.77	145.188	254.16
1975	5.271	10.421	20.976	36.393	50.731	72.595	94.409	120.17	143.851	258.185
1976	5.575	10.633	20.369	34.858	51.319	70.655	93.897	121.001	143.994	265.375
1977	4.759	10.234	20.513	34.659	52.172	71.693	95.402	117.898	144.03	252.646
1978	5.605	10.189	20.439	35.921	52.908	73.719	91.974	121.037	142.224	264.263
1979	5.885	11.526	21.265	35.473	52.111	72.86	94.348	117.287	142.138	242.484
1980	4.695	10.516	20.967	35.639	53.152	73.307	95.737	117.224	142.797	246.14
1981	5.462	10.816	21.83	35.301	51.821	72.628	95.121	118.646	143.958	229.8
1982	5.525	11.47	22.174	36.456	52.384	73.438	97.776	114.474	139.11	249.454
1983	5.399	12.231	20.898	35.176	51.877	72.56	98.308	119.148	146.454	231.857
1984	5.473	12.014	22.514	35.87	53.643	72.826	96.546	122.216	145.593	255.754
1985	5.207	11.395	22.091	36.759	52.891	72.715	95.17	120.544	147.451	227.354
1986	5.366	11.908	21.238	36.163	54.799	73.739	95.364	121.887	147.308	235.071
1987	5.176	11.485	20.736	35.466	53.639	72.83	94.709	122.042	146.267	215.688
1988	4.838	11.613	21.406	37.034	54.902	76.157	95.348	119.82	147.553	220.835
1989	5.398	10.866	21.946	35.59	53.09	74.377	96.963	119.42	144.905	221.08
1990	4.915	10.916	20.03	35.769	51.767	73.138	94.5	118.755	145.129	220.646
1991	4.688	10.743	22.328	35.914	54.572	73.485	95.514	121.199	147.195	221.993
1992	4.555	11.327	20.832	35.878	53.253	73.546	97.7	118.778	145.996	225.702
1993	4.752	11.091	21.237	36.248	53.636	74.424	96.512	118.862	148.306	234.465
1994	5.616	11.768	21.448	35.197	54.279	72.529	95.947	118.381	144.1	224.098
1995	5.237	11.668	21.854	36.067	54.149	73.166	95.683	121.016	144.478	228.206
1996	5.046	10.191	21.5	34.643	52.683	73.322	95.834	120.134	147.253	219.927
1997	5.323	12.165	20.765	36.459	52.358	72.604	96.155	119.426	146.168	227.759
1998	4.69	11	20.426	36.245	53.803	73.953	96.92	120.772	147.224	212.518
1999	5.058	11.659	23.805	35.516	52.929	74.414	97.282	120.852	146.211	212.342
2000	5.357	10.389	20.589	36.231	53.702	71.794	93.238	119.93	142.175	216.117
2001	5.949	10.502	21.019	34.065	51.493	74.06	94.477	120.698	145.797	204.128
2002	5.843	11.154	20.543	35.534	53.306	73.14	98.358	123.106	148.539	206.749
2003	5.066	11.21	21.742	35.139	54.449	73.972	97.181	121.213	146.419	220.941
2004	5.984	10.738	20.805	34.907	52.949	72.727	96.546	118.83	144.629	208.427
2005	6.09	10.881	19.842	34.277	52.794	72.848	96.172	118.626	142.671	215.734
2006	6.393	11.383	20.254	33.978	53.266	73.074	93.295	116.636	141.088	207.975
2007	4.35	10.639	23.086	33.438	49.474	71.267	95.32	117.609	142.704	217.697
2008	6.32	11.577	23.234	36.842	53.013	73.651	94.677	117.974	142.097	207.474
2009	5.103	12.634	21.389	35.756	53.725	76.072	93.255	120.004	142.748	199.941
2010	4.504	11.396	24.467	37.389	52.481	75.255	99.576	121.747	142.063	198.568
2011	3.663	10.352	23.469	33.736	52.795	72.308	92.711	120.267	142.598	202.754
2012	5.09	10.176	24.756	35.533	54.373	73.307	96.791	119.512	144.854	191.86
2013	3.58	11.609	24.495	36.541	49.939	73.288	97.686	117.685	145.102	211.384

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Appendix B. VPA2Box input file for western-origin Atlantic bluefin tuna.

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# DATA FILE FOR PROGRAM VPA-2BOX, Version 3.0
# 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.
```


2007	65	156	3712	5236	1367	1881	1405	979	794	365	502	405
	368	301	308	1061								
2008	77	462	1329	1544	4165	1284	1840	1901	1269	884	729	420
	381	316	449	1345								
2009	58	128	1256	712	688	5421	2020	1041	1330	911	758	482
	352	404	448	1243								
2010	65	1018	781	1698	572	652	963	2641	946	888	1039	598
	428	454	494	1362								
2011	3	529	1502	1486	1589	1084	441	2329	2434	660	656	641
	555	461	380	1353								
2012	108	373	1711	1093	424	553	659	766	1356	1727	1286	536
	555	449	490	1371								
2013	48	247	514	1154	181	557	602	1163	839	700	1038	847
	543	387	419	1256								

-1 end of catch data

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NOW ENTER IN THE ABUNDANCE INDEX SPECIFICATIONS

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#INDEX	PDF	(0= do not use, 1=lognormal, 2=normal)		UNITS (1 = numbers, 2 = biomass)		VULNERABILITY (1=fixed, 2=frac.catches, 3=part. catches, 4=Butt. & Gero.		TIMING (-1=average, +integer = number of months elapsed)			
#						FIRST TO	LAST AGE	INDEX TITLE (IN SINGLE QUOTES)			
#						16	16	'CAN_GSL'			
1	1	1	4	-1	8	16		'CAN_GSL'			
2	1	1	4	-1	5	16		'CAN_SWNS'			
3	1	1	4	-1	1	5		'US_RR<145'			
4	1	1	4	-1	2	3		'US_RR_66_114'			
5	1	1	4	-1	4	5		'US_RR_115_144'			
6	0	1	4	-1	6	8		'US_RR_145_177'			
7	1	1	4	-1	10	16		'US_RR>195'			
8	0	1	4	-1	10	16		'US_RR>195_COMB'			
9	1	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	9	16		'LARVAL_ZERO_INFLATED'			
14	1	1	4	0	9	16		'GOM_PLL_1-6'			
15	1	1	4	0	9	16		'JLL_GOM'			
16	1	1	1	-1	1	3		'TAGGING'			

-1 end index specifications

=====

NOW ENTER IN THE INDICES OF ABUNDANCE

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#ID	YEAR	INDEX	CV	INDEX_NAME
1	1970	-999	-999	'CAN_GSL'
1	1971	-999	-999	'CAN_GSL'
1	1972	-999	-999	'CAN_GSL'
1	1973	-999	-999	'CAN_GSL'
1	1974	-999	-999	'CAN_GSL'
1	1975	-999	-999	'CAN_GSL'
1	1976	-999	-999	'CAN_GSL'
1	1977	-999	-999	'CAN_GSL'
1	1978	-999	-999	'CAN_GSL'
1	1979	-999	-999	'CAN_GSL'
1	1980	-999	-999	'CAN_GSL'
1	1981	1.32	0.16	'CAN_GSL'
1	1982	0.6	0.38	'CAN_GSL'
1	1983	1.54	0.1	'CAN_GSL'
1	1984	0.85	0.09	'CAN_GSL'
1	1985	0.21	0.23	'CAN_GSL'
1	1986	0.24	0.22	'CAN_GSL'
1	1987	0.32	0.32	'CAN_GSL'
1	1988	0.53	0.25	'CAN_GSL'
1	1989	0.65	0.28	'CAN_GSL'
1	1990	0.19	0.27	'CAN_GSL'
1	1991	0.65	0.22	'CAN_GSL'
1	1992	1.45	0.2	'CAN_GSL'
1	1993	0.9	0.13	'CAN_GSL'
1	1994	0.25	0.13	'CAN_GSL'
1	1995	0.72	0.09	'CAN_GSL'
1	1996	0.08	0.2	'CAN_GSL'
1	1997	0.13	0.17	'CAN_GSL'
1	1998	0.24	0.15	'CAN_GSL'
1	1999	0.42	0.12	'CAN_GSL'
1	2000	0.32	0.13	'CAN_GSL'
1	2001	0.29	0.16	'CAN_GSL'
1	2002	0.45	0.13	'CAN_GSL'
1	2003	0.83	0.09	'CAN_GSL'
1	2004	1.08	0.1	'CAN_GSL'
1	2005	1.04	0.08	'CAN_GSL'
1	2006	1.14	0.09	'CAN_GSL'
1	2007	2.28	0.15	'CAN_GSL'

1	2008	1.74	0.11	'CAN_GSL'
1	2009	2.56	0.16	'CAN_GSL'
1	2010	-999	-999	'CAN_GSL'
1	2011	3.7	0.11	'CAN_GSL'
1	2012	5.62	0.11	'CAN_GSL'
1	2013	4.81	0.09	'CAN_GSL'
2	1970	-999	-999	'CAN_SWNS'
2	1971	-999	-999	'CAN_SWNS'
2	1972	-999	-999	'CAN_SWNS'
2	1973	-999	-999	'CAN_SWNS'
2	1974	-999	-999	'CAN_SWNS'
2	1975	-999	-999	'CAN_SWNS'
2	1976	-999	-999	'CAN_SWNS'
2	1977	-999	-999	'CAN_SWNS'
2	1978	-999	-999	'CAN_SWNS'
2	1979	-999	-999	'CAN_SWNS'
2	1980	-999	-999	'CAN_SWNS'
2	1981	-999	-999	'CAN_SWNS'
2	1982	-999	-999	'CAN_SWNS'
2	1983	-999	-999	'CAN_SWNS'
2	1984	-999	-999	'CAN_SWNS'
2	1985	-999	-999	'CAN_SWNS'
2	1986	-999	-999	'CAN_SWNS'
2	1987	-967	-999	'CAN_SWNS'
2	1988	10.04	0.19	'CAN_SWNS'
2	1989	9.10	0.18	'CAN_SWNS'
2	1990	8.13	0.18	'CAN_SWNS'
2	1991	4.85	0.19	'CAN_SWNS'
2	1992	4.80	0.18	'CAN_SWNS'
2	1993	3.11	0.19	'CAN_SWNS'
2	1994	3.71	0.18	'CAN_SWNS'
2	1995	3.59	0.19	'CAN_SWNS'
2	1996	2.84	0.18	'CAN_SWNS'
2	1997	2.28	0.17	'CAN_SWNS'
2	1998	4.05	0.17	'CAN_SWNS'
2	1999	5.52	0.18	'CAN_SWNS'
2	2000	2.38	0.18	'CAN_SWNS'
2	2001	4.78	0.19	'CAN_SWNS'
2	2002	5.86	0.18	'CAN_SWNS'
2	2003	8.11	0.18	'CAN_SWNS'
2	2004	4.67	0.19	'CAN_SWNS'
2	2005	5.38	0.17	'CAN_SWNS'
2	2006	5.95	0.18	'CAN_SWNS'
2	2007	4.83	0.18	'CAN_SWNS'
2	2008	6.96	0.2	'CAN_SWNS'
2	2009	5.39	0.18	'CAN_SWNS'
2	2010	8.45	0.21	'CAN_SWNS'
2	2011	9.60	0.21	'CAN_SWNS'
2	2012	8.89	0.2	'CAN_SWNS'
2	2013	4.91	0.19	'CAN_SWNS'
3	1970	-999	-999	'US_RR<145'
3	1971	-999	-999	'US_RR<145'
3	1972	-999	-999	'US_RR<145'
3	1973	-999	-999	'US_RR<145'
3	1974	-999	-999	'US_RR<145'
3	1975	-999	-999	'US_RR<145'
3	1976	-999	-999	'US_RR<145'
3	1977	-999	-999	'US_RR<145'
3	1978	-999	-999	'US_RR<145'
3	1979	-999	-999	'US_RR<145'
3	1980	0.41	0.43	'US_RR<145'
3	1981	0.20	0.52	'US_RR<145'
3	1982	1.07	0.33	'US_RR<145'
3	1983	0.57	0.26	'US_RR<145'
3	1984	-999	-999	'US_RR<145'
3	1985	0.32	0.64	'US_RR<145'
3	1986	0.40	0.43	'US_RR<145'
3	1987	0.62	0.4	'US_RR<145'
3	1988	0.50	0.38	'US_RR<145'
3	1989	0.50	0.43	'US_RR<145'
3	1990	0.46	0.34	'US_RR<145'
3	1991	0.64	0.35	'US_RR<145'
3	1992	0.42	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'
4	1970	-999	-999	'US_RR_66_114'
4	1971	-999	-999	'US_RR_66_114'
4	1972	-999	-999	'US_RR_66_114'
4	1973	-999	-999	'US_RR_66_114'
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	0.56	0.36	'US_RR_66_114'
4	1994	0.13	0.45	'US_RR_66_114'
4	1995	0.57	0.35	'US_RR_66_114'
4	1996	0.83	0.38	'US_RR_66_114'
4	1997	1.21	0.33	'US_RR_66_114'
4	1998	0.71	0.37	'US_RR_66_114'
4	1999	0.68	0.43	'US_RR_66_114'
4	2000	0.48	0.5	'US_RR_66_114'
4	2001	0.23	0.35	'US_RR_66_114'
4	2002	0.75	0.4	'US_RR_66_114'
4	2003	0.21	0.35	'US_RR_66_114'
4	2004	1.14	0.32	'US_RR_66_114'
4	2005	1.11	0.32	'US_RR_66_114'
4	2006	0.30	0.35	'US_RR_66_114'
4	2007	0.23	0.31	'US_RR_66_114'
4	2008	0.18	0.33	'US_RR_66_114'
4	2009	0.18	0.33	'US_RR_66_114'
4	2010	0.56	0.33	'US_RR_66_114'
4	2011	0.74	0.35	'US_RR_66_114'
4	2012	0.37	0.41	'US_RR_66_114'
4	2013	0.51	0.36	'US_RR_66_114'
5	1970	-999	-999	'US_RR_115_144'
5	1971	-999	-999	'US_RR_115_144'
5	1972	-999	-999	'US_RR_115_144'
5	1973	-999	-999	'US_RR_115_144'
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'
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5	1982	-999	-999	'US_RR_115_144'
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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	0.50	0.41	'US_RR_115_144'
5	1994	0.13	0.55	'US_RR_115_144'
5	1995	0.32	0.41	'US_RR_115_144'
5	1996	0.37	0.48	'US_RR_115_144'
5	1997	0.12	0.48	'US_RR_115_144'
5	1998	0.46	0.38	'US_RR_115_144'
5	1999	0.39	0.51	'US_RR_115_144'
5	2000	0.65	0.56	'US_RR_115_144'
5	2001	0.69	0.39	'US_RR_115_144'
5	2002	1.33	0.45	'US_RR_115_144'
5	2003	0.30	0.39	'US_RR_115_144'
5	2004	0.34	0.38	'US_RR_115_144'
5	2005	0.32	0.38	'US_RR_115_144'
5	2006	0.74	0.38	'US_RR_115_144'
5	2007	0.75	0.35	'US_RR_115_144'
5	2008	0.70	0.36	'US_RR_115_144'
5	2009	0.20	0.4	'US_RR_115_144'
5	2010	1.14	0.37	'US_RR_115_144'
5	2011	1.17	0.41	'US_RR_115_144'
5	2012	1.02	0.46	'US_RR_115_144'
5	2013	0.96	0.43	'US_RR_115_144'
6	1970	-999	-999	'US_RR_145_177'
6	1971	-999	-999	'US_RR_145_177'
6	1972	-999	-999	'US_RR_145_177'
6	1973	-999	-999	'US_RR_145_177'
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'
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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	0.31	3.74	'US_RR_145_177'

6	1994	0.38	3.12	'US_RR_145_177'
6	1995	1.33	1.78	'US_RR_145_177'
6	1996	0.70	2.72	'US_RR_145_177'
6	1997	0.46	3.05	'US_RR_145_177'
6	1998	0.36	3.46	'US_RR_145_177'
6	1999	1.07	2.06	'US_RR_145_177'
6	2000	0.96	2.06	'US_RR_145_177'
6	2001	3.42	2.57	'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'
7	1970	-999	-999	'US_RR>195'
7	1971	-999	-999	'US_RR>195'
7	1972	-999	-999	'US_RR>195'
7	1973	-999	-999	'US_RR>195'
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	0.1	'US_RR>195'
7	1984	1.25	0.19	'US_RR>195'
7	1985	0.84	0.3	'US_RR>195'
7	1986	0.47	1.1	'US_RR>195'
7	1987	0.47	0.48	'US_RR>195'
7	1988	0.81	0.36	'US_RR>195'
7	1989	0.62	0.36	'US_RR>195'
7	1990	0.50	0.34	'US_RR>195'
7	1991	0.42	0.28	'US_RR>195'
7	1992	0.46	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'
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7	1998	-999	-999	'US_RR>195'
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7	2008	-999	-999	'US_RR>195'
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7	2011	-999	-999	'US_RR>195'
7	2012	-999	-999	'US_RR>195'
7	2013	-999	-999	'US_RR>195'
8	1970	-999	-999	'US_RR>195_COMB'
8	1971	-999	-999	'US_RR>195_COMB'
8	1972	-999	-999	'US_RR>195_COMB'
8	1973	-999	-999	'US_RR>195_COMB'
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'
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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'
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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'
9	1970	-999	-999	'US_RR>177'
9	1971	-999	-999	'US_RR>177'
9	1972	-999	-999	'US_RR>177'
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9	1974	-999	-999	'US_RR>177'
9	1975	-999	-999	'US_RR>177'
9	1976	-999	-999	'US_RR>177'
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9	1978	-999	-999	'US_RR>177'
9	1979	-999	-999	'US_RR>177'
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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	0.35	0.31	'US_RR>177'
9	1994	0.48	0.29	'US_RR>177'
9	1995	0.58	0.27	'US_RR>177'
9	1996	1.70	0.26	'US_RR>177'
9	1997	0.77	0.37	'US_RR>177'
9	1998	0.83	0.26	'US_RR>177'
9	1999	0.96	0.29	'US_RR>177'
9	2000	0.32	0.28	'US_RR>177'
9	2001	0.70	0.3	'US_RR>177'
9	2002	0.99	0.24	'US_RR>177'
9	2003	0.23	0.29	'US_RR>177'
9	2004	0.38	0.28	'US_RR>177'
9	2005	0.33	0.27	'US_RR>177'
9	2006	0.22	0.38	'US_RR>177'
9	2007	0.17	0.37	'US_RR>177'
9	2008	0.20	0.36	'US_RR>177'
9	2009	0.15	0.4	'US_RR>177'
9	2010	0.86	0.27	'US_RR>177'
9	2011	0.54	0.3	'US_RR>177'
9	2012	0.60	0.27	'US_RR>177'
9	2013	0.46	0.29	'US_RR>177'
10	1970	-999	-999	'JLL_AREA_2_(WEST)'
10	1971	-999	-999	'JLL_AREA_2_(WEST)'
10	1972	-999	-999	'JLL_AREA_2_(WEST)'
10	1973	-999	-999	'JLL_AREA_2_(WEST)'
10	1974	-999	-999	'JLL_AREA_2_(WEST)'
10	1975	-999	-999	'JLL_AREA_2_(WEST)'
10	1976	0.34	0.43	'JLL_AREA_2_(WEST)'
10	1977	1.32	0.22	'JLL_AREA_2_(WEST)'
10	1978	0.64	0.29	'JLL_AREA_2_(WEST)'
10	1979	0.44	0.25	'JLL_AREA_2_(WEST)'
10	1980	0.83	0.21	'JLL_AREA_2_(WEST)'
10	1981	1.08	0.16	'JLL_AREA_2_(WEST)'
10	1982	0.40	0.25	'JLL_AREA_2_(WEST)'
10	1983	0.24	0.32	'JLL_AREA_2_(WEST)'
10	1984	0.57	0.22	'JLL_AREA_2_(WEST)'
10	1985	0.66	0.21	'JLL_AREA_2_(WEST)'
10	1986	0.05	0.6	'JLL_AREA_2_(WEST)'
10	1987	0.44	0.26	'JLL_AREA_2_(WEST)'
10	1988	0.66	0.21	'JLL_AREA_2_(WEST)'
10	1989	0.55	0.21	'JLL_AREA_2_(WEST)'
10	1990	0.46	0.24	'JLL_AREA_2_(WEST)'
10	1991	0.46	0.26	'JLL_AREA_2_(WEST)'
10	1992	0.70	0.21	'JLL_AREA_2_(WEST)'
10	1993	0.69	0.23	'JLL_AREA_2_(WEST)'
10	1994	0.64	0.22	'JLL_AREA_2_(WEST)'
10	1995	0.47	0.29	'JLL_AREA_2_(WEST)'
10	1996	1.18	0.2	'JLL_AREA_2_(WEST)'
10	1997	0.73	0.25	'JLL_AREA_2_(WEST)'
10	1998	0.34	0.29	'JLL_AREA_2_(WEST)'
10	1999	0.37	0.31	'JLL_AREA_2_(WEST)'
10	2000	0.46	0.27	'JLL_AREA_2_(WEST)'
10	2001	0.29	0.4	'JLL_AREA_2_(WEST)'
10	2002	0.34	0.31	'JLL_AREA_2_(WEST)'
10	2003	0.34	0.4	'JLL_AREA_2_(WEST)'
10	2004	0.30	0.39	'JLL_AREA_2_(WEST)'
10	2005	0.36	0.23	'JLL_AREA_2_(WEST)'
10	2006	0.62	0.23	'JLL_AREA_2_(WEST)'
10	2007	0.95	0.23	'JLL_AREA_2_(WEST)'
10	2008	0.41	0.35	'JLL_AREA_2_(WEST)'
10	2009	0.94	0.33	'JLL_AREA_2_(WEST)'
10	2010	0.34	0.37	'JLL_AREA_2_(WEST)'
10	2011	1.45	0.24	'JLL_AREA_2_(WEST)'
10	2012	2.02	0.3	'JLL_AREA_2_(WEST)'
10	2013	1.47	0.26	'JLL_AREA_2_(WEST)'
11	1971	-999	-999	'JLL_AREA_3_(31+32)'
11	1972	-999	-999	'JLL_AREA_3_(31+32)'
11	1973	-999	-999	'JLL_AREA_3_(31+32)'
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)'

13	1996	0.79	0.52	'LARVAL_ZERO_INFLATED'
13	1997	0.33	0.39	'LARVAL_ZERO_INFLATED'
13	1998	0.11	0.55	'LARVAL_ZERO_INFLATED'
13	1999	0.46	0.53	'LARVAL_ZERO_INFLATED'
13	2000	0.25	0.54	'LARVAL_ZERO_INFLATED'
13	2001	0.46	0.33	'LARVAL_ZERO_INFLATED'
13	2002	0.24	0.65	'LARVAL_ZERO_INFLATED'
13	2003	0.79	0.4	'LARVAL_ZERO_INFLATED'
13	2004	0.55	0.71	'LARVAL_ZERO_INFLATED'
13	2005	0.18	0.3	'LARVAL_ZERO_INFLATED'
13	2006	0.47	0.35	'LARVAL_ZERO_INFLATED'
13	2007	0.39	0.45	'LARVAL_ZERO_INFLATED'
13	2008	0.31	0.39	'LARVAL_ZERO_INFLATED'
13	2009	0.58	0.34	'LARVAL_ZERO_INFLATED'
13	2010	0.39	0.52	'LARVAL_ZERO_INFLATED'
13	2011	1.02	0.4	'LARVAL_ZERO_INFLATED'
13	2012	0.3	0.49	'LARVAL_ZERO_INFLATED'
13	2013	0.98	0.36	'LARVAL_ZERO_INFLATED'
14	1970	-999	-999	'GOM_PLL_1_6'
14	1971	-999	-999	'GOM_PLL_1_6'
14	1972	-999	-999	'GOM_PLL_1_6'
14	1973	-999	-999	'GOM_PLL_1_6'
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	0.8	0.35	'GOM_PLL_1_6'
14	1993	0.45	0.37	'GOM_PLL_1_6'
14	1994	0.33	0.39	'GOM_PLL_1_6'
14	1995	0.31	0.4	'GOM_PLL_1_6'
14	1996	0.18	0.4	'GOM_PLL_1_6'
14	1997	0.33	0.37	'GOM_PLL_1_6'
14	1998	0.36	0.37	'GOM_PLL_1_6'
14	1999	0.61	0.33	'GOM_PLL_1_6'
14	2000	0.89	0.33	'GOM_PLL_1_6'
14	2001	0.51	0.38	'GOM_PLL_1_6'
14	2002	0.48	0.39	'GOM_PLL_1_6'
14	2003	0.86	0.32	'GOM_PLL_1_6'
14	2004	0.78	0.33	'GOM_PLL_1_6'
14	2005	0.59	0.34	'GOM_PLL_1_6'
14	2006	0.41	0.39	'GOM_PLL_1_6'
14	2007	0.55	0.38	'GOM_PLL_1_6'
14	2008	1.26	0.34	'GOM_PLL_1_6'
14	2009	1.05	0.36	'GOM_PLL_1_6'
14	2010	0.89	0.34	'GOM_PLL_1_6'
14	2011	0.73	0.49	'GOM_PLL_1_6'
14	2012	1.34	0.34	'GOM_PLL_1_6'
14	2013	0.43	0.41	'GOM_PLL_1_6'
15	1970	-999	-999	'JLL_GOM'
15	1971	-999	-999	'JLL_GOM'
15	1972	-999	-999	'JLL_GOM'
15	1973	-999	-999	'JLL_GOM'
15	1974	0.968	0.266	'JLL_GOM'
15	1975	0.534	0.205	'JLL_GOM'
15	1976	0.666	0.207	'JLL_GOM'
15	1977	0.913	0.216	'JLL_GOM'
15	1978	0.876	0.225	'JLL_GOM'
15	1979	1.287	0.283	'JLL_GOM'
15	1980	1.158	0.265	'JLL_GOM'
15	1981	0.553	0.239	'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'

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15      2011      -999      -999      'JLL_GOM'
15      2012      -999      -999      'JLL_GOM'
15      2013      -999      -999      'JLL_GOM'
16      1970     1065132    0.2      'TAGGING'
16      1971     1001624    0.2      'TAGGING'
16      1972     431955    0.2      'TAGGING'
16      1973     183616    0.2      'TAGGING'
16      1974     341589    0.2      'TAGGING'
16      1975     554596    0.2      'TAGGING'
16      1976     253265    0.2      'TAGGING'
16      1977     257385    0.2      'TAGGING'
16      1978     121110    0.2      'TAGGING'
16      1979     98815     0.2      'TAGGING'
16      1980     192541    0.2      'TAGGING'
16      1981     337995    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'

```

-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	1970	0	0	0	0	0	0	0	0	2	1	2
	7	39	51	68	170							
1	1971	0	0	0	0	0	0	0	0	0	0	1
	5	11	35	37	136							
1	1972	0	0	0	0	0	0	1	0	0	0	0
	1	5	28	46	312							
1	1973	0	0	0	0	0	0	0	0	1	0	0
	6	3	21	44	489							
1	1974	0	0	0	0	0	3	0	0	0	0	0
	1	5	15	52	748							
1	1975	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	5	535							
1	1976	0	0	0	0	0	0	0	0	0	0	1
	0	0	2	11	842							
1	1977	0	0	0	0	0	0	0	0	0	0	1
	0	1	5	6	729							
1	1978	0	0	0	0	0	0	0	0	0	1	1
	0	0	3	6	468							
1	1979	0	0	0	0	0	0	0	0	0	0	0
	0	0	1	6	476							
1	1980	0	0	0	0	0	0	0	0	0	0	0
	1	0	4	5	620							
1	1981	0	0	0	0	0	0	0	0	0	0	0
	0	0	1	1	626							
1	1982	0	0	0	0	0	0	0	0	0	0	0
	0	0	3	6	506							
1	1983	0	0	0	0	0	0	0	0	0	0	0
	0	0	28	10	1012							
1	1984	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	2	546							
1	1985	0	0	0	0	0	0	0	0	0	0	0
	0	1	1	3	266							
1	1986	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	1	93							
1	1987	0	0	0	0	0	2	1	2	2	0	1
	1	1	1	2	41							
1	1988	0	1	0	0	1	6	22	64	34	140	331
	156	42	29	29	261							
1	1989	0	0	0	0	0	1	22	399	508	391	270
	210	138	118	76	524							
1	1990	0	0	0	0	0	1	49	275	550	385	142
	94	63	66	81	348							
1	1991	0	0	0	0	0	0	0	0	0	0	2
	1	21	27	10	111							
1	1992	0	0	0	0	2	0	0	2	1	1	2
	4	5	11	9	180							

1	1993	0	0	0	0	0	0	0	0	1	1	7
	4	7	4	10	339							
1	1994	0	0	0	0	0	1	0	2	0	1	3
	6	2	6	7	236							
1	1995	0	0	0	0	0	0	2	3	1	14	12
	12	12	16	16	501							
1	1996	0	0	0	0	0	0	1	0	0	0	0
	0	1	1	3	247							
1	1997	0	0	0	0	0	0	0	0	0	0	0
	1	0	2	2	221							
1	1998	0	0	0	0	0	0	0	0	0	0	0
	0	0	3	3	255							
1	1999	0	0	1	0	1	0	0	0	1	0	2
	12	6	2	7	375							
1	2000	0	0	0	0	1	0	0	1	0	1	2
	8	20	28	22	477							
1	2001	0	0	0	0	0	0	0	0	0	0	4
	1	18	37	34	291							
1	2002	0	0	0	0	0	0	0	1	7	0	5
	9	25	49	79	413							
1	2003	0	0	0	0	0	0	0	1	8	7	14
	15	17	39	51	343							
1	2004	0	0	0	0	0	0	2	1	2	10	28
	40	32	29	63	523							
1	2005	0	0	0	0	0	0	0	0	4	6	25
	60	57	49	70	521							
1	2006	0	0	0	0	0	0	1	0	2	11	19
	47	64	80	77	646							
1	2007	0	0	0	0	0	0	0	1	2	3	12
	22	41	51	58	394							
1	2008	0	0	0	0	0	0	0	0	0	5	11
	14	42	63	72	488							
1	2009	0	0	0	0	0	5	9	6	21	21	27
	29	38	62	69	373							
1	2010	0	0	0	0	0	0	14	19	5	19	22
	11	17	39	43	387							
1	2011	0	0	0	0	1	0	1	15	42	16	19
	22	44	60	50	363							
1	2012	0	0	0	0	0	0	1	7	43	100	82
	47	35	47	93	341							
1	2013	0	0	0	0	0	0	0	0	8	24	70
	86	72	60	53	358							
2	1970	0	0	0	0	0	0	0	0	2	1	2
	7	39	51	68	170							
2	1971	0	0	0	0	0	0	0	0	0	0	1
	5	11	35	37	136							
2	1972	0	0	0	0	0	0	1	0	0	0	0
	1	5	28	46	312							
2	1973	0	0	0	0	0	0	0	0	1	0	0
	6	3	21	44	489							
2	1974	0	0	0	0	0	3	0	0	0	0	0
	1	5	15	52	748							
2	1975	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	5	535							
2	1976	0	0	0	0	0	0	0	0	0	0	1
	0	0	2	11	842							
2	1977	0	0	0	0	0	0	0	0	0	0	1
	0	1	5	6	729							
2	1978	0	0	0	0	0	0	0	0	0	1	1
	0	0	3	6	468							
2	1979	0	0	0	0	0	0	0	0	0	0	0
	0	0	1	6	476							
2	1980	0	0	0	0	0	0	0	0	0	0	0
	1	0	4	5	620							
2	1981	0	0	0	0	0	0	0	0	0	0	0
	0	0	1	1	626							
2	1982	0	0	0	0	0	0	0	0	0	0	0
	0	0	3	6	506							
2	1983	0	0	0	0	0	0	0	0	0	0	0
	0	0	28	10	1012							
2	1984	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	2	546							
2	1985	0	0	0	0	0	0	0	0	0	0	0
	0	1	1	3	266							
2	1986	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	1	93							
2	1987	0	0	0	0	0	1	1	1	1	0	1
	1	1	1	2	41							
2	1988	0	1	0	0	1	3	11	33	17	71	169
	80	21	29	29	261							
2	1989	0	0	0	0	0	1	11	203	259	199	138
	107	70	60	76	524							
2	1990	0	0	0	0	0	1	25	140	281	196	72
	48	32	34	41	348							
2	1991	0	0	0	0	0	1	39	147	193	255	152
	59	33	23	13	8							
2	1992	0	0	0	0	1	1	16	75	95	93	121
	121	78	46	40	46							
2	1993	0	0	0	0	0	0	8	9	55	110	83
	66	65	53	31	54							
2	1994	0	0	0	0	0	2	8	52	45	78	95
	71	53	38	25	34							
2	1995	0	0	0	0	1	6	7	9	42	137	134
	93	60	44	32	52							
2	1996	0	0	0	0	0	0	7	20	28	36	76
	106	74	53	39	132							
2	1997	0	0	0	0	1	6	14	43	88	75	56
	45	53	46	41	137							
2	1998	0	0	0	0	0	5	6	26	115	190	167
	85	79	61	47	87							
2	1999	0	0	0	0	1	1	16	62	90	190	195
	156	79	36	17	36							

2	2000	0	0	0	0	0	2	2	10	57	72	72
	81	70	50	29	29							
2	2001	0	0	0	0	2	10	142	147	53	109	130
	92	75	59	32	27							
2	2002	0	0	0	0	0	1	21	201	246	68	66
	85	66	53	24	18							
2	2003	0	0	0	0	0	1	6	118	340	222	56
	13	8	8	4	6							
2	2004	0	0	0	0	4	11	52	176	182	135	62
	50	29	9	9	3							
2	2005	0	0	0	1	12	10	12	40	67	102	133
	119	63	36	38	55							
2	2006	0	0	0	0	6	12	68	70	107	151	144
	133	95	46	23	39							
2	2007	0	0	0	0	1	14	29	59	80	54	61
	61	49	34	16	23							
2	2008	0	1	1	32	199	395	252	191	108	34	10
	1	1	0	0	0							
2	2009	0	0	0	0	0	19	12	34	45	46	26
	30	26	34	21	24							
2	2010	0	0	0	0	0	3	20	24	35	64	65
	55	63	64	50	93							
2	2011	0	0	0	0	0	0	35	96	69	52	78
	66	45	31	33	78							
2	2012	0	0	0	0	0	5	11	48	116	61	43
	43	47	38	33	66							
2	2013	0	0	0	0	0	1	6	28	34	31	55
	73	51	36	26	131							
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3	1972	0	0	0	0	0	0	0	0	0	0	0
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3	1980	401	2101	148	82	34	1	0	0	0	0	0
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3	1981	1517	757	215	30	10	0	0	0	0	0	0
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3	1982	1381	1535	316	60	26	0	0	0	0	0	0
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3	1983	836	1195	415	59	19	0	0	0	0	0	0
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3	1985	378	2686	2796	43	26	0	0	0	0	0	0
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3	1986	491	2940	2678	346	24	0	0	0	0	0	0
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3	1987	1171	6236	3678	1118	341	0	0	0	0	0	0
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3	1990	996	1054	6645	329	298	0	0	0	0	0	0
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3	1991	1944	5923	4331	766	213	0	0	0	0	0	0
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3	1992	259	2965	726	62	131	0	0	0	0	0	0
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7	1984	0	0	0	0	0	0	0	0	7	64	102
	130	168	168	143	307							
7	1985	0	0	0	0	0	0	0	0	5	28	70
	82	145	136	164	288							
7	1986	0	0	0	0	0	0	0	0	4	17	16
	51	36	55	54	135							
7	1987	0	0	0	0	0	0	0	0	3	28	23
	22	47	51	43	159							
7	1988	0	0	0	0	0	0	0	0	4	29	22
	20	17	45	39	181							
7	1989	0	0	0	0	0	0	0	0	6	30	21
	32	24	23	47	207							
7	1990	0	0	0	0	0	0	0	0	10	61	24
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7	1991	0	0	0	0	0	0	0	0	8	32	37
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8	2010	0	0	0	0	0	0	0	0	0	0	0
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8	2013	0	0	0	0	0	0	0	0	0	0	0
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9	1971	0	0	0	0	0	0	0	0	0	0	0
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9	1979	0	0	0	0	0	0	0	0	0	0	0
9	0	0	0	0	0	0	0	0	0	0	0	0
9	1980	0	0	0	0	0	0	0	9	72	51	28
9	26	37	22	21	297	0	0	0	1	45	139	180
9	1981	0	0	0	0	0	0	0	0	0	0	0
9	127	67	45	49	249	0	0	0	11	56	101	210
9	1982	0	0	0	0	0	0	0	0	0	0	0
9	157	135	42	34	198	0	0	0	19	127	82	110
9	1983	0	0	0	0	0	0	0	0	0	0	0
9	91	143	185	141	440	0	0	0	21	35	64	102
9	1984	0	0	0	0	0	0	0	0	0	0	0
9	130	168	168	143	307	0	0	0	28	29	28	70
9	1985	0	0	0	0	0	0	0	0	0	0	0
9	82	145	136	164	288	0	0	0	23	22	17	16
9	1986	0	0	0	0	0	0	0	0	0	0	0
9	51	36	55	54	135	0	0	0	21	21	28	23
9	1987	0	0	0	0	0	0	0	0	0	0	0
9	22	47	51	43	159	0	0	0	13	33	29	22
9	1988	0	0	0	0	0	0	0	0	0	0	0
9	20	17	45	39	181	0	0	0	100	75	30	21
9	1989	0	0	0	0	0	0	0	0	0	0	0
9	32	24	23	47	207	0	0	0	73	69	61	24
9	1990	0	0	0	0	0	0	0	0	0	0	0
9	30	24	36	43	399	0	0	0	13	31	32	37
9	1991	0	0	0	0	0	0	0	0	0	0	0
9	57	39	45	54	128	0	0	0	57	107	31	37
9	1992	0	0	0	0	0	0	0	0	0	0	0
9	60	65	61	43	180	0	0	0	53	63	102	69
9	1993	0	0	0	0	0	0	0	0	0	0	0
9	40	36	38	37	129	0	0	0	151	268	83	62
9	1994	0	0	0	0	0	0	0	0	0	0	0
9	98	55	59	39	101	0	0	0	75	118	184	132
9	1995	0	0	0	0	0	0	0	0	0	0	0
9	83	70	73	80	230	0	0	0	316	129	62	71
9	1996	0	0	0	0	0	0	0	0	0	0	0
9	85	65	57	50	134	0	0	0	228	336	207	97
9	1997	0	0	0	0	0	0	0	0	0	0	0
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9	1998	0	0	0	0	0	0	0	143	401	124	118
	79	96	115	101	200							
9	1999	0	0	0	0	0	0	0	193	148	147	231
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9	2000	0	0	0	0	0	0	0	19	104	118	176
	177	176	187	99	172							
9	2001	0	0	0	0	0	0	0	157	62	94	232
	222	330	289	205	336							
9	2002	0	0	0	0	0	0	0	205	143	67	145
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9	2003	0	0	0	0	0	0	0	94	108	73	80
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9	2009	0	0	0	0	0	0	0	35	55	33	30
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9	2010	0	0	0	0	0	0	0	512	202	260	280
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9	2011	0	0	0	0	0	0	0	351	442	178	130
	165	155	107	80	224							
9	2012	0	0	0	0	0	0	0	118	345	407	213
	130	107	65	69	146							
9	2013	0	0	0	0	0	0	0	68	52	72	83
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10	1971	7	137	17	74	50	152	465	854	624	391	380
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10	1972	15	27	29	8	73	28	23	53	183	105	26
	37	38	34	13	60							
10	1973	47	239	304	256	373	140	122	320	603	375	95
	155	169	146	48	133							
10	1974	58	1427	1495	871	277	54	251	335	290	276	246
	235	217	138	144	181							
10	1975	1	21	30	43	105	11	9	89	188	344	642
	510	479	460	472	1029							
10	1976	98	659	3075	1330	1401	550	97	58	346	319	194
	379	819	1018	932	2328							
10	1977	32	230	2897	5191	1249	995	953	221	85	134	116
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10	1978	44	105	780	1523	1374	1462	542	216	173	95	96
	177	254	258	507	3468							
10	1979	26	186	790	677	375	861	1407	959	286	167	166
	218	364	510	619	2787							
10	1980	75	267	982	1490	684	740	1264	2566	1719	430	271
	254	286	333	549	3854							
10	1981	198	814	4706	1868	2433	1698	1408	1144	940	563	246
	367	324	305	248	2918							
10	1982	8	44	87	126	85	197	207	157	76	104	71
	54	69	49	22	57							
10	1983	3	67	1205	323	308	433	314	516	296	204	125
	64	63	26	20	25							
10	1984	31	853	337	666	1011	829	430	197	172	155	100
	58	34	61	1	62							
10	1985	20	72	3726	1127	1939	2069	974	330	200	137	87
	63	101	38	134	186							
10	1986	2	74	684	1238	750	584	544	278	183	152	40
	22	31	21	16	41							
10	1987	4	194	804	1097	1691	1925	573	554	403	348	92
	60	10	15	17	34							
10	1988	31	146	1853	1807	1550	1351	1392	634	415	186	89
	45	47	13	31	75							
10	1989	0	99	72	258	354	419	409	428	291	115	50
	40	36	24	10	53							
10	1990	0	52	391	184	686	665	414	321	335	217	118
	41	41	5	13	58							
10	1991	0	83	258	460	776	660	767	508	236	169	103
	92	52	12	4	61							
10	1992	6	8	143	159	416	450	294	454	472	113	78
	41	45	35	21	49							
10	1993	0	6	181	482	565	718	662	274	302	249	105
	39	21	16	7	54							
10	1994	0	41	134	684	1014	871	300	235	246	122	36
	35	13	5	0	3							
10	1995	30	30	68	218	339	1371	557	28	112	50	0
	0	0	0	0	0							
10	1996	3	99	228	390	572	294	496	367	132	25	60
	53	39	27	12	35							
10	1997	0	0	37	74	356	278	462	260	283	65	19
	15	9	18	4	9							
10	1998	0	0	80	400	259	471	337	381	469	635	169
	79	13	53	2	59							
10	1999	0	14	15	223	595	298	321	325	165	62	41
	32	49	19	7	10							
10	2000	0	6	8	130	1069	720	409	250	152	43	7
	16	4	11	5	18							
10	2001	13	3	8	16	57	120	455	472	166	151	96
	143	58	41	41	49							
10	2002	6	12	17	46	20	38	159	632	542	431	160
	78	60	24	5	41							
10	2003	0	6	6	88	114	91	49	29	14	8	6
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10	2004	0	0	0	129	772	1236	586	273	112	133	39
	48	8	26	1	8							

10	2005	0	22	330	339	359	222	280	325	170	60	99
	65	24	5	16	13							
10	2006	0	72	152	304	184	639	328	307	507	315	152
	132	83	48	64	137							
10	2007	0	2	1361	1061	373	338	204	120	86	37	39
	45	18	16	8	32							
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	133	122	38	41	58							
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	42	19	15	11	21							
10	2010	0	0	0	20	44	9	72	125	147	245	201
	116	68	35	33	57							
10	2011	0	0	0	24	534	232	162	741	522	108	90
	91	89	55	30	62							
10	2012	0	0	0	41	28	123	119	25	105	255	127
	45	44	29	26	44							
10	2013	0	0	0	0	4	3	21	41	27	81	166
	184	119	69	43	48							
11	1970	0	0	0	0	0	0	0	0	12	43	61
	43	55	59	28	14							
11	1971	13	244	31	132	89	272	830	1525	1114	699	679
	538	393	229	112	240							
11	1972	27	49	52	15	131	50	41	94	327	188	46
	66	67	60	24	108							
11	1973	84	427	543	458	666	250	218	572	1077	670	170
	276	301	261	86	237							
11	1974	104	2549	2669	1556	494	97	449	599	517	493	439
	419	388	247	257	324							
11	1975	2	37	54	76	187	20	16	159	335	614	1146
	910	855	821	842	1837							
11	1976	175	1176	5491	2375	2502	982	173	104	617	570	346
	676	1462	1817	1664	4157							
11	1977	58	411	5173	9269	2230	1777	1702	394	152	239	208
	331	467	929	1351	5898							
11	1978	79	187	1392	2719	2454	2611	967	385	309	169	172
	316	453	460	906	6193							
11	1979	47	332	1410	1209	669	1537	2513	1713	510	299	296
	390	650	910	1105	4976							
11	1980	134	477	1753	2661	1222	1322	2257	4582	3070	768	484
	454	511	594	980	6883							
11	1981	354	1453	8404	3335	4345	3033	2514	2043	1679	1005	439
	655	578	545	442	5211							
11	1982	14	78	156	225	152	352	370	280	136	186	126
	97	124	87	40	101							
11	1983	6	120	2151	577	550	774	560	922	529	365	223
	114	113	47	35	44							
11	1984	56	1523	602	1189	1805	1481	767	352	308	277	179
	103	61	109	2	110							
11	1985	35	128	6653	2013	3463	3695	1740	590	358	245	155
	112	180	67	239	332							
11	1986	4	133	1222	2210	1340	1043	972	496	326	271	72
	39	55	38	28	73							
11	1987	7	346	1436	1959	3020	3437	1023	990	720	621	165
	108	18	27	30	61							
11	1988	56	260	3309	3227	2768	2413	2486	1133	741	332	159
	80	84	23	56	134							
11	1989	0	177	129	461	633	749	730	764	519	205	90
	72	64	42	18	95							
11	1990	0	92	698	329	1225	1187	740	574	599	388	211
	73	73	9	23	103							
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	165	92	22	7	109							
11	1992	10	14	255	284	743	803	525	811	843	201	139
	74	80	63	38	87							
11	1993	0	10	323	861	1009	1283	1183	490	540	444	188
	69	38	29	13	97							
11	1994	0	73	240	1221	1811	1555	535	419	439	217	64
	62	23	9	0	5							
11	1995	54	54	121	390	605	2448	995	50	200	90	0
	0	0	0	0	0							
11	1996	6	176	408	697	1021	525	886	655	235	44	107
	95	70	49	21	63							
11	1997	0	0	66	132	635	496	825	464	506	116	34
	26	16	32	8	16							
11	1998	0	0	143	714	462	841	602	680	837	1134	302
	141	24	94	4	106							
11	1999	0	25	27	398	1062	533	573	580	294	110	73
	57	87	34	12	18							
11	2000	0	11	14	232	1909	1285	731	446	271	77	12
	28	8	19	9	32							
11	2001	24	6	15	29	101	214	812	842	296	269	172
	256	103	73	73	88							
11	2002	11	21	31	82	35	68	284	1128	968	769	285
	140	108	43	9	74							
11	2003	0	10	10	158	203	163	88	51	25	15	10
	10	0	0	0	0							
11	2004	0	0	0	231	1378	2208	1047	488	200	238	70
	85	15	46	1	15							
11	2005	0	40	590	606	641	396	500	580	304	108	176
	116	43	9	28	24							
11	2006	0	128	271	542	328	1141	586	549	905	563	271
	236	148	85	115	245							
11	2007	0	3	2430	1895	666	604	365	214	153	66	70
	80	32	29	15	58							
11	2008	0	3	4	215	573	345	833	715	561	392	311
	238	217	68	73	103							
11	2009	2	0	6	0	0	0	0	65	194	169	107
	75	34	26	20	38							
11	2010	0	0	0	35	78	16	129	224	263	437	359
	207	121	63	59	102							
11	2011	0	0	0	42	953	414	289	1323	933	192	161
	162	159	98	53	111							

11	2012	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0
11	2013	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0
12	1970	0	0	0	0	0	0	0	0	12	43	61
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12	1971	13	244	31	132	89	272	830	1525	1114	699	679
	538	393	229	112	240							
12	1972	27	49	52	15	131	50	41	94	327	188	46
	66	67	60	24	108							
12	1973	84	427	543	458	666	250	218	572	1077	670	170
	276	301	261	86	237							
12	1974	104	2549	2669	1556	494	97	449	599	517	493	439
	419	388	247	257	324							
12	1975	2	37	54	76	187	20	16	159	335	614	1146
	910	855	821	842	1837							
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	676	1462	1817	1664	4157							
12	1977	58	411	5173	9269	2230	1777	1702	394	152	239	208
	331	467	929	1351	5898							
12	1978	79	187	1392	2719	2454	2611	967	385	309	169	172
	316	453	460	906	6193							
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	390	650	910	1105	4976							
12	1980	134	477	1753	2661	1222	1322	2257	4582	3070	768	484
	454	511	594	980	6883							
12	1981	354	1453	8404	3335	4345	3033	2514	2043	1679	1005	439
	655	578	545	442	5211							
12	1982	14	78	156	225	152	352	370	280	136	186	126
	97	124	87	40	101							
12	1983	6	120	2151	577	550	774	560	922	529	365	223
	114	113	47	35	44							
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	103	61	109	2	110							
12	1985	35	128	6653	2013	3463	3695	1740	590	358	245	155
	112	180	67	239	332							
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	39	55	38	28	73							
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	80	84	23	56	134							
12	1989	0	177	129	461	633	749	730	764	519	205	90
	72	64	42	18	95							
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	165	92	22	7	109							
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	74	80	63	38	87							
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	116	43	9	28	24							
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13	1975	0	0	1	2	0	0	3	12	45	107	146
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16	1996	1	1	1	0	0	0	0	0	0	0	0
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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	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	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	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	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	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	0	0	0	0	0	0	0	0

-1 end index selectivities

#####

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

#####

13	1970	3.2	8.32	16.89	35.53	47.69	67.01	85.42	113.3	145.53	154.62	
	173.72	198.66	223.25	247.98	264.63	327.72						
13	1971	3.48	8.3	20.89	31.44	51.2	69.88	86.65	106.89	126.82	149.12	
	172.48	198.5	224.12	248.76	272.98	317.23						
13	1972	4.39	9.67	19.16	37.67	51.6	62.39	90.02	112.49	129.3	149.55	
	176.77	202.21	227.65	246.89	271.55	330.94						
13	1973	3.74	8.86	20.7	38.19	47.93	69.19	89.03	115.65	134.1	152.95	
	179.96	208.23	230.76	249.75	277.68	333.91						
13	1974	3.64	10.04	17.09	34.89	49.38	64.21	87.67	101.47	131.83	151.27	
	169.97	196.81	219.92	247.5	263.25	323.11						
13	1975	3.86	8.63	22.42	32.61	47.14	66.9	83.76	110.46	134.72	152.31	168
	193.83	216.42	243.31	264.63	321.65							
13	1976	4.01	10.2	18.75	32.08	45.09	64.23	91.77	113.95	144.21	160.36	
	176.03	195.67	218.1	236.65	256.84	322.16						
13	1977	4.77	10.26	20.48	33.84	45.65	63.04	81.33	102.93	128.31	150.47	
	172.98	195.58	218.15	241.28	258.37	325.9						
13	1978	5.14	10.94	21.48	30.99	47.02	64.38	83.55	108.92	138.73	163.12	185.7
	200.09	219.03	242.24	259.19	339.25							
13	1979	5.29	11.23	21.63	35.67	44.23	65.72	84.76	108.11	133.88	160.37	
	183.17	202.12	220.03	239.99	260.03	337.85						
13	1980	5.03	12.21	20.7	32.53	46.78	69.48	91.69	112.92	136.22	167.63	
	191.76	215.43	237.19	255.17	267.43	343.01						
13	1981	5.57	11.05	21.53	32.18	45.47	65.46	85.67	108.94	133.87	158.13	
	183.98	205	226.06	240.89	259.84	371.83						
13	1982	4.12	10.81	20.79	31.57	52.63	68.14	89.17	113.21	139.44	160.58	
	186.81	208.75	233.71	250.95	271.81	392.38						
13	1983	3.99	10.1	19.59	33.63	50.48	66.93	91.45	115.44	140.46	163.89	
	188.31	213.9	236.55	257.03	279.26	377.54						
13	1984	5.27	11.31	22.88	35.72	50.98	74.31	92.85	114.86	139.74	162.14	
	186.85	208.02	234.01	262.67	281.77	382.24						
13	1985	4.57	10.21	17.17	31.22	43.6	61.94	79.63	101.58	125.71	152.56	
	178.75	201.84	223.01	246.5	265.01	337.83						
13	1986	5.28	10.27	19.68	38.09	50.58	70.12	91.86	114.91	137.95	162.73	
	182.25	204.62	229.21	253.11	278.64	350.4						
13	1987	5.08	9.82	22.26	36.63	49.94	67.19	85.61	109.71	130.38	155.5	
	180.41	202.51	230	258.81	279.73	349.06						
13	1988	3.87	11.19	20.06	34.56	49.8	67.74	86.98	110.54	132.99	157.72	
	182.83	208.51	232.25	251.74	280.53	354.36						
13	1989	4.53	11.06	21.45	35.96	47.78	68.37	89.97	111.91	133.99	160.88	
	182.93	205.2	229.78	254.88	277	356.31						
13	1990	5.24	12.23	18.84	35.12	47.04	66.41	85.78	112.04	138.01	162.77	
	185.16	206.44	231.34	253.26	278.5	347.01						
13	1991	5.38	13.46	19.63	36.89	53.42	70.16	93.31	114.29	142.16	166.12	
	184.45	205.67	232.92	255.7	277.58	348.73						
13	1992	5.94	12.72	19.04	35.88	50.11	71.08	88.61	110.29	134.87	160.84	183.6
	205.63	231.7	252.07	275.39	347.62							
13	1993	5.1	11.57	23.82	33.36	51.24	66.94	89.28	110.87	135.71	157.85	
	182.17	204.81	227.22	250.52	275.46	364.06						
13	1994	4.71	12.03	22.14	31.87	45.52	62.76	82.88	109.25	132.38	157.32	
	183.82	203.76	226.7	249.73	269.64	350.71						
13	1995	4.9	13.62	22.44	35.13	48.6	71.02	89.57	109.22	137.5	160.01	
	182.17	204.74	228.28	251.22	273.36	369.78						
13	1996	5.15	11.08	22.82	34.79	48.72	69.94	92.56	113.19	137.7	159.85	187.9
	209.75	234.84	257.75	282.53	361.9							
13	1997	5.05	12.66	20.26	36.31	51.22	68.43	91.24	112.02	135.7	157.2	
	183.61	207.67	233.38	257.23	276.85	356.01						
13	1998	4.99	11.75	20.51	32.71	52.63	68.77	90.94	116.61	139.29	162.02	
	182.95	207.52	233.18	254.4	275.06	352.47						
13	1999	5.42	11.22	21.77	35.53	53.96	71.6	93.71	113.88	136.24	159.02	
	184.11	206.73	230.95	254.11	276.93	355.41						

2003	5.66	11.51	21.6	34.02	50.7	69.17	92.12	115.31	137.43	158.8	184.14	
	210.24	241.65	265.21	286.9	342.31							
2004	6.33	11.94	21.93	35.51	46.15	64.95	89.1	111.4	134.73	158.94	184.57	
	210.08	230.56	259.66	277.51	344.93							
2005	5.38	9.8	19.79	30.7	47.55	62.27	82.59	105.75	132.23	160.12	183.99	
	207.86	231.99	254.63	276.59	349.01							
2006	5.52	12.63	17.81	33.27	46.9	64.04	84.6	109.63	128.02	155.1	182.21	206.8
	231.96	255.9	269.42	348.34								
2007	4.51	11.76	22.41	30.4	49.64	63.54	82.38	111.84	136.63	162.07	186.44	
	211.78	237.65	262.72	278.79	365.83							
2008	4.56	11.92	21.83	36.66	49.11	70.13	93.26	114.7	138.27	157.86	179.43	
	207.84	231.34	259.44	278.87	377.8							
2009	5.39	13.24	21.76	34.43	51.29	69.43	83.92	112.09	133.36	156.42	180.31	
	207.54	235.55	260.51	277.31	372.46							
2010	5.12	11.01	22.02	35.6	49.02	67.91	89.4	112.96	133.56	157.33	182.6	
	210.61	237.15	264.11	286.54	366.28							
2011	4.88	10.77	23.04	31.74	48.2	63.95	87.78	110.99	135.13	159.59	184.86	
	211.25	239.99	263.7	286.75	361.16							
2012	5.19	13.07	21.96	34.06	47.77	73.65	89.05	114.08	137.19	163.41	185.83	
	212.36	236.08	262.05	283.8	359.29							
2013	5.24	12.22	22.48	32.68	47.83	64.47	90.57	111.06	133.01	161.57	188.18	
	216.72	241.04	266.07	282.79	362.64							

-1

@end of the data input file

Appendix C. VPA2Box output file for eastern-origin Atlantic bluefin tuna.

 VPA-2BOX
 SUMMARY STATISTICS AND DIAGNOSTIC OUTPUT

BFT Eastern Stock of Origin 1950-2013
 12:22, 30 August 2016

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=====
Total objective function      =      -1.54
      (with constants)      =      163.87
Number of parameters (P)     =       17
Number of data points (D)    =      180
AIC : 2*objective+2P        =      361.73
AICc: 2*objective+2P(...)   =      365.51
BIC : 2*objective+Plog(D)   =      416.01
Chi-square discrepancy       =      112.24

Loglikelihoods (deviance)    =      15.38 (      180.22)
      effort data           =      15.38 (      180.22)

Log-posteriors              =       0
      catchability          =       0
      f-ratio               =       0
      natural mortality     =       0
      mixing coeff.         =       0

Constraints                  =      -13.84
      Terminal F            =      -14.5
      stock-rec./sex ratio  =       0.66

Out of bounds penalty       =       0
=====
    
```

TABLE 1. FISHING MORTALITY RATE FOR BFTE test

	9	10		1	2	3	4	5	6	7	8
1950	0.106	0.227	0.003	0.01	0.045	0.071	0.08	0.112	0.257	0.18	
1951	0.02	0.032	0.029	0.023	0.066	0.109	0.111	0.09	0.22	0.154	
1952	0.002	0.006	0.011	0.015	0.049	0.111	0.167	0.167	0.219	0.153	
1953	0.008	0.014	0.015	0.018	0.097	0.083	0.169	0.211	0.181	0.126	
1954	0.007	0.014	0.002	0.008	0.069	0.124	0.081	0.093	0.225	0.157	
1955	0.01	0.051	0.101	0.046	0.064	0.082	0.141	0.101	0.227	0.159	
1956	0.006	0.038	0.052	0.029	0.034	0.06	0.076	0.138	0.143	0.1	
1957	0.009	0.07	0.096	0.042	0.042	0.089	0.173	0.128	0.159	0.111	
1958	0.026	0.088	0.134	0.059	0.102	0.109	0.095	0.16	0.13	0.091	
1959	0.011	0.084	0.208	0.085	0.043	0.039	0.04	0.047	0.138	0.097	
1960	0.008	0.048	0.077	0.091	0.142	0.09	0.05	0.081	0.117	0.082	
1961	0.01	0.089	0.138	0.1	0.217	0.192	0.056	0.05	0.13	0.091	
1962	0.005	0.054	0.124	0.086	0.12	0.265	0.111	0.132	0.133	0.093	
1963	0.004	0.035	0.096	0.105	0.117	0.102	0.142	0.081	0.067	0.047	

1964	0.01	0.051	0.096	0.131	0.168	0.11	0.103	0.106	0.072	0.05
1965	0.005	0.052	0.066	0.062	0.078	0.117	0.123	0.058	0.081	0.057
1966	0.025	0.067	0.2	0.079	0.053	0.118	0.091	0.057	0.046	0.032
1967	0.074	0.07	0.088	0.1	0.041	0.055	0.155	0.061	0.084	0.059
1968	0.029	0.082	0.075	0.046	0.055	0.021	0.052	0.077	0.048	0.034
1969	0.063	0.256	0.192	0.063	0.023	0.028	0.017	0.043	0.067	0.047
1970	0.059	0.183	0.121	0.078	0.026	0.015	0.029	0.021	0.041	0.041
1971	0.003	0.227	0.184	0.08	0.067	0.015	0.013	0.043	0.034	0.034
1972	0.005	0.189	0.343	0.096	0.071	0.055	0.019	0.008	0.023	0.023
1973	0.006	0.132	0.149	0.084	0.037	0.038	0.062	0.037	0.025	0.025
1974	0.026	0.168	0.163	0.156	0.124	0.063	0.043	0.055	0.049	0.049
1975	0.065	0.354	0.142	0.077	0.047	0.106	0.057	0.047	0.061	0.061
1976	0.009	0.26	0.464	0.121	0.085	0.036	0.07	0.033	0.052	0.052
1977	0.07	0.234	0.174	0.166	0.026	0.032	0.033	0.068	0.051	0.051
1978	0.132	0.348	0.177	0.085	0.046	0.016	0.023	0.016	0.041	0.041
1979	0.016	0.102	0.278	0.092	0.037	0.028	0.023	0.048	0.039	0.039
1980	0.109	0.238	0.4	0.191	0.032	0.037	0.038	0.029	0.043	0.043
1981	0.075	0.43	0.329	0.107	0.102	0.025	0.037	0.055	0.032	0.032
1982	0.242	0.382	0.464	0.165	0.066	0.042	0.022	0.075	0.055	0.055
1983	0.242	0.202	0.314	0.129	0.077	0.062	0.121	0.036	0.057	0.057
1984	0.107	0.451	0.124	0.128	0.129	0.095	0.088	0.119	0.063	0.063
1985	0.091	0.404	0.409	0.118	0.076	0.08	0.043	0.057	0.079	0.047
1986	0.272	0.317	0.251	0.153	0.034	0.048	0.045	0.034	0.074	0.044
1987	0.143	0.399	0.303	0.127	0.054	0.036	0.084	0.066	0.068	0.041
1988	0.338	0.223	0.397	0.166	0.064	0.046	0.055	0.078	0.102	0.061
1989	0.187	0.376	0.173	0.156	0.148	0.034	0.054	0.041	0.082	0.049
1990	0.173	0.244	0.338	0.133	0.168	0.057	0.054	0.076	0.096	0.058
1991	0.077	0.3	0.231	0.143	0.143	0.047	0.051	0.063	0.138	0.083
1992	0.079	0.291	0.36	0.09	0.073	0.063	0.104	0.132	0.162	0.097
1993	0.09	0.492	0.346	0.137	0.063	0.069	0.076	0.097	0.152	0.091
1994	0.121	0.281	0.207	0.087	0.125	0.095	0.189	0.212	0.351	0.211
1995	0.155	0.221	0.28	0.12	0.117	0.174	0.097	0.169	0.2	0.241
1996	0.177	0.46	0.362	0.271	0.135	0.065	0.111	0.087	0.23	0.276
1997	0.173	0.356	0.239	0.212	0.167	0.158	0.097	0.23	0.236	0.283
1998	0.124	0.552	0.399	0.287	0.136	0.302	0.047	0.052	0.157	0.189
1999	0.128	0.164	0.32	0.225	0.12	0.056	0.058	0.074	0.171	0.205
2000	0.356	0.31	0.177	0.198	0.22	0.163	0.064	0.099	0.113	0.135
2001	0.009	0.401	0.176	0.123	0.147	0.119	0.207	0.147	0.166	0.199
2002	0.019	0.476	0.327	0.13	0.063	0.134	0.083	0.139	0.154	0.185
2003	0.012	0.098	0.121	0.086	0.119	0.057	0.201	0.146	0.194	0.233
2004	0.042	0.138	0.108	0.081	0.047	0.088	0.089	0.128	0.207	0.248
2005	0.058	0.178	0.107	0.058	0.082	0.083	0.087	0.057	0.278	0.333
2006	0.039	0.046	0.163	0.053	0.016	0.123	0.061	0.071	0.202	0.243
2007	0	0.025	0.017	0.135	0.102	0.041	0.123	0.097	0.224	0.269
2008	0	0.018	0.014	0.033	0.072	0.06	0.039	0.139	0.155	0.155
2009	0	0.01	0.008	0.023	0.016	0.053	0.092	0.047	0.108	0.108
2010	0	0.007	0.008	0.015	0.014	0.015	0.032	0.039	0.036	0.036
2011	0.021	0.071	0.011	0.012	0.016	0.008	0.01	0.021	0.029	0.029
2012	0.003	0.01	0.007	0.006	0.003	0.005	0.013	0.036	0.025	0.025
2013	0.009	0.08	0.061	0.014	0.005	0.019	0.014	0.02	0.026	0.026

=====

TABLE 2. ABUNDANCE AT THE BEGINNING OF THE YEAR [BY AREA] FOR BFTE test

	1	2	3	4	5	6	7	8	9	10
1950	2843201	1458013	1526993	1054910	848431	957853	540287	229667	156709	173950
1951	2227996	1566502	913941	1197701	821871	637716	730524	418725	176657	238361
1952	2814922	1338227	1194019	698041	920582	604974	468244	548912	329352	310031
1953	2666058	1721067	1045888	928929	540964	689690	443166	332452	399871	474314
1954	2698412	1620592	1334742	810230	717694	386149	519467	314063	231644	672791
1955	1761985	1641660	1257198	1047636	632567	526751	279184	402194	246245	683450
1956	1155337	1069146	1227201	894211	787021	466649	397117	203469	312864	700595
1957	904643	703566	809488	916469	683260	598236	359654	309074	152572	812819
1958	1060417	549493	516058	578303	691203	515383	448098	253901	234073	773024
1959	903969	633258	395990	355089	428761	490953	378239	342220	186264	820235
1960	785466	547749	457945	252962	256582	322974	386466	305098	281118	816971
1961	1036786	477505	410701	333666	181702	175187	241757	308483	242099	901960
1962	1622818	629115	343746	281372	237401	115000	118355	191958	252441	932607
1963	1965786	988800	468636	238784	203151	165698	72229	88936	144733	963583
1964	1778683	1199599	751385	335050	169163	142101	122459	52631	70562	951627
1965	3192803	1079229	896431	536896	231284	112516	104228	92708	40760	876771
1966	1987061	1945586	805672	660011	397030	168300	81981	77369	75319	782878
1967	1155502	1186799	1431252	519089	479509	296322	122516	62807	62873	749347
1968	970384	657201	870481	1030618	369493	361870	229556	88039	50864	690240
1969	897554	577694	476166	635420	774370	275192	290094	182863	70146	646575
1970	853418	516546	351629	309142	469547	595461	219095	239446	150837	616178
1971	1606809	492685	338516	245107	224997	359872	480297	178689	201810	663047
1972	1301825	981693	308959	221439	178048	165545	290126	397842	147270	751748
1973	1725628	793208	639287	172441	158172	130429	128270	239047	339754	791583
1974	2209428	1051136	546845	433271	124660	119945	102763	101241	198360	990921
1975	1679633	1318700	698638	365521	291511	86661	92249	82639	82459	1020506
1976	2441691	964230	728032	476774	266247	218752	63791	73168	67877	936768
1977	1252610	1482222	584731	360174	332190	192401	172847	49918	60908	861794
1978	1000374	715267	922308	386485	239977	254536	152540	140426	40123	792325
1979	1262275	536852	397236	608061	279335	180270	205040	125152	119004	721952
1980	1873203	760924	381245	236713	436185	211692	143559	168234	102687	729493
1981	1636178	1028933	471901	201103	153839	332467	167072	116040	140636	719202
1982	2539637	929853	526255	267044	142079	109310	265429	135158	94565	750209
1983	3888023	1220873	499147	260327	178131	104599	85784	217936	107961	721393
1984	2025940	1869565	784737	286973	180054	129683	80513	63803	180974	706215
1985	1840609	1115082	936643	545043	198657	124435	96552	61923	48764	749860
1986	3184177	1029701	585393	489693	381193	144786	94071	77624	50323	686910
1987	2216734	1486176	589967	358242	330418	289712	113040	75518	64584	635980
1988	3438512	1176681	784822	342648	248141	246212	228815	87245	60820	605863
1989	3364143	1502839	740943	415010	228364	183170	192438	181742	69440	564258
1990	3464306	1709031	811813	490190	279206	154944	144902	152976	150099	542533
1991	4170151	1784968	1053111	455312	337409	185739	119779	115213	121995	583757
1992	3795117	2364806	1040656	657263	310545	230040	145054	95541	93154	580162
1993	4104740	2147478	1390827	571221	472342	227135	176777	109753	72069	546139
1994	3365235	2298039	1033157	774203	391670	348821	173517	137490	85748	505639

1995	3887660	1826684	1365437	660718	558202	271805	259712	120546	95722	423881
1996	3445033	2040354	1152002	811845	461070	390721	186995	197939	87606	370681
1997	2419546	1768529	1013647	631161	486882	316779	299691	140530	156170	315972
1998	3738208	1246332	974077	627948	401547	324050	221426	228347	96134	324286
1999	3033159	2023565	564750	514087	370716	275652	196065	177335	186574	315380
2000	3701193	1634299	1351109	322696	322952	258514	213465	155309	141704	371298
2001	2390725	1587912	942536	890283	208254	203860	179842	168012	121075	405140
2002	4004896	1452224	836426	621879	619013	141490	148133	122712	124892	390784
2003	3373819	2406976	709427	474491	429489	457137	101340	114492	91879	388219
2004	4923204	2042806	1717292	494337	342494	299828	353424	69590	85120	345198
2005	7030965	2893119	1399428	1213072	358742	257025	224717	271360	52709	304833
2006	7492253	4063122	1904287	988921	900803	259976	193591	172866	220566	232871
2007	6645316	4412785	3052276	1272145	737538	697135	188196	152958	138524	324260
2008	4306703	4069938	3385342	2361178	874023	524134	547962	139711	119516	322007
2009	4667834	2637812	3145400	2625223	1797582	639966	404303	442294	104667	339883
2010	1835466	2858841	2054972	2455336	2017968	1392045	496978	309603	363200	359005
2011	77612	1124265	2232650	1603457	1903367	1565407	1123062	403969	256263	622247
2012	5499	46551	824119	1737229	1246005	1473187	1271619	933399	340562	767102
2013	6225	3357	36245	643480	1357853	977459	1200599	1054166	775188	970482
2014	3781	2438	26832	499317	1062755	784866	993820	889513	1522645	

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TABLE 3 CATCH OF BFTE test

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	1	2	3	4	5	6	7	8	9	10
1950	227221	264498	3926	8984	33578	59513	38101	22709	33515	27330
1951	34493	43234	23622	24377	47004	59748	70418	33534	32856	32403
1952	4421	7682	11665	9197	38989	57831	66408	78472	60929	41914
1953	16403	21593	14130	14728	44604	50110	63493	58955	62224	53658
1954	14798	19900	2612	5405	42788	41008	37064	26001	43927	93313
1955	13292	72607	107287	41942	35018	37857	33831	35982	47166	95779
1956	5455	35668	55304	22788	23589	24829	26572	24377	39251	63567
1957	6090	42315	66203	33614	24986	46228	52604	34525	21086	81420
1958	21161	41049	57634	29588	59760	48488	37140	34886	26780	63842
1959	7803	45504	66430	25744	16179	17160	13577	14502	22619	71987
1960	4765	22822	30071	19572	30203	25135	17431	22141	29166	61076
1961	7810	36086	47258	28390	31705	27849	12017	14114	27817	74816
1962	6947	29693	35821	20586	23845	24378	11403	22140	29668	79161
1963	6052	29894	38038	21146	20055	14641	8764	6465	8772	41784
1964	13483	53407	61334	36574	23306	13436	11044	4904	4604	44458
1965	13433	48963	51094	28637	15434	11246	11086	4832	2980	45956
1966	39435	112262	130124	44909	18096	16945	6580	4015	3189	23646
1967	65607	71403	107837	43983	17335	14462	16219	3449	4776	40828
1968	21693	46196	55828	41113	17492	6842	10761	6080	2258	21866
1969	43105	116781	74227	34278	15471	6882	4455	7075	4268	28148
1970	38988	76923	35680	20582	10727	7999	5719	4622	5684	23504
1971	3457	89238	50874	16708	12952	4997	5844	7048	6421	21355
1972	5583	150816	80333	18139	10897	8052	4921	2883	3198	16525

1973	7779	87383	78907	12439	5064	4457	7040	7977	7908	18651
1974	45025	145399	73298	55906	12916	6598	3965	5052	8922	45116
1975	83784	352036	82506	24088	11945	7941	4672	3510	4624	57925
1976	17578	197403	242409	48551	19288	6924	3973	2232	3218	44955
1977	67445	276659	83337	49152	7658	5520	5108	3069	2836	40618
1978	98606	188251	133215	27946	9619	3717	3169	2009	1522	30424
1979	15989	46498	86104	47706	9093	4468	4251	5433	4242	26050
1980	153777	143835	112550	36720	12040	6920	4889	4495	4051	29131
1981	93860	322750	118504	18252	13255	7499	5567	5734	4211	21799
1982	436536	264548	175249	36209	8108	4112	5334	9039	4765	38264
1983	667675	199304	120178	28017	11818	5679	8987	7130	5669	38343
1984	163390	608977	81861	30688	19491	10670	6198	6647	10408	41111
1985	126807	332413	281545	53870	12998	8655	3747	3212	3476	32963
1986	606104	250245	116139	62112	11474	6094	3773	2405	3356	28222
1987	235380	437730	138079	38141	15505	9283	8368	4512	3975	24088
1988	789724	209643	230515	46687	13608	10129	11308	6105	5533	34138
1989	457614	421723	105084	53572	27992	5610	9371	6830	5144	25793
1990	438405	330784	208545	54609	38434	7843	7029	10445	12928	28911
1991	245891	413234	194319	53970	40096	7773	5477	6489	14768	44066
1992	229807	533589	281606	50589	19410	12814	13148	10984	13138	51258
1993	280586	748800	364005	65357	25730	13792	11933	9416	9583	45408
1994	304673	502642	172490	57523	41123	28693	27522	24466	23954	91563
1995	443247	323439	298047	66466	54804	39457	21972	17459	16376	86403
1996	444500	674473	313090	172424	52030	22390	17999	15335	16956	85249
1997	306627	474758	192384	107761	66842	42101	25424	26856	30922	74299
1998	345708	474934	287251	140093	45576	77041	9342	10759	13189	53223
1999	290424	272916	138257	92460	37501	13540	10149	11803	27580	55702
2000	889625	390123	195690	51727	56967	35312	12233	13612	14227	44786
2001	16011	470134	135586	92119	25310	20824	30974	21312	17459	69831
2002	60090	493957	208706	67648	33719	16090	10787	14850	16829	63012
2003	31090	199422	72188	34819	43074	23102	16967	14510	15244	76792
2004	158931	235163	156075	34092	14017	23017	27712	7767	14972	72302
2005	315924	421387	126753	60459	25156	18672	17261	14031	12052	82460
2006	228963	162758	256057	45682	12962	27348	10449	11083	38068	47879
2007	1510	97098	45024	143564	63458	25262	20004	13110	26179	72856
2008	763	63445	42721	67607	53833	27504	19349	16841	16151	44038
2009	1039	22607	21394	53274	24850	29896	32602	18877	10073	33106
2010	245	18312	14740	31726	24850	18430	14456	11025	12202	12209
2011	1287	68205	21512	17312	27201	11107	10234	7703	6782	16670
2012	15	421	5418	9828	3028	6135	14539	30435	7814	17817
2013	43	230	1901	7758	6070	17064	15337	19227	18469	23406

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TABLE 4 SPAWNING STOCK FECUNDITY AND RECRUITMENT OF BFTE test

year	Spawning biomass	recruits from VPA
1950	239598	2843201
1951	269255	2227996

1952	283213	2814922
1953	289504	2666058
1954	294769	2698412
1955	298940	1761985
1956	317312	1155337
1957	310640	904643
1958	328307	1060417
1959	310560	903969
1960	293320	785466
1961	286334	1036786
1962	272641	1622818
1963	238161	1965786
1964	234387	1778683
1965	236086	3192803
1966	237468	1987061
1967	246653	1155502
1968	259360	970384
1969	268621	897554
1970	266606	853418
1971	278817	1606809
1972	283247	1301825
1973	292115	1725628
1974	299311	2209428
1975	294491	1679633
1976	285047	2441691
1977	262640	1252610
1978	262466	1000374
1979	243270	1262275
1980	248478	1873203
1981	231404	1636178
1982	240021	2539637
1983	218317	3888023
1984	205025	2025940
1985	205057	1840609
1986	208544	3184177
1987	193454	2216734
1988	193691	3438512
1989	189373	3364143
1990	187601	3464306
1991	190822	4170151
1992	191573	3795117
1993	197368	4104740
1994	185316	3365235
1995	179209	3887660
1996	171128	3445033
1997	166718	2419546
1998	161352	3738208
1999	158834	3033159
2000	157282	3701193
2001	152333	2390725
2002	158361	4004896

2003	160588	3373819
2004	149921	4923204
2005	157365	7030965
2006	174208	7492253
2007	199107	6645316
2008	245956	4306703
2009	324674	4667834
2010	420880	1835466
2011	505949	77612
2012	582564	5499
2013	652174	6225

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TABLE 5      FITS      TO      INDEX      DATA      FOR      BFTE      test
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5.1      ESPMarTrap
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Lognormal dist.

average numbers

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Ages      6      -      10
log-likelihood      =      6.21
deviance      =      26.25
Chi-sq. discrepancy      =      18.65
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Untransfrmd Year	Observed	Chi-square			Residuals Standard Q			Untransfrmd		
		Predicted	(Obs-pred)		Deviation	Catchabil.		Observed	Predicted	Discrepancy
1981	0.062	0.24	-0.178	0.557	9.59E-04	722.26	862.816	0.221		
1982	0.363	0.229	0.134	0.557	9.59E-04	975.83	853.647	0.001		
1983	0.413	0.198	0.216	0.557	9.59E-04	1026.53	827.277	0.011		
1984	0.508	0.163	0.344	0.557	9.59E-04	1128.25	799.501	0.12		
1985	0.12	0.114	0.006	0.557	9.59E-04	765.59	760.929	0.053		
1986	-0.605	0.052	-0.658	0.557	9.59E-04	370.67	715.467	0.852		
1987	-0.51	0.032	-0.542	0.557	9.59E-04	407.52	700.908	0.694		
1988	0.34	0.017	0.323	0.557	9.59E-04	953.69	690.386	0.092		
1989	-0.307	0.008	-0.315	0.557	9.59E-04	499.56	684.212	0.387		
1990	-0.162	0.012	-0.174	0.557	9.59E-04	577.51	687.337	0.216		
1991	0.008	0.005	0.003	0.557	9.59E-04	684.19	682.334	0.055		
1992	-0.833	-0.031	-0.802	0.557	9.59E-04	295.11	658.133	1.045		
1993	-0.797	-0.075	-0.723	0.557	9.59E-04	305.84	630.111	0.94		
1994	-0.748	-0.134	-0.613	0.557	9.59E-04	321.39	593.494	0.792		
1995	-1.173	-0.237	-0.936	0.557	9.59E-04	210.02	535.39	1.214		
1996	-0.655	-0.28	-0.375	0.557	9.59E-04	352.71	513.189	0.466		
1997	0.318	-0.31	0.628	0.557	9.59E-04	932.87	497.794	1.009		
1998	0.248	-0.298	0.546	0.557	9.59E-04	869.63	503.764	0.631		
1999	0.454	-0.264	0.718	0.557	9.59E-04	1069.2	521.395	1.576		
2000	0.023	-0.222	0.245	0.557	9.59E-04	694.88	543.669	0.025		
2001	0.576	-0.239	0.815	0.557	9.59E-04	1207.54	534.629	2.406		
2002	0.448	-0.309	0.757	0.557	9.59E-04	1062.59	498.663	1.876		
2003	-0.086	-0.32	0.234	0.557	9.59E-04	622.9	492.78	0.019		
2004	-0.776	-0.366	-0.411	0.557	9.59E-04	312.42	470.998	0.514		

2005	-0.064	-0.402	0.338	0.557	9.59E-04	636.75	454.23	0.111
2006	-0.13	-0.382	0.251	0.557	9.59E-04	595.9	463.437	0.028
2007	0.326	-0.25	0.576	0.557	9.59E-04	940.56	528.819	0.755
2008	-0.13	-0.147	0.017	0.557	9.59E-04	596.13	586.329	0.046
2009	0.194	0.032	0.162	0.557	9.59E-04	824.11	701.156	0
2010	0.367	0.355	0.011	0.557	9.59E-04	979.71	968.681	0.049
2011	-0.068	0.681	-0.749	0.557	9.59E-04	634.47	1341.879	0.975
2012	0.497	0.952	-0.454	0.557	9.59E-04	1116.49	1758.541	0.573
2013	1.781	1.175	0.606	0.557	9.59E-04	4028.43	2198.41	0.893

Selectivities		by		age	
Year	6	7	8	9	10
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1981	0.146	0.26	0.449	0.74	1
1982	0.146	0.26	0.449	0.74	1
1983	0.146	0.26	0.449	0.74	1
1984	0.146	0.26	0.449	0.74	1
1985	0.146	0.26	0.449	0.74	1
1986	0.146	0.26	0.449	0.74	1
1987	0.146	0.26	0.449	0.74	1
1988	0.146	0.26	0.449	0.74	1
1989	0.146	0.26	0.449	0.74	1
1990	0.146	0.26	0.449	0.74	1
1991	0.146	0.26	0.449	0.74	1
1992	0.146	0.26	0.449	0.74	1
1993	0.146	0.26	0.449	0.74	1
1994	0.146	0.26	0.449	0.74	1
1995	0.146	0.26	0.449	0.74	1
1996	0.146	0.26	0.449	0.74	1
1997	0.146	0.26	0.449	0.74	1
1998	0.146	0.26	0.449	0.74	1
1999	0.146	0.26	0.449	0.74	1
2000	0.146	0.26	0.449	0.74	1
2001	0.146	0.26	0.449	0.74	1
2002	0.146	0.26	0.449	0.74	1
2003	0.146	0.26	0.449	0.74	1
2004	0.146	0.26	0.449	0.74	1
2005	0.146	0.26	0.449	0.74	1
2006	0.146	0.26	0.449	0.74	1
2007	0.146	0.26	0.449	0.74	1
2008	0.146	0.26	0.449	0.74	1
2009	0.146	0.26	0.449	0.74	1
2010	0.146	0.26	0.449	0.74	1
2011	0.146	0.26	0.449	0.74	1
2012	0.146	0.26	0.449	0.74	1
2013	0.146	0.26	0.449	0.74	1

5.2 JLL EastMed

Lognormal dist.

average numbers

Ages 6 - 10
 log-likelihood = 12.45
 deviance = 16.12
 Chi-sq. discrepancy= 13.59

Untransfrmd Catchabil.	Chi-square Observed	Predicted	Discrepancy	Residuals Year	Standard Observed	Q Predicted	(Obs-pred)	Untransfrmd Deviation
1.968	0.082			1975	0.361	0.396	-0.035	0.557 1.79E-06 1.9
1976	0.485	0.321	0.164	0.557	1.79E-06	2.15	1.825	0
1977	0.981	0.259	0.721	0.557	1.79E-06	3.53	1.716	1.6
1978	0.125	0.248	-0.123	0.557	1.79E-06	1.5	1.697	0.162
1979	0.713	0.234	0.478	0.557	1.79E-06	2.7	1.674	0.401
1980	0.244	0.244	0	0.557	1.79E-06	1.69	1.69	0.057
1981	0.208	0.255	-0.047	0.557	1.79E-06	1.63	1.708	0.092
1982	0.919	0.251	0.668	0.557	1.79E-06	3.32	1.702	1.239
1983	0.471	0.234	0.237	0.557	1.79E-06	2.12	1.673	0.02
1984	0.202	0.161	0.041	0.557	1.79E-06	1.62	1.555	0.032
1985	0.279	0.105	0.174	0.557	1.79E-06	1.75	1.47	0.001
1986	-0.003	0.051	-0.054	0.557	1.79E-06	1.32	1.393	0.098
1987	0.489	0.035	0.455	0.557	1.79E-06	2.16	1.371	0.337
1988	0.019	0.033	-0.014	0.557	1.79E-06	1.35	1.369	0.066
1989	-0.232	0.054	-0.286	0.557	1.79E-06	1.05	1.398	0.35
1990	0.063	0.05	0.013	0.557	1.79E-06	1.41	1.391	0.048
1991	-0.09	0.026	-0.116	0.557	1.79E-06	1.21	1.359	0.155
1992	-0.251	-0.015	-0.236	0.557	1.79E-06	1.03	1.304	0.288
1993	-0.241	-0.049	-0.192	0.557	1.79E-06	1.04	1.26	0.237
1994	-0.167	-0.096	-0.071	0.557	1.79E-06	1.12	1.203	0.113
1995	0.07	-0.187	0.257	0.557	1.79E-06	1.42	1.098	0.032
1996	-0.974	-0.197	-0.777	0.557	1.79E-06	0.5	1.088	1.013
1997	-0.916	-0.235	-0.68	0.557	1.79E-06	0.53	1.046	0.883
1998	-0.623	-0.195	-0.429	0.557	1.79E-06	0.71	1.09	0.538
1999	-0.727	-0.182	-0.545	0.557	1.79E-06	0.64	1.104	0.698
2000	-0.582	-0.157	-0.425	0.557	1.79E-06	0.74	1.132	0.533
2001	-0.322	-0.176	-0.145	0.557	1.79E-06	0.96	1.11	0.185
2002	0.437	-0.261	0.698	0.557	1.79E-06	2.05	1.02	1.435
2003	0.25	-0.279	0.529	0.557	1.79E-06	1.7	1.001	0.568
2004	-0.479	-0.315	-0.164	0.557	1.79E-06	0.82	0.966	0.206
2005	-0.409	-0.269	-0.14	0.557	1.79E-06	0.88	1.012	0.179
2006	0.366	-0.285	0.651	0.557	1.79E-06	1.91	0.996	1.137
2007	-0.343	-0.179	-0.163	0.557	1.79E-06	0.94	1.107	0.205
2008	-0.082	-0.061	-0.02	0.557	1.79E-06	1.22	1.245	0.071
2009	-0.241	0.182	-0.423	0.557	1.79E-06	1.04	1.588	0.531

Selectivities by age

Year	6	7	8	9	10
1975	0.158	0.332	0.739	0.806	1
1976	0.158	0.332	0.739	0.806	1
1977	0.158	0.332	0.739	0.806	1

1978	0.158	0.332	0.739	0.806	1
1979	0.158	0.332	0.739	0.806	1
1980	0.158	0.332	0.739	0.806	1
1981	0.158	0.332	0.739	0.806	1
1982	0.158	0.332	0.739	0.806	1
1983	0.158	0.332	0.739	0.806	1
1984	0.158	0.332	0.739	0.806	1
1985	0.158	0.332	0.739	0.806	1
1986	0.158	0.332	0.739	0.806	1
1987	0.158	0.332	0.739	0.806	1
1988	0.158	0.332	0.739	0.806	1
1989	0.158	0.332	0.739	0.806	1
1990	0.158	0.332	0.739	0.806	1
1991	0.158	0.332	0.739	0.806	1
1992	0.158	0.332	0.739	0.806	1
1993	0.158	0.332	0.739	0.806	1
1994	0.158	0.332	0.739	0.806	1
1995	0.158	0.332	0.739	0.806	1
1996	0.158	0.332	0.739	0.806	1
1997	0.158	0.332	0.739	0.806	1
1998	0.158	0.332	0.739	0.806	1
1999	0.158	0.332	0.739	0.806	1
2000	0.158	0.332	0.739	0.806	1
2001	0.158	0.332	0.739	0.806	1
2002	0.158	0.332	0.739	0.806	1
2003	0.158	0.332	0.739	0.806	1
2004	0.158	0.332	0.739	0.806	1
2005	0.158	0.332	0.739	0.806	1
2006	0.158	0.332	0.739	0.806	1
2007	0.158	0.332	0.739	0.806	1
2008	0.158	0.332	0.739	0.806	1
2009	0.158	0.332	0.739	0.806	1

5.3 Nor PS

Lognormal dist.
average biomass
Ages 10 - 10
log-likelihood = -13.1
deviance = 56.67
Chi-sq. discrepancy= 17.7

Untransfrmd Catchabil.	Chi-square Observed	Predicted	Discrepancy	Residuals Year	Standard Observed	Q Predicted	(Obs-pred)	Untransfrmd Deviation
36.199	20.348	0.756		1955	0.235	-0.341	0.576	0.557
1956	-0.298	-0.213	-0.084	0.557	1.65E-07	21.254	23.127	0.125
1957	-0.001	-0.168	0.168	0.557	1.65E-07	28.607	24.189	0
1958	-0.171	-0.073	-0.098	0.557	1.65E-07	24.126	26.606	0.137
1959	0.124	-0.08	0.204	0.557	1.65E-07	32.408	26.423	0.007

1960	0.492	-0.095	0.588	0.557	1.65E-07	46.831	26.023	0.808
1961	0.594	0.033	0.561	0.557	1.65E-07	51.836	29.581	0.691
1962	0.815	0.092	0.723	0.557	1.65E-07	64.669	31.392	1.61
1963	-2.841	0.046	-2.887	0.557	1.65E-07	1.671	29.982	2.498
1964	0.171	0.085	0.086	0.557	1.65E-07	33.978	31.179	0.012
1965	0.889	0.075	0.813	0.557	1.65E-07	69.604	30.864	2.391
1966	0.221	0.007	0.214	0.557	1.65E-07	35.705	28.83	0.01
1967	0.758	0.003	0.754	0.557	1.65E-07	61.057	28.721	1.856
1968	-0.196	-0.04	-0.156	0.557	1.65E-07	23.532	27.511	0.197
1969	-0.02	-0.144	0.124	0.557	1.65E-07	28.056	24.78	0.003
1970	0.401	-0.238	0.64	0.557	1.65E-07	42.755	22.553	1.072
1971	0.419	-0.116	0.535	0.557	1.65E-07	43.519	25.5	0.587
1972	0.408	-0.002	0.41	0.557	1.65E-07	43.047	28.56	0.233
1973	0.387	0.089	0.298	0.557	1.65E-07	42.148	31.302	0.065
1974	0.468	0.297	0.172	0.557	1.65E-07	45.719	38.507	0.001
1975	0.283	0.336	-0.052	0.557	1.65E-07	38	40.041	0.096
1976	-0.302	0.282	-0.584	0.557	1.65E-07	21.16	37.959	0.752
1977	0.394	0.15	0.244	0.557	1.65E-07	42.444	33.261	0.024
1978	-0.846	0.116	-0.962	0.557	1.65E-07	12.278	32.136	1.247
1979	-2.033	-0.062	-1.97	0.557	1.65E-07	3.75	26.902	2.136
1980	-0.351	-0.039	-0.313	0.557	1.65E-07	20.143	27.536	0.384

Selectivities by age

Year	10
----	-----
1955	1
1956	1
1957	1
1958	1
1959	1
1960	1
1961	1
1962	1
1963	1
1964	1
1965	1
1966	1
1967	1
1968	1
1969	1
1970	1
1971	1
1972	1
1973	1
1974	1
1975	1
1976	1
1977	1
1978	1
1979	1
1980	1

 5.4 JP LL NEA

Lognormal dist.
 month 1 numbers
 Ages 4 - 10
 log-likelihood = 7.46
 deviance = 13.21
 Chi-sq. discrepancy= 10.21

Untransfrmd Catchabil.	Chi-square Observed	Predicted	Discrepancy	Residuals Year	Standard Observed	Q Predicted	(Obs-pred)	Untransfrmd Deviation
1990	-1.198	-0.187	-1.011	0.557	1.42E-06	0.325	0.892	1.305
1991	-0.991	-0.248	-0.743	0.557	1.42E-06	0.399	0.839	0.967
1992	-0.429	-0.284	-0.145	0.557	1.42E-06	0.7	0.809	0.185
1993	-0.436	-0.291	-0.145	0.557	1.42E-06	0.695	0.804	0.185
1994	-0.274	-0.235	-0.039	0.557	1.42E-06	0.817	0.849	0.086
1995	-0.225	-0.25	0.025	0.557	1.42E-06	0.858	0.837	0.041
1996	0.622	-0.227	0.849	0.557	1.42E-06	2.003	0.857	2.769
1997	0.199	-0.182	0.381	0.557	1.42E-06	1.312	0.896	0.177
1998	-0.514	-0.226	-0.289	0.557	1.42E-06	0.643	0.858	0.354
1999	-0.098	-0.188	0.09	0.557	1.42E-06	0.974	0.891	0.011
2000	-0.112	-0.252	0.14	0.557	1.42E-06	0.961	0.835	0.001
2001	0.096	-0.276	0.373	0.557	1.42E-06	1.184	0.815	0.163
2002	-0.173	-0.342	0.168	0.557	1.42E-06	0.904	0.764	0
2003	-0.132	-0.37	0.238	0.557	1.42E-06	0.942	0.742	0.021
2004	-0.27	-0.353	0.083	0.557	1.42E-06	0.821	0.755	0.013
2005	-0.581	-0.257	-0.324	0.557	1.42E-06	0.601	0.831	0.399
2006	-0.463	-0.122	-0.341	0.557	1.42E-06	0.677	0.951	0.421
2007	-0.367	-0.082	-0.285	0.557	1.42E-06	0.745	0.991	0.349
2008	-0.236	0.092	-0.327	0.557	1.42E-06	0.849	1.178	0.403
2009	0.17	0.354	-0.185	0.557	1.42E-06	1.273	1.532	0.228
2010	0.675	0.652	0.023	0.557	1.42E-06	2.111	2.063	0.042
2011	1.149	0.862	0.286	0.557	1.42E-06	3.39	2.545	0.055
2012	1.857	1.117	0.74	0.557	1.42E-06	6.885	3.284	1.746
2013	1.732	1.295	0.436	0.557	1.42E-06	6.074	3.926	0.291

Selectivities by age

Year	4	5	6	7	8	9	10
1990	0.032	0.076	0.204	0.42	0.715	1	0.461
1991	0.032	0.076	0.204	0.42	0.715	1	0.461
1992	0.032	0.076	0.204	0.42	0.715	1	0.461
1993	0.032	0.076	0.204	0.42	0.715	1	0.461
1994	0.032	0.076	0.204	0.42	0.715	1	0.461
1995	0.032	0.076	0.204	0.42	0.715	1	0.461
1996	0.032	0.076	0.204	0.42	0.715	1	0.461
1997	0.032	0.076	0.204	0.42	0.715	1	0.461
1998	0.032	0.076	0.204	0.42	0.715	1	0.461

1999	0.032	0.076	0.204	0.42	0.715	1	0.461
2000	0.032	0.076	0.204	0.42	0.715	1	0.461
2001	0.032	0.076	0.204	0.42	0.715	1	0.461
2002	0.032	0.076	0.204	0.42	0.715	1	0.461
2003	0.032	0.076	0.204	0.42	0.715	1	0.461
2004	0.032	0.076	0.204	0.42	0.715	1	0.461
2005	0.032	0.076	0.204	0.42	0.715	1	0.461
2006	0.032	0.076	0.204	0.42	0.715	1	0.461
2007	0.032	0.076	0.204	0.42	0.715	1	0.461
2008	0.032	0.076	0.204	0.42	0.715	1	0.461
2009	0.032	0.076	0.204	0.42	0.715	1	0.461
2010	0.032	0.076	0.204	0.42	0.715	1	0.461
2011	0.032	0.076	0.204	0.42	0.715	1	0.461
2012	0.032	0.076	0.204	0.42	0.715	1	0.461
2013	0.032	0.076	0.204	0.42	0.715	1	0.461

```

-----
5.5      SP      BB1
-----
Lognormal dist.
average  biomass
Ages     5      -      6
log-likelihood =      -2.24
deviance =      17.36
Chi-sq.  discrepancy=      18.81

```

Untransfrmd	Chi-square	Residuals	Standard	Q	Untransfrmd			
Year	Observed	Predicted (Obs-pred)	Deviation	Catchabil.	Observed	Predicted	Discrepancy	
1952	-0.438	0.547	-0.985	0.557	5.91E-06	179.22	480.04	1.274
1953	-0.408	0.344	-0.751	0.557	5.91E-06	184.74	391.656	0.978
1954	-0.204	0.211	-0.416	0.557	5.91E-06	226.46	343.132	0.521
1955	-0.396	0.271	-0.666	0.557	5.91E-06	187.01	364.09	0.864
1956	0.527	0.354	0.173	0.557	5.91E-06	470.53	395.761	0.001
1957	0.126	0.376	-0.25	0.557	5.91E-06	315.05	404.696	0.306
1958	-0.096	0.298	-0.395	0.557	5.91E-06	252.25	374.39	0.493
1959	0.601	0.081	0.52	0.557	5.91E-06	506.79	301.147	0.537
1960	0.558	-0.437	0.994	0.557	5.91E-06	485.16	179.471	4.766
1961	0.164	-0.989	1.153	0.557	5.91E-06	327.29	103.284	8.094
1962	-0.433	-1.056	0.622	0.557	5.91E-06	180.12	96.665	0.979

```

Selectivities by age
Year 5 6
-----
1952 1 0.936
1953 1 0.936
1954 1 0.936
1955 1 0.936
1956 1 0.936
1957 1 0.936

```

```

1958      1      0.936
1959      1      0.936
1960      1      0.936
1961      1      0.936
1962      1      0.936

```

```

-----
5.6      SP      BB2
-----

```

Lognormal dist.

average biomass

Ages 2 - 3

log-likelihood = 2.73

deviance = 46.12

Chi-sq. discrepancy= 30.77

Chi-square	Residuals	Standard	Q	Untransfrmd	Untransfrmd
Year	Deviation	Catchabil.		Observed	Predicted Discrepancy
-----	-----	-----	-----	-----	-----
312.09	1963	-0.796	-0.36	-0.436	0.557 3.70E-05
482.779	1964	3.70E-05	457.4	653.43	0.442
0.549	1965	3.70E-05	228.91	683.334	1.401
-0.414	1966	3.70E-05	349.1	892.05	1.217
-0.057	1967	3.70E-05	345.89	923.706	1.271
-0.357	1968	3.70E-05	447	572.461	0.302
0.557	1969	3.70E-05	610.62	314.552	1.21
-0.938	1970	3.70E-05	594.66	290.681	1.559
0.557	1971	3.70E-05	744.71	287.066	4.114
0.557	1972	3.70E-05	525.63	397.611	0.048
0.557	1973	3.70E-05	535.63	484.692	0.008
0.557	1974	3.70E-05	245.39	545.108	1.04
0.557	1975	3.70E-05	484.22	639.235	0.34
0.557	1976	3.70E-05	483.96	522.119	0.117
0.557	1977	3.70E-05	547.56	653.348	0.219
0.557	1978	3.70E-05	705.26	527.44	0.058
0.557	1979	3.70E-05	623.01	332.378	1.01
0.557	1980	3.70E-05	634.81	359.476	0.724
0.557	1981	3.70E-05	510.66	465.08	0.01
0.557	1982	3.70E-05	503.78	469.83	0.018
0.557	1983	3.70E-05	625.14	615.043	0.046
0.557	1984	3.70E-05	331.71	911.161	1.304
0.557	1985	3.70E-05	1125.74	666.247	0.551
0.557	1986	3.70E-05	751.21	554.267	0.071
0.557	1987	3.70E-05	1008.43	665.209	0.245
0.557	1988	3.70E-05	1394.68	665.797	1.738
0.557	1989	3.70E-05	1285.6	730.971	0.706
0.557	1990	3.70E-05	986.51	806.705	0.006
0.557	1991	3.70E-05	901.2	942.144	0.09
0.557	1992	3.70E-05	695.16	1111.755	0.594
0.557	1993	3.70E-05	2093.55	1094.472	1.123
0.557	1994	3.70E-05	1007.03	1155.605	0.177

1995	0.58	0.482	0.098	0.557	3.70E-05	1235.91	1120.53	0.008
1996	0.922	0.311	0.611	0.557	3.70E-05	1739.29	944.312	0.919
1997	1.178	0.318	0.86	0.557	3.70E-05	2246.41	950.98	2.884
1998	0.24	-0.049	0.288	0.557	3.70E-05	879.51	659.161	0.056
1999	-0.711	0.301	-1.012	0.557	3.70E-05	339.77	934.819	1.306
2000	0.328	0.328	0	0.557	3.70E-05	960.44	960.686	0.057
2001	0.018	0.14	-0.122	0.557	3.70E-05	704.49	795.95	0.161
2002	-0.007	0.016	-0.023	0.557	3.70E-05	687.42	703.439	0.073
2003	-0.442	0.481	-0.923	0.557	3.70E-05	444.91	1119.664	1.199
2004	0.559	0.638	-0.079	0.557	3.70E-05	1210.46	1309.47	0.119
2005	1.237	0.736	0.501	0.557	3.70E-05	2383.57	1444.896	0.47
2006	0.206	1.136	-0.93	0.557	3.70E-05	850.09	2155.472	1.208

Selectivities by age

Year	2	3
1963	1	0.566
1964	1	0.566
1965	1	0.566
1966	1	0.566
1967	1	0.566
1968	1	0.566
1969	1	0.566
1970	1	0.566
1971	1	0.566
1972	1	0.566
1973	1	0.566
1974	1	0.566
1975	1	0.566
1976	1	0.566
1977	1	0.566
1978	1	0.566
1979	1	0.566
1980	1	0.566
1981	1	0.566
1982	1	0.566
1983	1	0.566
1984	1	0.566
1985	1	0.566
1986	1	0.566
1987	1	0.566
1988	1	0.566
1989	1	0.566
1990	1	0.566
1991	1	0.566
1992	1	0.566
1993	1	0.566
1994	1	0.566
1995	1	0.566
1996	1	0.566
1997	1	0.566

1998 1 0.566
 1999 1 0.566
 2000 1 0.566
 2001 1 0.566
 2002 1 0.566
 2003 1 0.566
 2004 1 0.566
 2005 1 0.566
 2006 1 0.566

 5.7 SP BB3

Lognormal dist.

average biomass

Ages 3 - 6
 log-likelihood = 1.86
 deviance = 4.48
 Chi-sq. discrepancy= 2.51

Chi-square Observed	Predicted	Discrepancy	Year	Residuals Observed	Standard Predicted	Q (Obs-pred)	Untransfrmd Deviation	Untransfrmd Catchabil.
-0.392	-0.177	-0.215	0.557	1.18E-05	1177.62	1460.759	0.264	2007
2008	0.207	0.156	0.051	0.557	1.18E-05	2144.54	2038.776	0.027
2009	-0.602	0.295	-0.896	0.557	1.18E-05	955.29	2340.795	1.165
2010	0.19	0.323	-0.133	0.557	1.18E-05	2109.08	2408.836	0.172
2011	0.46	0.155	0.306	0.557	1.18E-05	2762.62	2035.103	0.073
2012	0.24	-0.082	0.322	0.557	1.18E-05	2216.18	1605.409	0.092
2013	-0.104	-0.67	0.566	0.557	1.18E-05	1571.64	892.393	0.712

Selectivities by age

Year	3	4	5	6
2007	0.919	1	0.56	0.321
2008	0.919	1	0.56	0.321
2009	0.919	1	0.56	0.321
2010	0.919	1	0.56	0.321
2011	0.919	1	0.56	0.321
2012	0.919	1	0.56	0.321
2013	0.919	1	0.56	0.321

=====

TOTAL NUMBER OF FUNCTION EVALUATIONS = 6793

Appendix D. VPA2Box output file for western-origin Atlantic bluefin tuna.

 VPA-2BOX
 SUMMARY STATISTICS AND DIAGNOSTIC OUTPUT

BFT Western Population-of-origin 1970-2012
 16:53, 10 November 2016

```

=====
Total objective function =      1.09
  (with constants)      =     237.26
Number of parameters (P) =       28
Number of data points (D)=     257
AIC : 2*objective+2P    =     530.52
AICc: 2*objective+2P(...)=     537.64
BIC : 2*objective+Plog(D)=     629.90
Chi-square discrepancy  =     232.32

Loglikelihoods (deviance)=  0.11 (    257.00)
  effort data           =  0.11 (    257.00)

Log-posteriors
  catchability         =  0.00
  f-ratio              =  0.00
  natural mortality    =  0.00
  mixing coeff.        =  0.00

Constraints
  terminal F           = -1.20
  stock-rec./sex ratio =  0.00

Out of bounds penalty  =  0.00
=====
    
```

TABLE 1. FISHING MORTALITY RATE FOR Western-Origin Bluefin Tuna Assessment

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
1970	0.191	0.844	0.938	0.596	0.238	0.043	0.018	0.007	0.004	0.008	0.022	0.018	0.026	0.036	0.045	0.045
1971	0.233	0.959	0.808	1.046	0.023	0.036	0.036	0.044	0.027	0.014	0.019	0.033	0.040	0.046	0.052	0.052
1972	0.199	0.647	0.530	0.100	0.200	0.079	0.004	0.019	0.017	0.010	0.006	0.016	0.050	0.058	0.051	0.051
1973	0.040	0.527	0.381	0.147	0.100	0.166	0.023	0.027	0.041	0.034	0.010	0.016	0.026	0.051	0.038	0.038
1974	0.142	0.194	0.236	0.094	0.092	0.090	0.040	0.045	0.029	0.023	0.050	0.020	0.021	0.117	0.140	0.140
1975	0.346	0.619	0.090	0.233	0.019	0.029	0.022	0.020	0.031	0.048	0.057	0.059	0.052	0.049	0.081	0.081
1976	0.049	0.233	0.623	0.026	0.039	0.017	0.006	0.007	0.055	0.059	0.037	0.048	0.132	0.129	0.104	0.104
1977	0.015	0.261	0.114	0.432	0.145	0.054	0.059	0.021	0.027	0.080	0.151	0.117	0.067	0.111	0.126	0.126
1978	0.070	0.133	0.338	0.079	0.203	0.175	0.033	0.011	0.018	0.023	0.026	0.047	0.060	0.050	0.152	0.152
1979	0.038	0.170	0.267	0.227	0.277	0.044	0.064	0.050	0.016	0.017	0.035	0.067	0.137	0.169	0.174	0.174
1980	0.046	0.207	0.202	0.175	0.137	0.039	0.061	0.123	0.107	0.034	0.036	0.071	0.117	0.161	0.210	0.210
1981	0.072	0.166	0.324	0.066	0.130	0.110	0.076	0.077	0.093	0.135	0.078	0.092	0.135	0.196	0.218	0.218
1982	0.037	0.015	0.023	0.011	0.005	0.014	0.028	0.023	0.024	0.034	0.057	0.050	0.063	0.066	0.093	0.093
1983	0.037	0.002	0.036	0.013	0.014	0.022	0.023	0.052	0.052	0.053	0.056	0.059	0.072	0.131	0.186	0.186
1984	0.009	0.020	0.008	0.022	0.039	0.046	0.031	0.021	0.048	0.049	0.068	0.085	0.092	0.111	0.143	0.143
1985	0.004	0.003	0.081	0.032	0.075	0.107	0.074	0.027	0.023	0.032	0.043	0.073	0.112	0.135	0.166	0.166
1986	0.007	0.016	0.018	0.033	0.025	0.033	0.042	0.031	0.019	0.019	0.033	0.045	0.092	0.122	0.198	0.198
1987	0.011	0.008	0.022	0.038	0.057	0.086	0.045	0.061	0.059	0.062	0.040	0.054	0.069	0.098	0.120	0.120
1988	0.028	0.008	0.055	0.057	0.062	0.087	0.101	0.073	0.063	0.081	0.072	0.062	0.100	0.110	0.140	0.140
1989	0.005	0.007	0.006	0.027	0.020	0.045	0.066	0.102	0.097	0.085	0.090	0.094	0.088	0.138	0.148	0.148
1990	0.019	0.019	0.072	0.024	0.037	0.061	0.047	0.071	0.121	0.132	0.104	0.108	0.091	0.087	0.152	0.152
1991	0.020	0.039	0.027	0.027	0.031	0.048	0.064	0.077	0.110	0.130	0.144	0.143	0.133	0.116	0.122	0.122
1992	0.002	0.006	0.007	0.015	0.019	0.039	0.038	0.070	0.094	0.074	0.104	0.157	0.164	0.161	0.101	0.101
1993	0.005	0.009	0.047	0.043	0.030	0.027	0.053	0.062	0.100	0.126	0.079	0.084	0.103	0.091	0.096	0.096
1994	0.028	0.006	0.012	0.030	0.035	0.033	0.037	0.066	0.136	0.079	0.100	0.100	0.087	0.112	0.087	0.087
1995	0.008	0.010	0.035	0.043	0.047	0.119	0.041	0.031	0.069	0.128	0.089	0.076	0.078	0.086	0.122	0.122
1996	0.005	0.058	0.017	0.068	0.050	0.037	0.053	0.079	0.053	0.050	0.132	0.120	0.122	0.114	0.151	0.151
1997	0.003	0.008	0.049	0.015	0.028	0.049	0.055	0.090	0.090	0.060	0.055	0.098	0.130	0.161	0.160	0.160
1998	0.004	0.008	0.031	0.036	0.010	0.033	0.032	0.071	0.126	0.128	0.080	0.071	0.131	0.154	0.143	0.143
1999	0.001	0.004	0.022	0.027	0.031	0.022	0.037	0.090	0.090	0.129	0.126	0.128	0.141	0.181	0.160	0.160
2000	0.001	0.002	0.012	0.021	0.066	0.075	0.056	0.087	0.100	0.096	0.100	0.105	0.118	0.137	0.171	0.171
2001	0.016	0.003	0.019	0.043	0.018	0.043	0.061	0.082	0.063	0.055	0.089	0.137	0.123	0.119	0.144	0.144
2002	0.005	0.039	0.034	0.042	0.054	0.043	0.039	0.121	0.144	0.109	0.087	0.103	0.171	0.138	0.158	0.158
2003	0.001	0.016	0.047	0.058	0.037	0.049	0.025	0.065	0.122	0.117	0.091	0.051	0.093	0.124	0.131	0.131
2004	0.004	0.009	0.041	0.031	0.039	0.055	0.047	0.071	0.053	0.065	0.071	0.075	0.075	0.069	0.109	0.109
2005	0.009	0.023	0.009	0.018	0.016	0.021	0.023	0.041	0.064	0.042	0.077	0.114	0.106	0.073	0.104	0.104
2006	0.002	0.007	0.008	0.008	0.023	0.046	0.035	0.042	0.054	0.074	0.059	0.063	0.066	0.071	0.108	0.108
2007	0.001	0.002	0.086	0.065	0.013	0.035	0.046	0.038	0.036	0.021	0.044	0.037	0.044	0.050	0.075	0.075
2008	0.001	0.005	0.018	0.044	0.064	0.014	0.040	0.076	0.060	0.047	0.049	0.044	0.041	0.046	0.091	0.091
2009	0.001	0.001	0.015	0.011	0.023	0.104	0.026	0.027	0.066	0.053	0.049	0.039	0.044	0.053	0.079	0.079
2010	0.000	0.012	0.009	0.023	0.011	0.026	0.023	0.040	0.029	0.054	0.074	0.047	0.042	0.070	0.080	0.080
2011	0.000	0.005	0.020	0.021	0.025	0.024	0.021	0.066	0.044	0.024	0.048	0.056	0.052	0.054	0.072	0.072
2012	0.000	0.007	0.017	0.017	0.007	0.010	0.017	0.043	0.047	0.038	0.056	0.047	0.059	0.051	0.070	0.070
2013	0.000	0.001	0.011	0.014	0.003	0.011	0.013	0.035	0.057	0.029	0.027	0.045	0.058	0.050	0.058	0.058

TABLE 2. ABUNDANCE AT THE BEGINNING OF THE YEAR [BY AREA] FOR Western-Origin Bluefin Tuna Assessment

	1	2	3	4	5	6	7	8	9
10	11	12	13	14	15	16			
1970	363208.	194243.	221608.	41517.	32960.	36473.	29294.	32450.	40846.
34806.	22069.	27915.	28951.	23668.	15875.	35364.			
1971	318858.	260987.	72637.	75389.	19892.		30369.	25009.	28010.
35363.	30008.	18760.	23833.	24512.	19840.	42594.			
1972	268155.	219573.	86927.	28134.	23025.	16905.	18940.	25476.	20816.
23693.	30311.	25603.	15772.	19897.	20360.	51509.			

1973	136565.	190981.	99997.	44474.	22122.	16387.	13575.	16392.	21740.
17785.	20399.	26194.	21902.	13046.	16322.	59398.			
1974	451150.	114024.	98061.	59368.	33384.	17406.	12073.	11528.	13867.
18139.	14948.	17550.	22402.	18549.	10782.	63377.			
1975	158168.	340350.	81637.	67360.	47002.	26459.	13824.	10083.	9579.
11712.	15404.	12365.	14948.	19075.	14339.	56072.			
1976	123360.	97324.	159322.	64895.	46368.	40093.	22351.	11761.	8594.
8071.	9705.	12651.	10129.	12332.	15789.	56468.			
1977	104578.	102165.	67040.	74285.	54991.	38782.	34269.	19315.	10157.
7069.	6614.	8128.	10483.	7715.	9422.	56595.			
1978	87881.	89534.	68382.	52013.	41945.	41343.	31930.	28072.	16438.
8596.	5672.	4943.	6287.	8524.	6001.	50619.			
1979	80944.	71253.	68119.	42414.	41781.	29772.	30184.	26856.	24136.
14029.	7306.	4806.	4100.	5148.	7048.	42272.			
1980	64883.	67756.	52239.	45365.	29394.	27533.	24770.	24611.	22218.
20645.	11990.	6135.	3908.	3107.	3780.	36012.			
1981	59016.	53858.	47905.	37110.	33120.	22272.	23025.	20265.	18923.
17351.	17345.	10058.	4970.	3023.	2300.	28049.			
1982	65122.	47729.	39644.	30120.	30211.	25285.	17337.	18544.	16319.
14993.	13173.	13948.	7977.	3774.	2160.	21210.			
1983	74245.	54549.	40870.	33681.	25896.	26135.	21666.	14652.	15758.
13845.	12595.	10815.	11540.	6511.	3071.	18514.			
1984	67078.	62218.	47318.	34276.	28904.	22200.	22236.	18408.	12090.
12999.	11416.	10358.	8861.	9335.	4968.	15584.			
1985	71704.	57797.	53030.	40798.	29164.	24162.	18428.	18748.	15677.
10013.	10755.	9271.	8274.	7023.	7266.	15481.			
1986	66373.	62057.	50081.	42502.	34359.	23524.	18872.	14882.	15857.
13318.	8428.	8958.	7493.	6433.	5335.	16744.			
1987	72219.	57279.	53081.	42764.	35761.	29125.	19779.	15737.	12542.
13524.	11355.	7091.	7446.	5943.	4952.	15752.			
1988	99229.	62074.	49383.	45153.	35775.	29370.	23240.	16443.	12866.
10278.	11045.	9481.	5840.	6039.	4686.	15958.			
1989	101624.	83864.	53530.	40642.	37083.	29230.	23406.	18262.	13287.
10504.	8239.	8935.	7745.	4592.	4705.	15604.			
1990	91494.	87935.	72433.	46236.	34402.	31594.	24284.	19054.	14344.
10486.	8387.	6546.	7069.	6165.	3477.	15231.			
1991	77902.	78064.	75033.	58571.	39240.	28823.	25845.	20134.	15424.
11045.	7986.	6568.	5107.	5609.	4914.	13977.			
1992	81203.	66361.	65285.	63520.	49564.	33084.	23871.	21073.	16199.
12010.	8432.	6010.	4947.	3887.	4342.	14537.			
1993	73659.	70475.	57323.	56353.	54416.	42282.	27663.	19984.	17074.
12822.	9701.	6607.	4466.	3651.	2877.	14830.			
1994	86937.	63703.	60739.	47539.	46909.	45900.	35787.	22810.	16322.
13426.	9831.	7795.	5280.	3502.	2899.	13990.			
1995	105005.	73506.	55035.	52164.	40090.	39362.	38616.	29980.	18568.
12389.	10782.	7735.	6131.	4209.	2721.	13462.			
1996	86648.	90569.	63254.	46196.	43429.	33250.	30383.	32232.	25272.
15070.	9475.	8576.	6234.	4932.	3356.	12459.			
1997	72046.	74925.	74287.	54088.	37512.	35922.	27856.	25058.	25891.
20842.	12458.	7221.	6616.	4796.	3826.	11817.			
1998	91460.	62420.	64609.	61470.	46318.	31723.	29739.	22913.	19913.
20580.	17062.	10255.	5693.	5049.	3551.	11583.			
1999	93167.	79230.	53839.	54447.	51538.	39854.	26690.	25030.	18559.
15255.	15738.	13692.	8305.	4343.	3762.	11401.			
2000	89611.	80914.	68574.	45800.	46058.	43434.	33878.	22365.	19890.
14746.	11654.	12067.	10476.	6270.	3151.	11229.			
2001	93928.	77812.	70193.	58897.	38978.	37477.	35018.	27862.	17815.
15648.	11645.	9171.	9445.	8092.	4751.	10537.			
2002	132404.	80352.	67463.	59863.	49067.	33294.	31225.	28645.	22314.
14538.	12875.	9257.	6954.	7258.	6245.	11504.			
2003	207163.	114572.	67184.	56695.	49877.	40419.	27730.	26105.	22067.
16805.	11337.	10258.	7258.	5095.	5494.	13171.			
2004	139467.	179887.	98016.	55699.	46513.	41776.	33457.	23513.	21270.
16987.	13002.	8995.	8478.	5751.	3912.	14238.			
2005	64495.	120721.	155048.	81773.	46942.	38896.	34382.	27761.	19034.
17539.	13840.	10533.	7252.	6841.	4667.	14152.			
2006	103866.	55566.	102592.	133553.	69789.	40155.	33103.	29200.	23160.
15528.	14628.	11145.	8167.	5672.	5526.	14750.			
2007	123672.	90151.	47971.	88492.	115151.	59321.	33339.	27782.	24343.
19070.	12538.	11989.	9097.	6648.	4593.	15822.			
2008	118371.	107455.	78228.	38249.	72057.	98834.	49820.	27675.	23241.
20424.	16238.	10432.	10045.	7566.	5499.	16474.			
2009	109663.	102835.	92986.	66770.	31815.	58766.	84726.	41597.	22290.
19023.	16932.	13438.	8678.	8378.	6283.	17433.			
2010	142767.	95283.	89281.	79668.	57384.	27018.	46044.	71776.	35194.
18140.	15690.	14015.	11234.	7217.	6908.	19045.			
2011	69115.	124055.	81887.	76890.	67679.	49355.	22881.	39132.	59940.
29715.	14943.	12673.	11627.	9368.	5851.	20834.			
2012	326688.	60082.	107355.	69790.	65461.	57357.	41897.	19481.	31852.
49843.	25218.	12380.	10420.	9591.	7715.	21585.			
2013	177146.	283910.	51886.	91736.	59654.	56514.	49349.	35810.	16223.
26428.	41723.	20726.	10264.	8542.	7920.	23741.			
2014		153959.	246589.	44628.	78676.	51692.	48612.	42341.	30049.
13322.	22323.	35306.	17230.	8418.	7066.	25966.			

TABLE 3. CATCH OF Western-Origin Bluefin Tuna Assessment

	1	2	3	4	5	6	7	8	9
10	11	12	13	14	15	16			
1970	58920.	104299.	127233.	17510.	6531.	1438.	491.	215.	158.
269.	457.	467.	706.	791.	650.	1448.			
1971	62027.	151896.	37934.	46183.	417.	747.	994.	995.	706.
464.	521.	577.	883.	1019.	946.	2031.			
1972	45340.	98292.	33584.	2511.	3906.	1205.	79.	438.	334.
214.	168.	382.	715.	1048.	938.	2373.			
1973	5046.	73404.	29719.	5677.	1962.	2337.	294.	412.	817.
552.	197.	398.	528.	601.	568.	2067.			

1974	55760.	18817.	19256.	4954.	2755.	1406.	443.	476.	369.
392.	676.	332.	430.	1920.	1313.	7718.			
1975	43303.	147639.	6530.	13122.	825.	700.	276.	184.	275.
512.	796.	667.	713.	852.	1038.	4059.			
1976	5455.	18910.	69434.	1531.	1642.	630.	124.	72.	432.
433.	332.	553.	1173.	1396.	1461.	5225.			
1977	1483.	22002.	6738.	24418.	6950.	1917.	1847.	380.	251.
509.	867.	837.	633.	759.	1039.	6241.			
1978	5529.	10448.	18357.	3693.	7201.	6193.	969.	288.	281.
180.	134.	212.	341.	390.	792.	6681.			
1979	2807.	10439.	14917.	8049.	9465.	1195.	1751.	1213.	363.
221.	232.	291.	492.	748.	1055.	6328.			
1980	2737.	11835.	8935.	6796.	3528.	978.	1363.	2658.	2111.
647.	393.	391.	402.	431.	669.	6373.			
1981	3843.	7720.	12419.	2203.	3771.	2177.	1583.	1395.	1566.
2055.	1215.	824.	587.	504.	422.	5146.			
1982	2218.	669.	842.	310.	139.	339.	451.	390.	367.
472.	684.	629.	455.	226.	179.	1758.			
1983	2499.	113.	1348.	404.	336.	520.	459.	696.	752.
667.	635.	582.	750.	745.	487.	2936.			
1984	556.	1138.	363.	681.	1037.	936.	626.	350.	534.
586.	702.	786.	731.	913.	620.	1945.			
1985	300.	177.	3867.	1191.	1966.	2293.	1224.	474.	334.
298.	421.	609.	817.	828.	1041.	2218.			
1986	454.	933.	831.	1277.	800.	721.	719.	425.	281.
240.	253.	367.	613.	688.	895.	2809.			
1987	762.	444.	1066.	1506.	1846.	2235.	808.	876.	671.
765.	419.	349.	466.	517.	525.	1670.			
1988	2578.	466.	2459.	2332.	2010.	2286.	2087.	1082.	731.
748.	717.	534.	521.	586.	572.	1948.			
1989	442.	510.	323.	999.	692.	1211.	1390.	1647.	1145.
801.	663.	751.	611.	554.	604.	2003.			
1990	1586.	1518.	4726.	1026.	1165.	1742.	1050.	1225.	1531.
1215.	777.	627.	576.	479.	457.	2002.			
1991	1464.	2771.	1837.	1455.	1105.	1274.	1499.	1401.	1504.
1258.	1003.	820.	595.	574.	527.	1499.			
1992	128.	396.	433.	865.	866.	1180.	825.	1338.	1355.
795.	778.	816.	699.	540.	391.	1309.			
1993	357.	568.	2465.	2235.	1511.	1043.	1331.	1129.	1523.
1415.	686.	498.	409.	296.	245.	1263.			
1994	2226.	372.	687.	1330.	1524.	1382.	1215.	1356.	1936.
957.	872.	694.	410.	348.	225.	1086.			
1995	771.	697.	1771.	2062.	1721.	4124.	1439.	850.	1152.
1393.	856.	527.	428.	325.	291.	1440.			
1996	433.	4780.	969.	2845.	1969.	1128.	1456.	2288.	1212.
691.	1092.	903.	670.	496.	441.	1637.			
1997	230.	566.	3342.	756.	954.	1601.	1400.	2011.	2073.
1136.	618.	628.	755.	665.	530.	1637.			
1998	302.	458.	1849.	2042.	443.	954.	884.	1462.	2211.
2314.	1225.	655.	652.	675.	443.	1445.			
1999	88.	328.	1079.	1370.	1472.	826.	900.	2010.	1492.
1728.	1736.	1535.	1022.	672.	521.	1579.			
2000	98.	161.	771.	900.	2754.	2946.	1708.	1750.	1766.
1262.	1033.	1124.	1091.	752.	463.	1650.			
2001	1401.	198.	1246.	2293.	636.	1456.	1931.	2050.	1020.
783.	931.	1095.	1025.	849.	597.	1324.			
2002	573.	2868.	2099.	2325.	2404.	1304.	1117.	3048.	2789.
1399.	1004.	849.	1022.	877.	855.	1575.			
2003	227.	1705.	2908.	2981.	1702.	1806.	638.	1531.	2362.
1728.	925.	473.	600.	556.	629.	1508.			
2004	564.	1436.	3692.	1590.	1654.	2080.	1423.	1512.	1022.
996.	828.	610.	569.	358.	377.	1372.			
2005	540.	2531.	1330.	1397.	703.	764.	741.	1046.	1095.
666.	953.	1064.	680.	452.	429.	1301.			
2006	156.	360.	749.	1024.	1450.	1686.	1070.	1119.	1144.
1033.	782.	636.	485.	363.	529.	1412.			
2007	65.	156.	3712.	5236.	1367.	1881.	1405.	979.	794.
365.	502.	405.	368.	301.	308.	1061.			
2008	77.	462.	1329.	1544.	4165.	1284.	1840.	1901.	1269.
884.	729.	420.	381.	316.	449.	1345.			
2009	58.	128.	1256.	712.	688.	5421.	2020.	1041.	1330.
911.	758.	482.	352.	404.	448.	1243.			
2010	65.	1018.	781.	1698.	572.	652.	963.	2641.	946.
888.	1039.	598.	428.	454.	494.	1362.			
2011	3.	529.	1502.	1486.	1589.	1084.	441.	2329.	2434.
660.	656.	641.	555.	461.	380.	1353.			
2012	108.	373.	1711.	1093.	424.	553.	659.	766.	1356.
1727.	1286.	536.	555.	449.	490.	1371.			
2013	48.	247.	514.	1154.	181.	557.	602.	1163.	839.
700.	1038.	847.	543.	387.	419.	1256.			

TABLE 4. SPAWNING STOCK FECUNDITY AND RECRUITMENT OF Western-Origin Bluefin Tuna Assessment

year	spawning biomass	recruits from VPA
1970	44904.	363208.
1971	43974.	318858.
1972	43783.	268155.
1973	43510.	136565.
1974	38564.	451150.
1975	34033.	158168.
1976	30280.	123360.
1977	26525.	104578.
1978	24576.	87881.
1979	22784.	80944.
1980	21859.	64883.
1981	20157.	59016.
1982	19650.	65122.
1983	18900.	74245.

1984	17696.	67078.
1985	15930.	71704.
1986	16271.	66373.
1987	15507.	72219.
1988	15204.	99229.
1989	14615.	101624.
1990	14050.	91494.
1991	13760.	77902.
1992	13482.	81203.
1993	13838.	73659.
1994	13705.	86937.
1995	14427.	105005.
1996	15605.	86648.
1997	16446.	72046.
1998	16715.	91460.
1999	16378.	93167.
2000	16757.	89611.
2001	16653.	93928.
2002	16721.	132404.
2003	16888.	207163.
2004	17292.	139467.
2005	17620.	64495.
2006	18219.	103866.
2007	20265.	123672.
2008	21292.	118371.
2009	21937.	109663.
2010	24345.	142767.
2011	29749.	69115.
2012	31538.	326688.
2013	31330.	177146.

TABLE 5. FITS TO INDEX DATA FOR Western-Origin Bluefin Tuna Assessment

5.1 CAN_GSL

Lognormal dist.
average numbers
Ages 8 - 16
log-likelihood = -18.02
deviance = 68.07
Chi-sq. discrepancy= 73.37

Year	Observed	Predicted	Residuals (Obs-pred)	Standard Deviation	Q Catchabil.	Untransfrmd Observed	Untransfrmd Predicted	Chi-square Discrepancy
1981	0.645	0.323	0.322	0.606	0.294E-04	1.320	0.956	0.050
1982	-0.144	0.171	-0.315	0.606	0.294E-04	0.600	0.822	0.347
1983	0.799	0.061	0.738	0.606	0.294E-04	1.540	0.737	1.232
1984	0.205	-0.023	0.228	0.606	0.294E-04	0.850	0.677	0.005
1985	-1.193	-0.036	-1.158	0.606	0.294E-04	0.210	0.668	1.228
1986	-1.060	-0.028	-1.032	0.606	0.294E-04	0.240	0.673	1.114
1987	-0.772	-0.057	-0.715	0.606	0.294E-04	0.320	0.654	0.792
1988	-0.268	-0.071	-0.196	0.606	0.294E-04	0.530	0.645	0.225
1989	-0.064	-0.103	0.039	0.606	0.294E-04	0.650	0.625	0.041
1990	-1.294	-0.129	-1.164	0.606	0.294E-04	0.190	0.609	1.234
1991	-0.064	-0.166	0.102	0.606	0.294E-04	0.650	0.587	0.014
1992	0.739	-0.144	0.883	0.606	0.294E-04	1.450	0.600	2.308
1993	0.262	-0.135	0.396	0.606	0.294E-04	0.900	0.605	0.126
1994	-1.019	-0.153	-0.866	0.606	0.294E-04	0.250	0.594	0.951
1995	0.039	-0.149	0.188	0.606	0.294E-04	0.720	0.597	0.000
1996	-2.159	-0.141	-2.018	0.606	0.294E-04	0.080	0.602	1.781
1997	-1.673	-0.139	-1.534	0.606	0.294E-04	0.130	0.603	1.516
1998	-1.060	-0.149	-0.911	0.606	0.294E-04	0.240	0.597	0.997
1999	-0.500	-0.173	-0.328	0.606	0.294E-04	0.420	0.583	0.361
2000	-0.772	-0.191	-0.581	0.606	0.294E-04	0.320	0.572	0.643
2001	-0.871	-0.190	-0.681	0.606	0.294E-04	0.290	0.573	0.754
2002	-0.431	-0.138	-0.294	0.606	0.294E-04	0.450	0.604	0.324
2003	0.181	-0.079	0.260	0.606	0.294E-04	0.830	0.640	0.014
2004	0.444	-0.035	0.480	0.606	0.294E-04	1.080	0.669	0.267
2005	0.406	-0.015	0.421	0.606	0.294E-04	1.040	0.682	0.162
2006	0.498	0.029	0.469	0.606	0.294E-04	1.140	0.713	0.246
2007	1.191	0.094	1.097	0.606	0.294E-04	2.280	0.761	5.012
2008	0.921	0.138	0.783	0.606	0.294E-04	1.740	0.795	1.517
2009	1.307	0.207	1.100	0.606	0.294E-04	2.560	0.852	5.058
2011	1.675	0.447	1.228	0.606	0.294E-04	3.700	1.084	7.631
2012	2.093	0.468	1.626	0.606	0.294E-04	5.620	1.106	23.485
2013	1.938	0.505	1.433	0.606	0.294E-04	4.810	1.147	13.936

Selectivities by age									
Year	8	9	10	11	12	13	14	15	16
1981	0.051	0.104	0.119	0.122	0.112	0.123	0.190	0.272	1.000
1982	0.051	0.104	0.119	0.122	0.112	0.123	0.190	0.272	1.000
1983	0.051	0.104	0.119	0.122	0.112	0.123	0.190	0.272	1.000
1984	0.051	0.104	0.119	0.122	0.112	0.123	0.190	0.272	1.000
1985	0.051	0.104	0.119	0.122	0.112	0.123	0.190	0.272	1.000
1986	0.051	0.104	0.119	0.122	0.112	0.123	0.190	0.272	1.000
1987	0.051	0.104	0.119	0.122	0.112	0.123	0.190	0.272	1.000
1988	0.051	0.104	0.119	0.122	0.112	0.123	0.190	0.272	1.000
1989	0.051	0.104	0.119	0.122	0.112	0.123	0.190	0.272	1.000
1990	0.051	0.104	0.119	0.122	0.112	0.123	0.190	0.272	1.000
1991	0.051	0.104	0.119	0.122	0.112	0.123	0.190	0.272	1.000
1992	0.051	0.104	0.119	0.122	0.112	0.123	0.190	0.272	1.000
1993	0.051	0.104	0.119	0.122	0.112	0.123	0.190	0.272	1.000
1994	0.051	0.104	0.119	0.122	0.112	0.123	0.190	0.272	1.000
1995	0.051	0.104	0.119	0.122	0.112	0.123	0.190	0.272	1.000
1996	0.051	0.104	0.119	0.122	0.112	0.123	0.190	0.272	1.000
1997	0.051	0.104	0.119	0.122	0.112	0.123	0.190	0.272	1.000
1998	0.051	0.104	0.119	0.122	0.112	0.123	0.190	0.272	1.000

1999	0.051	0.104	0.119	0.122	0.112	0.123	0.190	0.272	1.000
2000	0.051	0.104	0.119	0.122	0.112	0.123	0.190	0.272	1.000
2001	0.051	0.104	0.119	0.122	0.112	0.123	0.190	0.272	1.000
2002	0.051	0.104	0.119	0.122	0.112	0.123	0.190	0.272	1.000
2003	0.051	0.104	0.119	0.122	0.112	0.123	0.190	0.272	1.000
2004	0.051	0.104	0.119	0.122	0.112	0.123	0.190	0.272	1.000
2005	0.051	0.104	0.119	0.122	0.112	0.123	0.190	0.272	1.000
2006	0.051	0.104	0.119	0.122	0.112	0.123	0.190	0.272	1.000
2007	0.051	0.104	0.119	0.122	0.112	0.123	0.190	0.272	1.000
2008	0.051	0.104	0.119	0.122	0.112	0.123	0.190	0.272	1.000
2009	0.051	0.104	0.119	0.122	0.112	0.123	0.190	0.272	1.000
2011	0.051	0.104	0.119	0.122	0.112	0.123	0.190	0.272	1.000
2012	0.051	0.104	0.119	0.122	0.112	0.123	0.190	0.272	1.000
2013	0.051	0.104	0.119	0.122	0.112	0.123	0.190	0.272	1.000

5.2 CAN_SWNS

Lognormal dist.
average numbers
Ages 5 - 16
log-likelihood = 6.85
deviance = 12.32
Chi-sq. discrepancy= 10.65

Year	Observed	Predicted	Residuals (Obs-pred)	Standard Deviation	Q Catchabil.	Untransfrmd Observed	Untransfrmd Predicted	Chi-square Discrepancy
1988	0.648	-0.251	0.899	0.606	0.599E-04	10.040	4.087	2.455
1989	0.549	-0.282	0.831	0.606	0.599E-04	9.100	3.963	1.868
1990	0.437	-0.307	0.743	0.606	0.599E-04	8.130	3.866	1.266
1991	-0.080	-0.316	0.236	0.606	0.599E-04	4.850	3.829	0.007
1992	-0.090	-0.307	0.217	0.606	0.599E-04	4.800	3.864	0.003
1993	-0.524	-0.278	-0.247	0.606	0.599E-04	3.110	3.980	0.275
1994	-0.348	-0.233	-0.115	0.606	0.599E-04	3.710	4.161	0.150
1995	-0.381	-0.164	-0.217	0.606	0.599E-04	3.590	4.458	0.245
1996	-0.615	-0.085	-0.530	0.606	0.599E-04	2.840	4.825	0.586
1997	-0.835	-0.037	-0.798	0.606	0.599E-04	2.280	5.063	0.880
1998	-0.260	-0.029	-0.231	0.606	0.599E-04	4.050	5.105	0.260
1999	0.050	-0.048	0.098	0.606	0.599E-04	5.520	5.005	0.015
2000	-0.792	-0.068	-0.723	0.606	0.599E-04	2.380	4.906	0.800
2001	-0.094	-0.061	-0.034	0.606	0.599E-04	4.780	4.944	0.086
2002	0.109	-0.049	0.158	0.606	0.599E-04	5.860	5.003	0.001
2003	0.434	-0.046	0.480	0.606	0.599E-04	8.110	5.018	0.268
2004	-0.118	-0.025	-0.092	0.606	0.599E-04	4.670	5.121	0.131
2005	0.024	0.010	0.014	0.606	0.599E-04	5.380	5.307	0.055
2006	0.125	0.055	0.069	0.606	0.599E-04	5.950	5.552	0.026
2007	-0.084	0.118	-0.202	0.606	0.599E-04	4.830	5.912	0.231
2008	0.281	0.182	0.100	0.606	0.599E-04	6.960	6.301	0.015
2009	0.026	0.268	-0.242	0.606	0.599E-04	5.390	6.866	0.271
2010	0.475	0.402	0.074	0.606	0.599E-04	8.450	7.848	0.024
2011	0.603	0.497	0.106	0.606	0.599E-04	9.600	8.634	0.013
2012	0.526	0.526	0.001	0.606	0.599E-04	8.890	8.885	0.063
2013	-0.068	0.528	-0.595	0.606	0.599E-04	4.910	8.904	0.659

Selectivities by age

Year	5	6	7	8	9	10	11	12	13	14	15	16
1988	0.016	0.031	0.110	0.400	0.710	0.936	1.000	0.981	0.926	0.885	0.867	0.743
1989	0.016	0.031	0.110	0.400	0.710	0.936	1.000	0.981	0.926	0.885	0.867	0.743
1990	0.016	0.031	0.110	0.400	0.710	0.936	1.000	0.981	0.926	0.885	0.867	0.743
1991	0.016	0.031	0.110	0.400	0.710	0.936	1.000	0.981	0.926	0.885	0.867	0.743
1992	0.016	0.031	0.110	0.400	0.710	0.936	1.000	0.981	0.926	0.885	0.867	0.743
1993	0.016	0.031	0.110	0.400	0.710	0.936	1.000	0.981	0.926	0.885	0.867	0.743
1994	0.016	0.031	0.110	0.400	0.710	0.936	1.000	0.981	0.926	0.885	0.867	0.743
1995	0.016	0.031	0.110	0.400	0.710	0.936	1.000	0.981	0.926	0.885	0.867	0.743
1996	0.016	0.031	0.110	0.400	0.710	0.936	1.000	0.981	0.926	0.885	0.867	0.743
1997	0.016	0.031	0.110	0.400	0.710	0.936	1.000	0.981	0.926	0.885	0.867	0.743
1998	0.016	0.031	0.110	0.400	0.710	0.936	1.000	0.981	0.926	0.885	0.867	0.743
1999	0.016	0.031	0.110	0.400	0.710	0.936	1.000	0.981	0.926	0.885	0.867	0.743
2000	0.016	0.031	0.110	0.400	0.710	0.936	1.000	0.981	0.926	0.885	0.867	0.743
2001	0.016	0.031	0.110	0.400	0.710	0.936	1.000	0.981	0.926	0.885	0.867	0.743
2002	0.016	0.031	0.110	0.400	0.710	0.936	1.000	0.981	0.926	0.885	0.867	0.743
2003	0.016	0.031	0.110	0.400	0.710	0.936	1.000	0.981	0.926	0.885	0.867	0.743
2004	0.016	0.031	0.110	0.400	0.710	0.936	1.000	0.981	0.926	0.885	0.867	0.743
2005	0.016	0.031	0.110	0.400	0.710	0.936	1.000	0.981	0.926	0.885	0.867	0.743
2006	0.016	0.031	0.110	0.400	0.710	0.936	1.000	0.981	0.926	0.885	0.867	0.743
2007	0.016	0.031	0.110	0.400	0.710	0.936	1.000	0.981	0.926	0.885	0.867	0.743
2008	0.016	0.031	0.110	0.400	0.710	0.936	1.000	0.981	0.926	0.885	0.867	0.743
2009	0.016	0.031	0.110	0.400	0.710	0.936	1.000	0.981	0.926	0.885	0.867	0.743
2010	0.016	0.031	0.110	0.400	0.710	0.936	1.000	0.981	0.926	0.885	0.867	0.743
2011	0.016	0.031	0.110	0.400	0.710	0.936	1.000	0.981	0.926	0.885	0.867	0.743
2012	0.016	0.031	0.110	0.400	0.710	0.936	1.000	0.981	0.926	0.885	0.867	0.743
2013	0.016	0.031	0.110	0.400	0.710	0.936	1.000	0.981	0.926	0.885	0.867	0.743

5.3 US_RR<145

Lognormal dist.
average numbers
Ages 1 - 5
log-likelihood = 3.15
deviance = 5.70
Chi-sq. discrepancy= 7.02

Year	Observed	Predicted	Residuals (Obs-pred)	Standard Deviation	Q Catchabil.	Untransfrmd Observed	Untransfrmd Predicted	Chi-square Discrepancy
1980	-0.141	-0.068	-0.073	0.606	0.380E-05	0.410	0.441	0.116
1981	-0.859	-0.232	-0.627	0.606	0.380E-05	0.200	0.374	0.694
1982	0.818	-0.260	1.078	0.606	0.380E-05	1.070	0.364	4.699

1983	0.188	-0.163	0.351	0.606	0.380E-05	0.570	0.401	0.075
1985	-0.389	-0.058	-0.331	0.606	0.380E-05	0.320	0.445	0.364
1986	-0.166	-0.042	-0.124	0.606	0.380E-05	0.400	0.453	0.158
1987	0.272	-0.046	0.319	0.606	0.380E-05	0.620	0.451	0.047
1988	0.057	0.021	0.037	0.606	0.380E-05	0.500	0.482	0.042
1989	0.057	0.198	-0.141	0.606	0.380E-05	0.500	0.576	0.173
1990	-0.026	0.281	-0.307	0.606	0.380E-05	0.460	0.625	0.339
1991	0.304	0.230	0.074	0.606	0.380E-05	0.640	0.594	0.024
1992	-0.117	0.139	-0.256	0.606	0.380E-05	0.420	0.543	0.285

Selectivities by age

Year	1	2	3	4	5
1980	0.276	1.000	0.776	0.151	0.094
1981	0.276	1.000	0.776	0.151	0.094
1982	0.276	1.000	0.776	0.151	0.094
1983	0.276	1.000	0.776	0.151	0.094
1985	0.276	1.000	0.776	0.151	0.094
1986	0.276	1.000	0.776	0.151	0.094
1987	0.276	1.000	0.776	0.151	0.094
1988	0.276	1.000	0.776	0.151	0.094
1989	0.276	1.000	0.776	0.151	0.094
1990	0.276	1.000	0.776	0.151	0.094
1991	0.276	1.000	0.776	0.151	0.094
1992	0.276	1.000	0.776	0.151	0.094

5.4 US_RR_66_114

Lognormal dist.

average numbers

Ages 2 - 3

log-likelihood = -1.39

deviance = 23.79

Chi-sq. discrepancy= 15.72

Year	Observed	Predicted	Residuals (Obs-pred)	Standard Deviation	Q Catchabil.	Untransfrmd Observed	Untransfrmd Predicted	Chi-square Discrepancy
1993	0.200	-0.283	0.483	0.606	0.410E-05	0.560	0.345	0.274
1994	-1.260	-0.271	-0.989	0.606	0.410E-05	0.130	0.350	1.074
1995	0.218	-0.289	0.506	0.606	0.410E-05	0.570	0.344	0.326
1996	0.593	-0.126	0.719	0.606	0.410E-05	0.830	0.404	1.127
1997	0.970	-0.095	1.066	0.606	0.410E-05	1.210	0.417	4.508
1998	0.437	-0.243	0.680	0.606	0.410E-05	0.710	0.360	0.930
1999	0.394	-0.266	0.660	0.606	0.410E-05	0.680	0.351	0.838
2000	0.046	-0.108	0.153	0.606	0.410E-05	0.480	0.412	0.002
2001	-0.690	-0.109	-0.581	0.606	0.410E-05	0.230	0.411	0.643
2002	0.492	-0.134	0.626	0.606	0.410E-05	0.750	0.401	0.695
2003	-0.781	0.010	-0.791	0.606	0.410E-05	0.210	0.463	0.873
2004	0.911	0.426	0.485	0.606	0.410E-05	1.140	0.702	0.278
2005	0.884	0.574	0.310	0.606	0.410E-05	1.110	0.814	0.041
2006	-0.424	0.076	-0.500	0.606	0.410E-05	0.300	0.495	0.552
2007	-0.690	-0.287	-0.403	0.606	0.410E-05	0.230	0.344	0.443
2008	-0.935	0.080	-1.015	0.606	0.410E-05	0.180	0.497	1.098
2009	-0.935	0.173	-1.108	0.606	0.410E-05	0.180	0.545	1.184
2010	0.200	0.120	0.080	0.606	0.410E-05	0.560	0.517	0.022
2011	0.479	0.166	0.313	0.606	0.410E-05	0.740	0.541	0.043
2012	-0.215	0.125	-0.339	0.606	0.410E-05	0.370	0.519	0.373
2013	0.106	0.460	-0.354	0.606	0.410E-05	0.510	0.727	0.389

Selectivities by age

Year	2	3
1993	0.487	1.000
1994	0.487	1.000
1995	0.487	1.000
1996	0.487	1.000
1997	0.487	1.000
1998	0.487	1.000
1999	0.487	1.000
2000	0.487	1.000
2001	0.487	1.000
2002	0.487	1.000
2003	0.487	1.000
2004	0.487	1.000
2005	0.487	1.000
2006	0.487	1.000
2007	0.487	1.000
2008	0.487	1.000
2009	0.487	1.000
2010	0.487	1.000
2011	0.487	1.000
2012	0.487	1.000
2013	0.487	1.000

5.5 US_RR_115_144

Lognormal dist.

average numbers

Ages 4 - 5

log-likelihood = 0.91

deviance = 19.20

Chi-sq. discrepancy= 13.18

Year	Observed	Predicted	Residuals (Obs-pred)	Standard Deviation	Q Catchabil.	Untransfrmd Observed	Untransfrmd Predicted	Chi-square Discrepancy
1993	0.018	-0.055	0.072	0.606	0.489E-05	0.500	0.465	0.025
1994	-1.329	-0.212	-1.117	0.606	0.489E-05	0.130	0.397	1.192

1995	-0.428	-0.233	-0.195	0.606	0.489E-05	0.320	0.389	0.224
1996	-0.283	-0.276	-0.007	0.606	0.489E-05	0.370	0.373	0.068
1997	-1.409	-0.225	-1.184	0.606	0.489E-05	0.120	0.392	1.251
1998	-0.065	-0.068	0.002	0.606	0.489E-05	0.460	0.459	0.062
1999	-0.231	-0.094	-0.137	0.606	0.489E-05	0.390	0.447	0.169
2000	0.280	-0.245	0.526	0.606	0.489E-05	0.650	0.384	0.374
2001	0.340	-0.164	0.504	0.606	0.489E-05	0.690	0.417	0.320
2002	0.996	-0.070	1.067	0.606	0.489E-05	1.330	0.458	4.526
2003	-0.493	-0.096	-0.397	0.606	0.489E-05	0.300	0.446	0.437
2004	-0.368	-0.128	-0.239	0.606	0.489E-05	0.340	0.432	0.268
2005	-0.428	0.123	-0.551	0.606	0.489E-05	0.320	0.555	0.610
2006	0.410	0.585	-0.175	0.606	0.489E-05	0.740	0.882	0.205
2007	0.423	0.544	-0.121	0.606	0.489E-05	0.750	0.846	0.155
2008	0.354	-0.091	0.445	0.606	0.489E-05	0.700	0.449	0.201
2009	-0.898	-0.137	-0.761	0.606	0.489E-05	0.200	0.428	0.841
2010	0.842	0.178	0.664	0.606	0.489E-05	1.140	0.587	0.858
2011	0.868	0.222	0.646	0.606	0.489E-05	1.170	0.613	0.778
2012	0.731	0.158	0.573	0.606	0.489E-05	1.020	0.575	0.508
2013	0.670	0.285	0.386	0.606	0.489E-05	0.960	0.653	0.113

Selectivities by age

Year	4	5
1993	1.000	0.871
1994	1.000	0.871
1995	1.000	0.871
1996	1.000	0.871
1997	1.000	0.871
1998	1.000	0.871
1999	1.000	0.871
2000	1.000	0.871
2001	1.000	0.871
2002	1.000	0.871
2003	1.000	0.871
2004	1.000	0.871
2005	1.000	0.871
2006	1.000	0.871
2007	1.000	0.871
2008	1.000	0.871
2009	1.000	0.871
2010	1.000	0.871
2011	1.000	0.871
2012	1.000	0.871
2013	1.000	0.871

5.6 US_RR_145_177

Not used

5.7 US_RR>195

Lognormal dist.
average numbers

Ages 10 - 16
log-likelihood = 1.68
deviance = 6.65
Chi-sq. discrepancy= 10.22

Year	Observed	Predicted	Residuals (Obs-pred)	Standard Deviation	Q Catchabil.	Untransfrmd Observed	Untransfrmd Predicted	Chi-square Discrepancy
1983	1.379	0.140	1.239	0.606	0.227E-04	2.810	0.814	7.883
1984	0.569	0.129	0.440	0.606	0.227E-04	1.250	0.805	0.191
1985	0.171	0.096	0.075	0.606	0.227E-04	0.840	0.779	0.024
1986	-0.410	0.048	-0.458	0.606	0.227E-04	0.470	0.743	0.505
1987	-0.410	0.025	-0.434	0.606	0.227E-04	0.470	0.726	0.479
1988	0.135	-0.002	0.137	0.606	0.227E-04	0.810	0.706	0.005
1989	-0.133	-0.044	-0.089	0.606	0.227E-04	0.620	0.678	0.128
1990	-0.348	-0.095	-0.253	0.606	0.227E-04	0.500	0.644	0.282
1991	-0.522	-0.129	-0.393	0.606	0.227E-04	0.420	0.622	0.432
1992	-0.431	-0.167	-0.264	0.606	0.227E-04	0.460	0.599	0.293

Selectivities by age

Year	10	11	12	13	14	15	16
1983	0.195	0.255	0.391	0.525	0.734	1.000	0.907
1984	0.195	0.255	0.391	0.525	0.734	1.000	0.907
1985	0.195	0.255	0.391	0.525	0.734	1.000	0.907
1986	0.195	0.255	0.391	0.525	0.734	1.000	0.907
1987	0.195	0.255	0.391	0.525	0.734	1.000	0.907
1988	0.195	0.255	0.391	0.525	0.734	1.000	0.907
1989	0.195	0.255	0.391	0.525	0.734	1.000	0.907
1990	0.195	0.255	0.391	0.525	0.734	1.000	0.907
1991	0.195	0.255	0.391	0.525	0.734	1.000	0.907
1992	0.195	0.255	0.391	0.525	0.734	1.000	0.907

5.8 US_RR>195_COMB

Not used

5.9 US_RR>177

Lognormal dist.
average numbers

Ages 8 - 16
log-likelihood = -3.53
deviance = 28.07

Chi-sq. discrepancy= 28.49

Year	Observed	Predicted	Residuals (Obs-pred)	Standard Deviation	Q Catchabil.	Untransfrmd Observed	Untransfrmd Predicted	Chi-square Discrepancy
1993	-0.279	-0.336	0.057	0.606	0.901E-05	0.350	0.331	0.032
1994	0.037	-0.310	0.347	0.606	0.901E-05	0.480	0.339	0.071
1995	0.226	-0.235	0.461	0.606	0.901E-05	0.580	0.366	0.230
1996	1.301	-0.157	1.459	0.606	0.901E-05	1.700	0.395	14.962
1997	0.509	-0.139	0.648	0.606	0.901E-05	0.770	0.403	0.788
1998	0.584	-0.141	0.725	0.606	0.901E-05	0.830	0.402	1.163
1999	0.730	-0.136	0.866	0.606	0.901E-05	0.960	0.404	2.152
2000	-0.369	-0.142	-0.227	0.606	0.901E-05	0.320	0.401	0.255
2001	0.414	-0.106	0.520	0.606	0.901E-05	0.700	0.416	0.359
2002	0.761	-0.085	0.846	0.606	0.901E-05	0.990	0.425	1.987
2003	-0.699	-0.098	-0.601	0.606	0.901E-05	0.230	0.419	0.666
2004	-0.197	-0.090	-0.107	0.606	0.901E-05	0.380	0.423	0.143
2005	-0.338	-0.045	-0.293	0.606	0.901E-05	0.330	0.442	0.323
2006	-0.743	0.004	-0.748	0.606	0.901E-05	0.220	0.465	0.827
2007	-1.001	0.050	-1.051	0.606	0.901E-05	0.170	0.486	1.132
2008	-0.839	0.101	-0.940	0.606	0.901E-05	0.200	0.512	1.026
2009	-1.126	0.191	-1.318	0.606	0.901E-05	0.150	0.560	1.360
2010	0.620	0.370	0.250	0.606	0.901E-05	0.860	0.670	0.010
2011	0.155	0.434	-0.279	0.606	0.901E-05	0.540	0.714	0.309
2012	0.260	0.414	-0.154	0.606	0.901E-05	0.600	0.700	0.185
2013	-0.006	0.456	-0.461	0.606	0.901E-05	0.460	0.730	0.509

Selectivities by age

Year	8	9	10	11	12	13	14	15	16
1993	0.240	0.333	0.311	0.426	0.491	0.637	0.866	1.000	0.703
1994	0.240	0.333	0.311	0.426	0.491	0.637	0.866	1.000	0.703
1995	0.240	0.333	0.311	0.426	0.491	0.637	0.866	1.000	0.703
1996	0.240	0.333	0.311	0.426	0.491	0.637	0.866	1.000	0.703
1997	0.240	0.333	0.311	0.426	0.491	0.637	0.866	1.000	0.703
1998	0.240	0.333	0.311	0.426	0.491	0.637	0.866	1.000	0.703
1999	0.240	0.333	0.311	0.426	0.491	0.637	0.866	1.000	0.703
2000	0.240	0.333	0.311	0.426	0.491	0.637	0.866	1.000	0.703
2001	0.240	0.333	0.311	0.426	0.491	0.637	0.866	1.000	0.703
2002	0.240	0.333	0.311	0.426	0.491	0.637	0.866	1.000	0.703
2003	0.240	0.333	0.311	0.426	0.491	0.637	0.866	1.000	0.703
2004	0.240	0.333	0.311	0.426	0.491	0.637	0.866	1.000	0.703
2005	0.240	0.333	0.311	0.426	0.491	0.637	0.866	1.000	0.703
2006	0.240	0.333	0.311	0.426	0.491	0.637	0.866	1.000	0.703
2007	0.240	0.333	0.311	0.426	0.491	0.637	0.866	1.000	0.703
2008	0.240	0.333	0.311	0.426	0.491	0.637	0.866	1.000	0.703
2009	0.240	0.333	0.311	0.426	0.491	0.637	0.866	1.000	0.703
2010	0.240	0.333	0.311	0.426	0.491	0.637	0.866	1.000	0.703
2011	0.240	0.333	0.311	0.426	0.491	0.637	0.866	1.000	0.703
2012	0.240	0.333	0.311	0.426	0.491	0.637	0.866	1.000	0.703
2013	0.240	0.333	0.311	0.426	0.491	0.637	0.866	1.000	0.703

5.10 JLL_AREA_2 (WEST)

Lognormal dist.
 month 0 numbers
 Ages 2 - 16
 log-likelihood = 0.52
 deviance = 36.99
 Chi-sq. discrepancy= 21.76

Year	Observed	Predicted	Residuals (Obs-pred)	Standard Deviation	Q Catchabil.	Untransfrmd Observed	Untransfrmd Predicted	Chi-square Discrepancy
1976	-0.460	0.251	-0.711	0.606	0.197E-05	0.340	0.692	0.787
1977	0.897	0.136	0.761	0.606	0.197E-05	1.320	0.617	1.372
1978	0.173	0.060	0.113	0.606	0.197E-05	0.640	0.572	0.010
1979	-0.202	-0.017	-0.185	0.606	0.197E-05	0.440	0.529	0.214
1980	0.433	-0.142	0.575	0.606	0.197E-05	0.830	0.467	0.515
1981	0.696	-0.246	0.942	0.606	0.197E-05	1.080	0.421	2.902
1982	-0.297	-0.353	0.056	0.606	0.197E-05	0.400	0.378	0.032
1983	-0.808	-0.343	-0.465	0.606	0.197E-05	0.240	0.382	0.513
1984	0.057	-0.327	0.384	0.606	0.197E-05	0.570	0.388	0.111
1985	0.204	-0.297	0.501	0.606	0.197E-05	0.660	0.400	0.313
1986	-2.376	-0.300	-2.077	0.606	0.197E-05	0.050	0.399	1.806
1987	-0.202	-0.271	0.069	0.606	0.197E-05	0.440	0.411	0.027
1988	0.204	-0.261	0.465	0.606	0.197E-05	0.660	0.414	0.238
1989	0.021	-0.247	0.269	0.606	0.197E-05	0.550	0.420	0.018
1990	-0.157	-0.175	0.018	0.606	0.197E-05	0.460	0.452	0.052
1991	-0.157	-0.125	-0.032	0.606	0.197E-05	0.460	0.475	0.085
1992	0.263	-0.094	0.357	0.606	0.197E-05	0.700	0.490	0.081
1993	0.248	-0.066	0.315	0.606	0.197E-05	0.690	0.504	0.044
1994	0.173	-0.053	0.226	0.606	0.197E-05	0.640	0.511	0.004
1995	-0.136	-0.055	-0.081	0.606	0.197E-05	0.470	0.509	0.121
1996	0.785	-0.050	0.835	0.606	0.197E-05	1.180	0.512	1.896
1997	0.305	-0.034	0.338	0.606	0.197E-05	0.730	0.520	0.063
1998	-0.460	-0.040	-0.420	0.606	0.197E-05	0.340	0.517	0.462
1999	-0.375	-0.039	-0.336	0.606	0.197E-05	0.370	0.518	0.370
2000	-0.157	-0.012	-0.146	0.606	0.197E-05	0.460	0.532	0.177
2001	-0.619	-0.003	-0.615	0.606	0.197E-05	0.290	0.537	0.682
2002	-0.460	0.010	-0.470	0.606	0.197E-05	0.340	0.544	0.518
2003	-0.460	0.021	-0.481	0.606	0.197E-05	0.340	0.550	0.531
2004	-0.585	0.107	-0.692	0.606	0.197E-05	0.300	0.599	0.766
2005	-0.402	0.254	-0.656	0.606	0.197E-05	0.360	0.694	0.727
2006	0.141	0.309	-0.168	0.606	0.197E-05	0.620	0.733	0.198
2007	0.568	0.313	0.255	0.606	0.197E-05	0.950	0.736	0.012
2008	-0.272	0.339	-0.612	0.606	0.197E-05	0.410	0.756	0.677
2009	0.557	0.336	0.221	0.606	0.197E-05	0.940	0.753	0.003
2010	-0.460	0.333	-0.792	0.606	0.197E-05	0.340	0.751	0.874
2011	0.991	0.348	0.643	0.606	0.197E-05	1.450	0.762	0.764
2012	1.322	0.367	0.956	0.606	0.197E-05	2.020	0.777	3.051

2013 1.005 0.367 0.638 0.606 0.197E-05 1.470 0.777 0.744

Selectivities by age

Year	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
1976	0.084	0.598	0.635	0.826	1.000	0.910	0.888	0.816	0.636	0.435	0.535	0.729	0.849	0.947	0.742
1977	0.084	0.598	0.635	0.826	1.000	0.910	0.888	0.816	0.636	0.435	0.535	0.729	0.849	0.947	0.742
1978	0.084	0.598	0.635	0.826	1.000	0.910	0.888	0.816	0.636	0.435	0.535	0.729	0.849	0.947	0.742
1979	0.084	0.598	0.635	0.826	1.000	0.910	0.888	0.816	0.636	0.435	0.535	0.729	0.849	0.947	0.742
1980	0.084	0.598	0.635	0.826	1.000	0.910	0.888	0.816	0.636	0.435	0.535	0.729	0.849	0.947	0.742
1981	0.084	0.598	0.635	0.826	1.000	0.910	0.888	0.816	0.636	0.435	0.535	0.729	0.849	0.947	0.742
1982	0.084	0.598	0.635	0.826	1.000	0.910	0.888	0.816	0.636	0.435	0.535	0.729	0.849	0.947	0.742
1983	0.084	0.598	0.635	0.826	1.000	0.910	0.888	0.816	0.636	0.435	0.535	0.729	0.849	0.947	0.742
1984	0.084	0.598	0.635	0.826	1.000	0.910	0.888	0.816	0.636	0.435	0.535	0.729	0.849	0.947	0.742
1985	0.084	0.598	0.635	0.826	1.000	0.910	0.888	0.816	0.636	0.435	0.535	0.729	0.849	0.947	0.742
1986	0.084	0.598	0.635	0.826	1.000	0.910	0.888	0.816	0.636	0.435	0.535	0.729	0.849	0.947	0.742
1987	0.084	0.598	0.635	0.826	1.000	0.910	0.888	0.816	0.636	0.435	0.535	0.729	0.849	0.947	0.742
1988	0.084	0.598	0.635	0.826	1.000	0.910	0.888	0.816	0.636	0.435	0.535	0.729	0.849	0.947	0.742
1989	0.084	0.598	0.635	0.826	1.000	0.910	0.888	0.816	0.636	0.435	0.535	0.729	0.849	0.947	0.742
1990	0.084	0.598	0.635	0.826	1.000	0.910	0.888	0.816	0.636	0.435	0.535	0.729	0.849	0.947	0.742
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1994	0.084	0.598	0.635	0.826	1.000	0.910	0.888	0.816	0.636	0.435	0.535	0.729	0.849	0.947	0.742
1995	0.084	0.598	0.635	0.826	1.000	0.910	0.888	0.816	0.636	0.435	0.535	0.729	0.849	0.947	0.742
1996	0.084	0.598	0.635	0.826	1.000	0.910	0.888	0.816	0.636	0.435	0.535	0.729	0.849	0.947	0.742
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1998	0.084	0.598	0.635	0.826	1.000	0.910	0.888	0.816	0.636	0.435	0.535	0.729	0.849	0.947	0.742
1999	0.084	0.598	0.635	0.826	1.000	0.910	0.888	0.816	0.636	0.435	0.535	0.729	0.849	0.947	0.742
2000	0.084	0.598	0.635	0.826	1.000	0.910	0.888	0.816	0.636	0.435	0.535	0.729	0.849	0.947	0.742
2001	0.084	0.598	0.635	0.826	1.000	0.910	0.888	0.816	0.636	0.435	0.535	0.729	0.849	0.947	0.742
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2005	0.084	0.598	0.635	0.826	1.000	0.910	0.888	0.816	0.636	0.435	0.535	0.729	0.849	0.947	0.742
2006	0.084	0.598	0.635	0.826	1.000	0.910	0.888	0.816	0.636	0.435	0.535	0.729	0.849	0.947	0.742
2007	0.084	0.598	0.635	0.826	1.000	0.910	0.888	0.816	0.636	0.435	0.535	0.729	0.849	0.947	0.742
2008	0.084	0.598	0.635	0.826	1.000	0.910	0.888	0.816	0.636	0.435	0.535	0.729	0.849	0.947	0.742
2009	0.084	0.598	0.635	0.826	1.000	0.910	0.888	0.816	0.636	0.435	0.535	0.729	0.849	0.947	0.742
2010	0.084	0.598	0.635	0.826	1.000	0.910	0.888	0.816	0.636	0.435	0.535	0.729	0.849	0.947	0.742
2011	0.084	0.598	0.635	0.826	1.000	0.910	0.888	0.816	0.636	0.435	0.535	0.729	0.849	0.947	0.742
2012	0.084	0.598	0.635	0.826	1.000	0.910	0.888	0.816	0.636	0.435	0.535	0.729	0.849	0.947	0.742
2013	0.084	0.598	0.635	0.826	1.000	0.910	0.888	0.816	0.636	0.435	0.535	0.729	0.849	0.947	0.742

5.11 JLL_AREA_3 (31+32)

Not used

5.12 JLL_AREAS_17+18

Not used

5.13 LARVAL_ZERO_INFLATED

Lognormal dist.

average biomass

Ages 9 - 16

log-likelihood = 1.44

deviance = 31.14

Chi-sq. discrepancy= 34.22

Year	Observed	Predicted	Residuals (Obs-pred)	Standard Deviation	Q Catchabil.	Untransfrmd Observed	Untransfrmd Predicted	Chi-square Discrepancy
1977	1.512	0.794	0.719	0.606	0.700E-07	2.250	1.097	1.126
1978	2.181	0.654	1.527	0.606	0.700E-07	4.390	0.953	18.049
1981	0.491	0.163	0.328	0.606	0.700E-07	0.810	0.584	0.054
1982	0.867	0.113	0.754	0.606	0.700E-07	1.180	0.555	1.329
1983	0.527	0.068	0.459	0.606	0.700E-07	0.840	0.531	0.227
1984	-0.470	0.055	-0.525	0.606	0.700E-07	0.310	0.524	0.580
1986	-0.348	-0.042	-0.307	0.606	0.700E-07	0.350	0.476	0.338
1987	-0.470	-0.072	-0.398	0.606	0.700E-07	0.310	0.461	0.438
1988	0.806	-0.085	0.891	0.606	0.700E-07	1.110	0.455	2.379
1989	0.223	-0.109	0.333	0.606	0.700E-07	0.620	0.445	0.058
1990	-0.407	-0.183	-0.224	0.606	0.700E-07	0.330	0.413	0.252
1991	-0.502	-0.200	-0.302	0.606	0.700E-07	0.300	0.406	0.334
1992	-0.166	-0.238	0.072	0.606	0.700E-07	0.420	0.391	0.025
1993	-0.119	-0.259	0.139	0.606	0.700E-07	0.440	0.383	0.004
1994	0.085	-0.295	0.380	0.606	0.700E-07	0.540	0.369	0.106
1995	-0.813	-0.270	-0.542	0.606	0.700E-07	0.220	0.378	0.600
1996	0.466	-0.273	0.739	0.606	0.700E-07	0.790	0.377	1.241
1997	-0.407	-0.282	-0.125	0.606	0.700E-07	0.330	0.374	0.159
1998	-1.506	-0.275	-1.231	0.606	0.700E-07	0.110	0.377	1.290
1999	-0.075	-0.236	0.161	0.606	0.700E-07	0.460	0.391	0.001
2000	-0.685	-0.186	-0.498	0.606	0.700E-07	0.250	0.411	0.550
2001	-0.075	-0.159	0.084	0.606	0.700E-07	0.460	0.423	0.020
2002	-0.726	-0.129	-0.597	0.606	0.700E-07	0.240	0.436	0.661
2003	0.466	-0.124	0.590	0.606	0.700E-07	0.790	0.438	0.565
2004	0.104	-0.125	0.228	0.606	0.700E-07	0.550	0.438	0.005
2005	-1.013	-0.083	-0.930	0.606	0.700E-07	0.180	0.456	1.016
2006	-0.054	-0.037	-0.016	0.606	0.700E-07	0.470	0.478	0.074
2007	-0.240	0.047	-0.288	0.606	0.700E-07	0.390	0.520	0.318
2008	-0.470	0.126	-0.595	0.606	0.700E-07	0.310	0.562	0.659
2009	0.157	0.186	-0.029	0.606	0.700E-07	0.580	0.597	0.083
2010	-0.240	0.262	-0.502	0.606	0.700E-07	0.390	0.644	0.554
2011	0.721	0.310	0.411	0.606	0.700E-07	1.020	0.676	0.146
2012	-0.502	0.393	-0.895	0.606	0.700E-07	0.300	0.734	0.981
2013	0.681	0.493	0.189	0.606	0.700E-07	0.980	0.811	0.000

Selectivities by age

Year	9	10	11	12	13	14	15	16
1977	0.017	0.056	0.131	0.238	0.440	0.450	1.000	0.701
1978	0.017	0.056	0.131	0.238	0.440	0.450	1.000	0.701
1981	0.017	0.056	0.131	0.238	0.440	0.450	1.000	0.701
1982	0.017	0.056	0.131	0.238	0.440	0.450	1.000	0.701
1983	0.017	0.056	0.131	0.238	0.440	0.450	1.000	0.701
1984	0.017	0.056	0.131	0.238	0.440	0.450	1.000	0.701
1986	0.017	0.056	0.131	0.238	0.440	0.450	1.000	0.701
1987	0.017	0.056	0.131	0.238	0.440	0.450	1.000	0.701
1988	0.017	0.056	0.131	0.238	0.440	0.450	1.000	0.701
1989	0.017	0.056	0.131	0.238	0.440	0.450	1.000	0.701
1990	0.017	0.056	0.131	0.238	0.440	0.450	1.000	0.701
1991	0.017	0.056	0.131	0.238	0.440	0.450	1.000	0.701
1992	0.017	0.056	0.131	0.238	0.440	0.450	1.000	0.701
1993	0.017	0.056	0.131	0.238	0.440	0.450	1.000	0.701
1994	0.017	0.056	0.131	0.238	0.440	0.450	1.000	0.701
1995	0.017	0.056	0.131	0.238	0.440	0.450	1.000	0.701
1996	0.017	0.056	0.131	0.238	0.440	0.450	1.000	0.701
1997	0.017	0.056	0.131	0.238	0.440	0.450	1.000	0.701
1998	0.017	0.056	0.131	0.238	0.440	0.450	1.000	0.701
1999	0.017	0.056	0.131	0.238	0.440	0.450	1.000	0.701
2000	0.017	0.056	0.131	0.238	0.440	0.450	1.000	0.701
2001	0.017	0.056	0.131	0.238	0.440	0.450	1.000	0.701
2002	0.017	0.056	0.131	0.238	0.440	0.450	1.000	0.701
2003	0.017	0.056	0.131	0.238	0.440	0.450	1.000	0.701
2004	0.017	0.056	0.131	0.238	0.440	0.450	1.000	0.701
2005	0.017	0.056	0.131	0.238	0.440	0.450	1.000	0.701
2006	0.017	0.056	0.131	0.238	0.440	0.450	1.000	0.701
2007	0.017	0.056	0.131	0.238	0.440	0.450	1.000	0.701
2008	0.017	0.056	0.131	0.238	0.440	0.450	1.000	0.701
2009	0.017	0.056	0.131	0.238	0.440	0.450	1.000	0.701
2010	0.017	0.056	0.131	0.238	0.440	0.450	1.000	0.701
2011	0.017	0.056	0.131	0.238	0.440	0.450	1.000	0.701
2012	0.017	0.056	0.131	0.238	0.440	0.450	1.000	0.701
2013	0.017	0.056	0.131	0.238	0.440	0.450	1.000	0.701

5.14 GOM_PLL_1-6

Lognormal dist.
month 0 numbers
Ages 9 - 16
log-likelihood = 5.53
deviance = 10.96
Chi-sq. discrepancy= 6.79

Year	Observed	Predicted	Residuals (Obs-pred)	Standard Deviation	Q Catchabil.	Untransfrmd Observed	Untransfrmd Predicted	Chi-square Discrepancy
1992	0.335	-0.241	0.576	0.606	0.258E-04	0.800	0.450	0.520
1993	-0.240	-0.304	0.063	0.606	0.258E-04	0.450	0.422	0.029
1994	-0.550	-0.297	-0.254	0.606	0.258E-04	0.330	0.425	0.283
1995	-0.613	-0.277	-0.336	0.606	0.258E-04	0.310	0.434	0.370
1996	-1.156	-0.235	-0.921	0.606	0.258E-04	0.180	0.452	1.007
1997	-0.550	-0.156	-0.394	0.606	0.258E-04	0.330	0.489	0.433
1998	-0.463	-0.116	-0.347	0.606	0.258E-04	0.360	0.510	0.382
1999	0.064	-0.099	0.163	0.606	0.258E-04	0.610	0.518	0.001
2000	0.442	-0.135	0.577	0.606	0.258E-04	0.890	0.500	0.522
2001	-0.115	-0.076	-0.039	0.606	0.258E-04	0.510	0.530	0.090
2002	-0.176	-0.017	-0.158	0.606	0.258E-04	0.480	0.562	0.189
2003	0.408	-0.051	0.459	0.606	0.258E-04	0.860	0.544	0.226
2004	0.310	-0.066	0.376	0.606	0.258E-04	0.780	0.535	0.102
2005	0.031	-0.017	0.048	0.606	0.258E-04	0.590	0.562	0.036
2006	-0.333	0.041	-0.374	0.606	0.258E-04	0.410	0.596	0.411
2007	-0.039	0.040	-0.079	0.606	0.258E-04	0.550	0.595	0.120
2008	0.789	0.146	0.643	0.606	0.258E-04	1.260	0.662	0.766
2009	0.607	0.199	0.408	0.606	0.258E-04	1.050	0.698	0.143
2010	0.442	0.265	0.177	0.606	0.258E-04	0.890	0.746	0.000
2011	0.244	0.330	-0.086	0.606	0.258E-04	0.730	0.796	0.126
2012	0.851	0.487	0.364	0.606	0.258E-04	1.340	0.931	0.088
2013	-0.286	0.581	-0.867	0.606	0.258E-04	0.430	1.023	0.952

Selectivities by age

Year	9	10	11	12	13	14	15	16
1992	0.036	0.086	0.264	0.128	0.314	0.296	1.000	0.394
1993	0.036	0.086	0.264	0.128	0.314	0.296	1.000	0.394
1994	0.036	0.086	0.264	0.128	0.314	0.296	1.000	0.394
1995	0.036	0.086	0.264	0.128	0.314	0.296	1.000	0.394
1996	0.036	0.086	0.264	0.128	0.314	0.296	1.000	0.394
1997	0.036	0.086	0.264	0.128	0.314	0.296	1.000	0.394
1998	0.036	0.086	0.264	0.128	0.314	0.296	1.000	0.394
1999	0.036	0.086	0.264	0.128	0.314	0.296	1.000	0.394
2000	0.036	0.086	0.264	0.128	0.314	0.296	1.000	0.394
2001	0.036	0.086	0.264	0.128	0.314	0.296	1.000	0.394
2002	0.036	0.086	0.264	0.128	0.314	0.296	1.000	0.394
2003	0.036	0.086	0.264	0.128	0.314	0.296	1.000	0.394
2004	0.036	0.086	0.264	0.128	0.314	0.296	1.000	0.394
2005	0.036	0.086	0.264	0.128	0.314	0.296	1.000	0.394
2006	0.036	0.086	0.264	0.128	0.314	0.296	1.000	0.394
2007	0.036	0.086	0.264	0.128	0.314	0.296	1.000	0.394
2008	0.036	0.086	0.264	0.128	0.314	0.296	1.000	0.394
2009	0.036	0.086	0.264	0.128	0.314	0.296	1.000	0.394
2010	0.036	0.086	0.264	0.128	0.314	0.296	1.000	0.394
2011	0.036	0.086	0.264	0.128	0.314	0.296	1.000	0.394
2012	0.036	0.086	0.264	0.128	0.314	0.296	1.000	0.394
2013	0.036	0.086	0.264	0.128	0.314	0.296	1.000	0.394

5.15 JLL_GOM

Lognormal dist.

month 0 numbers

Ages 9 - 16

log-likelihood = 1.44

deviance = 5.13

Chi-sq. discrepancy= 3.69

Year	Observed	Predicted	Residuals (Obs-pred)	Standard Deviation	Q Catchabil.	Untransfrmd Observed	Untransfrmd Predicted	Chi-square Discrepancy
1974	0.153	0.437	-0.284	0.606	0.135E-04	0.968	1.286	0.314
1975	-0.442	0.343	-0.785	0.606	0.135E-04	0.534	1.170	0.866
1976	-0.221	0.267	-0.488	0.606	0.135E-04	0.666	1.085	0.539
1977	0.094	0.123	-0.029	0.606	0.135E-04	0.913	0.940	0.083
1978	0.053	-0.048	0.101	0.606	0.135E-04	0.876	0.792	0.014
1979	0.438	-0.202	0.640	0.606	0.135E-04	1.287	0.679	0.753
1980	0.332	-0.385	0.717	0.606	0.135E-04	1.158	0.565	1.119
1981	-0.407	-0.534	0.127	0.606	0.135E-04	0.553	0.487	0.007

Selectivities by age

Year	9	10	11	12	13	14	15	16
1974	0.030	0.066	0.104	0.299	0.613	0.645	1.000	0.791
1975	0.030	0.066	0.104	0.299	0.613	0.645	1.000	0.791
1976	0.030	0.066	0.104	0.299	0.613	0.645	1.000	0.791
1977	0.030	0.066	0.104	0.299	0.613	0.645	1.000	0.791
1978	0.030	0.066	0.104	0.299	0.613	0.645	1.000	0.791
1979	0.030	0.066	0.104	0.299	0.613	0.645	1.000	0.791
1980	0.030	0.066	0.104	0.299	0.613	0.645	1.000	0.791
1981	0.030	0.066	0.104	0.299	0.613	0.645	1.000	0.791

5.16 TAGGING

Lognormal dist.

average numbers

Ages 1 - 3

log-likelihood = 1.52

deviance = 8.97

Chi-sq. discrepancy= 7.20

Year	Observed	Predicted	Residuals (Obs-pred)	Standard Deviation	Q Catchabil.	Untransfrmd Observed	Untransfrmd Predicted	Chi-square Discrepancy
1970	1.232	0.620	0.611	0.606	0.102E+01	1065132.000	577933.838	0.641
1971	1.170	0.433	0.737	0.606	0.102E+01	1001624.000	479179.115	1.231
1972	0.329	0.370	-0.041	0.606	0.102E+01	431955.000	450091.085	0.091
1973	-0.526	0.113	-0.639	0.606	0.102E+01	183616.000	347942.834	0.708
1974	0.094	0.626	-0.532	0.606	0.102E+01	341589.000	581297.608	0.588
1975	0.579	0.356	0.223	0.606	0.102E+01	554596.000	443960.648	0.004
1976	-0.205	-0.002	-0.203	0.606	0.102E+01	253265.000	310170.924	0.231
1977	-0.189	-0.241	0.053	0.606	0.102E+01	257385.000	244192.202	0.034
1978	-0.943	-0.366	-0.576	0.606	0.102E+01	121110.000	215492.249	0.638
1979	-1.146	-0.469	-0.677	0.606	0.102E+01	98815.000	194550.336	0.750
1980	-0.479	-0.643	0.164	0.606	0.102E+01	192541.000	163361.426	0.001
1981	0.084	-0.796	0.880	0.606	0.102E+01	337995.000	140171.341	2.280

Selectivities by age

Year	1	2	3
1970	1.000	1.000	1.000
1971	1.000	1.000	1.000
1972	1.000	1.000	1.000
1973	1.000	1.000	1.000
1974	1.000	1.000	1.000
1975	1.000	1.000	1.000
1976	1.000	1.000	1.000
1977	1.000	1.000	1.000
1978	1.000	1.000	1.000
1979	1.000	1.000	1.000
1980	1.000	1.000	1.000
1981	1.000	1.000	1.000

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TOTAL NUMBER OF FUNCTION EVALUATIONS = 18754