

AN UPDATED ANALYSIS OF BLUEFIN TUNA STOCK MIXING

M. Morse¹, S. Cadrin¹, L. Kerr², D. Secor³, M. Siskey^{3,4},
H. Arrizabalaga⁵, A. Hanke⁶, and C. Porch⁷

SUMMARY

Input data from the 2017 base case virtual population analyses (VPAs) of Atlantic bluefin tuna fisheries were adjusted to account for revised 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 that account for stock mixing. Similar to results from previous analyses, estimates of stock size and fishing mortality from the VPAs of both eastern- and western-origin Atlantic bluefin tuna were generally similar to the VPAs of 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 du cas de base des analyses de population virtuelle de 2017 (VPA) des pêches de thon rouge de l'Atlantique ont été ajustées pour tenir compte des estimations révisées de la composition des stocks. Les évaluations des pêches 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 approche pratique aux évaluations opérationnelles qui tiennent compte du mélange des stocks. Pareillement aux résultats obtenus des analyses antérieures, 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 VPA des pêches 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.

SUMMARY

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

¹ University of Massachusetts Dartmouth, School for Marine Science and Technology, 836 South Rodney French Blvd, New Bedford, MA 02744, USA, scadrin@umassd.edu

² Gulf of Maine Research Institute

³ University of Maryland Center for Environmental Science, Chesapeake Biological Laboratory

⁴ Stony Brook University, School of Marine and Atmospheric Sciences

⁵ AZTI. Herrera Kaia Portualdea z/g 20110 Pasaiña

⁶ Canada Department of Fisheries and Oceans

⁷ US National Marine Fisheries Service, Southeast Fisheries Science Center

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). These populations are known to intermix, but management advice has typically been based on separate stock assessments of the fisheries east and west of the 45°W stock boundary that assume the effects of mixing are negligible (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 (VPA) and statistical age-structured (stock synthesis [SS]) assessment models to separate eastern and western stocks (ICCAT 2017). Depending on the extent of mixing, violations of the unit stock 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 2017). 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 integrate 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). The results indicate that the stock composition of bluefin tuna 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 support 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 demonstrate the operational application of otolith chemistry techniques for characterizing the stock composition of bluefin tuna; apply stock composition information to parse catch, catch-per-unit-effort (CPUE), and age composition data; and use the parsed data to conduct population-specific (rather than area-specific) assessments. We updated the analyses reported by Cadrian *et al.* (2017), which were based on information from the previous stock assessment (ICCAT 2014) and a previous summary of stock composition information (Busawon *et al.* 2013, Fraile *et al.* 2014, Rooker *et al.* 2014, Secor *et al.* 2014, Siskey *et al.* 2016).

1. Methods

The 2017 base case virtual population analyses (VPAs) of eastern and western Atlantic bluefin tuna were revised based on an exploratory analysis of available stock composition data by year and fleet. A large database on stock composition was developed by the “mixing subgroup” in preparation for the 2017 assessment (ICCAT 2014, 2017). Discrete population assignment was applied where individuals identified as having >70% probability of eastern-origin were assigned to the east and observations with <30% probability of eastern-origin were assigned to the west (as agreed by the mixing subgroup). Population assignment data were aggregated by statistical reporting area (i.e., “BFT_Area,” **Figure 1**), gear, and year to derive Proportion-East of fleets used in the 2017 VPAs of eastern and western bluefin tuna (**Table 1**). Temporal trends in Proportion-East were examined by fleet (defined by area and gear) to determine stock composition assumptions for population-of-origin VPAs (**Table 2, Figure 2**). If the data available suggested annual differences in Proportion-East, time-varying estimates of stock composition were assumed by fleet. Multi-year estimates of Proportion-East were assumed for years with no data or sample sizes less than 14 (based on the minimum sample size needed to detect a difference between 0.7 and 0.3). Median proportions among aggregated samples were used to determine stock composition by fleet. Catch and indices of abundance for eastern fleets located in areas with no stock composition data (i.e., in the Mediterranean Sea) were assumed to be 100% eastern-origin (**Table 1**).

The 2017 base case VPA of eastern bluefin tuna was revised by removing the proportion of western-origin fish from the 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 partial catch and CPUE values of indices with no stock composition data were not adjusted. The eastern assessment included year classes 1 to 10+ for the time period 1968 to 2015.

Catch-at-age of eastern-origin fish was derived from the 2017 base case VPA input data file for eastern fisheries and stock composition estimates. Catch-at-age of eastern-origin fish ($C_{eo,t,a}$) was calculated as

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

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

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

where ef is eastern fisheries, wf is western fisheries, and P is proportion of eastern-origin fish by fleet (f) across years (t). In order to derive the estimated number of eastern-origin fish in western fisheries ($\sum_f [C_{wf,t,a}(P_{f,t})]$), it was assumed that no eastern fish were caught in western fisheries before 1974 because western catch data before this year were not available. To derive the number of western-origin fish in eastern fisheries for the years 1968-1969, the stock composition data were extrapolated by assuming the stock composition estimates for 1970 were also true for these years.

Revised partial catch-at-age estimates for eastern-origin fish were calculated as

$$3) \quad C_{eo,f,t,a} = C_{ef,f,t,a} * P_{f,t}$$

for each fleet.

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

$$4) \quad U_{eo,t,f} = U_{ms,t} \frac{\sum_a P_{f,t} C_{f,t,a}}{\sum_a C_{f,t,a}} .$$

The 2017 base case VPA assuming the younger spawning schedule of western bluefin tuna was revised by removing the proportion of eastern-origin fish from the catch-at-age, partial catch-at-age, and CPUE, as well as adding western-origin fish caught in eastern fisheries to the catch-at-age. The partial catch and CPUE values of indices without stock composition data retained their original values. The western assessment included year classes 1 to 16+ for the time period 1974 to 2015.

Catch-at-age of western-origin fish was derived from the 2017 base case VPA input data file for western fisheries and stock composition estimates. Catch-at-age of western-origin fish ($C_{wo,t,a}$) was calculated as

$$5) \quad C_{wo,t,a} = C_{wf,t,a} - \sum_f (C_{wf,t,a}(P_{f,t})) + \sum_f (C_{ef,t,a}(1 - P_{f,t})) ,$$

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

$$6) \quad C_{wo,t,a} = \sum_f (C_{f,t,a}(1 - P_{f,t})) .$$

In calculating the number of western-origin fish in eastern fisheries, fish in the age 10+ plus group of the eastern catch-at-age had to be extrapolated out to the older plus-group used for the western assessment (age 16+). This was done by multiplying the number of western-origin fish in the eastern age 10+ catch by the proportion of western-origin fish for each age class (10-16+) in the total western catch of age classes 10-16+:

$$7) \quad \Sigma_f(C_{ef,t,a}[1 - P_{f,t}]) = \left(\frac{\sum_f[C_{wf,t,a}(1 - P_{f,t})]}{\sum_{a=10}^{16} \sum_f[C_{wf,t,a}(1 - P_{f,t})]} \right) * \Sigma_f(C_{ef,t,a=10}[1 - P_{f,t}]),$$

where a represents each age 10-16 unless otherwise indicated.

Revised partial catch-at-age estimates for western-origin fish were calculated as

$$8) \quad C_{wo,f,t,a} = C_{wf,f,t,a} * (1 - P_{f,t})$$

for each fleet.

Fleet CPUE of mixed stocks ($U_{ms,t}$) over time was adjusted downward to derive CPUE of western-origin fish ($U_{w,t,f}$) for each fleet over time, using proportion of western-origin fish for catch-at-age:

$$9) \quad U_{wo,t,f} = U_{ms,t} \frac{\sum_a(1-P_{f,t})C_{f,t,a}}{\sum_a C_{f,t,a}}.$$

To verify that the population-of-origin revised catch-at-age data were correctly calculated (i.e., did not result in the removal or addition of fish to the total catch-at-age), the total (east + west) mixed-stock catch-at-age was compared to the total (east + west) population-of-origin catch-at-age. Data that were subtracted in the calculations because of mismatched catch-at-age matrix dimensions (e.g., removal of eastern catch data for years 1968-1973 when calculating western-origin fish in eastern fisheries) were added back in for the data check.

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 VPA using the VPA-2BOX program (Version 4.01 (2017); Porch 1995, 2003) maintaining all settings from the respective 2017 base case assessments (ICCAT 2017).

2. Results

The ICCAT database of bluefin tuna population-of-origin includes 6886 observations of stock identity, but assignment probability varied widely, and many observations had probability of eastern origin <70% and >30%. After excluding observations where population-of-origin was unclear (between 30% and 70% probability East), 2727 observations were assigned as members of the eastern population, while 2773 observations were assigned as members of the western population. Proportion-East, derived from observations of discrete population assignment, varied widely among year and area (**Figure 2**).

Moroccan & Spanish Traps (MOR_SP_TP) – Data were available for annual estimates for 2010-2016 (**Figure 3**). However, the 2014 sample appears to be an anomaly despite adequate same size ($n=39$), so the 2010-2016 median (83%, horizontal line) was assumed for 2014 and the earlier time series (1970-2009).

Japanese Longline in Eastern Atlantic and Mediterranean (JPN_LL_EastMed) – Data were available for 2011 and 2012 (**Figure 4**), but sample size is insufficient in 2012 ($n=8$), so the 2011-2012 median (85%) was assumed for 1970-2015.

Japanese Longline Northeast Atlantic (JPN_LL_NEA) – Data were available for annual estimates in 2010-2015 (**Figure 5**), but the 2009 sample is an anomaly from low sample size ($n=1$), so the time series median (83%) was assumed for 1970-2009.

Spanish Bait Boat (SP_BB) – Data and sufficient sample size were available for annual estimates for 2009-2016 (**Figure 6**), and the 2009-2016 median (93%) was assumed for 1970-2008.

Canadian Combined-Area Rod & Reel (CAN_COMB_RR) – Data were available in three periods: 1974-1977, 1996-2000, and 2010-2015 (**Figure 7**). However, sample size is insufficient in 1974 ($n=1$), 1999 ($n=5$), and 2000 ($n=7$). The median from 1974-1977, 1996-2000, and 2010-2015 (20%) was assumed for 1970-1974, 1978-1995, and 1999-2009.

US Rod & Reel (US_RR) – Data were available in three periods: 1975-1977, 1998-2002, and 2010-2015 (**Figure 8**), but sample sizes are insufficient in 1977 ($n=8$), 1999 ($n=9$), 2000 ($n=1$), and 2015 ($n=2$). The median from 1975-1977, 1998-2002, and 2010-2015 (25%) was assumed for 1970-1974, 1977-1997, 1999-2000, 2003-2009,

and 2015. Sample sizes were insufficient for further disaggregation by size to reflect size-based fleets in 1975-1977 (US_RR<145, US_RR>195). Sample sizes are sufficient for disaggregation to size-based fleets in 2011-2014 (US_RR_66-114, US_RR_115-144, US_RR>177), but stock composition was similar among size classes.

Japanese Longline West of 45°W (JPN_LL_West) – Data were available for 2010-2015 (**Figure 9**), but sample sizes are insufficient in 2010 (n=1) and 2015 (n=1). The 2010-2015 median (67%) was assumed for 1970-2010 and 2015.

Gulf of Mexico Longline (GOM_LL) – Data available for 1978 and 2009-2014 indicate 100% western population for all years (**Figure 10**). Sample sizes were adequate in all years, except 2011 (n=5).

General patterns in catch-at-age of eastern-origin fish were nearly identical to the mixed stock catch-at-age from eastern Atlantic fisheries, except that catches of young fish (ages 1-2) in the 1980s and 1990s were less in the eastern-origin catch-at-age, but catches of middle-aged fish (ages 3-7) at this same time period were more (**Figure 11**). General patterns in catch-at-age of western-origin fish were also nearly identical to the mixed stock catch-at-age from western Atlantic fisheries, but with the opposite trends from the eastern catch-at-age: catches of young fish (ages 1-2) in the 1980s and 1990s were greater in the western-origin catch-at-age, but catches of middle-aged fish (ages 3-7) in the same time period were generally less (**Figure 12**).

CPUE time series trends were identical for fleets that were assumed to have constant stock composition, but adjusted CPUE values were lower for fleets and years that caught mixed stocks (**Figures 13 and 14**). The CPUE time series differed very little between the eastern mixed-stock and eastern-origin indices of abundance, but varied more significantly between the western mixed-stock and western-origin indices, especially the JLL_AREA_2(WEST) and JLL_AREA_2(RECENT) series. The VPA-2BOX input data file for the eastern-origin VPA is reported in **Appendix A**, and for the western-origin VPA in **Appendix B**.

The model fit to the indices of relative abundance changed very little from the mixed-stock to the population-of-origin VPAs for both the east and west (**Figures 15 and 16**). The trends in stock size (spawning stock biomass and recruitment) and fishing mortality from the VPAs of both eastern- and western-origin Atlantic bluefin tuna were generally similar to those based on eastern and western Atlantic mixed-stock fisheries, respectively (**Figures 17 and 18**). However, the magnitude of estimates of spawning stock biomass increased by 11% to 36% from the ICCAT (2017) western mixed-stock to the western-origin VPA, whereas spawning stock biomass from the eastern-origin VPA decreased by no more than 4% from the eastern mixed-stock VPA results for all years 1970 to 2011 (**Figure 19**). The magnitude of recruitment also increased by as much as 136% (2013) from the mixed-stock to the western-origin VPA, whereas the recruitment from the eastern-origin VPA changed by no more than 9% from the mixed-stock VPA results (**Figure 19**). The stock-recruitment relationships were similar (**Figures 20 and 21**), but the western-origin VPA results suggest that there were some intermediate-sized year classes between the high recruitment of the 1970s and the low subsequent recruitment (**Figure 21**). The VPA-2BOX results file for the eastern-origin VPA is reported in **Appendix C**, and for the western-origin VPA in **Appendix D**.

3. 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 tuna 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.

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.

Ideally, stock composition should be sampled for each fishery and fishery-independent index every year to estimate stock composition, but our analyses identify historical sampling gaps, and our attempt to fill gaps is somewhat subjective. For example, we assumed 100% eastern-origin for the French Aerial survey, because it was difficult to match fishery samples to the survey. In lieu of annual samples by fishery and index, 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. Our exploratory analysis of stock composition samples was intended to determine periods of shifting stock composition.

Our results can guide future representative sampling of otoliths (for age determination and stock composition) with multiple samples each year by fleet and area. The minimum sample size criteria we applied assumes random sampling, but the criterion effectively removed many apparent anomalies. However, further sampling criteria may be needed to investigate other possible problems.

The objective of our analysis was to evaluate the sensitivity of eastern and western fishery VPAs to stock mixing. These population-of-origin VPAs are not intended to provide TAC advice, because there are unresolved issues with stock composition estimates. According to that objective, assuming time-varying stock composition is a more rigorous sensitivity analysis, because the CPUE trends and VPAs do not appear to be sensitive to time-constant stock composition assumptions (Cadrin *et al.* 2017). In addition, catch limit advice derived from this approach would need to be population-specific, whereas actual catches are mixed-stock. Alternatively, projections of catch would need to include estimates of mixing. Therefore, in order to use this approach for management advice, one of the following approaches might be necessary: 1) assume that the proportions of eastern- and western-origin fish remain the same as in the recent past (for short term projections) or 2) institute a mandatory sampling program where population-of-origin is determined in real time so that a fishery can close once the population-specific quota is reached. Either way, catch allocation would need to be fleet-based according to the geographical partitioning of stock composition data.

The 2017 VPA base case 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.

Because the objective of this demonstration was to test the sensitivity of VPA estimates to stock mixing, we deliberately omitted the calculation of reference points, which would have extended the results beyond their intended role in the 2017 bluefin tuna stock assessment. Considering the similarity in fishing mortality rate and recruitment estimates between base case (mixed-stock) and population-of-origin VPAs, and the use of the same weight-at-age data, we expect that calculation of the $F_{0.1}$ reference point would be essentially the same as the base case.

Alternative approaches to incorporating stock composition in the Atlantic bluefin tuna 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 2014) and other integrated models (Taylor *et al.* 2011, Carruthers and Kell 2016) offer more advanced approaches for considering stock composition data derived from multiple approaches.

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References

- Busawon, D.S., J.D. Neilson, I. Andrushchenko, A. Hanke, D.H. Secor, and G. Melvin. 2013. Evaluation of Canadian sampling program for bluefin tuna, assessment of length-weight conversions, and results of natal origin studies 2011-2012. ICCAT SCRS/2013/050.
- Butterworth, D.S. and Rademeyer, R.A. 2014. An Updated Statistical Catch-At-Length Assessment for Eastern Atlantic Bluefin Tuna. ICCAT SCRS/2014/169.
- Cadrin S., Morse, M., Kerr, L., Secor, D., and Siskey, M. 2017. Exploratory stock assessment of eastern and western population-of-origin Atlantic bluefin tuna accounting for stock composition. ICCAT SCRS/2017/174.
- Carruthers, T.R. and Kell, L. 2016. Issues arising from the preliminary conditioning of operating models for Atlantic bluefin tuna. ICCAT SCRS/2016/145.
- 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.
- ICCAT. 2008. Report of the 2008 Atlantic Bluefin Tuna Stock Assessment Session. (Madrid, Spain – June 23 to July 4, 2008).
- 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.
- ICCAT. 2017. Report of the 2017 ICCAT Bluefin Stock Assessment Meeting (Madrid, Spain – July 20 to 28, 2017).
- 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.

Table 1. Fleet stock composition assignments with corresponding fleets used in the 2017 VPAs of eastern and western bluefin tuna.

	Stock Composition Fleets	2017 VPA Fleets
East	MOR_SP_TP	MOR_SP_TP MOR_POR_TP
	JPN_LL_EastMed	JPN_LL_EastMed
	JPN_LL_NEA	JPN_LL1_NEA JPN_LL2_NEA
	SP_BB	SP_BB1 SP_BB2
West	CAN_COMB_RR	CAN_COMB_RR CAN_GSL_Acoustic
	US_RR	US_RR<145 US_RR_66_114 US_RR_115_144 US_RR_145_177 US_RR>195 US_RR>195_COMB US_RR>177
	JPN_LL_West	JLL_AREA_2_(WEST) JLL_AREA_3_(31+32) JLL_AREAS_17+18 JLL_AREA_2_RECENT
	GOM_LL	GOM_PLL JLL_GOM
	<i>No stock composition data (assumed 100% population-of-origin in stock area)</i>	FR_AER1 FR_AER2 WMED_LARV LARVAL_ZERO_INFLATED TAGGING

Table 2. Assumed stock composition (Proportion-East) by year and fleet.

Year	MOR_SP_TP	JPN_LL_EastMed	JPN_LL_NEA	SP_BB	CAN_COMB_RR	US_RR	JPN_LL_West	GOM_LL
1970	0.83	0.85	0.83	0.93	0.20	0.25	0.67	0.00
1971	0.83	0.85	0.83	0.93	0.20	0.25	0.67	0.00
1972	0.83	0.85	0.83	0.93	0.20	0.25	0.67	0.00
1973	0.83	0.85	0.83	0.93	0.20	0.25	0.67	0.00
1974	0.83	0.85	0.83	0.93	0.20	0.25	0.67	0.00
1975	0.83	0.85	0.83	0.93	0.20	0.00	0.67	0.00
1976	0.83	0.85	0.83	0.93	0.00	0.04	0.67	0.00
1977	0.83	0.85	0.83	0.93	0.14	0.25	0.67	0.00
1978	0.83	0.85	0.83	0.93	0.20	0.25	0.67	0.00
1979	0.83	0.85	0.83	0.93	0.20	0.25	0.67	0.00
1980	0.83	0.85	0.83	0.93	0.20	0.25	0.67	0.00
1981	0.83	0.85	0.83	0.93	0.20	0.25	0.67	0.00
1982	0.83	0.85	0.83	0.93	0.20	0.25	0.67	0.00
1983	0.83	0.85	0.83	0.93	0.20	0.25	0.67	0.00
1984	0.83	0.85	0.83	0.93	0.20	0.25	0.67	0.00
1985	0.83	0.85	0.83	0.93	0.20	0.25	0.67	0.00
1986	0.83	0.85	0.83	0.93	0.20	0.25	0.67	0.00
1987	0.83	0.85	0.83	0.93	0.20	0.25	0.67	0.00
1988	0.83	0.85	0.83	0.93	0.20	0.25	0.67	0.00
1989	0.83	0.85	0.83	0.93	0.20	0.25	0.67	0.00
1990	0.83	0.85	0.83	0.93	0.20	0.25	0.67	0.00
1991	0.83	0.85	0.83	0.93	0.20	0.25	0.67	0.00
1992	0.83	0.85	0.83	0.93	0.20	0.25	0.67	0.00
1993	0.83	0.85	0.83	0.93	0.20	0.25	0.67	0.00
1994	0.83	0.85	0.83	0.93	0.20	0.25	0.67	0.00
1995	0.83	0.85	0.83	0.93	0.20	0.25	0.67	0.00
1996	0.83	0.85	0.83	0.93	0.42	0.25	0.67	0.00
1997	0.83	0.85	0.83	0.93	0.72	0.25	0.67	0.00
1998	0.83	0.85	0.83	0.93	0.90	0.60	0.67	0.00
1999	0.83	0.85	0.83	0.93	0.20	0.25	0.67	0.00
2000	0.83	0.85	0.83	0.93	0.20	0.25	0.67	0.00
2001	0.83	0.85	0.83	0.93	0.20	0.25	0.67	0.00
2002	0.83	0.85	0.83	0.93	0.20	0.22	0.67	0.00
2003	0.83	0.85	0.83	0.93	0.20	0.25	0.67	0.00
2004	0.83	0.85	0.83	0.93	0.20	0.25	0.67	0.00
2005	0.83	0.85	0.83	0.93	0.20	0.25	0.67	0.00
2006	0.83	0.85	0.83	0.93	0.20	0.25	0.67	0.00
2007	0.83	0.85	0.83	0.93	0.20	0.25	0.67	0.00
2008	0.83	0.85	0.83	0.93	0.20	0.25	0.67	0.00
2009	0.83	0.85	0.83	0.91	0.20	0.25	0.67	0.00
2010	0.83	0.85	0.61	1.00	0.20	0.18	0.67	0.00
2011	0.88	0.85	0.92	0.97	0.12	0.14	0.55	0.00
2012	0.83	0.85	0.90	0.94	0.14	0.27	0.38	0.00
2013	0.80	0.85	0.69	0.89	0.11	0.21	0.48	0.00
2014	0.83	0.85	0.92	0.85	0.56	0.32	0.79	0.00
2015	0.76	0.85	0.89	0.79	0.34	0.25	0.67	0.00

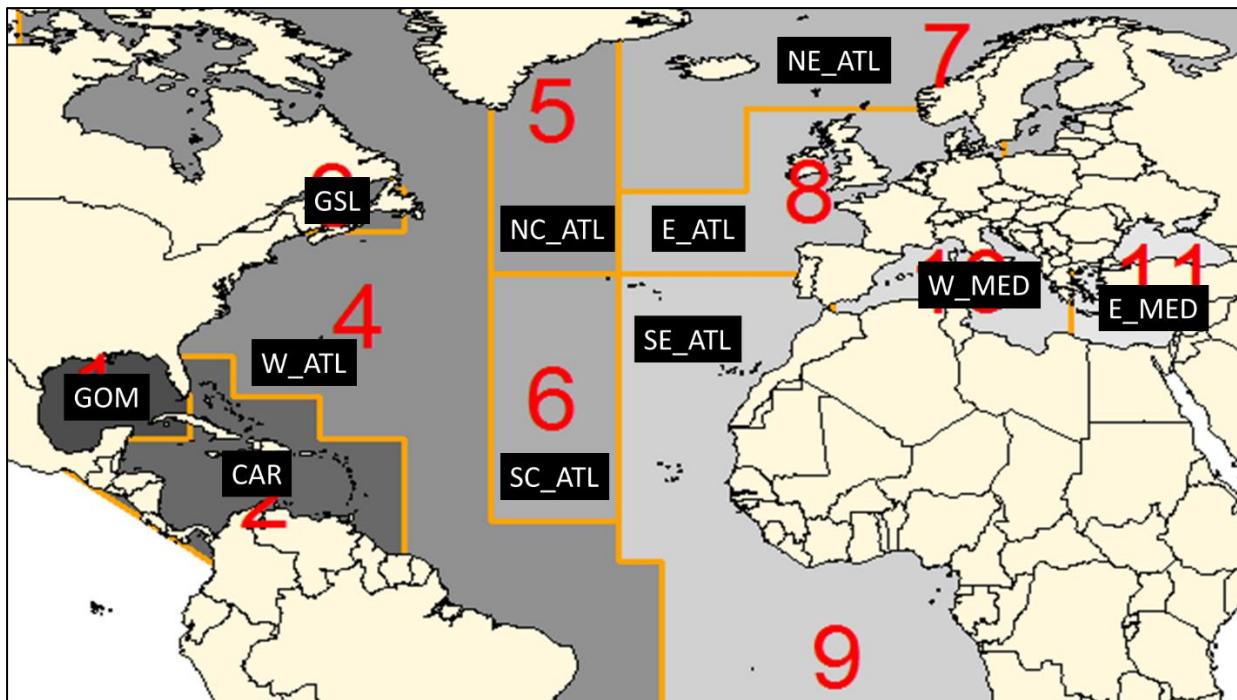


Figure 1. ICCAT bluefin tuna statistical areas (BFT_Area): Gulf of Mexico (GOM), Caribbean (CAR), Gulf of St. Lawrence (GSL), western Atlantic (W_ATL), north-central Atlantic (NC_ATL), south-central Atlantic (SC_ATL); northeast Atlantic (NE_ATL), southeast Atlantic (SE_ATL), western Mediterranean (W_MED), and eastern Mediterranean (E_MED).

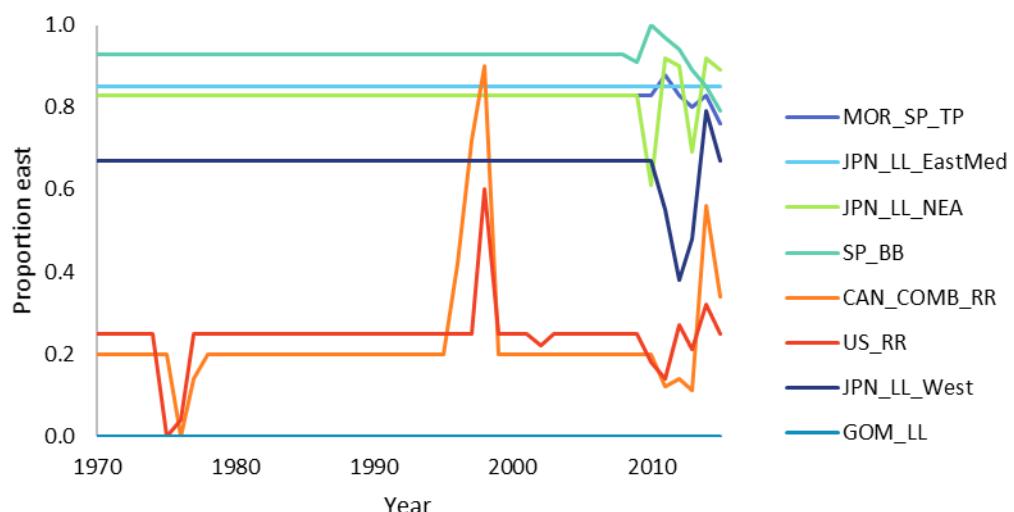


Figure 2. Estimated eastern proportions by year and fleet from the ICCAT Stock Composition Database.

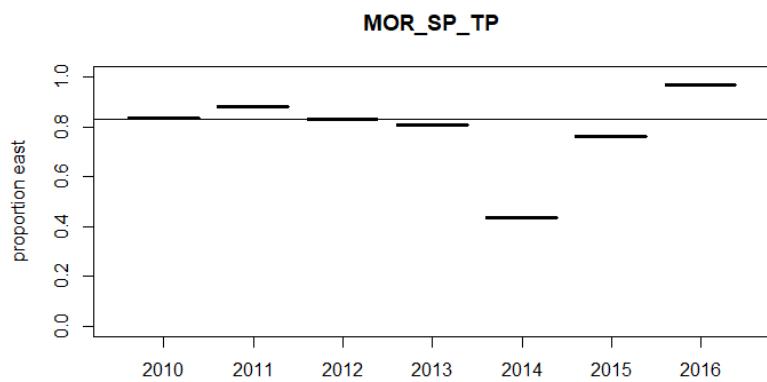


Figure 3. Stock composition (Proportion-East) in the Moroccan & Spanish Traps fleet.

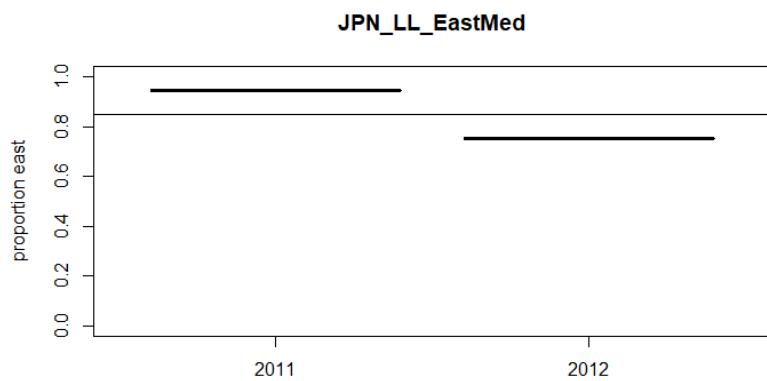


Figure 4. Stock composition (Proportion-East) in the Japanese Longline in Eastern Atlantic and Mediterranean fleet.

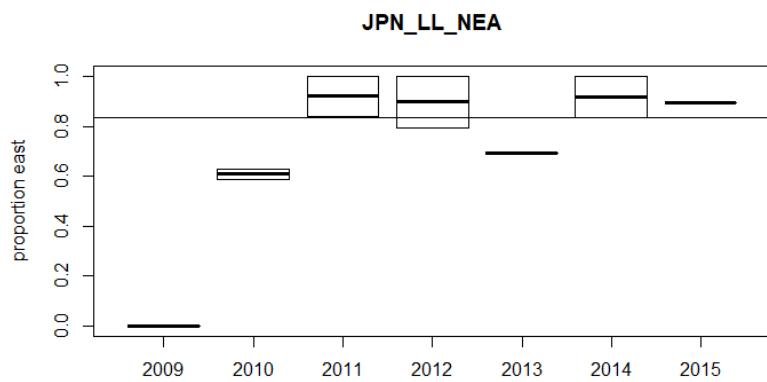


Figure 5. Stock composition (Proportion-East) in the Japanese Longline Northeast Atlantic fleet.

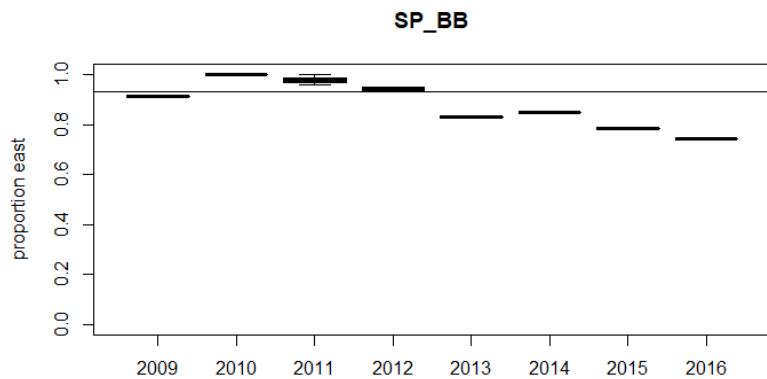


Figure 6. Stock composition (Proportion-East) in the Spanish Bait Boat fleet.

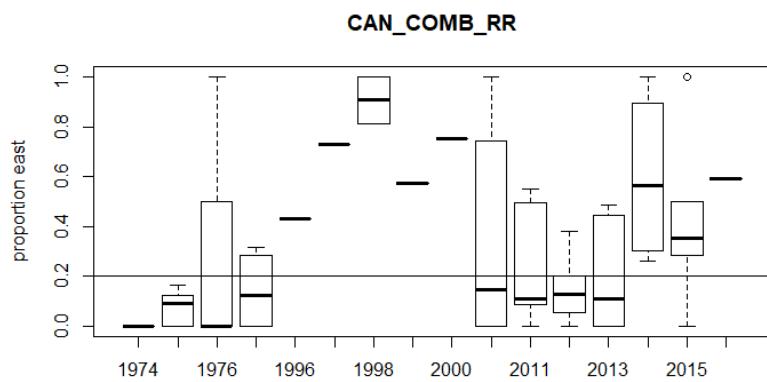


Figure 7. Stock composition (Proportion-East) in the Canadian Combined-Area Rod & Reel fleet.

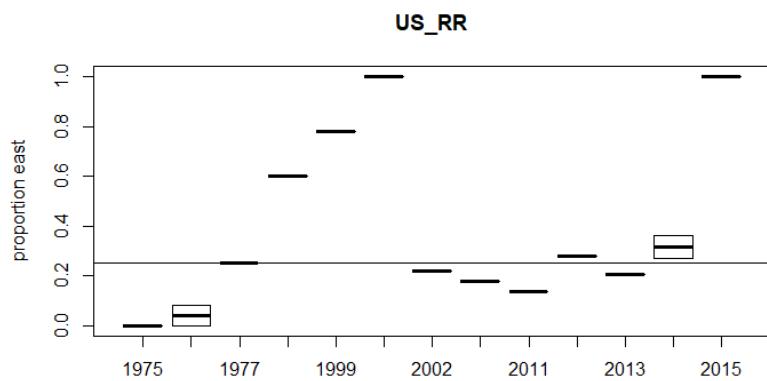


Figure 8. Stock composition (Proportion-East) in the US Rod & Reel fleet.

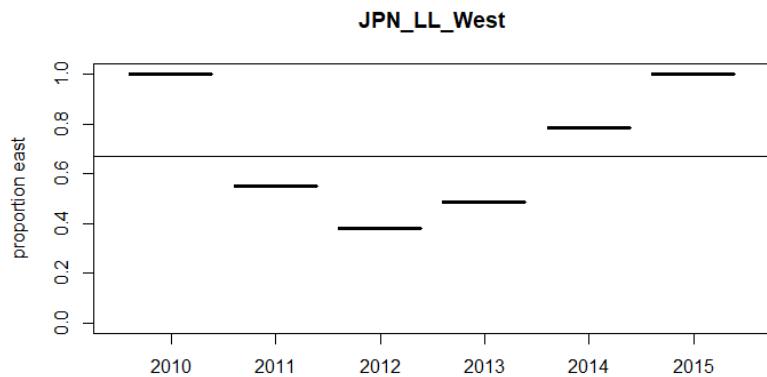


Figure 9. Stock composition (Proportion-East) in the Japanese Longline West of 45°W fleet.

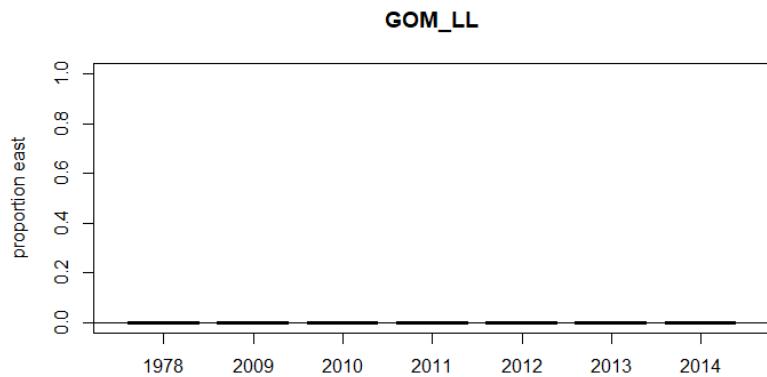


Figure 10. Stock composition (Proportion-East) in the Gulf of Mexico Longline fleet.

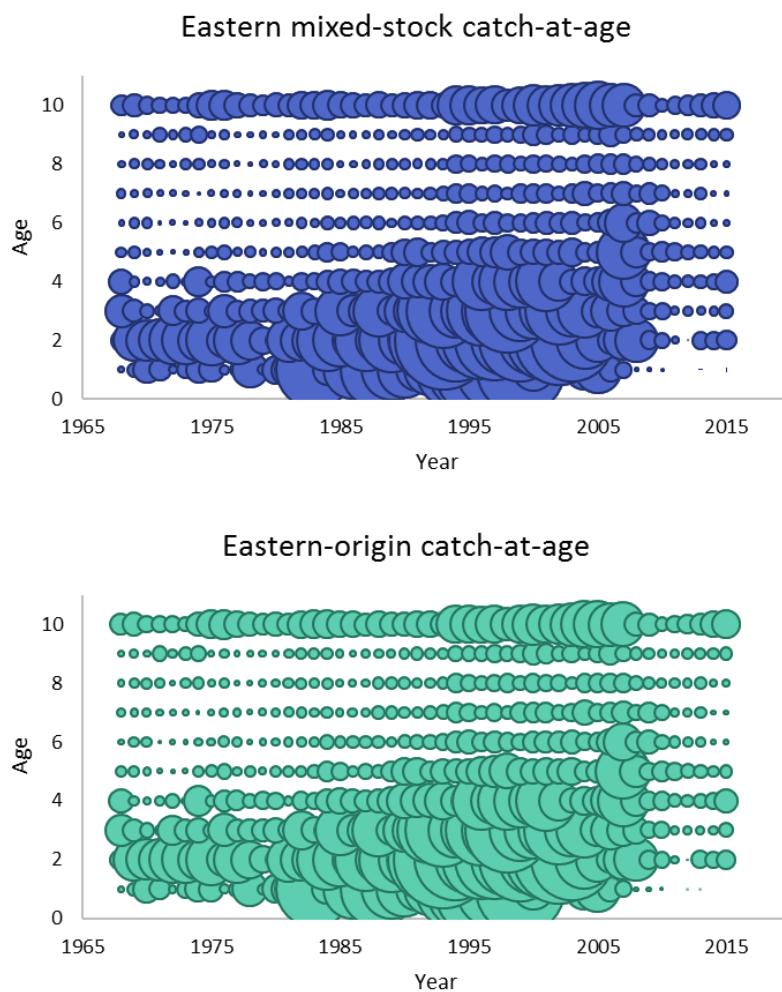
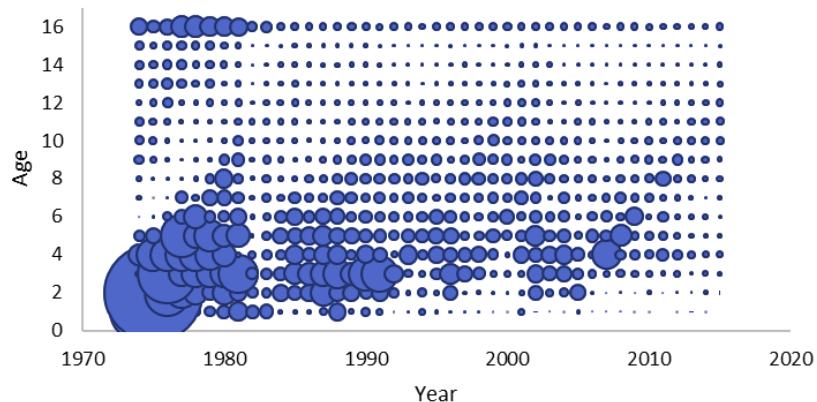


Figure 11. Catch at age of bluefin tuna from mixed-stock fisheries in the eastern Atlantic and of eastern-origin Atlantic bluefin tuna (circle size is scaled similarly for both).

Western mixed-stock catch-at-age



Western-origin catch-at-age

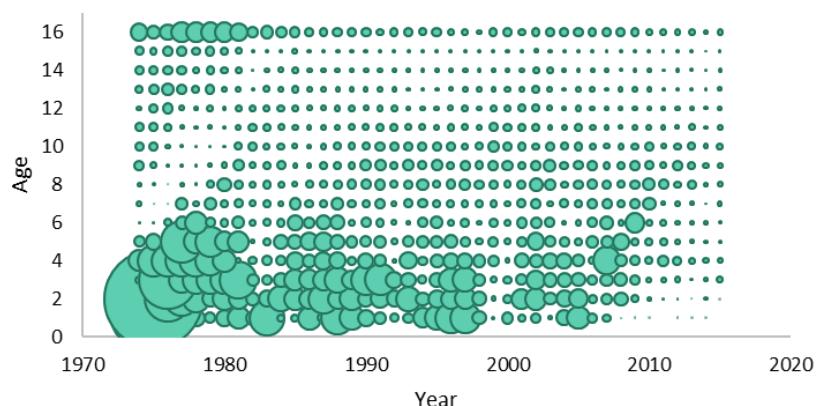


Figure 12. Catch at age of bluefin tuna from mixed-stock fisheries in the western Atlantic and of western-origin Atlantic bluefin tuna (circle size is scaled similarly for both).

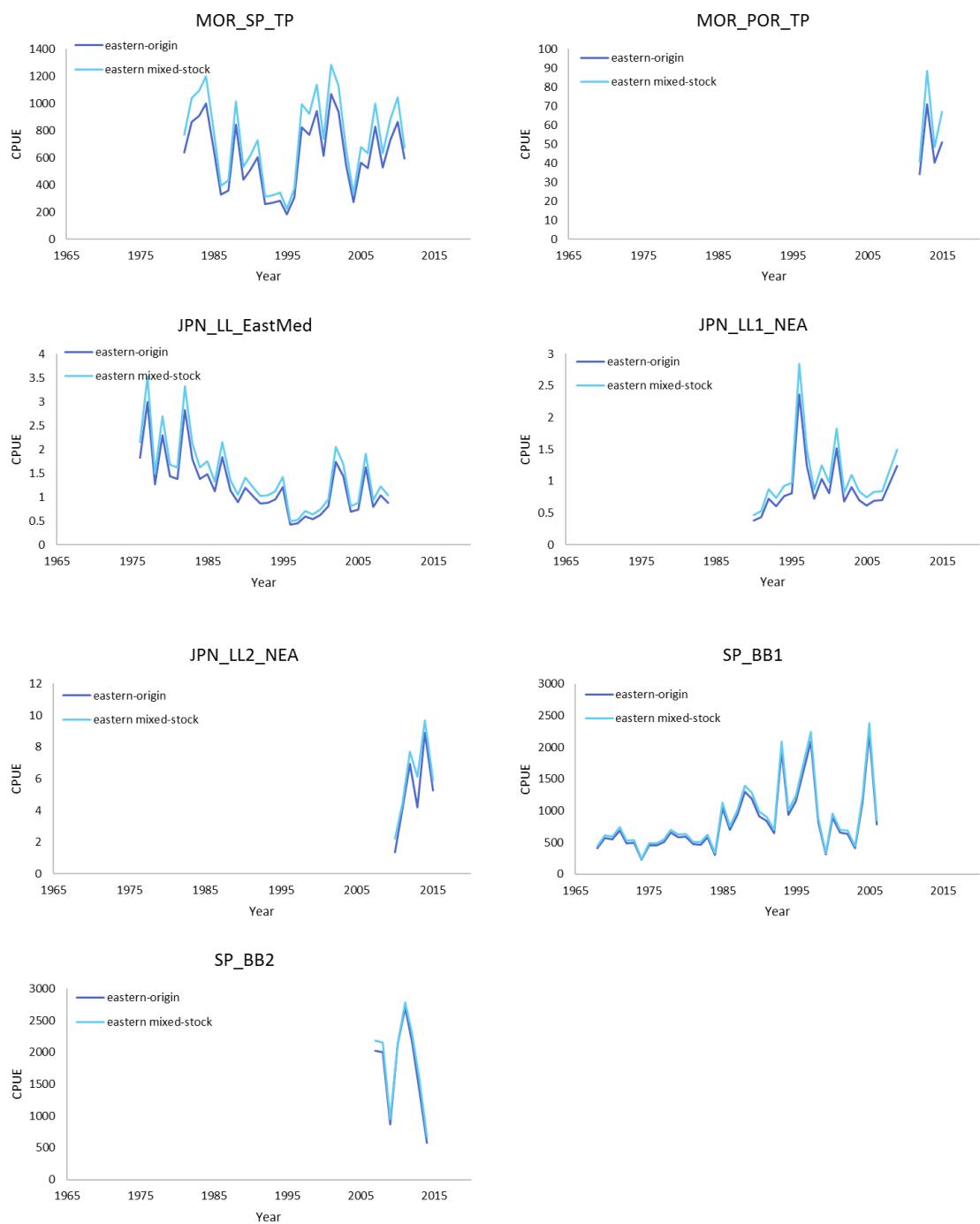


Figure 13. Catch-per-unit-effort (CPUE) of bluefin tuna from mixed-stock fisheries in the eastern Atlantic and eastern-origin bluefin tuna.

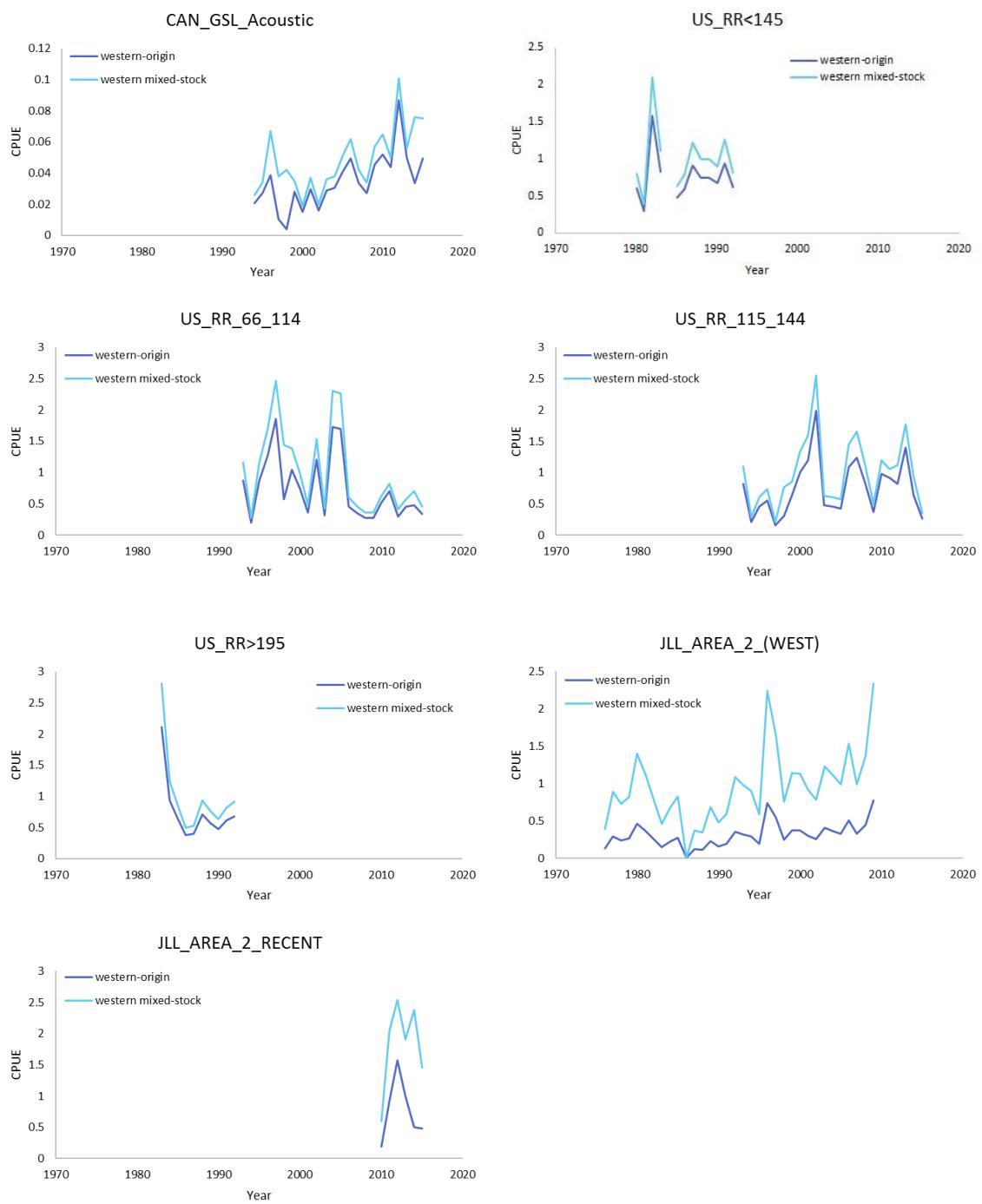


Figure 14. Catch-per-unit-effort (CPUE) of bluefin tuna from mixed-stock fisheries in the western Atlantic and western-origin bluefin tuna.

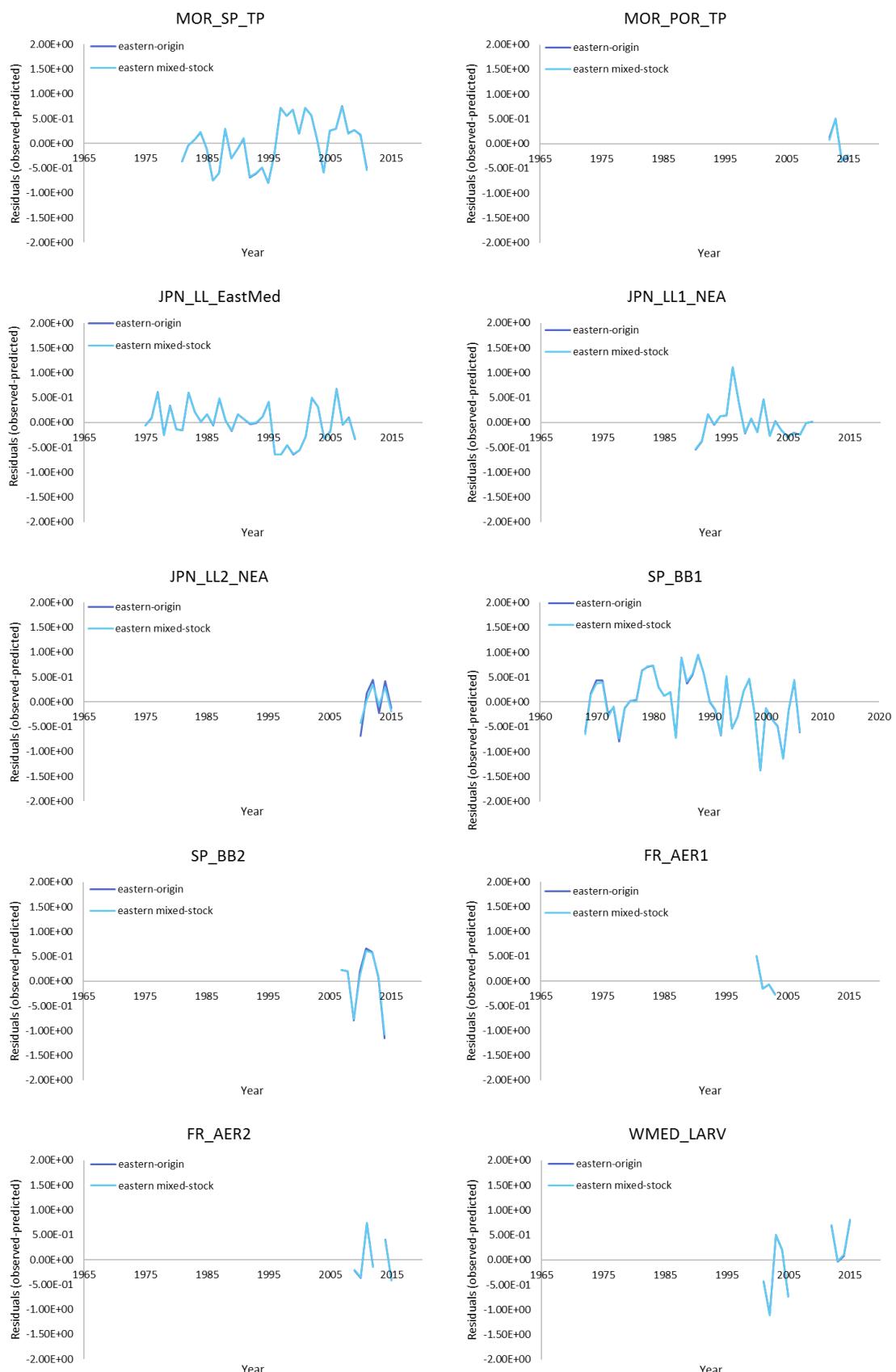


Figure 15. Residuals (observed-predicted) of eastern-origin and eastern mixed-stock indices of abundance from VPA results.

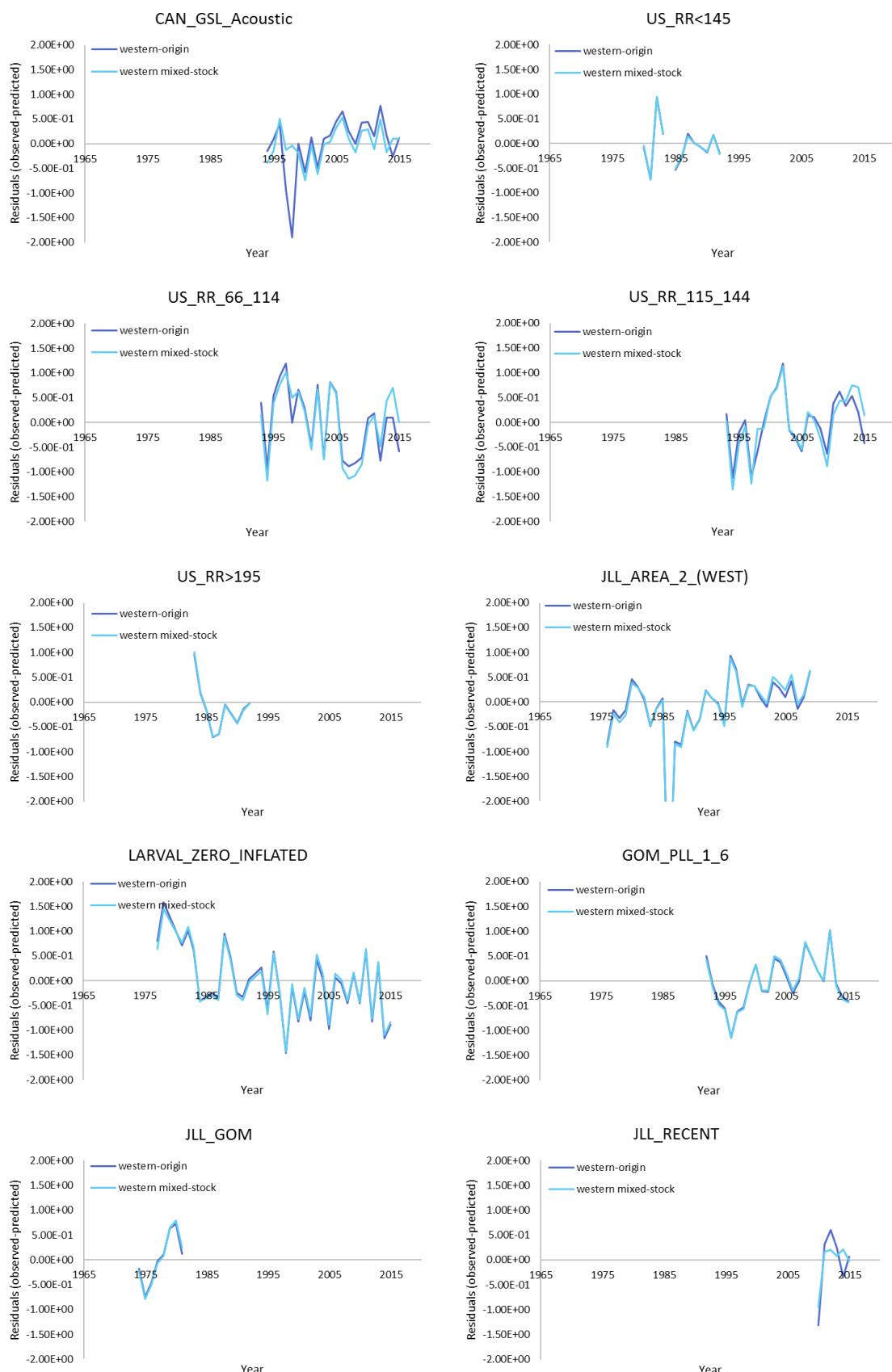


Figure 16. Residuals (observed-predicted) of western-origin and western mixed-stock indices of abundance from VPA results.

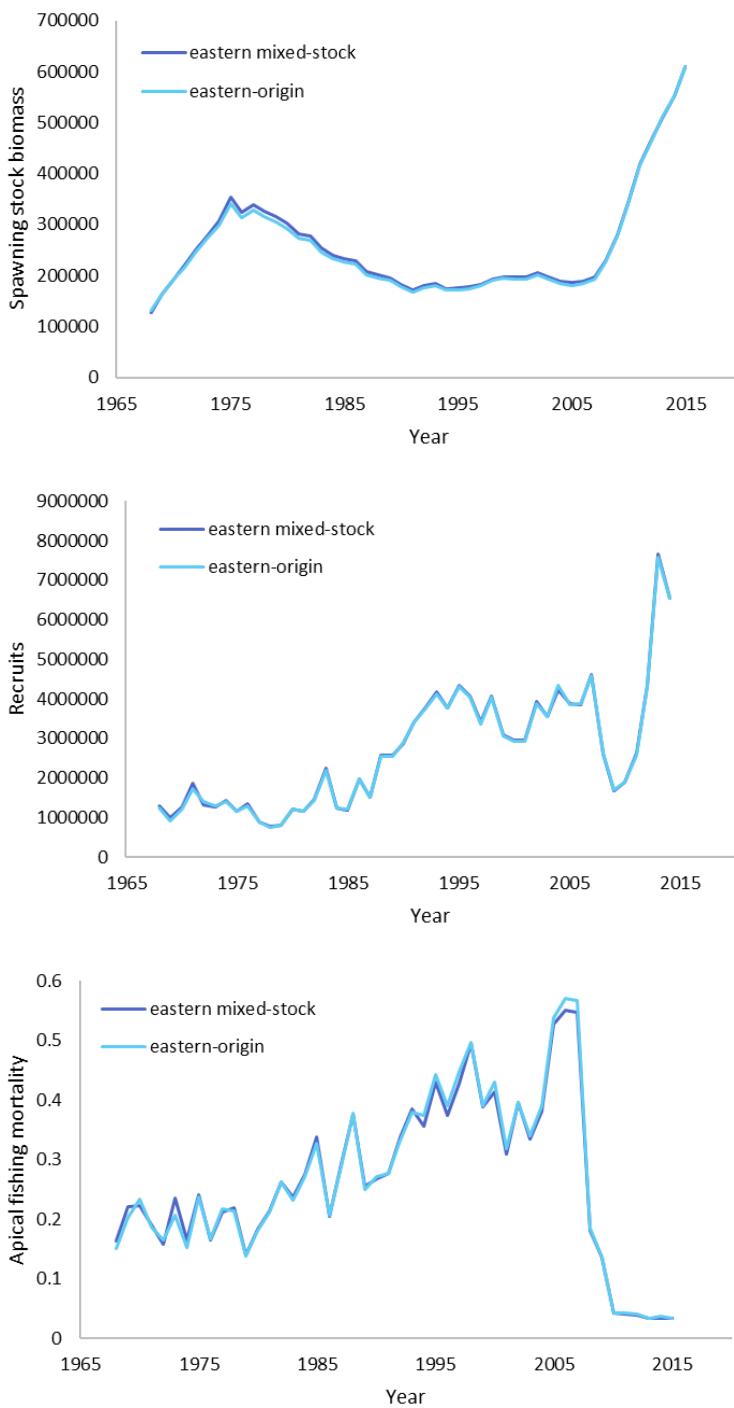


Figure 17. Estimates of eastern Atlantic bluefin tuna spawning biomass (SSB), age-1 recruitment, and apical fishing mortality from the ICCAT (2017) VPA of eastern Atlantic mixed-stock fisheries and the VPA of eastern-origin Atlantic bluefin tuna.

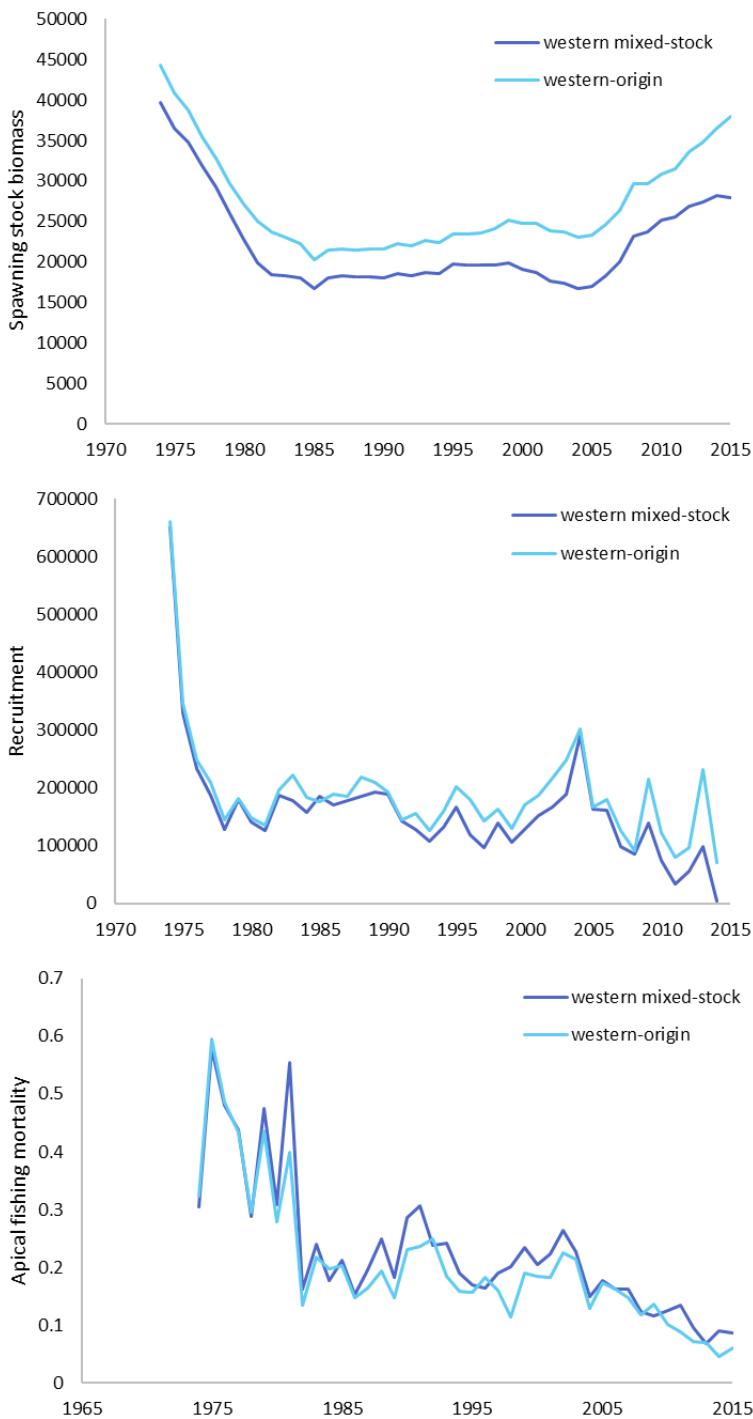


Figure 18. Estimates of western Atlantic bluefin tuna spawning biomass (SSB), age-1 recruitment, and apical fishing mortality from the ICCAT (2017) VPA of western Atlantic mixed-stock fisheries and the VPA of western-origin Atlantic bluefin tuna.



Figure 19. Percent increase from mixed-stock to population-of-origin VPA results for spawning stock biomass (SSB), age-1 recruitment, and apical fishing mortality rate (F) for eastern (left) and western (right) bluefin tuna. Note different scale of y-axes.

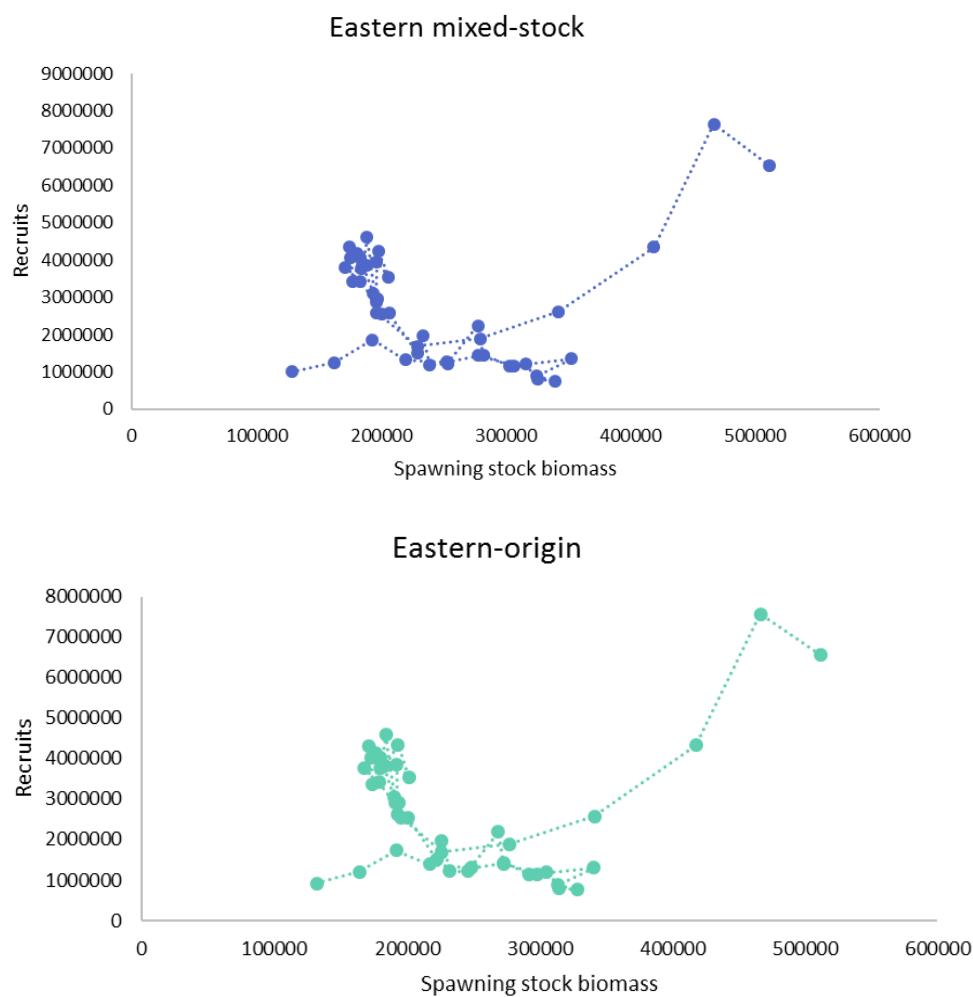


Figure 20. Estimates of eastern Atlantic bluefin tuna spawning biomass (SSB) and age-1 recruitment from the ICCAT (2017) VPA of eastern Atlantic mixed-stock fisheries and the VPA of eastern-origin Atlantic bluefin tuna.

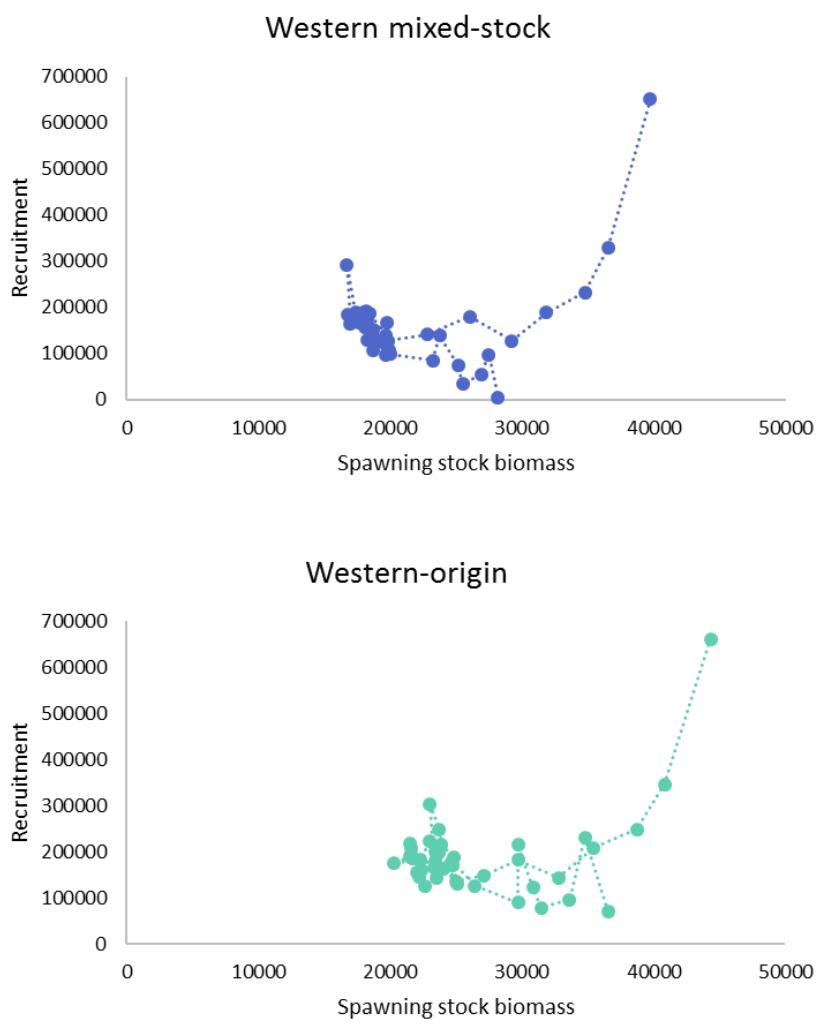


Figure 21. Estimates of western Atlantic bluefin tuna spawning biomass (SSB) and age-1 recruitment from the ICCAT (2017) VPA of western Atlantic mixed-stock fisheries and the VPA of western-origin Atlantic bluefin tuna.

Appendix A. VPA-2BOX input data file for eastern-origin 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 write_d1VPA.R function on Thu Aug 31 19:02:22 2017
#####
# DATA FILE FOR RUN XX
1968 2015
1 10 10 10
#####
# BEGIN INPUT FOR ZONE/STOCK 1
#####
10
6
0 0 0.25 0.5 1 1 1 1 1
# 50 CHARACTER TITLE WITHIN SINGLE QUOTES ---->] PDF OF CATCH
# |           | SIGMA CATCH
'BFTE' 0.0.1
#####
# NOW ENTER THE CATCH-AT-AGE DATA. ROW=YEAR, COLUMN=AGE
#####
# YEAR 1 - 10 +--> AGE
1968 4085 34886 72261 41655 9142 3361 7299 4789 3148 32848
1969 15320 114481 36408 9080 11252 9135 5451 8470 6937 37854
1970 51805 111086 17060 4751 5553 9658 6780 9956 5077 22846
1971 33645 116363 9418 7225 2900 1608 4172 8063 16772 20638
1972 6046 152746 62565 15695 2069 2995 3823 3579 7057 19862
1973 22739 153951 34344 5935 2975 2195 3699 9505 14648 16762
1974 47357 107794 45203 63239 8937 5720 1358 11267 20150 40786
1975 43695 169926 17032 11029 12100 5824 4131 5230 4544 59371
1976 8313 79709 74599 32140 16460 9857 6261 7749 7520 60243
1977 18298 150061 34270 29971 7293 8236 5803 3015 3439 46529
1978 83537 98520 38627 15683 10192 3820 2992 2836 3854 39147
1979 9145 50849 36335 23311 5350 4248 5302 5715 4786 31238
1980 54445 29361 43347 22754 9096 6053 7778 6216 4926 41179
1981 82272 129933 33180 7957 9422 7659 8190 9583 8035 34812
1982 188356 114740 96938 24724 9931 8870 8888 9960 9257 51821
1983 379566 136018 47474 21783 15300 7277 7929 8825 10131 51947
1984 63670 245438 45525 39197 27311 15392 10901 9979 11709 55600
1985 45772 191822 165226 46803 24359 10773 5635 4657 5378 46388
1986 230127 110076 70120 40608 10315 13047 7899 5097 4552 43995
1987 124497 253535 89010 34467 18134 12578 7685 5691 5627 36542
1988 370595 141801 182396 38121 14736 13695 13224 10019 7891 46667
1989 239946 276890 62981 54329 29364 8759 13267 11655 6503 37785
1990 201557 177482 121517 85675 50092 13755 10590 11059 9331 40058
1991 123044 239888 155400 76351 54900 14811 9510 8182 12964 49144
1992 183079 450430 289355 78630 27665 16763 14238 9750 9137 50613
1993 210770 615623 359708 93435 44172 19782 16177 10154 8537 41047
1994 416842 438210 197062 62037 39433 33516 27834 25517 18734 98694
1995 460908 291796 211114 80221 44855 40862 25246 21728 17796 96525
1996 591329 405198 333544 226443 63038 24701 15500 15805 16499 90077
1997 392307 413066 289251 143907 65273 35409 21202 22088 23218 96400
1998 272875 344383 468229 223455 83725 25494 13272 23828 16483 74541
1999 507545 441999 251154 187862 51324 23091 28064 16919 23229 91508
2000 116900 314729 209448 154761 45622 31559 26876 25299 33544 112782
2001 10466 416259 197939 244682 49197 35252 30157 21928 27228 99193
2002 42472 516431 309262 110141 41572 30856 17158 19682 17313 109147
2003 45101 439604 184662 43013 54363 37134 25734 13797 25320 125383
2004 109080 222159 204017 56349 27106 23992 43647 24947 14324 144763
2005 140745 130298 74687 58411 35351 26204 23804 26310 24060 149041
2006 41660 49616 105211 100380 59182 48680 28769 27792 38318 125158
2007 20643 107366 70135 171083 196899 100124 37978 26783 20848 126969
2008 2413 125910 49356 66328 71269 30596 20369 16994 13693 38885
2009 2546 25543 20683 26369 24672 42200 31952 12301 11300 35971
2010 1190 19380 20954 25004 30620 17397 17424 8192 7024 14780
2011 0 5749 7381 13688 23773 10804 6415 8923 6896 23098
2012 16 537 7550 13124 16075 7886 6211 7477 10568 28882
2013 44 23182 6927 15568 14873 9004 11145 11063 9779 34599
2014 0 22936 7648 19132 11000 3770 2859 4974 11149 48316
2015 2 28328 15998 38150 12410 3553 2859 5114 12999 54886
-1
#####
# 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 'MOR_SP_TP'
2 1 1 4 -1 10 10 'MOR_POR_TP'
3 1 1 4 -1 6 10 'JPN_LL_EastMed'
4 1 1 4 1 4 10 'JPN_LL1_NEA'
5 1 1 4 1 4 10 'JPN_LL2_NEA'
6 1 2 4 -1 2 3 'SP_BB1'
7 1 2 4 -1 3 6 'SP_BB2'
8 1 1 1 -1 2 4 'FR_AER1'
9 1 1 1 -1 2 4 'FR_AER2'
10 1 2 4 -1 3 10 'WMED_LARV'
-1
#####
# NOW ENTER IN THE INDICES OF ABUNDANCE
#####
#INDEX
#ID YEAR VALUE CV (or STD ERROR) INDEX NAME
1 1968 -999 -999 MOR_SP_TP
1 1969 -999 -999 MOR_SP_TP
```

1	1970	-999	-999	MOR_SP_TP
1	1971	-999	-999	MOR_SP_TP
1	1972	-999	-999	MOR_SP_TP
1	1973	-999	-999	MOR_SP_TP
1	1974	-999	-999	MOR_SP_TP
1	1975	-999	-999	MOR_SP_TP
1	1976	-999	-999	MOR_SP_TP
1	1977	-999	-999	MOR_SP_TP
1	1978	-999	-999	MOR_SP_TP
1	1979	-999	-999	MOR_SP_TP
1	1980	-999	-999	MOR_SP_TP
1	1981	637.7388	0.572	MOR_SP_TP
1	1982	861.6396	0.346	MOR_SP_TP
1	1983	906.4015	0.346	MOR_SP_TP
1	1984	996.2241	0.346	MOR_SP_TP
1	1985	676.0018	0.346	MOR_SP_TP
1	1986	327.2939	0.281	MOR_SP_TP
1	1987	359.8299	0.281	MOR_SP_TP
1	1988	842.0848	0.28	MOR_SP_TP
1	1989	441.1035	0.261	MOR_SP_TP
1	1990	509.9271	0.226	MOR_SP_TP
1	1991	604.1238	0.226	MOR_SP_TP
1	1992	260.5785	0.226	MOR_SP_TP
1	1993	270.0488	0.226	MOR_SP_TP
1	1994	283.777	0.226	MOR_SP_TP
1	1995	185.4469	0.227	MOR_SP_TP
1	1996	311.4326	0.246	MOR_SP_TP
1	1997	823.7003	0.246	MOR_SP_TP
1	1998	767.8662	0.246	MOR_SP_TP
1	1999	944.0835	0.246	MOR_SP_TP
1	2000	613.5609	0.226	MOR_SP_TP
1	2001	1066.2346	0.226	MOR_SP_TP
1	2002	938.2486	0.226	MOR_SP_TP
1	2003	550.0078	0.237	MOR_SP_TP
1	2004	275.8588	0.226	MOR_SP_TP
1	2005	562.2337	0.226	MOR_SP_TP
1	2006	526.1702	0.226	MOR_SP_TP
1	2007	830.498	0.226	MOR_SP_TP
1	2008	526.3694	0.226	MOR_SP_TP
1	2009	727.6693	0.226	MOR_SP_TP
1	2010	865.0592	0.237	MOR_SP_TP
1	2011	593.9736	0.226	MOR_SP_TP
1	2012	-999	-999	MOR_SP_TP
1	2013	-999	-999	MOR_SP_TP
1	2014	-999	-999	MOR_SP_TP
1	2015	-999	-999	MOR_SP_TP
2	1968	-999	-999	MOR_POR_TP
2	1969	-999	-999	MOR_POR_TP
2	1970	-999	-999	MOR_POR_TP
2	1971	-999	-999	MOR_POR_TP
2	1972	-999	-999	MOR_POR_TP
2	1973	-999	-999	MOR_POR_TP
2	1974	-999	-999	MOR_POR_TP
2	1975	-999	-999	MOR_POR_TP
2	1976	-999	-999	MOR_POR_TP
2	1977	-999	-999	MOR_POR_TP
2	1978	-999	-999	MOR_POR_TP
2	1979	-999	-999	MOR_POR_TP
2	1980	-999	-999	MOR_POR_TP
2	1981	-999	-999	MOR_POR_TP
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2	1984	-999	-999	MOR_POR_TP
2	1985	-999	-999	MOR_POR_TP
2	1986	-999	-999	MOR_POR_TP
2	1987	-999	-999	MOR_POR_TP
2	1988	-999	-999	MOR_POR_TP
2	1989	-999	-999	MOR_POR_TP
2	1990	-999	-999	MOR_POR_TP
2	1991	-999	-999	MOR_POR_TP
2	1992	-999	-999	MOR_POR_TP
2	1993	-999	-999	MOR_POR_TP
2	1994	-999	-999	MOR_POR_TP
2	1995	-999	-999	MOR_POR_TP
2	1996	-999	-999	MOR_POR_TP
2	1997	-999	-999	MOR_POR_TP
2	1998	-999	-999	MOR_POR_TP
2	1999	-999	-999	MOR_POR_TP
2	2000	-999	-999	MOR_POR_TP
2	2001	-999	-999	MOR_POR_TP
2	2002	-999	-999	MOR_POR_TP
2	2003	-999	-999	MOR_POR_TP
2	2004	-999	-999	MOR_POR_TP
2	2005	-999	-999	MOR_POR_TP
2	2006	-999	-999	MOR_POR_TP
2	2007	-999	-999	MOR_POR_TP
2	2008	-999	-999	MOR_POR_TP
2	2009	-999	-999	MOR_POR_TP
2	2010	-999	-999	MOR_POR_TP
2	2011	-999	-999	MOR_POR_TP
2	2012	34.1545	0.4906	MOR_POR_TP
2	2013	70.864	0.5436	MOR_POR_TP
2	2014	40.2882	0.4978	MOR_POR_TP
2	2015	50.9048	0.5394	MOR_POR_TP
3	1968	-999	-999	JPN_LL_EastMed
3	1969	-999	-999	JPN_LL_EastMed
3	1970	-999	-999	JPN_LL_EastMed
3	1971	-999	-999	JPN_LL_EastMed
3	1972	-999	-999	JPN_LL_EastMed
3	1973	-999	-999	JPN_LL_EastMed
3	1974	-999	-999	JPN_LL_EastMed

3	1975	1.615	0.15	JPN_LL_EastMed
3	1976	1.8275	0.12	JPN_LL_EastMed
3	1977	3.0005	0.14	JPN_LL_EastMed
3	1978	1.275	0.15	JPN_LL_EastMed
3	1979	2.295	0.14	JPN_LL_EastMed
3	1980	1.4365	0.16	JPN_LL_EastMed
3	1981	1.3855	0.17	JPN_LL_EastMed
3	1982	2.822	0.13	JPN_LL_EastMed
3	1983	1.802	0.13	JPN_LL_EastMed
3	1984	1.377	0.12	JPN_LL_EastMed
3	1985	1.4875	0.15	JPN_LL_EastMed
3	1986	1.122	0.14	JPN_LL_EastMed
3	1987	1.836	0.13	JPN_LL_EastMed
3	1988	1.1475	0.14	JPN_LL_EastMed
3	1989	0.8925	0.16	JPN_LL_EastMed
3	1990	1.1985	0.14	JPN_LL_EastMed
3	1991	1.0285	0.13	JPN_LL_EastMed
3	1992	0.8755	0.14	JPN_LL_EastMed
3	1993	0.884	0.14	JPN_LL_EastMed
3	1994	0.952	0.16	JPN_LL_EastMed
3	1995	1.207	0.15	JPN_LL_EastMed
3	1996	0.425	0.22	JPN_LL_EastMed
3	1997	0.4505	0.21	JPN_LL_EastMed
3	1998	0.6035	0.17	JPN_LL_EastMed
3	1999	0.544	0.22	JPN_LL_EastMed
3	2000	0.629	0.2	JPN_LL_EastMed
3	2001	0.816	0.17	JPN_LL_EastMed
3	2002	1.7425	0.15	JPN_LL_EastMed
3	2003	1.445	0.13	JPN_LL_EastMed
3	2004	0.697	0.18	JPN_LL_EastMed
3	2005	0.748	0.15	JPN_LL_EastMed
3	2006	1.6235	0.15	JPN_LL_EastMed
3	2007	0.799	0.19	JPN_LL_EastMed
3	2008	1.037	0.17	JPN_LL_EastMed
3	2009	0.884	0.24	JPN_LL_EastMed
3	2010	-999	-999	JPN_LL_EastMed
3	2011	-999	-999	JPN_LL_EastMed
3	2012	-999	-999	JPN_LL_EastMed
3	2013	-999	-999	JPN_LL_EastMed
3	2014	-999	-999	JPN_LL_EastMed
3	2015	-999	-999	JPN_LL_EastMed
4	1968	-999	-999	JPN_LLI_NEA
4	1969	-999	-999	JPN_LLI_NEA
4	1970	-999	-999	JPN_LLI_NEA
4	1971	-999	-999	JPN_LLI_NEA
4	1972	-999	-999	JPN_LLI_NEA
4	1973	-999	-999	JPN_LLI_NEA
4	1974	-999	-999	JPN_LLI_NEA
4	1975	-999	-999	JPN_LLI_NEA
4	1976	-999	-999	JPN_LLI_NEA
4	1977	-999	-999	JPN_LLI_NEA
4	1978	-999	-999	JPN_LLI_NEA
4	1979	-999	-999	JPN_LLI_NEA
4	1980	-999	-999	JPN_LLI_NEA
4	1981	-999	-999	JPN_LLI_NEA
4	1982	-999	-999	JPN_LLI_NEA
4	1983	-999	-999	JPN_LLI_NEA
4	1984	-999	-999	JPN_LLI_NEA
4	1985	-999	-999	JPN_LLI_NEA
4	1986	-999	-999	JPN_LLI_NEA
4	1987	-999	-999	JPN_LLI_NEA
4	1988	-999	-999	JPN_LLI_NEA
4	1989	-999	-999	JPN_LLI_NEA
4	1990	0.38678	0.351	JPN_LLI_NEA
4	1991	0.43907	0.309	JPN_LLI_NEA
4	1992	0.72625	0.238	JPN_LLI_NEA
4	1993	0.61337	0.219	JPN_LLI_NEA
4	1994	0.77024	0.232	JPN_LLI_NEA
4	1995	0.80676	0.224	JPN_LLI_NEA
4	1996	2.35969	0.217	JPN_LLI_NEA
4	1997	1.25164	0.24	JPN_LLI_NEA
4	1998	0.7221	0.245	JPN_LLI_NEA
4	1999	1.0375	0.224	JPN_LLI_NEA
4	2000	0.81506	0.216	JPN_LLI_NEA
4	2001	1.51475	0.206	JPN_LLI_NEA
4	2002	0.68226	0.215	JPN_LLI_NEA
4	2003	0.91051	0.244	JPN_LLI_NEA
4	2004	0.70052	0.224	JPN_LLI_NEA
4	2005	0.62333	0.214	JPN_LLI_NEA
4	2006	0.69139	0.222	JPN_LLI_NEA
4	2007	0.70052	0.216	JPN_LLI_NEA
4	2008	0.97359	0.211	JPN_LLI_NEA
4	2009	1.24417	0.207	JPN_LLI_NEA
4	2010	-999	-999	JPN_LLI_NEA
4	2011	-999	-999	JPN_LLI_NEA
4	2012	-999	-999	JPN_LLI_NEA
4	2013	-999	-999	JPN_LLI_NEA
4	2014	-999	-999	JPN_LLI_NEA
4	2015	-999	-999	JPN_LLI_NEA
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5	1979	-999	-999	JPN_LL2_NEA

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5	1983	-999	-999	JPN_LL2_NEA
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5	2008	-999	-999	JPN_LL2_NEA
5	2009	-999	-999	JPN_LL2_NEA
5	2010	1.35542	0.224	JPN_LL2_NEA
5	2011	4.09584	0.26	JPN_LL2_NEA
5	2012	6.9318	0.306	JPN_LL2_NEA
5	2013	4.21521	0.264	JPN_LL2_NEA
5	2014	8.92032	0.299	JPN_LL2_NEA
5	2015	5.25812	0.299	JPN_LL2_NEA
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6	1969	567.8766	0.401	SP_BB1
6	1970	553.0338	0.431	SP_BB1
6	1971	692.5803	0.403	SP_BB1
6	1972	488.8359	0.413	SP_BB1
6	1973	498.1359	0.396	SP_BB1
6	1974	228.2127	0.439	SP_BB1
6	1975	450.3246	0.41	SP_BB1
6	1976	450.0828	0.414	SP_BB1
6	1977	509.2308	0.407	SP_BB1
6	1978	655.8918	0.412	SP_BB1
6	1979	579.3993	0.409	SP_BB1
6	1980	590.3733	0.446	SP_BB1
6	1981	474.9138	0.422	SP_BB1
6	1982	468.5154	0.418	SP_BB1
6	1983	581.3802	0.432	SP_BB1
6	1984	308.4903	0.449	SP_BB1
6	1985	1046.9382	0.407	SP_BB1
6	1986	698.6253	0.419	SP_BB1
6	1987	937.8399	0.415	SP_BB1
6	1988	1297.0524	0.419	SP_BB1
6	1989	1195.608	0.4	SP_BB1
6	1990	917.4543	0.407	SP_BB1
6	1991	838.116	0.422	SP_BB1
6	1992	646.4988	0.427	SP_BB1
6	1993	1947.0015	0.403	SP_BB1
6	1994	936.5379	0.419	SP_BB1
6	1995	1149.3963	0.405	SP_BB1
6	1996	1617.5397	0.398	SP_BB1
6	1997	2089.1613	0.404	SP_BB1
6	1998	817.9443	0.409	SP_BB1
6	1999	315.9861	0.436	SP_BB1
6	2000	893.2092	0.402	SP_BB1
6	2001	655.1757	0.447	SP_BB1
6	2002	639.3006	0.423	SP_BB1
6	2003	413.7663	0.482	SP_BB1
6	2004	1125.7278	0.417	SP_BB1
6	2005	2216.7201	0.4	SP_BB1
6	2006	790.5837	0.48	SP_BB1
6	2007	-999	-999	SP_BB1
6	2008	-999	-999	SP_BB1
6	2009	-999	-999	SP_BB1
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7	2004	-999	-999	SP_BB2
7	2005	-999	-999	SP_BB2
7	2006	-999	-999	SP_BB2
7	2007	2027.38326	0.312	SP_BB2
7	2008	2003.23302	0.302	SP_BB2
7	2009	869.39307	0.303	SP_BB2
7	2010	2126.197	0.307	SP_BB2
7	2011	2701.90978	0.304	SP_BB2
7	2012	2168.56872	0.387	SP_BB2
7	2013	1396.52214	0.443	SP_BB2
7	2014	576.54395	0.411	SP_BB2
7	2015	-999	-999	SP_BB2
8	1968	-999	-999	FR_AER1
8	1969	-999	-999	FR_AER1
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8	1999	-999	-999	FR_AER1
8	2000	0.02	0.39	FR_AER1
8	2001	0.01	0.37	FR_AER1
8	2002	0.01	0.5	FR_AER1
8	2003	0.01	0.35	FR_AER1
8	2004	-999	-999	FR_AER1
8	2005	-999	-999	FR_AER1
8	2006	-999	-999	FR_AER1
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8	2012	-999	-999	FR_AER1
8	2013	-999	-999	FR_AER1
8	2014	-999	-999	FR_AER1
8	2015	-999	-999	FR_AER1
9	1968	-999	-999	FR_AER2
9	1969	-999	-999	FR_AER2
9	1970	-999	-999	FR_AER2
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9	1987	-999	-999	FR_AER2
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9	1994	-999	-999	FR_AER2
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9	2006	-999	-999	FR_AER2
9	2007	-999	-999	FR_AER2
9	2008	-999	-999	FR_AER2
9	2009	0.06	0.42	FR_AER2
9	2010	0.04	0.52	FR_AER2
9	2011	0.09	0.34	FR_AER2
9	2012	0.04	0.32	FR_AER2
9	2013	-999	-999	FR_AER2
9	2014	0.17	0.38	FR_AER2
9	2015	0.09	0.34	FR_AER2
10	1968	-999	-999	WMED_LARV
10	1969	-999	-999	WMED_LARV
10	1970	-999	-999	WMED_LARV
10	1971	-999	-999	WMED_LARV
10	1972	-999	-999	WMED_LARV
10	1973	-999	-999	WMED_LARV
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10	1998	-999	-999	WMED_LARV
10	1999	-999	-999	WMED_LARV
10	2000	-999	-999	WMED_LARV
10	2001	5.497	0.185	WMED_LARV
10	2002	2.758	0.261	WMED_LARV
10	2003	13.401	0.253	WMED_LARV
10	2004	9.026	0.195	WMED_LARV
10	2005	3.561	0.171	WMED_LARV
10	2006	-999	-999	WMED_LARV
10	2007	-999	-999	WMED_LARV
10	2008	-999	-999	WMED_LARV
10	2009	-999	-999	WMED_LARV
10	2010	-999	-999	WMED_LARV
10	2011	-999	-999	WMED_LARV
10	2012	41.051	0.073	WMED_LARV
10	2013	21.833	0.081	WMED_LARV
10	2014	25.407	0.104	WMED_LARV
10	2015	54.287	0.071	WMED_LARV

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

#INDEX	YEAR	AGE	1 - 10									
1	1968	0	0	0	0	0	0	0	0	0	0	0
1	1969	0	0	0	0	0	0	0	0	0	0	0
1	1970	0	0	0	0	0	0	0	0	0	0	0
1	1971	0	0	0	0	0	0	0	0	0	0	0
1	1972	0	0	0	0	0	0	0	0	0	0	0
1	1973	0	0	0	0	0	0	0	0	0	0	0
1	1974	0	0	0	0	0	0	0	0	0	0	0
1	1975	0	0	0	0	0	0	0	0	0	0	0
1	1976	0	0	0	0	0	0	0	0	0	0	0
1	1977	0	0	0	0	0	0	0	0	0	0	0
1	1978	0	0	0	0	0	0	0	0	0	0	0
1	1979	0	0	0	0	0	0	0	0	0	0	0
1	1980	0	0	0	0	0	0	0	0	0	0	0
1	1981	0	0	0	0.12699	152.57392	945.21313	1384.72386	1868.20301	621.56542	2617.74945	
1	1982	0	0	0	2.80125	125.98736	458.6829	1641.36899	1629.83448	1725.79742	6601.42575	
1	1983	0	0	0	1.57036	6.28144	15.31101	38.15925	248.73689	416.06157	6845.27809	
1	1984	0	0	0	26.35665	199.20664	362.47843	1015.58468	1475.49598	2629.34455	8972.83203	
1	1985	0	0	0	0	76.02717	340.90424	297.17486	416.80359	588.71817	6335.79255	
1	1986	0	2.21029	0	0	2.25677	63.38378	208.73919	201.21773	298.57507	4251.69326	
1	1987	0	2.1746	0	0	4.0753	84.85256	273.78214	275.99492	394.03254	4700.01029	
1	1988	139.9131	31.98488	46.08492	33.30209	96.26257	692.02246	776.03257	801.25046	666.99879	8917.01868	
1	1989	586.89466	0	1.79529	7.99539	157.98137	734.04287	1213.03919	1329.4359	888.72748	5572.83995	

1	1990	1580.25941	0	0	51.58533	313.65866	727.38212	1313.95059	2808.03442	3465.22842	10947.13228
1	1991	0	0	0	189.12048	3665.14222	3206.79132	1776.53698	1629.03353	1759.75936	4835.85058
1	1992	0	0	2.22191	28.21585	306.98961	689.0826	1150.15756	1176.61879	964.40522	4163.0559
1	1993	0	0	0	54.25212	142.4446	290.30661	304.40416	311.2251	417.33396	5113.65822
1	1994	2925.25864	0	23.40185	70.20638	1597.48274	2218.33353	1720.922	799.01112	704.11556	5559.05448
1	1995	0	0	15.48116	151.85597	233.48232	248.40323	179.20115	261.60521	729.70031	3775.25168
1	1996	0	0	3.95661	92.24869	231.48783	184.37952	188.51126	215.81909	497.82902	5458.98221
1	1997	0	0	24.77799	402.70189	1611.90731	1813.25867	1147.68748	1805.65753	1958.38998	11343.87643
1	1998	0	0	10.80494	223.68334	592.15105	957.60005	1282.17072	1460.32275	2453.04342	10118.69766
1	1999	0	0	3.64951	34.69815	101.52394	523.88949	685.60407	1245.90055	1360.80492	12607.00944
1	2000	0	0	4.59073	20.6836	303.49697	383.00931	865.73731	1765.82002	2173.25374	9095.59567
1	2001	0	0	36.13986	157.32567	153.24373	439.62112	1017.52107	2182.03846	3280.1351	11577.37784
1	2002	0	0	0	4.82811	55.92208	152.47764	450.19034	1285.79782	1776.62247	10383.34233
1	2003	0	0	0	4.0504	186.68277	441.36661	499.99864	1209.87108	2578.32362	5589.05234
1	2004	0	0	0.02573	0.50547	46.43601	129.77382	136.93257	342.79581	1276.56656	6692.4062
1	2005	0	0	9.37153	1.87414	40.76794	192.5932	496.24455	1005.14079	1074.96205	8188.73601
1	2006	0	0	0	136.85123	451.60798	2126.01429	2243.54561	2700.83162	1824.16404	6377.57309
1	2007	0	0	0	163.84449	540.6869	2532.30676	2565.12911	2757.16538	1872.4053	8746.91931
1	2008	0	0	1.21844	2.92492	51.20104	113.12319	270.47708	781.31469	1848.17428	9899.07468
1	2009	0	0	0	18.22182	306.42023	523.72419	468.8836	1133.50195	1711.045	9343.68516
1	2010	0	0	1.62431	3.6105	39.17185	205.48393	673.8936	994.23957	1923.72752	6528.41231
1	2011	0	0	0	8.21744	14.94064	35.49568	68.57312	231.7832	559.67912	7150.98208
1	2012	0	0	0	0	0	0	0	0	0	0
1	2013	0	0	0	0	0	0	0	0	0	0
1	2014	0	0	0	0	0	0	0	0	0	0
1	2015	0	0	0	0	0	0	0	0	0	0
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2	2009	0	0	0	0	0	0	0	0	0	0
2	2010	0	0	0	0	0	0	0	0	0	0
2	2011	0	0	0	0	0	0	0	0	0	0
2	2012	0	0	0	2.39206	21.52605	63.66847	107.06585	379.07511	4307.40784	
2	2013	0	0	1.4904	1.1176	1.1176	22.352	122.2632	187.492	429.2456	4106.9384
2	2014	0	0	0.85407	0	0.85407	2.56138	16.22401	47.22949	160.96605	4035.92978
2	2015	0	0	0	4.3776	5.83604	18.23848	32.10012	69.53468	115.99728	3973.15992
3	1968	0	0	0	0	0	0	0	0	0	0
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3	1970	0	0	0	0	0	0	0	0	0	0
3	1971	0	0	0	0	0	0	0	0	0	0
3	1972	0	0	0	0	0	0	0	0	0	0
3	1973	0	0	0	0	0	0	0	0	0	0
3	1974	0	0	0	0	0	0	0	0	0	0
3	1975	0	13.3416	23.12	91.596	22.23515	90.71115	73.8072	277.848	399.70145	13154.9519
3	1976	7.95345	94.8991	312.00525	261.24835	250.6327	254.97025	172.08845	182.6514	254.25285	9331.7607
3	1977	0.00085	0.0153	25.83745	20.2181	36.822	235.4143	494.62945	863.01605	1277.7285	6434.0223
3	1978	0.2193	13.6765	101.7161	203.0429	244.83995	203.6311	85.59585	53.2287	26.4146	1632.73185
3	1979	0.3502	3.63715	24.0958	51.4199	113.5073	780.95365	1060.5756	1730.2889	1051.6948	586.6547
3	1980	0	0.17255	58.565	46.98035	77.71975	223.02045	392.411	621.0253	526.80365	3127.0735
3	1981	3.0158	22.457	58.6211	53.3171	58.259	102.03145	212.09965	517.50975	394.08125	1649.7004
3	1982	19.669	474.61195	958.1625	1225.87935	1011.3657	2623.72815	2298.64395	2484.1947	1352.5081	8089.1916
3	1983	0.00085	22.35415	147.0466	253.72925	920.41485	1110.6338	1468.86885	1835.1007	1716.8572	9466.8461
3	1984	0.0102	0.71995	38.87475	161.2756	301.87325	626.6081	943.20335	1731.7577	3227.5843	6786.5292
3	1985	7.29895	48.6948	148.56045	108.2798	242.8433	294.13315	493.7335	317.72065	445.3133	4442.8786
3	1986	0.1785	15.7165	43.88465	85.56525	309.6074	311.92875	278.8306	363.7303	366.67215	3298.3247
3	1987	0.00085	0.0051	12.3182	37.12375	115.71305	429.8144	713.6226	646.18955	575.6574	3419.567
3	1988	0.22355	7.4511	40.7813	121.52705	84.9643	330.973	715.55975	881.99995	839.647	4093.0798
3	1989	0	0.2176	17.4539	97.121	133.96425	218.042	539.3454	435.44565	337.9991	1653.7005
3	1990	0.03485	5.5573	29.08785	61.9145	318.90725	449.7588	631.0978	862.09805	898.977	2533.34
3	1991	6.7201	3.34475	23.8561	20.5683	47.056	119.88995	500.5293	1229.134	2182.6674	3086.3279
3	1992	0.10965	0.15555	68.1615	234.88645	60.5812	165.8673	234.5201	460.0693	1375.41135	7418.2152
3	1993	0	28.97905	31.0505	64.4521	71.9423	208.165	130.1724	144.93775	543.0684	7034.124
3	1994	0	0	66.9154	210.43875	160.8795					

3	1995	2.47945	5.2462	11.3118	278.5977	151.5244	275.7927	812.294	961.12985	924.53225	8928.74255
3	1996	0	0	66.66975	85.9299	273.6541	214.59865	165.9013	301.0343	427.6979	5225.1387
3	1997	0	64.03135	253.929	248.3717	156.4901	50.21205	112.8341	270.49295	551.7418	3260.5133
3	1998	0	0	8.97855	15.3119	55.3996	103.04805	148.9302	256.632	547.51475	4832.2908
3	1999	0	0	0	1.9193	138.2015	231.7065	299.1184	403.64035	850.96135	2806.003
3	2000	0	0	0	11.8167	585.4477	442.08075	419.10355	244.66825	363.51355	1688.4417
3	2001	0.28135	0	1.9618	37.6907	80.5528	665.01365	790.65385	1094.45915	631.6588	833.3808
3	2002	0.714	0.714	3.2487	50.27665	508.9307	373.62685	1647.76665	1041.4183	583.24195	2504.07195
3	2003	0	0	47.51585	156.72725	175.25725	104.9869	277.98315	460.7697	835.56955	3053.1303
3	2004	0	0	10.01045	55.90535	173.83435	198.32285	491.9545	461.22785	1083.5851	2442.79035
3	2005	1.26225	29.0054	47.69945	57.8289	89.77105	136.8534	390.8827	477.0625	703.57645	2656.3418
3	2006	45.0194	0	265.67685	89.92575	395.29165	447.59045	1406.7517	1638.1693	1468.9275	3897.2228
3	2007	4.31205	50.4645	569.71165	429.8501	250.6412	233.07085	351.7368	887.05915	712.94855	1825.0826
3	2008	0	8.2807	60.1426	43.5812	9.0066	0	25.93095	86.07355	69.51215	207.44845
3	2009	0	0	0.9146	3.1025	9.62965	10.438	2.7098	16.269	37.9083	190.8896
3	2010	0	0	0	0	0	0	0	0	0	0
3	2011	0	0	0	0	0	0	0	0	0	0
3	2012	0	0	0	0	0	0	0	0	0	0
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4	1987	0	0	0	0	0	0	0	0	0	0
4	1988	0	0	0	0	0	0	0	0	0	0
4	1989	0	0	0	0	0	0	0	0	0	0
4	1990	0.00166	15.92604	82.18079	88.11778	308.34583	485.51846	464.16256	486.59331	831.92975	1229.80104
4	1991	0.01743	117.47654	427.65086	622.37135	766.18462	1287.99981	1718.30501	974.11705	1222.07291	3548.61686
4	1992	0.1411	15.39235	97.17889	677.04262	1336.11906	967.70115	878.0854	1026.05928	1306.18428	2414.97796
4	1993	0	18.26747	360.74207	1594.16855	2060.58124	2337.92823	1684.44682	976.21446	614.63409	1283.03973
4	1994	7.68165	119.3374	253.98332	570.54353	932.15142	833.1042	1710.06062	1617.14876	1094.5293	1204.11669
4	1995	1.63261	10.87632	253.68286	1049.65867	1709.88217	3903.22938	2901.59783	2546.57695	2061.32824	1597.69024
4	1996	0	134.49237	521.89487	700.20875	1010.00542	2131.93219	2826.64302	3046.47765	4744.32482	
4	1997	1.47159	9.81309	14.75408	83.7802	504.68316	1319.21196	1891.57581	2942.32759	3278.09081	3430.11776
4	1998	1.03916	0.08217	124.18211	204.8855	322.61519	1151.41169	2283.43126	1940.88611	2671.08608	4659.79762
4	1999	0	90.51482	102.01613	1190.91222	2288.06764	2311.32839	3529.76922	2883.33783	1830.09688	2863.6494
4	2000	0	9.18893	14.442	42.84626	761.27683	3136.7775	2125.22828	3349.2575	3908.09899	3309.71215
4	2001	41.69339	19.65357	2.7639	86.81136	894.87114	4331.01138	4385.8196	3153.53188	1688.04902	1904.13952
4	2002	0.00332	5.3784	28.07558	46.01105	23.20763	171.56598	899.02612	3849.9384	3719.64998	2840.22431
4	2003	8.32905	86.62212	291.45201	917.86048	1269.15051	1580.91262	1402.85272	1756.65848	2325.83679	4667.86024
4	2004	14.95494	251.94733	114.4902	297.36742	338.4159	582.94801	2226.62191	1911.03599	998.0999	4371.76023
4	2005	5.86312	134.70983	221.52949	268.57555	416.92062	635.58412	1815.36521	2054.61935	2803.94501	4631.63655
4	2006	36.76651	0	194.11874	69.49756	322.8285	338.74126	854.0866	962.68629	725.16104	1888.58034
4	2007	17.60015	8.9972	894.68273	717.78234	808.75864	951.27794	818.8033	1573.12224	1256.43823	2514.58294
4	2008	0	2.67426	7.04421	550.79215	3296.05118	1380.48505	5030.12536	3384.05691	2322.9791	2296.49546
4	2009	0	0.88146	11.84493	13.57133	113.80711	5376.48353	2564.65858	2561.96764	2496.04323	1287.77405
4	2010	0	0	0	0	0	0	0	0	0	0
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5	1998	0	0	0	0	0	0	0	0	0	0
5	1999	0	0	0	0	0	0	0	0	0	0

7	2005	0	0	0	0	0	0	0	0	0	0
7	2006	0	0	0	0	0	0	0	0	0	0
7	2007	17486.8272	35970.03501	25870.19781	16711.69824	5899.41129	1758.88761	618.6081	145.6008	92.02908	831.42744
7	2008	277.91934	48906.17133	32995.10637	15448.37043	2186.93406	95.7807	369.85263	216.8574	279.21018	995.9184
7	2009	40.46497	11622.86398	12878.44831	5245.21452	1882.60163	2788.38469	852.11126	301.35924	274.61525	485.20199
7	2010	122.767	16606.885	7517.981	4134.842	901.151	285.71	608.584	116.543	99.611	206.712
7	2011	0	5436.39022	4067.31185	2680.78318	3046.05123	1200.46521	217.48176	259.30719	83.80509	280.70248
7	2012	0	0	2933.18258	2355.7152	809.63704	97.7459	51.70658	23.86942	52.35706	198.66618
7	2013	0	6.99629	80.96775	502.60792	355.67871	199.74092	33.33851	105.26386	15.70939	651.59659
7	2014	0	31.5826	93.5578	228.4766	120.3906	32.1946	11.9748	8.39205	13.55835	277.47485
7	2015	0	131.20241	1752.93495	129.51102	38.99282	4.72183	1.67559	5.51341	16.56867	461.31102
10	1968	0	0	0	0	0	0	0	0	0	0
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10	1971	0	0	0	0	0	0	0	0	0	0
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10	1993	0	0	0	0	0	0	0	0	0	0
10	1994	0	0	0	0	0	0	0	0	0	0
10	1995	0	0	0	0	0	0	0	0	0	0
10	1996	0	0	0	0	0	0	0	0	0	0
10	1997	0	0	0	0	0	0	0	0	0	0
10	1998	0	0	0	0	0	0	0	0	0	0
10	1999	0	0	0	0	0	0	0	0	0	0
10	2000	0	0	0	0	0	0	0	0	0	0
10	2001	0	0	0.25	0.5	1	1	1	1	1	1
10	2002	0	0	0.25	0.5	1	1	1	1	1	1
10	2003	0	0	0.25	0.5	1	1	1	1	1	1
10	2004	0	0	0.25	0.5	1	1	1	1	1	1
10	2005	0	0	0.25	0.5	1	1	1	1	1	1
10	2006	0	0	0.25	0.5	1	1	1	1	1	1
10	2007	0	0	0.25	0.5	1	1	1	1	1	1
10	2008	0	0	0.25	0.5	1	1	1	1	1	1
10	2009	0	0	0.25	0.5	1	1	1	1	1	1
10	2010	0	0	0.25	0.5	1	1	1	1	1	1
10	2011	0	0	0.25	0.5	1	1	1	1	1	1
10	2012	0	0	0.25	0.5	1	1	1	1	1	1
10	2013	0	0	0.25	0.5	1	1	1	1	1	1
10	2014	0	0	0.25	0.5	1	1	1	1	1	1
10	2015	0	0	0.25	0.5	1	1	1	1	1	1

-1

#=====

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

#=====

#Index	year	ages	1 - 10	11 - 20	21 - 30	31 - 40	41 - 50	51 - 60	61 - 70	71 - 80	81 - 90
6	1968	5.591	13.262	21.843	35.702	46.125	63.743	94.083	117.434	138.385	321.548
6	1969	5.293	12.02	20.416	33.855	53.124	65.984	79.664	110.1754167	132.720931	308.915
6	1970	5.357	10.494	18.789	33.926	48.529	66.157	87.053	103.602	132.720931	334.142
6	1971	5.549	12.146	22.452	35.237	51.292	64.972	83.034	103.762	132.720931	344.312
6	1972	4.616	12.283	18.105	32.67	52.644	69.189	93.57	103.031	125.452	323.537
6	1973	5.987	10.818	19.949	32.837	52.04	67.384	89.769	109.971	126.937	347.226
6	1974	6.317	11.32	19.646	32.997	48.659	64.232	96.671	110.1754167	132.720931	350.592
6	1975	6.122	11.16	19.761	33.177	48.726	64.73	96.193	110.1754167	132.720931	281.465
6	1976	5.53	11.044	19.807	34.609	50.667	66.621	86.426	110.654	132.720931	287.606
6	1977	5.529	11.613	20.54	32.507	47.358	68.378	89.169	106.878	132.720931	291.194
6	1978	5.633	9.861	20.783	35.764	49.854	66.491	86.869	111.708	134.864	273.546
6	1979	5.502	11.619	20.588	34.418	50.693	67.265	87.147	117.715	139.18	281.103
6	1980	5.134	10.405	19.89	33.426	51.349	67.999	88.66	105.353	133.096	246.501
6	1981	4.907	9.221	20.45	32.113	51.22	68.903	90.183	107.068	120.78	245.604
6	1982	5.119	11.511	21.369	34.224	48.905	68.262	88.898	110.058	126.461	264.192
6	1983	5.431	12.218	21.282	34.858	46.211	67.205	84.877	121.981	132.720931	224.971
6	1984	5.248	11.965	22.618	33.077	48.384	69.819	91.323	108.865	128.37	224.971
6	1985	4.838	10.271	20.403	34.982	49.301	68.031	85.993	102.749	144.944	229.692
6	1986	5.326	12.964	21.622	35.63	50.174	65.593	84.337	108.658	125.901	221.458
6	1987	5.725	10.432	21.465	34.976	53.511	65.969	89.655	102.551	132.720931	205.019
6	1988	5.023	10.521	21.202	37.093	50.762	68.475	84.69	111.128	132.720931	205.019
6	1989	5.957	10.212	22.048	35.707	49.35	68.383	88.407	109.519	134.305	205.019
6	1990	5.681	12.479	20.68	37.329	49.424	63.84	80.135	104.351	129.862	171.441
6	1991	6.141	11.049	21.395	35.749	47.891	69.984	88.728	105.153	129.815	171.441
6	1992	4.92	12.895	20.592	35.232	49.256	64.617	86.248	104.213	130.179	171.441
6	1993	6.061	10.627	21.306	34.219	48.487	69.656	86.677	104.828	129.815	171.441
6	1994	7.469	13.338	22.152	39.21	52.555	72.019	88.792	104.876	123.064	239.547
6	1995	5.479	14.45	19.59	33.642	47.501	66.501	94.463	113.906	123.064	239.547
6	1996	5.073	10.613	20.033	34.19	48.12	67.212	95.664	118.624	135.716	257.451
6	1997	5.195	12.124	18.476	35.75	51.507	68.029	90.072	118.656	136.38	258.056
6	1998	4.178	10.844	21.145	31.885	50	68.239	88.32	109.667	141.369	369.436
6	1999	4.818	10.751	20.807	34.096	48.303	68.293	85.769	113.886	139.241	230.434
6	2000	6.231	10.451	21.165	35.515	53.112	67.177	94.876	116.447	137.914	202.636
6	2001	5.449	10.456	20.519	32.784	48.225	68.66	84.979	111.097	133.957	193.6
6	2002	5.986	12.307	19.652	32.476	47.078	64.705	92.969	114.943	136.583	189.231
6	2003	6.447	11.261	19.827	31.006	51.487	64.538	89.029	117.554	138.238	175.044
6	2004	6.586	10.441	20.415	31.165	48.284	68.618	88.336			

6	2005	6.647	9.868	18.024	32.956	50.132	67.89	93.554	110.442	128.173	188.431
6	2006	7.247	10.056	18.117	30.223	45.964	72.613	90.544	111.493	136.034	199.219
7	2007	3.765	11.61	22.547	31.165	52.055	67.326	87.214	109.832	134.942	175.409
7	2008	8.002	12.036	20.484	34.124	47.068	71.582	90.426	112.302	136.588	197.753
7	2009	6.197	13.003	21.661	32.688	52.121	70.462	87.273	112.5	133.787	189.114
7	2010	6.876	13.686	20.237	35.211	50.352	74.249	92.062	113.568	135.086	194.31
7	2011	6.21	11.752	23.518	33.783	53.204	70.912	88.723	112.579	132.778	189.46
7	2012	6.21	12.36028571	25.008	37.288	49.154	71.251	90.664	116.306	135.429	201.177
7	2013	6.21	9.166	27.405	37.594	51.299	76.625	90.269	114.522	135.557	211.856
7	2014	6.21	15.269	27.108	38.456	53.05	72.84	92.286	114.67	134.323	199.497
10	2001	6.74	11.144	21.033	29.091	48.657	67.744	91.263	112.534	134.531	198.767
10	2002	6.108	12.327	19.29	31.263	50.683	69.144	90.851	114.193	136.92	208.952
10	2003	6.59	11.637	20.551	33.405	52.74	69.898	91.108	113.363	135.466	203.625
10	2004	6.735	10.703	20.622	33.805	51.044	70.346	89.334	111.589	135.334	197.262
10	2005	6.607	11.356	18.748	33.405	51.858	69.759	91.684	113.477	136.127	207.906
10	2012	5.261	12.352	24.394	34.336	50.293	67.102	91.281	114.07	137.289	212.811
10	2013	3.349	10.082	21.22	34.233	49.124	69.114	92.004	114.838	140.854	203.318
10	2014	5.41326087	10.084	22.44	35.189	48.921	69.07	91.556	115.931	138.202	198.929
10	2015	3.025	9.944	19.507	33.878	48.971	66.333	90.823	113.783	137.719	202.524

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

#=====

1968	5.528	13.35	19.178	33.527	48.362	69.747	92.36	111.871	139.522	241.5
1969	5.287	12.297	18.785	34.761	51.578	67.563	93.221	114.565	137.239	239.357
1970	5.36	10.539	18.456	34.136	49.687	68.472	90.945	110.958	136.908	240.418
1971	5.534	12.188	22.649	35.164	51.529	69.517	92.153	113.599	130.197	257.689
1972	4.097	11.73	21.182	33.036	51.123	70.797	93.535	112.87	139.834	247.828
1973	5.891	10.962	19.904	32.619	50.366	66.523	96.561	113.012	133.733	262.603
1974	4.761	11.19	21.041	34.845	52.273	64.016	91.123	112.114	138.804	232.956
1975	5.7	11.524	22.661	34.623	47.408	69.546	91.115	112.623	136.284	253.167
1976	5.51	12.945	19.8	36.524	50.341	68.853	90.086	112.898	137.368	235.825
1977	5.119	12.571	24.771	33.028	49.556	69.64	88.047	112.184	136.309	257.722
1978	6.419	11.18	19.616	35.551	48.294	68.793	89.491	110.789	132.962	251.915
1979	7.195	16.227	22.225	34.222	50.512	69.461	89.583	112.556	135.378	242.455
1980	5.33	11.477	20.237	33.961	48.759	68.421	89.32	110.491	134	228.911
1981	5.431	11.661	21.159	34.046	49.041	67.902	89.542	110.906	133.744	215.897
1982	6.083	13.933	21.583	35.236	49.052	69.509	90.402	111.729	134.454	222.41
1983	5.464	12.64	20.514	33.12	49.324	67.87	92.37	111.787	137.885	211.949
1984	5.973	12.576	23.714	33.175	49.312	70.002	90.037	112.555	136.408	211.652
1985	5.236	11.611	21.761	34.649	49.625	68.397	89.243	112.465	135.726	218.884
1986	5.191	13.074	22.481	32.708	51.5	70.443	89.356	111.879	136.157	228.449
1987	5.565	10.986	19.877	34.13	48.578	68.901	89.105	110.686	134.934	212.179
1988	5.014	11.777	20.742	35.525	49.448	69.537	88.72	111.382	135.258	215.422
1989	5.87	10.834	22.809	30.958	42.799	69.55	91.212	111.548	134.427	224.149
1990	4.842	11.062	18.863	31.193	43.622	66.954	89.611	111.215	136.905	215.015
1991	5.329	11.145	21.032	29.907	46.555	71.104	91.452	113.281	137.986	199.052
1992	4.326	11.731	19.995	32.282	53.989	73.439	94.883	113.613	137.756	210.016
1993	4.357	10.871	18.663	31.693	51.433	69.644	85.904	105.876	129.742	219.296
1994	5.817	10.71	20.74	32.932	50.491	66.825	85.845	109.162	135.218	206.84
1995	5.57	11.745	19.95	31.985	49.43	67.677	88.965	111.869	137.521	222.486
1996	5.471	9.738	19.301	30.889	48.043	68.074	91.801	114.119	137.822	223.826
1997	5.484	11.454	19.284	33.079	50.238	68.399	89.562	113.989	137.016	204.761
1998	5.419	11.894	19.482	32.543	47.439	67.494	90.955	113.542	138.606	216.784
1999	6.244	11.857	21.776	29.331	48.484	69.558	94.436	111.294	137.274	196.196
2000	6.29	11.819	21.144	31.188	50.12	68.405	90.817	113.278	139.368	191.551
2001	6.74	11.144	21.033	29.091	48.657	67.744	91.263	112.534	134.531	198.767
2002	6.108	12.327	19.29	31.263	50.683	69.144	90.851	114.193	136.92	208.952
2003	6.59	11.637	20.551	33.405	52.74	69.898	91.108	113.363	135.466	203.625
2004	6.735	10.703	20.622	33.805	51.044	70.346	89.334	111.589	135.334	197.262
2005	6.607	11.356	18.748	33.405	51.858	69.759	91.684	113.477	136.127	207.906
2006	7.198	11.381	18.987	34.168	47.272	66.563	89.627	112.532	135.475	205.87
2007	3.653	11.525	22.243	35.045	45.976	62.074	86.494	110.836	134.835	209.103
2008	4.417	10.864	20.716	33.771	48.3	67.211	93.141	114.433	137.757	210.887
2009	4.421	12.933	20.863	34.762	50.511	68.899	88.553	111.977	135.133	207.428
2010	4.202	13.161	20.624	35.285	50.029	69.231	92.204	113.154	138.687	206.3
2011	5.413	11.642	23.512	33.53	50.541	69.764	89.296	116.271	137.047	217.738
2012	5.261	12.352	24.394	34.336	50.293	67.102	91.281	114.07	137.289	212.811
2013	3.349	10.082	21.22	34.233	49.124	69.114	92.004	114.838	140.854	203.318
2014	5.413	10.084	22.44	35.189	48.921	69.07	91.556	115.931	138.202	198.929
2015	3.025	9.944	19.507	33.878	48.971	66.333	90.823	113.783	137.719	202.524

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Appendix B. VPA-2BOX input data file for western-origin bluefin tuna

2008	87	3850	3562	2938	5395	910	1430	1401	1302	890	509	505
	594	353	310	1753								
2009	29	1216	2172	2268	1431	7207	2168	1976	2048	1096	676	580
	674	462	401	1468								
2010	30	450	832	1432	1295	909	3255	2998	1748	1495	754	500
	579	432	317	1066								
2011	0	250	740	2632	1375	1100	537	2242	1071	720	663	515
	366	311	226	962								
2012	46	140	968	1750	759	581	713	1261	1872	1281	528	574
	436	374	282	927								
2013	9	131	249	1060	493	603	600	1871	1288	1296	1010	538
	420	335	248	1104								
2014	10	419	505	788	396	623	96	455	791	746	451	353
	270	199	104	408								
2015	0	36	962	750	330	325	610	827	745	959	795	628
	529	426	258	889								

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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	0	1	4	-1	7	16	'CAN_Combined_RR'					
2	1	1	4	-1	8	16	'CAN_GSL_Acoustic'					
3	1	1	4	-1	1	5	'US_RR<145'					
4	1	1	4	-1	2	4	'US_RR_66_114'					
5	1	1	4	-1	4	6	'US_RR_115_144'					
6	0	1	4	-1	6	8	'US_RR_145_177'					
7	1	1	4	-1	9	16	'US_RR>195'					
8	0	1	4	-1	9	16	'US_RR>195_COMB'					
9	0	1	4	-1	8	16	'US_RR>177'					
10	1	1	4	0	2	16	'JLL_AREA_2_(WEST)'					
11	0	1	4	0	2	16	'JLL_AREA_3_(31+32)'					
12	0	1	4	0	2	16	'JLL_AREAS_17+18'					
13	1	2	4	-1	8	16	'LARVAL_ZERO_INFLATED'					
14	1	1	4	0	8	16	'GOM_PLL_1-6'					
15	1	1	4	0	8	16	'JLL_GOM'					
16	0	4	1	-1	1	3	'TAGGING'					
17	1	1	3	0	5	16	'JLL_RECENT'					

-1

#=====

NOW ENTER IN THE INDICES OF ABUNDANCE

#=====

#INDEX

ID	YEAR	VALUE	CV (or STD ERROR)	INDEX NAME
1	1974	-0.999	-0.999	CAN_Combined_RR
1	1975	-0.999	-0.999	CAN_Combined_RR
1	1976	-0.999	-0.999	CAN_Combined_RR
1	1977	-0.999	-0.999	CAN_Combined_RR
1	1978	-0.999	-0.999	CAN_Combined_RR
1	1979	-0.999	-0.999	CAN_Combined_RR
1	1980	-0.999	-0.999	CAN_Combined_RR
1	1981	-0.999	-0.999	CAN_Combined_RR
1	1982	-0.999	-0.999	CAN_Combined_RR
1	1983	-0.999	-0.999	CAN_Combined_RR
1	1984	0.456	0.14	CAN_Combined_RR
1	1985	0.248	0.16	CAN_Combined_RR
1	1986	0.144	0.21	CAN_Combined_RR
1	1987	0.176	0.37	CAN_Combined_RR
1	1988	0.48	0.14	CAN_Combined_RR
1	1989	0.512	0.13	CAN_Combined_RR
1	1990	0.184	0.11	CAN_Combined_RR
1	1991	0.176	0.11	CAN_Combined_RR
1	1992	0.192	0.11	CAN_Combined_RR
1	1993	0.192	0.12	CAN_Combined_RR
1	1994	0.168	0.12	CAN_Combined_RR
1	1995	0.384	0.11	CAN_Combined_RR
1	1996	0.1566	0.11	CAN_Combined_RR
1	1997	0.0644	0.1	CAN_Combined_RR
1	1998	0.035	0.1	CAN_Combined_RR
1	1999	0.408	0.11	CAN_Combined_RR
1	2000	0.256	0.11	CAN_Combined_RR
1	2001	0.4	0.1	CAN_Combined_RR
1	2002	0.6	0.11	CAN_Combined_RR
1	2003	0.768	0.11	CAN_Combined_RR
1	2004	0.872	0.11	CAN_Combined_RR
1	2005	0.792	0.1	CAN_Combined_RR
1	2006	1.016	0.1	CAN_Combined_RR
1	2007	1	0.11	CAN_Combined_RR
1	2008	0.888	0.11	CAN_Combined_RR
1	2009	1.576	0.11	CAN_Combined_RR
1	2010	1.848	0.12	CAN_Combined_RR
1	2011	1.6456	0.11	CAN_Combined_RR
1	2012	1.7888	0.11	CAN_Combined_RR
1	2013	1.5041	0.11	CAN_Combined_RR
1	2014	0.7524	0.11	CAN_Combined_RR
1	2015	1.0362	0.11	CAN_Combined_RR
2	1974	-0.999	-0.999	CAN_GSL_Acoustic
2	1975	-0.999	-0.999	CAN_GSL_Acoustic
2	1976	-0.999	-0.999	CAN_GSL_Acoustic

2	1977	.999	.999	CAN_GSL_Acoustic
2	1978	.999	.999	CAN_GSL_Acoustic
2	1979	.999	.999	CAN_GSL_Acoustic
2	1980	.999	.999	CAN_GSL_Acoustic
2	1981	.999	.999	CAN_GSL_Acoustic
2	1982	.999	.999	CAN_GSL_Acoustic
2	1983	.999	.999	CAN_GSL_Acoustic
2	1984	.999	.999	CAN_GSL_Acoustic
2	1985	.999	.999	CAN_GSL_Acoustic
2	1986	.999	.999	CAN_GSL_Acoustic
2	1987	.999	.999	CAN_GSL_Acoustic
2	1988	.999	.999	CAN_GSL_Acoustic
2	1989	.999	.999	CAN_GSL_Acoustic
2	1990	.999	.999	CAN_GSL_Acoustic
2	1991	.999	.999	CAN_GSL_Acoustic
2	1992	.999	.999	CAN_GSL_Acoustic
2	1993	.999	.999	CAN_GSL_Acoustic
2	1994	0.0208	0.3	CAN_GSL_Acoustic
2	1995	0.0272	0.3	CAN_GSL_Acoustic
2	1996	0.03886	0.3	CAN_GSL_Acoustic
2	1997	0.01064	0.3	CAN_GSL_Acoustic
2	1998	0.0042	0.3	CAN_GSL_Acoustic
2	1999	0.028	0.3	CAN_GSL_Acoustic
2	2000	0.0152	0.3	CAN_GSL_Acoustic
2	2001	0.0296	0.3	CAN_GSL_Acoustic
2	2002	0.016	0.3	CAN_GSL_Acoustic
2	2003	0.0288	0.3	CAN_GSL_Acoustic
2	2004	0.0304	0.3	CAN_GSL_Acoustic
2	2005	0.0408	0.3	CAN_GSL_Acoustic
2	2006	0.0496	0.3	CAN_GSL_Acoustic
2	2007	0.0336	0.3	CAN_GSL_Acoustic
2	2008	0.0272	0.3	CAN_GSL_Acoustic
2	2009	0.0456	0.3	CAN_GSL_Acoustic
2	2010	0.052	0.3	CAN_GSL_Acoustic
2	2011	0.044	0.3	CAN_GSL_Acoustic
2	2012	0.08686	0.3	CAN_GSL_Acoustic
2	2013	0.04984	0.3	CAN_GSL_Acoustic
2	2014	0.03344	0.3	CAN_GSL_Acoustic
2	2015	0.0495	0.3	CAN_GSL_Acoustic
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	0.6	0.43	US_RR<145
3	1981	0.3	0.52	US_RR<145
3	1982	1.575	0.33	US_RR<145
3	1983	0.8325	0.26	US_RR<145
3	1984	.999	.999	US_RR<145
3	1985	0.4725	0.64	US_RR<145
3	1986	0.585	0.43	US_RR<145
3	1987	0.915	0.4	US_RR<145
3	1988	0.7425	0.38	US_RR<145
3	1989	0.7425	0.43	US_RR<145
3	1990	0.675	0.34	US_RR<145
3	1991	0.945	0.35	US_RR<145
3	1992	0.615	0.42	US_RR<145
3	1993	.999	.999	US_RR<145
3	1994	.999	.999	US_RR<145
3	1995	.999	.999	US_RR<145
3	1996	.999	.999	US_RR<145
3	1997	.999	.999	US_RR<145
3	1998	.999	.999	US_RR<145
3	1999	.999	.999	US_RR<145
3	2000	.999	.999	US_RR<145
3	2001	.999	.999	US_RR<145
3	2002	.999	.999	US_RR<145
3	2003	.999	.999	US_RR<145
3	2004	.999	.999	US_RR<145
3	2005	.999	.999	US_RR<145
3	2006	.999	.999	US_RR<145
3	2007	.999	.999	US_RR<145
3	2008	.999	.999	US_RR<145
3	2009	.999	.999	US_RR<145
3	2010	.999	.999	US_RR<145
3	2011	.999	.999	US_RR<145
3	2012	.999	.999	US_RR<145
3	2013	.999	.999	US_RR<145
3	2014	.999	.999	US_RR<145
3	2015	.999	.999	US_RR<145
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	-0.999	-0.999	US_RR_66_114
4	1987	-0.999	-0.999	US_RR_66_114
4	1988	-0.999	-0.999	US_RR_66_114
4	1989	-0.999	-0.999	US_RR_66_114
4	1990	-0.999	-0.999	US_RR_66_114
4	1991	-0.999	-0.999	US_RR_66_114
4	1992	-0.999	-0.999	US_RR_66_114
4	1993	0.87	0.36	US_RR_66_114
4	1994	0.2025	0.44	US_RR_66_114
4	1995	0.8625	0.34	US_RR_66_114
4	1996	1.2825	0.37	US_RR_66_114
4	1997	1.8525	0.32	US_RR_66_114
4	1998	0.576	0.36	US_RR_66_114
4	1999	1.0425	0.42	US_RR_66_114
4	2000	0.7425	0.5	US_RR_66_114
4	2001	0.36	0.34	US_RR_66_114
4	2002	1.2012	0.39	US_RR_66_114
4	2003	0.315	0.33	US_RR_66_114
4	2004	1.7325	0.31	US_RR_66_114
4	2005	1.695	0.3	US_RR_66_114
4	2006	0.4575	0.33	US_RR_66_114
4	2007	0.345	0.3	US_RR_66_114
4	2008	0.27	0.32	US_RR_66_114
4	2009	0.27	0.31	US_RR_66_114
4	2010	0.5166	0.32	US_RR_66_114
4	2011	0.7052	0.34	US_RR_66_114
4	2012	0.2993	0.4	US_RR_66_114
4	2013	0.4503	0.35	US_RR_66_114
4	2014	0.476	0.37	US_RR_66_114
4	2015	0.3375	0.39	US_RR_66_114
5	1974	-0.999	-0.999	US_RR_115_144
5	1975	-0.999	-0.999	US_RR_115_144
5	1976	-0.999	-0.999	US_RR_115_144
5	1977	-0.999	-0.999	US_RR_115_144
5	1978	-0.999	-0.999	US_RR_115_144
5	1979	-0.999	-0.999	US_RR_115_144
5	1980	-0.999	-0.999	US_RR_115_144
5	1981	-0.999	-0.999	US_RR_115_144
5	1982	-0.999	-0.999	US_RR_115_144
5	1983	-0.999	-0.999	US_RR_115_144
5	1984	-0.999	-0.999	US_RR_115_144
5	1985	-0.999	-0.999	US_RR_115_144
5	1986	-0.999	-0.999	US_RR_115_144
5	1987	-0.999	-0.999	US_RR_115_144
5	1988	-0.999	-0.999	US_RR_115_144
5	1989	-0.999	-0.999	US_RR_115_144
5	1990	-0.999	-0.999	US_RR_115_144
5	1991	-0.999	-0.999	US_RR_115_144
5	1992	-0.999	-0.999	US_RR_115_144
5	1993	0.825	0.21	US_RR_115_144
5	1994	0.21	0.38	US_RR_115_144
5	1995	0.4575	0.22	US_RR_115_144
5	1996	0.5475	0.22	US_RR_115_144
5	1997	0.1575	0.35	US_RR_115_144
5	1998	0.308	0.17	US_RR_115_144
5	1999	0.6375	0.31	US_RR_115_144
5	2000	0.9975	0.39	US_RR_115_144
5	2001	1.1925	0.2	US_RR_115_144
5	2002	1.989	0.26	US_RR_115_144
5	2003	0.4725	0.15	US_RR_115_144
5	2004	0.4575	0.19	US_RR_115_144
5	2005	0.4275	0.18	US_RR_115_144
5	2006	1.0875	0.19	US_RR_115_144
5	2007	1.2375	0.13	US_RR_115_144
5	2008	0.855	0.16	US_RR_115_144
5	2009	0.375	0.2	US_RR_115_144
5	2010	0.984	0.17	US_RR_115_144
5	2011	0.9116	0.21	US_RR_115_144
5	2012	0.8176	0.23	US_RR_115_144
5	2013	1.3983	0.2	US_RR_115_144
5	2014	0.6392	0.26	US_RR_115_144
5	2015	0.2625	0.33	US_RR_115_144
6	1974	-0.999	-0.999	US_RR_145_177
6	1975	-0.999	-0.999	US_RR_145_177
6	1976	-0.999	-0.999	US_RR_145_177
6	1977	-0.999	-0.999	US_RR_145_177
6	1978	-0.999	-0.999	US_RR_145_177
6	1979	-0.999	-0.999	US_RR_145_177
6	1980	-0.999	-0.999	US_RR_145_177
6	1981	-0.999	-0.999	US_RR_145_177
6	1982	-0.999	-0.999	US_RR_145_177
6	1983	-0.999	-0.999	US_RR_145_177
6	1984	-0.999	-0.999	US_RR_145_177
6	1985	-0.999	-0.999	US_RR_145_177
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6	1987	-0.999	-0.999	US_RR_145_177
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6	1990	-0.999	-0.999	US_RR_145_177
6	1991	-0.999	-0.999	US_RR_145_177
6	1992	-0.999	-0.999	US_RR_145_177
6	1993	-0.999	-0.999	US_RR_145_177
6	1994	-0.999	-0.999	US_RR_145_177

6	1995	.999	.999	US_RR_145_177
6	1996	.999	.999	US_RR_145_177
6	1997	.999	.999	US_RR_145_177
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6	2011	.999	.999	US_RR_145_177
6	2012	.999	.999	US_RR_145_177
6	2013	.999	.999	US_RR_145_177
6	2014	.999	.999	US_RR_145_177
6	2015	.999	.999	US_RR_145_177
7	1974	.999	.999	US_RR>195
7	1975	.999	.999	US_RR>195
7	1976	.999	.999	US_RR>195
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7	1980	.999	.999	US_RR>195
7	1981	.999	.999	US_RR>195
7	1982	.999	.999	US_RR>195
7	1983	2.1075	0.1	US_RR>195
7	1984	0.9375	0.19	US_RR>195
7	1985	0.645	0.3	US_RR>195
7	1986	0.375	1.1	US_RR>195
7	1987	0.3975	0.48	US_RR>195
7	1988	0.705	0.36	US_RR>195
7	1989	0.57	0.36	US_RR>195
7	1990	0.4725	0.34	US_RR>195
7	1991	0.615	0.28	US_RR>195
7	1992	0.6825	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	2008	.999	.999	US_RR>195
7	2009	.999	.999	US_RR>195
7	2010	.999	.999	US_RR>195
7	2011	.999	.999	US_RR>195
7	2012	.999	.999	US_RR>195
7	2013	.999	.999	US_RR>195
7	2014	.999	.999	US_RR>195
7	2015	.999	.999	US_RR>195
8	1974	.999	.999	US_RR>195_COMB
8	1975	.999	.999	US_RR>195_COMB
8	1976	.999	.999	US_RR>195_COMB
8	1977	.999	.999	US_RR>195_COMB
8	1978	.999	.999	US_RR>195_COMB
8	1979	.999	.999	US_RR>195_COMB
8	1980	.999	.999	US_RR>195_COMB
8	1981	.999	.999	US_RR>195_COMB
8	1982	.999	.999	US_RR>195_COMB
8	1983	.999	.999	US_RR>195_COMB
8	1984	.999	.999	US_RR>195_COMB
8	1985	.999	.999	US_RR>195_COMB
8	1986	.999	.999	US_RR>195_COMB
8	1987	.999	.999	US_RR>195_COMB
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8	1990	.999	.999	US_RR>195_COMB
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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
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8	2011	-999	-999	US_RR>195_COMB
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8	2013	-999	-999	US_RR>195_COMB
8	2014	-999	-999	US_RR>195_COMB
8	2015	-999	-999	US_RR>195_COMB
9	1974	-999	-999	US_RR>177
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9	1990	-999	-999	US_RR>177
9	1991	-999	-999	US_RR>177
9	1992	-999	-999	US_RR>177
9	1993	0.495	0.3	US_RR>177
9	1994	0.6675	0.28	US_RR>177
9	1995	0.8175	0.26	US_RR>177
9	1996	2.6775	0.25	US_RR>177
9	1997	1.065	0.37	US_RR>177
9	1998	0.624	0.25	US_RR>177
9	1999	1.4925	0.28	US_RR>177
9	2000	0.45	0.27	US_RR>177
9	2001	1.1325	0.29	US_RR>177
9	2002	1.443	0.23	US_RR>177
9	2003	0.3525	0.27	US_RR>177
9	2004	0.555	0.27	US_RR>177
9	2005	0.465	0.27	US_RR>177
9	2006	0.3675	0.35	US_RR>177
9	2007	0.2325	0.37	US_RR>177
9	2008	0.285	0.35	US_RR>177
9	2009	0.2025	0.4	US_RR>177
9	2010	0.8446	0.26	US_RR>177
9	2011	0.5418	0.28	US_RR>177
9	2012	0.5256	0.25	US_RR>177
9	2013	0.3713	0.29	US_RR>177
9	2014	0.4352	0.27	US_RR>177
9	2015	0.8175	0.23	US_RR>177
10	1974	-999	-999	JLL_AREA_2_(WEST)
10	1975	-999	-999	JLL_AREA_2_(WEST)
10	1976	0.1287	0.4	JLL_AREA_2_(WEST)
10	1977	0.2937	0.31	JLL_AREA_2_(WEST)
10	1978	0.2409	0.33	JLL_AREA_2_(WEST)
10	1979	0.2706	0.28	JLL_AREA_2_(WEST)
10	1980	0.462	0.28	JLL_AREA_2_(WEST)
10	1981	0.3663	0.26	JLL_AREA_2_(WEST)
10	1982	0.2574	0.27	JLL_AREA_2_(WEST)
10	1983	0.1518	0.34	JLL_AREA_2_(WEST)
10	1984	0.2211	0.29	JLL_AREA_2_(WEST)
10	1985	0.2739	0.27	JLL_AREA_2_(WEST)
10	1986	0.0033	1.55	JLL_AREA_2_(WEST)
10	1987	0.1221	0.33	JLL_AREA_2_(WEST)
10	1988	0.1155	0.37	JLL_AREA_2_(WEST)
10	1989	0.2277	0.3	JLL_AREA_2_(WEST)
10	1990	0.1584	0.32	JLL_AREA_2_(WEST)
10	1991	0.198	0.3	JLL_AREA_2_(WEST)
10	1992	0.3597	0.26	JLL_AREA_2_(WEST)
10	1993	0.3234	0.27	JLL_AREA_2_(WEST)
10	1994	0.297	0.27	JLL_AREA_2_(WEST)
10	1995	0.1947	0.34	JLL_AREA_2_(WEST)
10	1996	0.7392	0.27	JLL_AREA_2_(WEST)
10	1997	0.5412	0.26	JLL_AREA_2_(WEST)
10	1998	0.2508	0.29	JLL_AREA_2_(WEST)
10	1999	0.3762	0.26	JLL_AREA_2_(WEST)
10	2000	0.3729	0.27	JLL_AREA_2_(WEST)
10	2001	0.3036	0.27	JLL_AREA_2_(WEST)
10	2002	0.2574	0.28	JLL_AREA_2_(WEST)
10	2003	0.4059	0.29	JLL_AREA_2_(WEST)
10	2004	0.3663	0.3	JLL_AREA_2_(WEST)
10	2005	0.3267	0.26	JLL_AREA_2_(WEST)
10	2006	0.5049	0.29	JLL_AREA_2_(WEST)
10	2007	0.3267	0.4	JLL_AREA_2_(WEST)
10	2008	0.4488	0.45	JLL_AREA_2_(WEST)
10	2009	0.7722	0.35	JLL_AREA_2_(WEST)
10	2010	-999	-999	JLL_AREA_2_(WEST)
10	2011	-999	-999	JLL_AREA_2_(WEST)
10	2012	-999	-999	JLL_AREA_2_(WEST)

13	1980	-999	-999	LARVAL_ZERO_INFATED
13	1981	1.15	0.81	LARVAL_ZERO_INFATED
13	1982	1.36	1.2	LARVAL_ZERO_INFATED
13	1983	0.9	1.02	LARVAL_ZERO_INFATED
13	1984	0.31	0.32	LARVAL_ZERO_INFATED
13	1985	-999	-999	LARVAL_ZERO_INFATED
13	1986	0.34	0.42	LARVAL_ZERO_INFATED
13	1987	0.31	0.46	LARVAL_ZERO_INFATED
13	1988	1.13	0.32	LARVAL_ZERO_INFATED
13	1989	0.7	0.36	LARVAL_ZERO_INFATED
13	1990	0.34	0.35	LARVAL_ZERO_INFATED
13	1991	0.31	0.57	LARVAL_ZERO_INFATED
13	1992	0.43	0.34	LARVAL_ZERO_INFATED
13	1993	0.47	0.66	LARVAL_ZERO_INFATED
13	1994	0.53	0.34	LARVAL_ZERO_INFATED
13	1995	0.23	0.54	LARVAL_ZERO_INFATED
13	1996	0.78	0.49	LARVAL_ZERO_INFATED
13	1997	0.34	0.38	LARVAL_ZERO_INFATED
13	1998	0.11	0.54	LARVAL_ZERO_INFATED
13	1999	0.46	0.51	LARVAL_ZERO_INFATED
13	2000	0.24	0.51	LARVAL_ZERO_INFATED
13	2001	0.44	0.32	LARVAL_ZERO_INFATED
13	2002	0.24	0.62	LARVAL_ZERO_INFATED
13	2003	0.77	0.39	LARVAL_ZERO_INFATED
13	2004	0.5	0.67	LARVAL_ZERO_INFATED
13	2005	0.18	0.29	LARVAL_ZERO_INFATED
13	2006	0.5	0.35	LARVAL_ZERO_INFATED
13	2007	0.46	0.38	LARVAL_ZERO_INFATED
13	2008	0.32	0.38	LARVAL_ZERO_INFATED
13	2009	0.59	0.32	LARVAL_ZERO_INFATED
13	2010	0.34	0.51	LARVAL_ZERO_INFATED
13	2011	1.04	0.39	LARVAL_ZERO_INFATED
13	2012	0.28	0.47	LARVAL_ZERO_INFATED
13	2013	0.99	0.34	LARVAL_ZERO_INFATED
13	2014	0.26	0.37	LARVAL_ZERO_INFATED
13	2015	0.39	0.31	LARVAL_ZERO_INFATED
14	1974	-999	-999	GOM_PLL_1_6
14	1975	-999	-999	GOM_PLL_1_6
14	1976	-999	-999	GOM_PLL_1_6
14	1977	-999	-999	GOM_PLL_1_6
14	1978	-999	-999	GOM_PLL_1_6
14	1979	-999	-999	GOM_PLL_1_6
14	1980	-999	-999	GOM_PLL_1_6
14	1981	-999	-999	GOM_PLL_1_6
14	1982	-999	-999	GOM_PLL_1_6
14	1983	-999	-999	GOM_PLL_1_6
14	1984	-999	-999	GOM_PLL_1_6
14	1985	-999	-999	GOM_PLL_1_6
14	1986	-999	-999	GOM_PLL_1_6
14	1987	-999	-999	GOM_PLL_1_6
14	1988	-999	-999	GOM_PLL_1_6
14	1989	-999	-999	GOM_PLL_1_6
14	1990	-999	-999	GOM_PLL_1_6
14	1991	-999	-999	GOM_PLL_1_6
14	1992	1.14	0.35	GOM_PLL_1_6
14	1993	0.64	0.36	GOM_PLL_1_6
14	1994	0.47	0.39	GOM_PLL_1_6
14	1995	0.44	0.39	GOM_PLL_1_6
14	1996	0.26	0.4	GOM_PLL_1_6
14	1997	0.46	0.36	GOM_PLL_1_6
14	1998	0.5	0.37	GOM_PLL_1_6
14	1999	0.85	0.33	GOM_PLL_1_6
14	2000	1.24	0.33	GOM_PLL_1_6
14	2001	0.71	0.38	GOM_PLL_1_6
14	2002	0.66	0.39	GOM_PLL_1_6
14	2003	1.19	0.32	GOM_PLL_1_6
14	2004	1.08	0.32	GOM_PLL_1_6
14	2005	0.82	0.34	GOM_PLL_1_6
14	2006	0.58	0.39	GOM_PLL_1_6
14	2007	0.78	0.38	GOM_PLL_1_6
14	2008	1.78	0.33	GOM_PLL_1_6
14	2009	1.46	0.35	GOM_PLL_1_6
14	2010	1.22	0.34	GOM_PLL_1_6
14	2011	1.09	0.48	GOM_PLL_1_6
14	2012	3.39	0.37	GOM_PLL_1_6
14	2013	1.23	0.42	GOM_PLL_1_6
14	2014	1.02	0.44	GOM_PLL_1_6
14	2015	1.02	0.47	GOM_PLL_1_6
15	1974	0.97	0.27	JLL_GOM
15	1975	0.53	0.21	JLL_GOM
15	1976	0.67	0.21	JLL_GOM
15	1977	0.91	0.22	JLL_GOM
15	1978	0.88	0.23	JLL_GOM
15	1979	1.29	0.28	JLL_GOM
15	1980	1.16	0.27	JLL_GOM
15	1981	0.55	0.24	JLL_GOM
15	1982	-999	-999	JLL_GOM
15	1983	-999	-999	JLL_GOM
15	1984	-999	-999	JLL_GOM
15	1985	-999	-999	JLL_GOM
15	1986	-999	-999	JLL_GOM
15	1987	-999	-999	JLL_GOM
15	1988	-999	-999	JLL_GOM

15	1989	.999	.999	JLL_GOM
15	1990	.999	.999	JLL_GOM
15	1991	.999	.999	JLL_GOM
15	1992	.999	.999	JLL_GOM
15	1993	.999	.999	JLL_GOM
15	1994	.999	.999	JLL_GOM
15	1995	.999	.999	JLL_GOM
15	1996	.999	.999	JLL_GOM
15	1997	.999	.999	JLL_GOM
15	1998	.999	.999	JLL_GOM
15	1999	.999	.999	JLL_GOM
15	2000	.999	.999	JLL_GOM
15	2001	.999	.999	JLL_GOM
15	2002	.999	.999	JLL_GOM
15	2003	.999	.999	JLL_GOM
15	2004	.999	.999	JLL_GOM
15	2005	.999	.999	JLL_GOM
15	2006	.999	.999	JLL_GOM
15	2007	.999	.999	JLL_GOM
15	2008	.999	.999	JLL_GOM
15	2009	.999	.999	JLL_GOM
15	2010	.999	.999	JLL_GOM
15	2011	.999	.999	JLL_GOM
15	2012	.999	.999	JLL_GOM
15	2013	.999	.999	JLL_GOM
15	2014	.999	.999	JLL_GOM
15	2015	.999	.999	JLL_GOM
16	1974	0.64	0.21	TAGGING
16	1975	0.52	0.22	TAGGING
16	1976	0.48	0.23	TAGGING
16	1977	0.86	0.2	TAGGING
16	1978	0.62	0.22	TAGGING
16	1979	0.62	0.22	TAGGING
16	1980	0.82	0.2	TAGGING
16	1981	0.9	0.2	TAGGING
16	1982	.999	.999	TAGGING
16	1983	.999	.999	TAGGING
16	1984	.999	.999	TAGGING
16	1985	.999	.999	TAGGING
16	1986	.999	.999	TAGGING
16	1987	.999	.999	TAGGING
16	1988	.999	.999	TAGGING
16	1989	.999	.999	TAGGING
16	1990	.999	.999	TAGGING
16	1991	.999	.999	TAGGING
16	1992	.999	.999	TAGGING
16	1993	.999	.999	TAGGING
16	1994	.999	.999	TAGGING
16	1995	.999	.999	TAGGING
16	1996	.999	.999	TAGGING
16	1997	.999	.999	TAGGING
16	1998	.999	.999	TAGGING
16	1999	.999	.999	TAGGING
16	2000	.999	.999	TAGGING
16	2001	.999	.999	TAGGING
16	2002	.999	.999	TAGGING
16	2003	.999	.999	TAGGING
16	2004	.999	.999	TAGGING
16	2005	.999	.999	TAGGING
16	2006	.999	.999	TAGGING
16	2007	.999	.999	TAGGING
16	2008	.999	.999	TAGGING
16	2009	.999	.999	TAGGING
16	2010	.999	.999	TAGGING
16	2011	.999	.999	TAGGING
16	2012	.999	.999	TAGGING
16	2013	.999	.999	TAGGING
16	2014	.999	.999	TAGGING
16	2015	.999	.999	TAGGING
17	1974	.999	.999	JLL_AREA_2_RECENT
17	1975	.999	.999	JLL_AREA_2_RECENT
17	1976	.999	.999	JLL_AREA_2_RECENT
17	1977	.999	.999	JLL_AREA_2_RECENT
17	1978	.999	.999	JLL_AREA_2_RECENT
17	1979	.999	.999	JLL_AREA_2_RECENT
17	1980	.999	.999	JLL_AREA_2_RECENT
17	1981	.999	.999	JLL_AREA_2_RECENT
17	1982	.999	.999	JLL_AREA_2_RECENT
17	1983	.999	.999	JLL_AREA_2_RECENT
17	1984	.999	.999	JLL_AREA_2_RECENT
17	1985	.999	.999	JLL_AREA_2_RECENT
17	1986	.999	.999	JLL_AREA_2_RECENT
17	1987	.999	.999	JLL_AREA_2_RECENT
17	1988	.999	.999	JLL_AREA_2_RECENT
17	1989	.999	.999	JLL_AREA_2_RECENT
17	1990	.999	.999	JLL_AREA_2_RECENT
17	1991	.999	.999	JLL_AREA_2_RECENT
17	1992	.999	.999	JLL_AREA_2_RECENT
17	1993	.999	.999	JLL_AREA_2_RECENT
17	1994	.999	.999	JLL_AREA_2_RECENT
17	1995	.999	.999	JLL_AREA_2_RECENT
17	1996	.999	.999	JLL_AREA_2_RECENT
17	1997	.999	.999	JLL_AREA_2_RECENT

17	1998	-999	-999	JLL_AREA_2_RECENT
17	1999	-999	-999	JLL_AREA_2_RECENT
17	2000	-999	-999	JLL_AREA_2_RECENT
17	2001	-999	-999	JLL_AREA_2_RECENT
17	2002	-999	-999	JLL_AREA_2_RECENT
17	2003	-999	-999	JLL_AREA_2_RECENT
17	2004	-999	-999	JLL_AREA_2_RECENT
17	2005	-999	-999	JLL_AREA_2_RECENT
17	2006	-999	-999	JLL_AREA_2_RECENT
17	2007	-999	-999	JLL_AREA_2_RECENT
17	2008	-999	-999	JLL_AREA_2_RECENT
17	2009	-999	-999	JLL_AREA_2_RECENT
17	2010	0.198	0.37	JLL_AREA_2_RECENT
17	2011	0.918	0.26	JLL_AREA_2_RECENT
17	2012	1.5748	0.27	JLL_AREA_2_RECENT
17	2013	0.9932	0.26	JLL_AREA_2_RECENT
17	2014	0.4998	0.28	JLL_AREA_2_RECENT
17	2015	0.4818	0.27	JLL_AREA_2_RECENT

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

#INDEX	YEAR	AGE	1 - 16										
1	1974	0	0	0	0	0	0	0	0	0	0	0	0
1	0	0	0	0	0	0	0	0	0	0	0	0	0
1	1975	0	0	0	0	0	0	0	0	0	0	0	0
1	0	0	0	0	0	0	0	0	0	0	0	0	0
1	1976	0	0	0	0	0	0	0	0	0	0	0	0
1	0	0	0	0	0	0	0	0	0	0	0	0	0
1	1977	0	0	0	0	0	0	0	0	0	0	0	0
1	0	0	0	0	0	0	0	0	0	0	0	0	0
1	1978	0	0	0	0	0	0	0	0	0	0	0	0
1	0	0	0	0	0	0	0	0	0	0	0	0	0
1	1979	0	0	0	0	0	0	0	0	0	0	0	0
1	0	0	0	0	0	0	0	0	0	0	0	0	0
1	1980	0	0	0	0	0	0	0	0	0	0	0	0
1	0	0	0	0	0	0	0	0	0	0	0	0	0
1	1981	0	0	0	0	0	0	0	0	0	0	0	0
1	0	0	0	0	0	0	0	0	0	0	0	0	0
1	1982	0	0	0	0	0	0	0	0	0	0	0	0
1	0	0	0	0	0	0	0	0	0	0	0	0	0
1	1983	0	0	0	0	0	0	0	0	0	0	0	0
1	0	0	0	0	0	0	0	0	0	0	0	0	0
1	1984	0	0	0	0	0	0	0	0	0	0	0	0
1	0	0	0	0	532								
1	1985	0	0	0	0	0	0	0	0	0	0	0	0
1	0.8	0	0	0	252.8								
1	1986	0	0	0	0	0	0	0	0	0	0	0	0.8
1	0.8	0.8	0	0	84								
1	1987	0	0	0	0	0	0	0	4	36.8	24	17.6	10.4
1	7.2	4	4	1.6	24.8								
1	1988	0	0	0	0	0	0.8	36	308	200	146.4	86.4	
1	59.2	36	32	16.8	205.6								
1	1989	0	0	0	0	0	0.8	77.6	665.6	431.2	313.6	182.4	
1	118.4	72.8	67.2	34.4	423.2								
1	1990	0	0	0	0	0.8	4.8	118.4	538.4	496.8	152.8	100	
1	66.4	73.6	60	55.2	251.2								
1	1991	0	0	0	0	0	0.8	152.8	387.2	579.2	355.2	131.2	
1	108	96.8	65.6	48.8	210.4								
1	1992	0	0	0	0	0.8	5.6	81.6	206.4	220	290.4	233.6	
1	148	83.2	84.8	57.6	260.8								
1	1993	0	0	0	0	0	0.8	16	79.2	229.6	185.6	152	
1	116.8	79.2	48.8	58.4	395.2								
1	1994	0	0	0	0	0	5.6	41.6	126.4	154.4	215.2	144	
1	96.8	56	42.4	28	241.6								
1	1995	0	0	0	0	0.8	21.6	21.6	51.2	298.4	289.6	179.2	
1	114.4	77.6	68	51.2	510.4								
1	1996	0	0	0	0	0	0.58	22.62	49.3	63.22	141.52	150.22	
1	114.84	88.74	85.26	71.34	335.24								
1	1997	0	0	0	0	0.56	4.76	16.52	62.72	66.08	42	38.36	
1	42.56	35	28.28	22.96	160.72								
1	1998	0	0	0	0	0	1.1	2.5	21.8	53.4	41.3	22.1	
1	18.4	13.7	9.3	5.7	47.2								
1	1999	0	0	0	0	0.8	1.6	31.2	116	230.4	365.6	326.4	
1	174.4	75.2	44.8	28.8	387.2								
1	2000	0	0	0	0	0	1.6	4	25.6	124.8	122.4	116.8	
1	110.4	128	70.4	65.6	661.6								
1	2001	0	0	0	0	0	8	228	244.8	104	228.8	189.6	
1	115.2	103.2	89.6	54.4	446.4								
1	2002	0	0	0	0	0	4	30.4	403.2	373.6	104.8	131.2	
1	132.8	110.4	84.8	86.4	542.4								
1	2003	0	0	0	0	0	0.8	8.8	274.4	631.2	258.4	53.6	
1	31.2	41.6	60	38.4	414.4								
1	2004	0	0	0	0	0	4	26.4	58.4	208.8	255.2	152	
1	91.2	52.8	68.8	73.6	564								
1	2005	0	0	0	0	8.8	28	24.8	99.2	122.4	215.2	248	
1	188.8	108	87.2	60.8	606.4								
1	2006	0	0	0	0	4	16.8	110.4	132	223.2	269.6	288.8	
1	230.4	161.6	112.8	77.6	664.8								
1	2007	0	0	0	0	0	20	47.2	122.4	140	121.6	100.8	
1	120	98.4	65.6	59.2	468.8								
1	2008	0	0	0	0	0	24.8	58.4	149.6	170.4	147.2	123.2	
1	147.2	120	80.8	73.6	568								

1	2009	0	0	0	0	0.8	70.4	54.4	149.6	167.2	113.6	127.2
1	140.8	151.2	119.2	104.8	368.8							
1	2010	0	0	0	0	0	4.8	63.2	44.8	114.4	119.2	102.4
1	109.6	130.4	98.4	84.8	414.4							
1	2011	0	0	0	0	0	4.4	75.68	180.4	111.76	130.24	126.72
1	115.28	89.76	102.96	77.44	359.92							
1	2012	0	0	0	0	0	5.16	30.1	159.1	243.38	158.24	135.88
1	104.06	125.56	127.28	105.78	364.64							
1	2013	0	0	0	0	0	0.89	22.25	49.84	77.43	178	204.7
1	131.72	98.79	89	85.44	476.15							
1	2014	0	0	0	0	0.44	3.52	7.04	27.28	58.96	77.44	113.08
1	107.8	59.84	51.04	32.56	162.36							
1	2015	0	0	0	0	0	1.32	9.24	20.46	40.26	107.58	129.36
2	129.36	114.84	111.54	84.48	369.6							
2	1974	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0							
2	1975	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0							
2	1976	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0							
2	1977	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0							
2	1978	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0							
2	1979	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0							
2	1980	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0							
2	1981	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0							
2	1982	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0							
2	1983	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0							
2	1984	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0							
2	1985	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0							
2	1986	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0							
2	1987	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0							
2	1988	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0							
2	1989	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0							
2	1990	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0							
2	1991	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0							
2	1992	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0							
2	1993	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0							
2	1994	0	0	0	0	0	4.8	40	126.4	153.6	215.2	144.8
100	66.4	50.4	39.2	388								
2	1995	0	0	0	0	0.8	25.6	22.4	53.6	298.4	289.6	184
127.2	78.4	79.2	64	627.2								
2	1996	0	0	0	0	0.58	1.16	26.1	52.78	59.74	143.84	158.34
116	88.16	60.9	64.96	351.48								
2	1997	0	0	0	0.28	1.12	21.84	23.24	66.64	68.04	42.84	38.92
42	35.56	30.52	24.92	184.8								
2	1998	0	0	0	0	0	1.1	2.5	22.1	53.6	41.9	23.6
20.6	15	11.9	6.9	54.2								
2	1999	0	0	0	0	0.8	1.6	31.2	117.6	236	379.2	342.4
179.2	90.4	54.4	40	461.6								
2	2000	0	0	50.4	0	0	52.8	4	25.6	136	122.4	116
112	125.6	69.6	74.4	528.8								
2	2001	0	0	0	0	0	14.4	231.2	248.8	109.6	228.8	191.2
118.4	104	86.4	62.4	374.4								
2	2002	0	0	0	9.6	41.6	121.6	481.6	384	103.2	131.2	
138.4	115.2	88	87.2	448								
2	2003	0	0	0	0	39.2	47.2	313.6	638.4	271.2	68.8	
56	66.4	95.2	56	449.6								
2	2004	0	0	0.8	4.8	25.6	112	108	231.2	292.8	166.4	
100	62.4	74.4	92	602.4								
2	2005	0	0	2.4	19.2	66.4	39.2	112	132.8	220	268.8	
199.2	123.2	94.4	61.6	568								
2	2006	0	0	0	13.6	82.4	185.6	155.2	233.6	288	303.2	
234.4	168.8	117.6	84.8	654.4								
2	2007	0	0	0.8	8.8	116.8	136	163.2	149.6	128	109.6	
130.4	112	76.8	72	464.8								
2	2008	0	0	0.8	4.8	74.4	104	170.4	175.2	151.2	125.6	
148.8	126.4	88.8	97.6	585.6								
2	2009	0	0	0	5.6	244	88	201.6	200.8	144.8	147.2	
153.6	159.2	123.2	104.8	387.2								
2	2010	0	0	0	0.8	23.2	140	96	157.6	164.8	170.4	
141.6	180.8	116.8	92	432								
2	2011	0	0	0	18.48	71.28	155.76	299.2	161.92	162.8	154	
147.84	110	117.92	88.88	425.92								
2	2012	0	0	0	0	92.88	108.36	231.34	315.62	194.36	148.78	
114.38	125.56	123.84	99.76	345.72								

2	2013	0	0	0	0	5.34	44.5	101.46	108.58	239.41	257.21
2	140.62	106.8	91.67	91.67	442.33						
2	2014	0	0	0	0	1.32	11.88	24.2	51.04	87.56	95.92
2	116.6	64.24	53.24	33	151.8						127.16
2	2015	0	0	0	0	0.66	4.62	36.3	41.58	60.72	135.96
2	146.52	126.06	117.48	83.82	343.2						155.76
3	1974	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0						
3	1975	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0						
3	1976	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0						
3	1977	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0						
3	1978	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0						
3	1979	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0						
3	1980	635.25	2716.5	1155.75	224.25	117	6	0	0	0	0
0	0	0	0	0	0						
3	1981	2064	246	1146	75.75	24	4.5	0	0	0	0
0	0	0	0	0	0						
3	1982	2166.75	1422.75	1639.5	354	57.75	0	0	0	0	0
0	0	0	0	0	0						
3	1983	1312.5	1360.5	861	388.5	42	3.75	0	0	0	0
0	0	0	0	0	0						
3	1984	378.75	3400.5	1773.75	753	222.75	16.5	0	0	0	0
0	0	0	0	0	0						
3	1985	351.75	3148.5	4490.25	1212	90.75	0	0	0	0	0
0	0	0	0	0	0						
3	1986	430.5	3923.25	5516.25	655.5	359.25	0	0	0	0	0
0	0	0	0	0	0						
3	1987	1036.5	8976.75	7023.75	2200.5	1460.25	0	0	0	0	0
0	0	0	0	0	0						
3	1988	4173.75	3490.5	9537	1340.25	129.75	0	0	0	0	0
0	0	0	0	0	0						
3	1989	497.25	3837	6546	1092	2167.5	2.25	0	0	0	0
0	0	0	0	0	0						
3	1990	781.5	1486.5	9585.75	3123.75	658.5	0	0	0	0	0
0	0	0	0	0	0						
3	1991	677.25	3527.25	14007	1908.75	811.5	0.75	0	0	0	0
0	0	0	0	0	0						
3	1992	30	1418.25	4339.5	260.25	196.5	0	0	0	0	0
0	0	0	0	0	0						
3	1993	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0						
3	1994	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0						
3	1995	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0						
3	1996	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0						
3	1997	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0						
3	1998	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0						
3	1999	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0						
3	2000	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0						
3	2001	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0						
3	2002	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0						
3	2003	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0						
3	2004	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0						
3	2005	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0						
3	2006	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0						
3	2007	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0						
3	2008	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0						
3	2009	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0						
3	2010	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0						
3	2011	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0						
3	2012	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0						
3	2013	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0						
3	2014	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0						
3	2015	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0						
4	1974	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0						

4	1975	0	0	0	0	0	0	0	0	0	0	0
4	1976	0	0	0	0	0	0	0	0	0	0	0
4	1977	0	0	0	0	0	0	0	0	0	0	0
4	1978	0	0	0	0	0	0	0	0	0	0	0
4	1979	0	0	0	0	0	0	0	0	0	0	0
4	1980	0	0	0	0	0	0	0	0	0	0	0
4	1981	0	0	0	0	0	0	0	0	0	0	0
4	1982	0	0	0	0	0	0	0	0	0	0	0
4	1983	0	0	0	0	0	0	0	0	0	0	0
4	1984	0	0	0	0	0	0	0	0	0	0	0
4	1985	0	0	0	0	0	0	0	0	0	0	0
4	1986	0	0	0	0	0	0	0	0	0	0	0
4	1987	0	0	0	0	0	0	0	0	0	0	0
4	1988	0	0	0	0	0	0	0	0	0	0	0
4	1989	0	0	0	0	0	0	0	0	0	0	0
4	1990	0	0	0	0	0	0	0	0	0	0	0
4	1991	0	0	0	0	0	0	0	0	0	0	0
4	1992	0	0	0	0	0	0	0	0	0	0	0
4	1993	0	399	929.25	3109.5	0	0	0	0	0	0	0
4	1994	0	228	509.25	889.5	0	0	0	0	0	0	0
4	1995	0	295.5	1759.5	2152.5	0	0	0	0	0	0	0
4	1996	0	2808	5596.5	1063.5	0	0	0	0	0	0	0
4	1997	0	210.75	3313.5	2691.75	0	0	0	0	0	0	0
4	1998	0	152.8	1040.4	1079.2	0	0	0	0	0	0	0
4	1999	0	257.25	633	1202.25	0	0	0	0	0	0	0
4	2000	0	96.75	466.5	186.75	0	0	0	0	0	0	0
4	2001	0	75	717.75	1957.5	0	0	0	0	0	0	0
4	2002	0	2960.1	4431.96	1694.94	0	0	0	0	0	0	0
4	2003	0	681.75	2291.25	1875	0	0	0	0	0	0	0
4	2004	0	1023.75	3654.75	3583.5	0	0	0	0	0	0	0
4	2005	0	3521.25	1926.75	1151.25	0	0	0	0	0	0	0
4	2006	0	155.25	820.5	321.75	0	0	0	0	0	0	0
4	2007	0	51	330	4566	0	0	0	0	0	0	0
4	2008	0	134.25	922.5	1297.5	0	0	0	0	0	0	0
4	2009	0	42.75	735.75	1078.5	0	0	0	0	0	0	0
4	2010	0	338.66	726.52	598.6	0	0	0	0	0	0	0
4	2011	0	60.2	424.84	1683.02	0	0	0	0	0	0	0
4	2012	0	73.73	727.08	1306.7	0	0	0	0	0	0	0
4	2013	0	94.01	232.26	568.8	0	0	0	0	0	0	0
4	2014	0	337.28	469.88	345.44	0	0	0	0	0	0	0
4	2015	0	1.5	477	648.75	0	0	0	0	0	0	0
5	1974	0	0	0	0	0	0	0	0	0	0	0
5	1975	0	0	0	0	0	0	0	0	0	0	0
5	1976	0	0	0	0	0	0	0	0	0	0	0
5	1977	0	0	0	0	0	0	0	0	0	0	0
5	1978	0	0	0	0	0	0	0	0	0	0	0

5	1979	0	0	0	0	0	0	0	0	0	0	0
5	0	0	0	0	0	0	0	0	0	0	0	0
5	1980	0	0	0	0	0	0	0	0	0	0	0
5	0	0	0	0	0	0	0	0	0	0	0	0
5	1981	0	0	0	0	0	0	0	0	0	0	0
5	0	0	0	0	0	0	0	0	0	0	0	0
5	1982	0	0	0	0	0	0	0	0	0	0	0
5	0	0	0	0	0	0	0	0	0	0	0	0
5	1983	0	0	0	0	0	0	0	0	0	0	0
5	0	0	0	0	0	0	0	0	0	0	0	0
5	1984	0	0	0	0	0	0	0	0	0	0	0
5	0	0	0	0	0	0	0	0	0	0	0	0
5	1985	0	0	0	0	0	0	0	0	0	0	0
5	0	0	0	0	0	0	0	0	0	0	0	0
5	1986	0	0	0	0	0	0	0	0	0	0	0
5	0	0	0	0	0	0	0	0	0	0	0	0
5	1987	0	0	0	0	0	0	0	0	0	0	0
5	0	0	0	0	0	0	0	0	0	0	0	0
5	1988	0	0	0	0	0	0	0	0	0	0	0
5	0	0	0	0	0	0	0	0	0	0	0	0
5	1989	0	0	0	0	0	0	0	0	0	0	0
5	0	0	0	0	0	0	0	0	0	0	0	0
5	1990	0	0	0	0	0	0	0	0	0	0	0
5	0	0	0	0	0	0	0	0	0	0	0	0
5	1991	0	0	0	0	0	0	0	0	0	0	0
5	0	0	0	0	0	0	0	0	0	0	0	0
5	1992	0	0	0	0	0	0	0	0	0	0	0
5	0	0	0	0	0	0	0	0	0	0	0	0
5	1993	0	0	0	801	1104	0	0	0	0	0	0
5	0	0	0	0	0	0	0	0	0	0	0	0
5	1994	0	0	0	236.25	582	34.5	0	0	0	0	0
5	0	0	0	0	0	0	0	0	0	0	0	0
5	1995	0	0	0	951	1962	255.75	0	0	0	0	0
5	0	0	0	0	0	0	0	0	0	0	0	0
5	1996	0	0	0	1686	2211.75	410.25	0	0	0	0	0
5	0	0	0	0	0	0	0	0	0	0	0	0
5	1997	0	0	0	47.25	617.25	0	0	0	0	0	0
5	0	0	0	0	0	0	0	0	0	0	0	0
5	1998	0	0	0	475.2	365.6	0	0	0	0	0	0
5	0	0	0	0	0	0	0	0	0	0	0	0
5	1999	0	0	0	311.25	513	96.75	0	0	0	0	0
5	0	0	0	0	0	0	0	0	0	0	0	0
5	2000	0	0	0	107.25	345	36.75	0	0	0	0	0
5	0	0	0	0	0	0	0	0	0	0	0	0
5	2001	0	0	0	1808.25	1843.5	61.5	0	0	0	0	0
5	0	0	0	0	0	0	0	0	0	0	0	0
5	2002	0	0	0	1620.06	5403.06	605.28	0	0	0	0	0
5	0	0	0	0	0	0	0	0	0	0	0	0
5	2003	0	0	0	687	1062	33.75	0	0	0	0	0
5	0	0	0	0	0	0	0	0	0	0	0	0
5	2004	0	0	0	732.75	1878.75	0	0	0	0	0	0
5	0	0	0	0	0	0	0	0	0	0	0	0
5	2005	0	0	0	876.75	491.25	45	0	0	0	0	0
5	0	0	0	0	0	0	0	0	0	0	0	0
5	2006	0	0	0	399	1948.5	98.25	0	0	0	0	0
5	0	0	0	0	0	0	0	0	0	0	0	0
5	2007	0	0	0	3539.25	1480.5	193.5	0	0	0	0	0
5	0	0	0	0	0	0	0	0	0	0	0	0
5	2008	0	0	0	258.75	4339.5	135	0	0	0	0	0
5	0	0	0	0	0	0	0	0	0	0	0	0
5	2009	0	0	0	330.75	912	72.75	0	0	0	0	0
5	0	0	0	0	0	0	0	0	0	0	0	0
5	2010	0	0	0	597.78	1049.6	11.48	0	0	0	0	0
5	0	0	0	0	0	0	0	0	0	0	0	0
5	2011	0	0	0	437.74	735.3	4.3	0	0	0	0	0
5	0	0	0	0	0	0	0	0	0	0	0	0
5	2012	0	0	0	230.68	620.5	13.87	0	0	0	0	0
5	0	0	0	0	0	0	0	0	0	0	0	0
5	2013	0	0	0	413.96	433.71	0	0	0	0	0	0
5	0	0	0	0	0	0	0	0	0	0	0	0
5	2014	0	0	0	271.32	327.76	0	0	0	0	0	0
5	0	0	0	0	0	0	0	0	0	0	0	0
5	2015	0	0	0	46.5	312	63.75	0	0	0	0	0
5	0	0	0	0	0	0	0	0	0	0	0	0
6	1974	0	0	0	0	0	0	0	0	0	0	0
6	0	0	0	0	0	0	0	0	0	0	0	0
6	1975	0	0	0	0	0	0	0	0	0	0	0
6	0	0	0	0	0	0	0	0	0	0	0	0
6	1976	0	0	0	0	0	0	0	0	0	0	0
6	0	0	0	0	0	0	0	0	0	0	0	0
6	1977	0	0	0	0	0	0	0	0	0	0	0
6	0	0	0	0	0	0	0	0	0	0	0	0
6	1978	0	0	0	0	0	0	0	0	0	0	0
6	0	0	0	0	0	0	0	0	0	0	0	0
6	1979	0	0	0	0	0	0	0	0	0	0	0
6	0	0	0	0	0	0	0	0	0	0	0	0
6	1980	0	0	0	0	0	0	0	0	0	0	0
6	0	0	0	0	0	0	0	0	0	0	0	0
6	1981	0	0	0	0	0	0	0	0	0	0	0
6	0	0	0	0	0	0	0	0	0	0	0	0
6	1982	0	0	0	0	0	0	0	0	0	0	0
6	0	0	0	0	0	0	0	0	0	0	0	0

6	1983	0	0	0	0	0	0	0	0	0	0
6	0	0	0	0	0	0	0	0	0	0	0
6	1984	0	0	0	0	0	0	0	0	0	0
6	0	0	0	0	0	0	0	0	0	0	0
6	1985	0	0	0	0	0	0	0	0	0	0
6	0	0	0	0	0	0	0	0	0	0	0
6	1986	0	0	0	0	0	0	0	0	0	0
6	0	0	0	0	0	0	0	0	0	0	0
6	1987	0	0	0	0	0	0	0	0	0	0
6	0	0	0	0	0	0	0	0	0	0	0
6	1988	0	0	0	0	0	0	0	0	0	0
6	0	0	0	0	0	0	0	0	0	0	0
6	1989	0	0	0	0	0	0	0	0	0	0
6	0	0	0	0	0	0	0	0	0	0	0
6	1990	0	0	0	0	0	0	0	0	0	0
6	0	0	0	0	0	0	0	0	0	0	0
6	1991	0	0	0	0	0	0	0	0	0	0
6	0	0	0	0	0	0	0	0	0	0	0
6	1992	0	0	0	0	0	0	0	0	0	0
6	0	0	0	0	0	0	0	0	0	0	0
6	1993	0	0	0	0	0	0	0	0	0	0
6	0	0	0	0	0	0	0	0	0	0	0
6	1994	0	0	0	0	0	0	0	0	0	0
6	0	0	0	0	0	0	0	0	0	0	0
6	1995	0	0	0	0	0	0	0	0	0	0
6	0	0	0	0	0	0	0	0	0	0	0
6	1996	0	0	0	0	0	0	0	0	0	0
6	0	0	0	0	0	0	0	0	0	0	0
6	1997	0	0	0	0	0	0	0	0	0	0
6	0	0	0	0	0	0	0	0	0	0	0
6	1998	0	0	0	0	0	0	0	0	0	0
6	0	0	0	0	0	0	0	0	0	0	0
6	1999	0	0	0	0	0	0	0	0	0	0
6	0	0	0	0	0	0	0	0	0	0	0
6	2000	0	0	0	0	0	0	0	0	0	0
6	0	0	0	0	0	0	0	0	0	0	0
6	2001	0	0	0	0	0	0	0	0	0	0
6	0	0	0	0	0	0	0	0	0	0	0
6	2002	0	0	0	0	0	0	0	0	0	0
6	0	0	0	0	0	0	0	0	0	0	0
6	2003	0	0	0	0	0	0	0	0	0	0
6	0	0	0	0	0	0	0	0	0	0	0
6	2004	0	0	0	0	0	0	0	0	0	0
6	0	0	0	0	0	0	0	0	0	0	0
6	2005	0	0	0	0	0	0	0	0	0	0
6	0	0	0	0	0	0	0	0	0	0	0
6	2006	0	0	0	0	0	0	0	0	0	0
6	0	0	0	0	0	0	0	0	0	0	0
6	2007	0	0	0	0	0	0	0	0	0	0
6	0	0	0	0	0	0	0	0	0	0	0
6	2008	0	0	0	0	0	0	0	0	0	0
6	0	0	0	0	0	0	0	0	0	0	0
6	2009	0	0	0	0	0	0	0	0	0	0
6	0	0	0	0	0	0	0	0	0	0	0
6	2010	0	0	0	0	0	0	0	0	0	0
6	0	0	0	0	0	0	0	0	0	0	0
6	2011	0	0	0	0	0	0	0	0	0	0
6	0	0	0	0	0	0	0	0	0	0	0
6	2012	0	0	0	0	0	0	0	0	0	0
6	0	0	0	0	0	0	0	0	0	0	0
6	2013	0	0	0	0	0	0	0	0	0	0
6	0	0	0	0	0	0	0	0	0	0	0
6	2014	0	0	0	0	0	0	0	0	0	0
6	0	0	0	0	0	0	0	0	0	0	0
6	2015	0	0	0	0	0	0	0	0	0	0
6	0	0	0	0	0	0	0	0	0	0	0
7	1974	0	0	0	0	0	0	0	0	0	0
7	0	0	0	0	0	0	0	0	0	0	0
7	1975	0	0	0	0	0	0	0	0	0	0
7	0	0	0	0	0	0	0	0	0	0	0
7	1976	0	0	0	0	0	0	0	0	0	0
7	0	0	0	0	0	0	0	0	0	0	0
7	1977	0	0	0	0	0	0	0	0	0	0
7	0	0	0	0	0	0	0	0	0	0	0
7	1978	0	0	0	0	0	0	0	0	0	0
7	0	0	0	0	0	0	0	0	0	0	0
7	1979	0	0	0	0	0	0	0	0	0	0
7	0	0	0	0	0	0	0	0	0	0	0
7	1980	0	0	0	0	0	0	0	0	0	0
7	0	0	0	0	0	0	0	0	0	0	0
7	1981	0	0	0	0	0	0	0	0	0	0
7	0	0	0	0	0	0	0	0	0	0	0
7	1982	0	0	0	0	0	0	0	0	0	0
7	0	0	0	0	0	0	0	0	0	0	0
7	1983	0	0	0	0	0	0	0	7.5	89.25	96
7	105.75	144.75	87.75	59.25	266.25						123
7	1984	0	0	0	0	0	0	0	0	63	107.25
7	141.75	126.75	105.75	82.5	129						135
7	1985	0	0	0	0	0	0	0	0	51	75.75
7	121.5	129	91.5	65.25	134.25						90
7	1986	0	0	0	0	0	0	0	0	35.25	37.5
	38.25	46.5	43.5	27	72						45.75

7	1987	0	0	0	0	0	0	0	49.5	51	36
7	48	30	39.75	30	92.25	0	0	0	57	54	29.25
7	1988	0	0	0	0	0	0	0	54	48	48.75
7	38.25	28.5	46.5	32.25	105	0	0	0	0	0	0
7	1989	0	0	0	0	0	0	0	54	48	48.75
7	35.25	28.5	45	25.5	122.25	0	0	0	0	0	0
7	1990	0	0	0	0	0	0	0	98.25	42	51
7	39.75	39.75	78	55.5	192	0	0	0	0	0	0
7	1991	0	0	0	0	0	0	0	60	80.25	93.75
7	69.75	50.25	74.25	49.5	122.25	0	0	0	0	0	0
7	1992	0	0	0	0	0	0	0	38.25	57.75	78
7	80.25	36.75	56.25	38.25	133.5	0	0	0	0	0	0
7	1993	0	0	0	0	0	0	0	0	0	0
7	0	0	0	0	0	0	0	0	0	0	0
7	1994	0	0	0	0	0	0	0	0	0	0
7	0	0	0	0	0	0	0	0	0	0	0
7	1995	0	0	0	0	0	0	0	0	0	0
7	0	0	0	0	0	0	0	0	0	0	0
7	1996	0	0	0	0	0	0	0	0	0	0
7	0	0	0	0	0	0	0	0	0	0	0
7	1997	0	0	0	0	0	0	0	0	0	0
7	0	0	0	0	0	0	0	0	0	0	0
7	1998	0	0	0	0	0	0	0	0	0	0
7	0	0	0	0	0	0	0	0	0	0	0
7	1999	0	0	0	0	0	0	0	0	0	0
7	0	0	0	0	0	0	0	0	0	0	0
7	2000	0	0	0	0	0	0	0	0	0	0
7	0	0	0	0	0	0	0	0	0	0	0
7	2001	0	0	0	0	0	0	0	0	0	0
7	0	0	0	0	0	0	0	0	0	0	0
7	2002	0	0	0	0	0	0	0	0	0	0
7	0	0	0	0	0	0	0	0	0	0	0
7	2003	0	0	0	0	0	0	0	0	0	0
7	0	0	0	0	0	0	0	0	0	0	0
7	2004	0	0	0	0	0	0	0	0	0	0
7	0	0	0	0	0	0	0	0	0	0	0
7	2005	0	0	0	0	0	0	0	0	0	0
7	0	0	0	0	0	0	0	0	0	0	0
7	2006	0	0	0	0	0	0	0	0	0	0
7	0	0	0	0	0	0	0	0	0	0	0
7	2007	0	0	0	0	0	0	0	0	0	0
7	0	0	0	0	0	0	0	0	0	0	0
7	2008	0	0	0	0	0	0	0	0	0	0
7	0	0	0	0	0	0	0	0	0	0	0
7	2009	0	0	0	0	0	0	0	0	0	0
7	0	0	0	0	0	0	0	0	0	0	0
7	2010	0	0	0	0	0	0	0	0	0	0
7	0	0	0	0	0	0	0	0	0	0	0
7	2011	0	0	0	0	0	0	0	0	0	0
7	0	0	0	0	0	0	0	0	0	0	0
7	2012	0	0	0	0	0	0	0	0	0	0
7	0	0	0	0	0	0	0	0	0	0	0
7	2013	0	0	0	0	0	0	0	0	0	0
7	0	0	0	0	0	0	0	0	0	0	0
7	2014	0	0	0	0	0	0	0	0	0	0
7	0	0	0	0	0	0	0	0	0	0	0
7	2015	0	0	0	0	0	0	0	0	0	0
8	0	0	0	0	0	0	0	0	0	0	0
8	1974	0	0	0	0	0	0	0	0	0	0
8	0	0	0	0	0	0	0	0	0	0	0
8	1975	0	0	0	0	0	0	0	0	0	0
8	0	0	0	0	0	0	0	0	0	0	0
8	1976	0	0	0	0	0	0	0	0	0	0
8	0	0	0	0	0	0	0	0	0	0	0
8	1977	0	0	0	0	0	0	0	0	0	0
8	0	0	0	0	0	0	0	0	0	0	0
8	1978	0	0	0	0	0	0	0	0	0	0
8	0	0	0	0	0	0	0	0	0	0	0
8	1979	0	0	0	0	0	0	0	0	0	0
8	0	0	0	0	0	0	0	0	0	0	0
8	1980	0	0	0	0	0	0	0	0	0	0
8	0	0	0	0	0	0	0	0	0	0	0
8	1981	0	0	0	0	0	0	0	0	0	0
8	0	0	0	0	0	0	0	0	0	0	0
8	1982	0	0	0	0	0	0	0	0	0	0
8	0	0	0	0	0	0	0	0	0	0	0
8	1983	0	0	0	0	0	0	0	0	0	0
8	0	0	0	0	0	0	0	0	0	0	0
8	1984	0	0	0	0	0	0	0	0	0	0
8	0	0	0	0	0	0	0	0	0	0	0
8	1985	0	0	0	0	0	0	0	0	0	0
8	0	0	0	0	0	0	0	0	0	0	0
8	1986	0	0	0	0	0	0	0	0	0	0
8	0	0	0	0	0	0	0	0	0	0	0
8	1987	0	0	0	0	0	0	0	0	0	0
8	0	0	0	0	0	0	0	0	0	0	0
8	1988	0	0	0	0	0	0	0	0	0	0
8	0	0	0	0	0	0	0	0	0	0	0
8	1989	0	0	0	0	0	0	0	0	0	0
8	0	0	0	0	0	0	0	0	0	0	0
8	1990	0	0	0	0	0	0	0	0	0	0

8	1991	0	0	0	0	0	0	0	0	0	0
8	1992	0	0	0	0	0	0	0	0	0	0
8	1993	0	0	0	0	0	0	0	0	0	0
8	1994	0	0	0	0	0	0	0	0	0	0
8	1995	0	0	0	0	0	0	0	0	0	0
8	1996	0	0	0	0	0	0	0	0	0	0
8	1997	0	0	0	0	0	0	0	0	0	0
8	1998	0	0	0	0	0	0	0	0	0	0
8	1999	0	0	0	0	0	0	0	0	0	0
8	2000	0	0	0	0	0	0	0	0	0	0
8	2001	0	0	0	0	0	0	0	0	0	0
8	2002	0	0	0	0	0	0	0	0	0	0
8	2003	0	0	0	0	0	0	0	0	0	0
8	2004	0	0	0	0	0	0	0	0	0	0
8	2005	0	0	0	0	0	0	0	0	0	0
8	2006	0	0	0	0	0	0	0	0	0	0
8	2007	0	0	0	0	0	0	0	0	0	0
8	2008	0	0	0	0	0	0	0	0	0	0
8	2009	0	0	0	0	0	0	0	0	0	0
8	2010	0	0	0	0	0	0	0	0	0	0
8	2011	0	0	0	0	0	0	0	0	0	0
8	2012	0	0	0	0	0	0	0	0	0	0
8	2013	0	0	0	0	0	0	0	0	0	0
8	2014	0	0	0	0	0	0	0	0	0	0
8	2015	0	0	0	0	0	0	0	0	0	0
9	1974	0	0	0	0	0	0	0	0	0	0
9	1975	0	0	0	0	0	0	0	0	0	0
9	1976	0	0	0	0	0	0	0	0	0	0
9	1977	0	0	0	0	0	0	0	0	0	0
9	1978	0	0	0	0	0	0	0	0	0	0
9	1979	0	0	0	0	0	0	0	0	0	0
9	1980	0	0	0	0	0	0	0	0	0	0
9	1981	0	0	0	0	0	0	0	0	0	0
9	1982	0	0	0	0	0	0	0	0	0	0
9	1983	0	0	0	0	0	0	0	0	0	0
9	1984	0	0	0	0	0	0	0	0	0	0
9	1985	0	0	0	0	0	0	0	0	0	0
9	1986	0	0	0	0	0	0	0	0	0	0
9	1987	0	0	0	0	0	0	0	0	0	0
9	1988	0	0	0	0	0	0	0	0	0	0
9	1989	0	0	0	0	0	0	0	0	0	0
9	1990	0	0	0	0	0	0	0	0	0	0
9	1991	0	0	0	0	0	0	0	0	0	0
9	1992	0	0	0	0	0	0	0	0	0	0
9	1993	0	0	0	0	0	0	2.25	168.75	243.75	151.5
9	1994	70.5	44.25	89.25	33	179.25			583.5	226.5	144
9	100.5	57	63	23.25	120.75						156.75

9	1995	0	0	0	0	0	0	235.5	373.5	243	152.25
9	118.5	108.75	126	66	262.5						
9	1996	0	0	0	0	0	0	33.75	644.25	142.5	150
9	101.25	63.75	85.5	53.25	132.75						159.75
9	1997	0	0	0	0	0	0	21	711.75	447	191.25
9	231	151.5	198.75	76.5	231						218.25
9	1998	0	0	0	0	0	0	7.6	461.2	137.6	133.2
9	90.8	110	78.4	39.2	114.8						77.2
9	1999	0	0	0	0	0	0	3.75	440.25	273	453
9	213.75	144	187.5	105	190.5						350.25
9	2000	0	0	0	0	0	0	0	114	253.5	343.5
9	270.75	203.25	135	81	132.75						336.75
9	2001	0	0	0	0	0	0	26.25	284.25	159	464.25
9	481.5	341.25	279.75	128.25	265.5						450
9	2002	0	0	0	0	0	0	12.48	493.74	144.3	301.08
9	404.04	419.64	389.22	154.44	244.14						298.74
9	2003	0	0	0	0	0	0	13.5	239.25	162	156.75
9	203.25	239.25	247.5	92.25	174						107.25
9	2004	0	0	0	0	0	0	9	110.25	84.75	132
9	49.5	84	63.75	27.75	111.75						63.75
9	2005	0	0	0	0	0	0	2.25	73.5	85.5	83.25
9	58.5	48.75	25.5	24.75	88.5						84
9	2006	0	0	0	0	0	0	9.75	45.75	18.75	31.5
9	28.5	15.75	33.75	19.5	81.75						32.25
9	2007	0	0	0	0	0	0	0.75	72	24.75	39.75
9	22.5	9	21.75	11.25	54.75						28.5
9	2008	0	0	0	0	0	0	56.25	82.5	30.75	21.75
9	20.25	18.75	18	14.25	64.5						13.5
9	2009	0	0	0	0	0	0	2.25	111.75	80.25	73.5
9	36.75	27	49.5	45.75	239.25						32.25
9	2010	0	0	0	0	0	0	98.4	569.08	303.4	318.98
9	94.3	88.56	105.78	68.06	138.58						127.1
9	2011	0	0	0	0	0	0	39.56	611.46	270.9	159.1
9	142.76	81.7	49.88	51.6	153.94						178.88
9	2012	0	0	0	0	0	0	14.6	277.4	412.45	214.62
9	91.98	46.72	34.31	24.82	89.79						90.52
9	2013	0	0	0	0	0	0	2.37	138.25	56.88	85.32
9	31.6	25.28	33.18	15.8	58.46						63.99
9	2014	0	0	0	0	0	0	6.12	93.16	221.68	157.08
9	114.24	61.88	51	25.84	107.44						108.8
9	2015	0	0	0	0	0	0	56.25	277.5	161.25	323.25
9	190.5	136.5	111.75	48	160.5						247.5
10	1974	0	0	0	0	0	0	0	0	0	0
10	0	0	0	0	0						
10	1975	0	0	0	0	0	0	0	0	0	0
10	0	0	0	0	0						
10	1976	3.96	14.52	83.49	141.9	28.71	74.58	32.01	59.07	112.86	1.98
10	3.3	5.28	6.93	3.3	9.57						9.24
10	1977	0	0	38.61	56.1	115.17	18.48	17.49	11.88	15.51	20.13
10	3.96	22.44	6.93	2.64	15.18						6.27
10	1978	0	6.27	14.19	20.13	37.29	124.41	68.31	65.67	55.77	50.16
10	4.62	12.87	2.31	6.27	10.23						12.54
10	1979	0	21.45	30.69	198.99	103.95	207.24	440.88	196.35	73.26	60.72
10	2.64	17.49	12.21	7.92	12.87						10.89
10	1980	0	20.79	7.92	91.08	311.85	257.4	720.06	566.28	292.38	101.97
10	54.12	23.76	21.12	14.85	19.8						81.84
10	1981	34.32	74.25	351.45	41.58	474.21	547.8	307.23	266.31	213.84	107.58
10	43.56	14.85	10.56	8.58	43.56						73.59
10	1982	0	1.32	13.2	38.61	41.25	72.6	99.33	38.61	39.93	29.7
10	14.85	5.28	4.29	6.6	2.97						21.12
10	1983	7.92	4.29	12.87	31.35	93.06	48.84	91.08	111.21	76.56	25.74
10	21.12	14.85	6.6	5.61	7.26						42.24
10	1984	1.98	2.31	18.48	31.02	193.38	317.79	156.75	39.27	57.09	26.07
10	25.41	33.66	12.21	7.59	18.48						19.8
10	1985	0.33	2.64	73.59	180.18	123.75	123.75	63.03	32.34	24.75	11.22
10	13.2	1.65	0.66	0	1.32						5.61
10	1986	1.65	1.32	0	10.23	16.83	68.31	63.69	83.82	68.31	30.36
10	13.2	11.22	9.9	1.98	13.53						25.08
10	1987	0	0.99	11.88	53.13	113.19	130.35	75.57	62.04	33	22.11
10	9.24	11.22	5.28	0.66	10.23						14.52
10	1988	0	6.6	55.77	127.05	260.37	187.11	228.03	115.83	67.98	26.4
10	12.21	15.51	20.79	7.92	64.35						14.85
10	1989	0	0.33	7.92	71.61	270.6	314.16	426.36	287.1	85.8	32.34
10	17.16	23.43	18.48	14.85	101.97						26.07
10	1990	0	0	138.93	168.63	240.57	332.31	170.94	142.23	117.15	25.41
10	15.51	21.12	24.09	22.11	68.64						25.08
10	1991	0	0	50.82	201.96	199.98	345.51	362.01	170.94	128.7	71.61
10	28.05	23.1	20.13	15.84	65.34						36.3
10	1992	0	2.31	21.78	172.92	306.9	346.5	292.71	373.56	174.57	44.55
10	24.75	9.24	10.56	19.14	43.56						64.68
10	1993	0	0	19.47	168.3	382.14	465.63	335.28	155.1	115.83	39.27
10	7.59	9.9	3.3	3.3	20.79						15.51
10	1994	0	0	7.92	137.28	328.68	247.5	154.11	190.08	103.62	28.71
10	13.53	1.32	0.99	0.33	2.64						17.82
10	1995	0	2.31	15.51	279.51	389.73	407.88	177.21	214.83	29.37	10.23
10	1.98	1.32	0.66	0.33	11.22						5.28
10	1996	0.99	59.73	47.85	137.28	242.88	558.69	247.5	133.32	73.59	60.72
10	23.1	26.73	31.35	21.12	62.37						33
10	1997	0	0	12.87	16.17	157.74	189.75	261.69	195.69	84.15	40.26
10	15.84	21.45	2.64	4.62	38.61						26.73
10	1998	2.64	0.66	44.55	130.02	154.11	358.71	282.15	292.05	311.19	115.83
10	23.43	19.14	8.58	10.56	36.3						53.46

10	1999	0	0.99	13.86	98.67	613.14	356.07	479.16	264	147.18	188.76	160.38
10	32.67	18.81	5.94	1.65	17.16							
10	2000	0	15.51	11.88	31.68	388.74	1024.65	441.54	457.05	234.96	60.72	81.84
10	26.4	25.08	13.86	7.26	123.42							
10	2001	0	17.16	7.26	2.31	10.89	145.53	650.1	482.13	88.77	26.73	27.72
10	27.39	23.43	19.8	13.86	73.59							
10	2002	0	2.97	2.97	19.47	22.11	14.19	157.41	351.45	280.83	66.99	20.79
10	3.96	2.97	7.26	5.28	53.13							
10	2003	0	0	3.3	19.14	45.87	48.18	26.4	17.82	20.13	11.88	6.27
10	3.63	0.99	4.62	2.97	36.96							
10	2004	3.96	8.25	20.13	22.11	277.86	526.02	350.79	147.84	87.78	51.81	21.78
10	6.93	10.23	0.66	0.99	12.54							
10	2005	0	0	0	0	0.66	6.27	4.62	10.56	4.29	2.97	1.98
10	0.33	0.99	0.99	0.66	23.1							
10	2006	0	0.33	1.98	1.32	1.65	4.29	10.56	3.3	5.28	5.61	2.31
10	3.63	2.31	1.65	0.33	14.19							
10	2007	0	0	0	0	0	0	2.64	6.6	6.27	2.97	5.61
10	3.63	1.98	0.66	1.32	13.2							
10	2008	0	0	1.32	4.95	554.73	213.84	433.62	220.11	127.05	59.07	30.36
10	21.45	6.93	2.64	1.32	17.16							
10	2009	0	0	0	0	0.66	11.55	6.93	14.85	16.17	12.87	5.28
10	6.27	4.62	6.6	3.63	8.58							
10	2010	0	0	0	0	38.28	9.57	80.52	42.9	16.17	31.35	26.4
10	21.78	14.52	8.25	9.24	39.93							
10	2011	0	0	0	0	134.1	501.3	225.45	917.55	207	82.35	99
10	64.8	34.2	27.9	21.15	42.3							
10	2012	0	0	0	0.62	81.22	190.34	130.82	103.54	388.12	183.52	76.88
10	56.42	35.96	36.58	23.56	58.28							
10	2013	0	0	0	0	0	7.28	22.88	71.76	95.16	256.36	228.8
10	115.44	74.88	31.72	18.72	59.8							
10	2014	0	0	0	0	0.42	2.94	10.5	16.8	44.1	61.53	85.26
10	64.47	38.01	11.55	7.35	21.42							
10	2015	0	0	0	0	0	0	0.99	14.19	49.17	121.44	163.02
11	118.14	62.04	29.7	17.82	38.28							
11	1974	0	0	0	0	0	0	0	0	0	0	0
11	0	0	0	0	0							
11	1975	0	0	0	0	0	0	0	0	0	0	0
11	0	0	0	0	0							
11	1976	0	0	0	0	0	0	0	0	0	0	0
11	0	0	0	0	0							
11	1977	0	0	0	0	0	0	0	0	0	0	0
11	0	0	0	0	0							
11	1978	0	0	0	0	0	0	0	0	0	0	0
11	0	0	0	0	0							
11	1979	0	0	0	0	0	0	0	0	0	0	0
11	0	0	0	0	0							
11	1980	0	0	0	0	0	0	0	0	0	0	0
11	0	0	0	0	0							
11	1981	0	0	0	0	0	0	0	0	0	0	0
11	0	0	0	0	0							
11	1982	0	0	0	0	0	0	0	0	0	0	0
11	0	0	0	0	0							
11	1983	0	0	0	0	0	0	0	0	0	0	0
11	0	0	0	0	0							
11	1984	0	0	0	0	0	0	0	0	0	0	0
11	0	0	0	0	0							
11	1985	0	0	0	0	0	0	0	0	0	0	0
11	0	0	0	0	0							
11	1986	0	0	0	0	0	0	0	0	0	0	0
11	0	0	0	0	0							
11	1987	0	0	0	0	0	0	0	0	0	0	0
11	0	0	0	0	0							
11	1988	0	0	0	0	0	0	0	0	0	0	0
11	0	0	0	0	0							
11	1989	0	0	0	0	0	0	0	0	0	0	0
11	0	0	0	0	0							
11	1990	0	0	0	0	0	0	0	0	0	0	0
11	0	0	0	0	0							
11	1991	0	0	0	0	0	0	0	0	0	0	0
11	0	0	0	0	0							
11	1992	0	0	0	0	0	0	0	0	0	0	0
11	0	0	0	0	0							
11	1993	0	0	0	0	0	0	0	0	0	0	0
11	0	0	0	0	0							
11	1994	0	0	0	0	0	0	0	0	0	0	0
11	0	0	0	0	0							
11	1995	0	0	0	0	0	0	0	0	0	0	0
11	0	0	0	0	0							
11	1996	0	0	0	0	0	0	0	0	0	0	0
11	0	0	0	0	0							
11	1997	0	0	0	0	0	0	0	0	0	0	0
11	0	0	0	0	0							
11	1998	0	0	0	0	0	0	0	0	0	0	0
11	0	0	0	0	0							
11	1999	0	0	0	0	0	0	0	0	0	0	0
11	0	0	0	0	0							
11	2000	0	0	0	0	0	0	0	0	0	0	0
11	0	0	0	0	0							
11	2001	0	0	0	0	0	0	0	0	0	0	0
11	0	0	0	0	0							
11	2002	0	0	0	0	0	0	0	0	0	0	0
11	0	0	0	0	0							

11	2003	0	0	0	0	0	0	0	0	0	0
11	2004	0	0	0	0	0	0	0	0	0	0
11	2005	0	0	0	0	0	0	0	0	0	0
11	2006	0	0	0	0	0	0	0	0	0	0
11	2007	0	0	0	0	0	0	0	0	0	0
11	2008	0	0	0	0	0	0	0	0	0	0
11	2009	0	0	0	0	0	0	0	0	0	0
11	2010	0	0	0	0	0	0	0	0	0	0
11	2011	0	0	0	0	0	0	0	0	0	0
11	2012	0	0	0	0	0	0	0	0	0	0
11	2013	0	0	0	0	0	0	0	0	0	0
11	2014	0	0	0	0	0	0	0	0	0	0
11	2015	0	0	0	0	0	0	0	0	0	0
12	1974	0	0	0	0	0	0	0	0	0	0
12	1975	0	0	0	0	0	0	0	0	0	0
12	1976	0	0	0	0	0	0	0	0	0	0
12	1977	0	0	0	0	0	0	0	0	0	0
12	1978	0	0	0	0	0	0	0	0	0	0
12	1979	0	0	0	0	0	0	0	0	0	0
12	1980	0	0	0	0	0	0	0	0	0	0
12	1981	0	0	0	0	0	0	0	0	0	0
12	1982	0	0	0	0	0	0	0	0	0	0
12	1983	0	0	0	0	0	0	0	0	0	0
12	1984	0	0	0	0	0	0	0	0	0	0
12	1985	0	0	0	0	0	0	0	0	0	0
12	1986	0	0	0	0	0	0	0	0	0	0
12	1987	0	0	0	0	0	0	0	0	0	0
12	1988	0	0	0	0	0	0	0	0	0	0
12	1989	0	0	0	0	0	0	0	0	0	0
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12	1992	0	0	0	0	0	0	0	0	0	0
12	1993	0	0	0	0	0	0	0	0	0	0
12	1994	0	0	0	0	0	0	0	0	0	0
12	1995	0	0	0	0	0	0	0	0	0	0
12	1996	0	0	0	0	0	0	0	0	0	0
12	1997	0	0	0	0	0	0	0	0	0	0
12	1998	0	0	0	0	0	0	0	0	0	0
12	1999	0	0	0	0	0	0	0	0	0	0
12	2000	0	0	0	0	0	0	0	0	0	0
12	2001	0	0	0	0	0	0	0	0	0	0
12	2002	0	0	0	0	0	0	0	0	0	0
12	2003	0	0	0	0	0	0	0	0	0	0
12	2004	0	0	0	0	0	0	0	0	0	0
12	2005	0	0	0	0	0	0	0	0	0	0
12	2006	0	0	0	0	0	0	0	0	0	0

12	2007	0	0	0	0	0	0	0	0	0	0	0
12	2008	0	0	0	0	0	0	0	0	0	0	0
12	2009	0	0	0	0	0	0	0	0	0	0	0
12	2010	0	0	0	0	0	0	0	0	0	0	0
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12	2014	0	0	0	0	0	0	0	0	0	0	0
12	2015	0	0	0	0	0	0	0	0	0	0	0
13	1974	0	0	0	0	0	0	0	0	0	0	0
13	1975	0	0	0	0	6	11	0	23	200	702	1005
13	774	970	719	411	825							
13	1976	0	0	0	0	2	5	24	70	180	383	760
13	1548	2037	1285	1247	2045							
13	1977	0	0	0	0	0	16	8	32	97	125	377
13	532	1532	1381	1426	4056							
13	1978	0	0	0	0	0	2	4	4	35	90	320
13	448	998	741	1153	4612							
13	1979	0	0	0	2	3	13	0	4	30	90	393
13	919	1501	940	1346	3787							
13	1980	0	0	0	0	0	0	0	5	11	32	121
13	262	475	861	937	4228							
13	1981	0	0	0	0	8	8	5	65	134	86	252
13	529	564	651	802	3874							
13	1982	0	0	0	0	0	0	0	0	0	0	0
13	1983	0	0	0	0	0	0	0	0	0	0	0
13	1984	0	0	0	0	0	0	0	0	0	0	0
13	1985	0	0	0	0	0	0	0	0	0	0	0
13	1986	0	0	0	0	0	0	0	0	0	0	0
13	1987	0	0	0	0	0	0	0	0	0	0	0
13	1988	0	0	0	0	0	0	0	0	0	0	0
13	1989	0	0	0	0	0	0	0	0	0	0	0
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13	1992	0	0	0	0	0	0	0	0	0	0	0
13	1993	0	0	0	0	0	0	0	0	0	0	0
13	1994	0	0	0	0	0	0	0	0	0	0	0
13	1995	0	0	0	0	0	0	0	0	0	0	0
13	1996	0	0	0	0	0	0	0	0	0	0	0
13	1997	0	0	0	0	0	0	0	0	0	0	0
13	1998	0	0	0	0	0	0	0	0	0	0	0
13	1999	0	0	0	0	0	0	0	0	0	0	0
13	2000	0	0	0	0	0	0	0	0	0	0	0
13	2001	0	0	0	0	0	0	0	0	0	0	0
13	2002	0	0	0	0	0	0	0	0	0	0	0
13	2003	0	0	0	0	0	0	0	0	0	0	0
13	2004	0	0	0	0	0	0	0	0	18	20	18
13	63	26	20	4	30							
13	2005	0	0	0	0	0	0	0	0	0	0	0
13	2006	0	0	0	0	0	0	0	0	27	69	14
13	18	108	58	3	21							
13	2007	0	0	0	0	2	12	0	24	14	62	37
13	33	37	36	14	40							
13	2008	0	0	0	0	1	1	0	42	56	92	31
13	13	70	25	17	52							
13	2009	0	0	0	0	2	3	0	25	12	55	46
13	29	68	34	37	64							
13	2010	0	0	0	0	0	13	0	6	0	23	25
13	19	32	21	25	52							

13	2011	0	0	0	0	0	0	0	2	1	8	2
5	4	9	1	11								
13	2012	0	0	0	0	0	1	0	33	13	76	10
52	51	47	26	84								
13	2013	0	0	0	0	0	1	1	10	22	18	4
16	8	7	13	11								
13	2014	0	0	0	0	0	8	0	19	13	32	17
18	16	0	5	8								
13	2015	0	0	0	0	0	0	5	9	0	9	4
3	2	0	0	0								
14	1974	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0								
14	1975	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0								
14	1976	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0								
14	1977	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0								
14	1978	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0								
14	1979	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0								
14	1980	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0								
14	1981	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0								
14	1982	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0								
14	1983	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0								
14	1984	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0								
14	1985	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0								
14	1986	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0								
14	1987	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0								
14	1988	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0								
14	1989	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0								
14	1990	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0								
14	1991	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0								
14	1992	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0								
14	1993	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0								
14	1994	0	0	0	0	0	0	0	0	0	0	0
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0	0	0	0	0								
14	1996	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0								
14	1997	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0								
14	1998	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0								
14	1999	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0								
14	2000	0	0	0	0	0	0	0	0	0	0	0
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14	2001	0	0	0	0	0	0	0	0	0	0	0
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14	2002	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0								
14	2003	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0								
14	2004	0	0	0	0	0	0	0	0	18	20	18
63	26	20	4	30								
14	2005	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0								
14	2006	0	0	0	0	0	0	0	0	27	69	14
18	108	58	3	21								
14	2007	0	0	0	0	2	12	0	24	14	62	37
33	37	36	14	40								
14	2008	0	0	0	0	1	1	0	42	56	92	31
13	70	25	17	52								
14	2009	0	0	0	0	2	3	0	25	12	55	46
29	68	34	37	64								
14	2010	0	0	0	0	0	13	0	6	0	23	25
19	32	21	25	52								
14	2011	0	0	0	0	0	0	0	2	1	8	2
5	4	9	1	11								
14	2012	0	0	0	0	0	1	0	33	13	76	10
52	51	47	26	84								
14	2013	0	0	0	0	0	1	1	10	22	18	4
16	8	7	13	11								
14	2014	0	0	0	0	0	8	0	19	13	32	17
18	16	0	5	8								

14	2015	0	0	0	0	0	0	5	9	0	9	4
3	2	0	0	0	0	0	0	0	0	0	0	0
15	1974	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0
15	1975	0	0	0	6	11	0	23	200	702	1005	1022
774	970	719	411	825								
15	1976	0	0	0	0	2	5	24	70	180	383	760
1548	2037	1285	1247	2045								
15	1977	0	0	0	0	0	16	8	32	97	125	377
532	1532	1381	1426	4056								
15	1978	0	0	0	0	0	2	4	4	35	90	320
448	998	741	1153	4612								
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919	1501	940	1346	3787								
15	1980	0	0	0	0	0	0	0	5	11	32	121
262	475	861	937	4228								
15	1981	0	0	0	0	8	8	5	65	134	86	252
529	564	651	802	3874								
15	1982	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0								
15	1983	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0								
15	1984	0	0	0	0	0	0	0	0	0	0	0
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15	1986	0	0	0	0	0	0	0	0	0	0	0
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15	1987	0	0	0	0	0	0	0	0	0	0	0
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15	1988	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0								
15	1989	0	0	0	0	0	0	0	0	0	0	0
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0	0	0	0	0								
15	1991	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0								
15	1992	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0								
15	1993	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0								
15	1994	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0								
15	1995	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0								
15	1996	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0								
15	1997	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0								
15	1998	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0								
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15	2001	0	0	0	0	0	0	0	0	0	0	0
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15	2005	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0								
15	2006	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0								
15	2007	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0								
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0	0	0	0	0								
15	2010	0	0	0	0	0	0	0	0	0	0	0
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0	0	0	0	0								
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0	0	0	0	0								
15	2014	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0								
15	2015	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0								
16	1974	1	1	1	0	0	0	0	0	0	0	0
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16	1975	1	1	1	0	0	0	0	0	0	0	0
0	0	0	0	0								
16	1976	1	1	1	0	0	0	0	0	0	0	0
0	0	0	0	0								

16	1977	1	1	1	0	0	0	0	0	0	0	
0	0	0	0	0	0	0	0	0	0	0	0	
16	1978	1	1	1	0	0	0	0	0	0	0	
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16	1980	1	1	1	0	0	0	0	0	0	0	
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16	1987	1	1	1	0	0	0	0	0	0	0	
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16	1988	1	1	1	0	0	0	0	0	0	0	
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16	1996	1	1	1	0	0	0	0	0	0	0	
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16	1997	1	1	1	0	0	0	0	0	0	0	
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16	1998	1	1	1	0	0	0	0	0	0	0	
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16	1999	1	1	1	0	0	0	0	0	0	0	
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16	2001	1	1	1	0	0	0	0	0	0	0	
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16	2002	1	1	1	0	0	0	0	0	0	0	
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16	2007	1	1	1	0	0	0	0	0	0	0	
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16	2008	1	1	1	0	0	0	0	0	0	0	
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16	2009	1	1	1	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	
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16	2011	1	1	1	0	0	0	0	0	0	0	
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16	2012	1	1	1	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	
16	2014	1	1	1	0	0	0	0	0	0	0	
0	0	0	0	0	0	0	0	0	0	0	0	
16	2015	1	1	1	0	0	0	0	0	0	0	
0	0	0	0	0	0	0	0	0	0	0	0	
17	1974	0	0	0	0	0	0	0	0	0	0	
0	0	0	0	0	0	0	0	0	0	0	0	
17	1975	0	0	0	0	0	0	0	0	0	0	
0	0	0	0	0	0	0	0	0	0	0	0	
17	1976	3.96	14.52	83.49	141.9	28.71	74.58	32.01	59.07	112.86	1.98	9.24
3.3	5.28	6.93	3.3	9.57								
17	1977	0	0	38.61	56.1	115.17	18.48	17.49	11.88	15.51	20.13	6.27
3.96	22.44	6.93	2.64	15.18								
17	1978	0	6.27	14.19	20.13	37.29	124.41	68.31	65.67	55.77	50.16	12.54
4.62	12.87	2.31	6.27	10.23								
17	1979	0	21.45	30.69	198.99	103.95	207.24	440.88	196.35	73.26	60.72	10.89
2.64	17.49	12.21	7.92	12.87								
17	1980	0	20.79	7.92	91.08	311.85	257.4	720.06	566.28	292.38	101.97	81.84
54.12	23.76	21.12	14.85	19.8								

17	1981	34.32	74.25	351.45	41.58	474.21	547.8	307.23	266.31	213.84	107.58	73.59
	43.56	14.85	10.56	8.58	43.56							
17	1982	0	1.32	13.2	38.61	41.25	72.6	99.33	38.61	39.93	29.7	21.12
	14.85	5.28	4.29	6.6	2.97							
17	1983	7.92	4.29	12.87	31.35	93.06	48.84	91.08	111.21	76.56	25.74	42.24
	21.12	14.85	6.6	5.61	7.26							
17	1984	1.98	2.31	18.48	31.02	193.38	317.79	156.75	39.27	57.09	26.07	19.8
	25.41	33.66	12.21	7.59	18.48							
17	1985	0.33	2.64	73.59	180.18	123.75	123.75	63.03	32.34	24.75	11.22	5.61
	13.2	1.65	0.66	0	1.32							
17	1986	1.65	1.32	0	10.23	16.83	68.31	63.69	83.82	68.31	30.36	25.08
	13.2	11.22	9.9	1.98	13.53							
17	1987	0	0.99	11.88	53.13	113.19	130.35	75.57	62.04	33	22.11	14.52
	9.24	11.22	5.28	0.66	10.23							
17	1988	0	6.6	55.77	127.05	260.37	187.11	228.03	115.83	67.98	26.4	14.85
	12.21	15.51	20.79	7.92	64.35							
17	1989	0	0.33	7.92	71.61	270.6	314.16	426.36	287.1	85.8	32.34	26.07
	17.16	23.43	18.48	14.85	101.97							
17	1990	0	0	138.93	168.63	240.57	332.31	170.94	142.23	117.15	25.41	25.08
	15.51	21.12	24.09	22.11	68.64							
17	1991	0	0	50.82	201.96	199.98	345.51	362.01	170.94	128.7	71.61	36.3
	28.05	23.1	20.13	15.84	65.34							
17	1992	0	2.31	21.78	172.92	306.9	346.5	292.71	373.56	174.57	44.55	64.68
	24.75	9.24	10.56	19.14	43.56							
17	1993	0	0	19.47	168.3	382.14	465.63	335.28	155.1	115.83	39.27	15.51
	7.59	9.9	3.3	3.3	20.79							
17	1994	0	0	7.92	137.28	328.68	247.5	154.11	190.08	103.62	28.71	17.82
	13.53	1.32	0.99	0.33	2.64							
17	1995	0	2.31	15.51	279.51	389.73	407.88	177.21	214.83	29.37	10.23	5.28
	1.98	1.32	0.66	0.33	11.22							
17	1996	0.99	59.73	47.85	137.28	242.88	558.69	247.5	133.32	73.59	60.72	33
	23.1	26.73	31.35	21.12	62.37							
17	1997	0	0	12.87	16.17	157.74	189.75	261.69	195.69	84.15	40.26	26.73
	15.84	21.45	2.64	4.62	38.61							
17	1998	2.64	0.66	44.55	130.02	154.11	358.71	282.15	292.05	311.19	115.83	53.46
	23.43	19.14	8.58	10.56	36.3							
17	1999	0	0.99	13.86	98.67	613.14	356.07	479.16	264	147.18	188.76	160.38
	32.67	18.81	5.94	1.65	17.16							
17	2000	0	15.51	11.88	31.68	388.74	1024.65	441.54	457.05	234.96	60.72	81.84
	26.4	25.08	13.86	7.26	123.42							
17	2001	0	17.16	7.26	2.31	10.89	145.53	650.1	482.13	88.77	26.73	27.72
	27.39	23.43	19.8	13.86	73.59							
17	2002	0	2.97	2.97	19.47	22.11	14.19	157.41	351.45	280.83	66.99	20.79
	3.96	2.97	7.26	5.28	53.13							
17	2003	0	0	3.3	19.14	45.87	48.18	26.4	17.82	20.13	11.88	6.27
	3.63	0.99	4.62	2.97	36.96							
17	2004	3.96	8.25	20.13	22.11	277.86	526.02	350.79	147.84	87.78	51.81	21.78
	6.93	10.23	0.66	0.99	12.54							
17	2005	0	0	0	0	0.66	6.27	4.62	10.56	4.29	2.97	1.98
	0.33	0.99	0.99	0.66	23.1							
17	2006	0	0.33	1.98	1.32	1.65	4.29	10.56	3.3	5.28	5.61	2.31
	3.63	2.31	1.65	0.33	14.19							
17	2007	0	0	0	0	0	0	2.64	6.6	6.27	2.97	5.61
	3.63	1.98	0.66	1.32	13.2							
17	2008	0	0	1.32	4.95	554.73	213.84	433.62	220.11	127.05	59.07	30.36
	21.45	6.93	2.64	1.32	17.16							
17	2009	0	0	0	0.66	11.55	6.93	14.85	16.17	12.87	5.28	
	6.27	4.62	6.6	3.63	8.58							
17	2010	0	0	0	0	38.28	9.57	80.52	42.9	16.17	31.35	26.4
	21.78	14.52	8.25	9.24	39.93							
17	2011	0	0	0	0	134.1	501.3	225.45	917.55	207	82.35	99
	64.8	34.2	27.9	21.15	42.3							
17	2012	0	0	0	0.62	81.22	190.34	130.82	103.54	388.12	183.52	76.88
	56.42	35.96	36.58	23.56	58.28							
17	2013	0	0	0	0	0	7.28	22.88	71.76	95.16	256.36	228.8
	115.44	74.88	31.72	18.72	59.8							
17	2014	0	0	0	0	0.42	2.94	10.5	16.8	44.1	61.53	85.26
	64.47	38.01	11.55	7.35	21.42							
17	2015	0	0	0	0	0	0	0.99	14.19	49.17	121.44	163.02
	118.14	62.04	29.7	17.82	38.28							

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#=====

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

#=====

#Index	year	ages	1 - 16	17	18	19	20	21	22	23	24	25
13	1974	3.2	7.5	16.1	25.8	34.7	63.3	96.9	127	154.5	178	202.8
	220.5	239.8	258.5	274.1	319.6							
13	1975	3.3	7.4	12.2	25.7	34.7	60.1	90.6	117.1	143.8	168.8	195.4
	219.6	238.9	257.8	273.2	319.2							
13	1976	3.2	7.6	14.8	19.9	34.5	51.2	84.6	123.4	142.9	167.7	194.8
	218.4	243.6	262.6	280.2	330.1							
13	1977	3.3	7.7	10.5	21.7	33	53.9	72.4	100.6	137.9	169.9	194.1
	220.2	244.5	265.8	281.8	332.6							
13	1978	3.7	6.5	12.6	19.8	35.9	55.5	76.2	112.9	144.5	175.4	199
	222.2	247.9	266.4	283.3	340.8							
13	1979	4.2	6.7	11.5	20.5	35.2	59.5	80.1	104.3	137.1	172.5	199.9
	223.5	249.9	267.5	286.4	344.5							
13	1980	4.3	9.5	13.4	22.8	36.2	61.8	88.7	109	140.4	173.3	200.1
	221.2	243.2	258.9	278.2	337.1							
13	1981	5	7.9	16	25.1	36.5	58.6	80.7	108.3	141.5	168.5	193.2
	219.3	247.2	262.7	281.4	366.9							
13	1982	3.1	7	11.7	22.9	40.6	62	86.3	114.2	142.5	171.1	196.3
	216.4	238.8	256.6	277.3	357.1							

13	1983	3.5	7.3	14.1	22.6	41.3	59.9	85.8	113.1	139.9	170.4	198
	220.6	239.4	258.4	274.3	357.1							
13	1984	3.2	7.2	11.8	22.2	37	62.3	87	113.2	143.1	171.8	196.3
	221.4	241.1	260.2	277.3	358.9							
13	1985	2.6	7.4	13.1	17.1	34.5	54.3	72.4	98.8	135.2	166.7	192.9
	216.5	238.6	256.3	274.1	336.3							
13	1986	3.1	6.7	14.3	26.9	36.2	62.6	85.9	110.3	141.8	168.9	198.2
	219.2	241.7	260.1	278.6	334.5							
13	1987	3	6.8	16.1	25.7	39	56.8	84.4	108.3	138.4	167.4	195.2
	218.9	242.3	259.1	278.7	334.5							
13	1988	2.9	7.2	13	23.4	38.5	58.3	80.3	109.7	139.5	169.6	196.3
	218.4	241.2	259.4	278.6	334							
13	1989	3.1	7.6	10.1	25.3	38	59.9	86	111.5	142.2	169.1	193.3
	217.9	238.8	256.7	275.7	336.2							
13	1990	3.6	6.8	15.9	20.9	38.2	60.7	84.3	113.5	142.2	169.4	194.4
	218.6	238.7	257.9	278.1	329							
13	1991	3.5	6.2	14.6	26	41.6	64.1	87.9	116.2	144.9	169.6	195.8
	219.6	242.2	261.4	280.5	335.3							
13	1992	3.1	7.4	13.2	23.2	38.5	62.3	85.9	110.7	139.8	170	194.4
	218.8	239.7	260.1	277.2	336							
13	1993	3.6	6.9	13.3	24	40.5	60.1	82.6	113	138	165.7	194.8
	217.3	238.5	258.2	276.8	341.8							
13	1994	3.1	4.8	12.6	22	35.8	53.4	78.3	110.9	136.9	168.7	193.4
	217.3	237.3	258.3	279	338.1							
13	1995	3.1	5	14	25	40.8	60.9	84.1	110.9	142.7	167.2	194.7
	217.6	240	259.2	278.6	348.9							
13	1996	2.9	7.6	10.5	26.7	38.2	55.1	89	109.8	143.1	171.7	197.4
	218.8	241.8	260.9	279.9	342.1							
13	1997	3.9	6.9	14.9	19.8	40.3	61.6	85	111.2	139.6	169.4	197.6
	220	240.4	258.4	277.2	338							
13	1998	3.7	6.5	14.1	23.8	36.3	64.9	86.3	114.1	142	168.5	197
	219.8	240.4	258.1	275.9	339.6							
13	1999	3.7	8.1	15.1	24.3	44.2	64.8	89.5	112.6	142.6	168	193.6
	221.7	243	261	279.5	362.9							
13	2000	3.7	6.5	14.7	23.6	39.1	60.3	83	110.9	138.4	172.3	198.2
	220.3	243.6	262.4	281	374.8							
13	2001	3.7	5	15.1	25.5	36.2	63	92	115.5	145.5	174.5	200
	223.6	246.3	263.8	282	349.8							
13	2002	4.7	7.3	12.8	24.3	38.3	54.5	89.1	113.4	141.5	171.3	199.7
	223.3	245.9	262.7	281.3	346.5							
13	2003	4.1	8.1	14.6	26.3	42.3	63.6	93.1	115	141.1	168.2	196.9
	224	248.3	262.9	278.9	338.2							
13	2004	5.3	6.9	14.3	23.2	37.9	57.2	80.2	108.3	139.2	168	195.2
	218.1	245.7	262.5	279.8	339.4							
13	2005	2.9	7.3	13.6	23.6	36.5	51.8	78.2	106	138.2	169.2	194.5
	219.3	242.7	259.9	277.2	344.7							
13	2006	3.4	6.6	13.6	25.1	38.7	56.4	81.6	105.1	134.7	166.2	192.7
	221.8	242.3	257.5	276.8	348.3							
13	2007	3.4	7.8	14	24	37.9	55.6	77.6	110.8	140.6	170.1	195.2
	222	242.9	261.5	279.7	356.9							
13	2008	3.5	8.4	14	22	43.7	63.5	93.1	115.3	143.8	170	196.3
	222.4	245	261.7	278.8	362.7							
13	2009	3.4	7	16	23.8	40.8	63.3	79.5	110.8	138.8	166.2	193.4
	221.7	244.4	263.5	282.4	345.4							
13	2010	3.8	7.7	11.6	25.6	37.9	62	92.2	109.1	139.1	166	194.4
	221.3	244.4	262.7	281.6	336.5							
13	2011	3.5	7.4	10.8	23.5	41.7	53.6	86.6	109.3	135.9	168.6	196
	222.2	244.4	262.3	282	330.6							
13	2012	3.5	6.4	15.5	22.9	38.6	67.6	85.6	114.3	143.4	169.1	197.7
	219.7	246.6	262.3	280.2	336.7							
13	2013	2.8	7	13.9	25.2	36.1	58.3	90.8	109.1	141.3	170.8	198.6
	224.2	247.1	263.5	281.6	335.9							
13	2014	3	8	10.5	25.9	35.9	62.4	94	116.2	143.5	171.2	200.2
	223.4	244.4	262.2	281	342.4							
13	2015	3.1	9.8	15.1	19.9	43.3	60.5	89.9	111.6	144.8	174	201.1
	225.5	247.7	264	283.5	340							

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#

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

#=====	#=====	#=====	#=====	#=====	#=====	#=====	#=====	#=====	#=====	#=====	#=====	#=====
1974	3.2	7.5	16.1	25.8	34.7	63.3	96.9	127	154.5	178	202.8	220.5
	239.8	258.5	274.1	319.6								
1975	3.3	7.4	12.2	25.7	34.7	60.1	90.6	117.1	143.8	168.8	195.4	219.6
	238.9	257.8	273.2	319.2								
1976	3.2	7.6	14.8	19.9	34.5	51.2	84.6	123.4	142.9	167.7	194.8	218.4
	243.6	262.6	280.2	330.1								
1977	3.3	7.7	10.5	21.7	33	53.9	72.4	100.6	137.9	169.9	194.1	220.2
	244.5	265.8	281.8	332.6								
1978	3.7	6.5	12.6	19.8	35.9	55.5	76.2	112.9	144.5	175.4	199	222.2
	247.9	266.4	283.3	340.8								
1979	4.2	6.7	11.5	20.5	35.2	59.5	80.1	104.3	137.1	172.5	199.9	223.5
	249.9	267.5	286.4	344.5								
1980	4.3	9.5	13.4	22.8	36.2	61.8	88.7	109	140.4	173.3	200.1	221.2
	243.2	258.9	278.2	337.1								
1981	5	7.9	16	25.1	36.5	58.6	80.7	108.3	141.5	168.5	193.2	219.3
	247.2	262.7	281.4	366.9								
1982	3.1	7	11.7	22.9	40.6	62	86.3	114.2	142.5	171.1	196.3	216.4
	238.8	256.6	277.3	357.1								
1983	3.5	7.3	14.1	22.6	41.3	59.9	85.8	113.1	139.9	170.4	198	220.6
	239.4	258.4	274.3	357.1								
1984	3.2	7.2	11.8	22.2	37	62.3	87	113.2	143.1	171.8	196.3	221.4
	241.1	260.2	277.3	358.9								

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1985	2.6	7.4	13.1	17.1	34.5	54.3	72.4	98.8	135.2	166.7	192.9	216.5
	238.6	256.3	274.1	336.3								
1986	3.1	6.7	14.3	26.9	36.2	62.6	85.9	110.3	141.8	168.9	198.2	219.2
	241.7	260.1	278.6	334.5								
1987	3	6.8	16.1	25.7	39	56.8	84.4	108.3	138.4	167.4	195.2	218.9
	242.3	259.1	278.7	334.5								
1988	2.9	7.2	13	23.4	38.5	58.3	80.3	109.7	139.5	169.6	196.3	218.4
	241.2	259.4	278.6	334								
1989	3.1	7.6	10.1	25.3	38	59.9	86	111.5	142.2	169.1	193.3	217.9
	238.8	256.7	275.7	336.2								
1990	3.6	6.8	15.9	20.9	38.2	60.7	84.3	113.5	142.2	169.4	194.4	218.6
	238.7	257.9	278.1	329								
1991	3.5	6.2	14.6	26	41.6	64.1	87.9	116.2	144.9	169.6	195.8	219.6
	242.2	261.4	280.5	335.3								
1992	3.1	7.4	13.2	23.2	38.5	62.3	85.9	110.7	139.8	170	194.4	218.8
	239.7	260.1	277.2	336								
1993	3.6	6.9	13.3	24	40.5	60.1	82.6	113	138	165.7	194.8	217.3
	238.5	258.2	276.8	341.8								
1994	3.1	4.8	12.6	22	35.8	53.4	78.3	110.9	136.9	168.7	193.4	217.3
	237.3	258.3	279	338.1								
1995	3.1	5	14	25	40.8	60.9	84.1	110.9	142.7	167.2	194.7	217.6
	240	259.2	278.6	348.9								
1996	2.9	7.6	10.5	26.7	38.2	55.1	89	109.8	143.1	171.7	197.4	218.8
	241.8	260.9	279.9	342.1								
1997	3.9	6.9	14.9	19.8	40.3	61.6	85	111.2	139.6	169.4	197.6	220
	240.4	258.4	277.2	338								
1998	3.7	6.5	14.1	23.8	36.3	64.9	86.3	114.1	142	168.5	197	219.8
	240.4	258.1	275.9	339.6								
1999	3.7	8.1	15.1	24.3	44.2	64.8	89.5	112.6	142.6	168	193.6	221.7
	243	261	279.5	362.9								
2000	3.7	6.5	14.7	23.6	39.1	60.3	83	110.9	138.4	172.3	198.2	220.3
	243.6	262.4	281	374.8								
2001	3.7	5	15.1	25.5	36.2	63	92	115.5	145.5	174.5	200	223.6
	246.3	263.8	282	349.8								
2002	4.7	7.3	12.8	24.3	38.3	54.5	89.1	113.4	141.5	171.3	199.7	223.3
	245.9	262.7	281.3	346.5								
2003	4.1	8.1	14.6	26.3	42.3	63.6	93.1	115	141.1	168.2	196.9	224
	248.3	262.9	278.9	338.2								
2004	5.3	6.9	14.3	23.2	37.9	57.2	80.2	108.3	139.2	168	195.2	218.1
	245.7	262.5	279.8	339.4								
2005	2.9	7.3	13.6	23.6	36.5	51.8	78.2	106	138.2	169.2	194.5	219.3
	242.7	259.9	277.2	344.7								
2006	3.4	6.6	13.6	25.1	38.7	56.4	81.6	105.1	134.7	166.2	192.7	221.8
	242.3	257.5	276.8	348.3								
2007	3.4	7.8	14	24	37.9	55.6	77.6	110.8	140.6	170.1	195.2	222
	242.9	261.5	279.7	356.9								
2008	3.5	8.4	14	22	43.7	63.5	93.1	115.3	143.8	170	196.3	222.4
	245	261.7	278.8	362.7								
2009	3.4	7	16	23.8	40.8	63.3	79.5	110.8	138.8	166.2	193.4	221.7
	244.4	263.5	282.4	345.4								
2010	3.8	7.7	11.6	25.6	37.9	62	92.2	109.1	139.1	166	194.4	221.3
	244.4	262.7	281.6	336.5								
2011	3.5	7.4	10.8	23.5	41.7	53.6	86.6	109.3	135.9	168.6	196	222.2
	244.4	262.3	282	330.6								
2012	3.5	6.4	15.5	22.9	38.6	67.6	85.6	114.3	143.4	169.1	197.7	219.7
	246.6	262.3	280.2	336.7								
2013	2.8	7	13.9	25.2	36.1	58.3	90.8	109.1	141.3	170.8	198.6	224.2
	247.1	263.5	281.6	335.9								
2014	3	8	10.5	25.9	35.9	62.4	94	116.2	143.5	171.2	200.2	223.4
	244.4	262.2	281	342.4								
2015	3.1	9.8	15.1	19.9	43.3	60.5	89.9	111.6	144.8	174	201.1	225.5
	247.7	264	283.5	340								

-1

Appendix C. VPA-2BOX results file for eastern-origin bluefin tuna

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*****
VPA-2BOX
SUMMARY STATISTICS AND DIAGNOSTIC OUTPUT
*****
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BFT East 1968-2015 Population-of-Origin Run
 19:03, 31 August 2017

Total objective function = -62.86
 (with constants) = 86.00
 Number of parameters (P) = 29
 Number of data points (D) = 162
 AIC : 2*objective+2P = 230.01
 AICc: 2*objective+2P(...)= 243.19
 BIC : 2*objective+Plog(D)= 319.55
 Chi-square discrepancy = 150.75

Loglikelihoods (deviance)= 51.63 (-162.34)
 effort data = 51.63 (-162.34)

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

Constraints = 11.24
 terminal F = 11.24
 stock-rec./sex ratio = 0.00

Out of bounds penalty = 0.00

TABLE 1. FISHING MORTALITY RATE FOR BFTE

1	2	3	4	5	6	7	8	9	10	
1968	0.004	0.070	0.053	0.040	0.030	0.010	0.088	0.084	0.115	0.151
1969	0.020	0.168	0.105	0.009	0.013	0.037	0.020	0.130	0.156	0.203
1970	0.053	0.234	0.037	0.018	0.006	0.014	0.033	0.042	0.099	0.129
1971	0.024	0.188	0.030	0.020	0.014	0.002	0.007	0.047	0.086	0.112
1972	0.005	0.165	0.158	0.065	0.007	0.017	0.006	0.007	0.049	0.063
1973	0.021	0.207	0.055	0.020	0.016	0.009	0.025	0.018	0.033	0.043
1974	0.041	0.153	0.093	0.138	0.038	0.036	0.006	0.092	0.043	0.056
1975	0.047	0.237	0.035	0.030	0.035	0.031	0.032	0.029	0.045	0.059
1976	0.008	0.131	0.168	0.088	0.057	0.035	0.040	0.071	0.049	0.064
1977	0.025	0.218	0.082	0.096	0.025	0.035	0.025	0.023	0.038	0.049
1978	0.141	0.215	0.086	0.050	0.042	0.016	0.015	0.014	0.034	0.044
1979	0.014	0.139	0.124	0.070	0.021	0.022	0.027	0.034	0.027	0.036
1980	0.055	0.065	0.182	0.109	0.035	0.029	0.048	0.037	0.035	0.045
1981	0.089	0.212	0.104	0.047	0.059	0.036	0.048	0.071	0.057	0.038
1982	0.170	0.202	0.262	0.108	0.075	0.071	0.051	0.071	0.085	0.057
1983	0.232	0.209	0.130	0.088	0.089	0.070	0.079	0.061	0.089	0.060
1984	0.064	0.272	0.108	0.154	0.150	0.118	0.135	0.126	0.099	0.067
1985	0.046	0.328	0.324	0.158	0.134	0.079	0.055	0.074	0.086	0.058
1986	0.150	0.174	0.207	0.125	0.047	0.095	0.073	0.060	0.088	0.060
1987	0.103	0.289	0.226	0.152	0.075	0.072	0.071	0.064	0.080	0.054
1988	0.192	0.192	0.379	0.146	0.089	0.072	0.095	0.116	0.110	0.074
1989	0.120	0.251	0.132	0.189	0.158	0.068	0.088	0.106	0.095	0.064
1990	0.087	0.143	0.180	0.272	0.263	0.100	0.104	0.092	0.107	0.072
1991	0.044	0.165	0.194	0.168	0.278	0.112	0.088	0.102	0.137	0.092
1992	0.060	0.264	0.333	0.145	0.084	0.124	0.142	0.115	0.146	0.098
1993	0.063	0.343	0.380	0.174	0.112	0.077	0.160	0.133	0.128	0.087
1994	0.142	0.211	0.190	0.105	0.102	0.113	0.141	0.174	0.352	0.237
1995	0.137	0.164	0.161	0.112	0.102	0.142	0.111	0.145	0.443	0.299
1996	0.193	0.201	0.309	0.266	0.120	0.073	0.070	0.088	0.144	0.390
1997	0.150	0.235	0.233	0.217	0.112	0.089	0.078	0.125	0.166	0.448
1998	0.084	0.223	0.497	0.292	0.188	0.057	0.041	0.111	0.120	0.324
1999	0.220	0.224	0.274	0.390	0.099	0.070	0.078	0.063	0.138	0.375
2000	0.049	0.242	0.170	0.277	0.152	0.079	0.103	0.087	0.159	0.430
2001	0.004	0.290	0.256	0.314	0.132	0.163	0.096	0.107	0.117	0.318
2002	0.013	0.354	0.396	0.227	0.079	0.110	0.105	0.078	0.107	0.288
2003	0.015	0.216	0.223	0.089	0.165	0.091	0.120	0.108	0.126	0.341
2004	0.031	0.114	0.159	0.100	0.073	0.099	0.140	0.153	0.144	0.390
2005	0.045	0.054	0.055	0.064	0.083	0.091	0.128	0.109	0.199	0.538
2006	0.013	0.023	0.060	0.099	0.084	0.153	0.130	0.201	0.211	0.571
2007	0.005	0.049	0.044	0.134	0.282	0.192	0.163	0.160	0.210	0.567
2008	0.001	0.048	0.031	0.055	0.075	0.062	0.052	0.095	0.106	0.185
2009	0.002	0.017	0.011	0.021	0.026	0.057	0.081	0.037	0.078	0.136
2010	0.001	0.020	0.018	0.016	0.030	0.022	0.028	0.025	0.025	0.043
2011	0.000	0.005	0.010	0.015	0.019	0.013	0.010	0.017	0.025	0.043
2012	0.000	0.000	0.009	0.022	0.022	0.008	0.009	0.013	0.023	0.041
2013	0.000	0.009	0.006	0.023	0.032	0.015	0.013	0.018	0.020	0.034
2014	0.000	0.005	0.004	0.021	0.020	0.010	0.005	0.006	0.021	0.037
2015	0.000	0.007	0.005	0.025	0.017	0.008	0.009	0.011	0.019	0.034

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

1	2	3	4	5	6	7	8	9	10
1968	1250593.	594306.	1581304.	1176858.	336260.	355598.	93101.	63155.	30593.
1969	915539.	851871.	410411.	1180028.	925924.	272528.	299923.	74145.	50976.
1970	1206905.	613518.	533328.	290695.	957920.	763128.	228313.	255662.	57186.
1971	1728655.	782842.	359802.	404445.	233710.	795057.	641393.	188259.	215177.
1972	1392695.	1154529.	480629.	274701.	324607.	192565.	676021.	553711.	157763.
1973	1306988.	947446.	724859.	322893.	210743.	269246.	161331.	584142.	482862.
1974	1410484.	875116.	570554.	539841.	259004.	173313.	227412.	136810.	504033.
1975	1150616.	925699.	556223.	408892.	384990.	208186.	142416.	196438.	109592.
1976	1301592.	751000.	540925.	422483.	324815.	310533.	172035.	119964.	167596.
1977	878911.	883273.	488227.	359724.	316909.	256298.	255534.	143729.	98089.
1978	762099.	586027.	526366.	353782.	267487.	258052.	210811.	216746.	123385.
1979	802686.	452806.	350112.	379937.	275497.	214127.	216376.	180483.	187668.
1980	1211996.	541413.	291995.	243339.	290034.	225232.	178550.	183170.	153132.
1981	1156094.	784160.	375952.	191476.	178712.	233960.	186351.	147983.	155022.
1982	1441261.	723172.	470091.	266437.	149585.	140681.	192308.	154381.	120976.
1983	2183990.	831619.	437844.	284463.	195847.	115889.	111710.	158910.	126242.
1984	1227214.	1183819.	500047.	302524.	213251.	149640.	92050.	89736.	131280.
1985	1214326.	787014.	667958.	353159.	212369.	153251.	113343.	69885.	69465.
1986	1975132.	792863.	419883.	380183.	246974.	155197.	120668.	93289.	57008.
1987	1518123.	1162438.	493388.	268506.	274662.	196882.	120234.	97551.	725799.
1988	2537343.	936184.	645306.	309711.	188777.	212884.	156185.	97373.	80334.
1989	2536484.	143294.	572527.	347447.	219218.	144248.	168792.	123475.	76132.
1990	2897806.	1538118.	825191.	397488.	235542.	156369.	114850.	134393.	97521.
1991	3414555.	1816467.	987816.	541985.	246180.	151202.	120582.	89992.	107665.
1992	3776471.	2234080.	1140813.	640076.	374962.	155727.	115208.	95978.	71368.
1993	4133624.	2432376.	1271336.	643067.	453190.	287976.	117270.	86915.	75160.
1994	3758964.	2653918.	1278540.	684197.	442339.	338287.	227174.	86907.	66824.
1995	4307053.	229500.	1592273.	820304.	504232.	333537.	257410.	171607.	52515.
1996	4029914.	2568195.	1402463.	1066331.	608882.	380292.	246612.	200293.	130372.
1997	3364244.	2272764.	1556849.	809908.	669390.	451150.	301309.	199965.	161090.
1998	4037283.	1979718.	1331566.	969920.	533569.	499647.	351831.	242212.	154933.
1999	3067990.	2537230.	1172947.	637226.	593252.	369473.	402280.	293509.	190399.
2000	2921999.	1683750.	1502729.	701661.	353109.	448730.	293571.	323605.	241897.
2001	2919133.	1902994.	979095.	997400.	435312.	253398.	353311.	230210.	260488.
2002	3867086.	1987689.	1054876.	595944.	596723.	318790.	183494.	279091.	181636.
2003	3542279.	2609644.	1033561.	558310.	388798.	460529.	243244.	143557.	226654.
2004	4340764.	2385377.	1558329.	650366.	418307.	275256.	358236.	187525.	113153.
2005	3839311.	2878898.	1577166.	1045881.	481659.	324685.	212464.	270838.	141344.
2006	3869127.	2510034.	2021165.	1174636.	803586.	370091.	252545.	162563.	213214.
2007	4587920.	2611723.	1816955.	1496921.	871185.	617263.	270572.	192790.	116778.
2008	2632433.	3120532.	1842860.	1367272.	1071373.	548725.	433905.	199909.	144252.
2009	1691644.	1798244.	2203919.	1406003.	1059569.	829913.	439402.	358254.	159643.
2010	1886215.	1154761.	310278.	1715371.	1127321.	862521.	668319.	352258.	303067.
2011	2574260.	1288926.	838861.	1012168.	1381849.	913684.	718952.	564779.	301647.
2012	4330926.	1760428.	949933.	653343.	816331.	1132529.	768631.	619053.	487574.
2013	7579498.	2961726.	1303702.	740568.	523061.	667189.	957804.	662428.	536588.
2014	6553802.	5183266.	2174225.	1019398.	592270.	423330.	560242.	822290.	571319.
2015	405894.	4481870.	3820197.	1703546.	817332.	484670.	357264.	484385.	717389.
2016	277573.	3295964.	2990920.	1360297.	671370.	409733.	307927.	420548.	2138468.

TABLE 3. CATCH OF BFTE

1	2	3	4	5	6	7	8	9	10
1968	4085.	34886.	72261.	41655.	9142.	3361.	7299.	4789.	3148.
1969	15320.	114481.	36408.	9080.	11252.	9135.	5451.	8470.	6937.
1970	51805.	111086.	17060.	4751.	5553.	9658.	6780.	9956.	5077.
1971	33645.	116363.	9418.	7225.	2900.	1608.	4172.	8063.	16772.
1972	6046.	152746.	62565.	15695.	2069.	2995.	3823.	3579.	7057.
1973	22739.	153951.	34344.	5935.	2975.	2195.	3699.	9505.	14648.
1974	47357.	107794.	45203.	63239.	8937.	5720.	1358.	11267.	20150.
1975	43695.	169926.	17032.	11029.	12100.	5824.	4131.	5230.	4544.
1976	8313.	79709.	74599.	32140.	16460.	9857.	6261.	7749.	7520.
1977	18298.	150061.	34270.	29971.	7293.	8236.	5803.	3015.	3439.
1978	83537.	98520.	38627.	15683.	10192.	3820.	2992.	2836.	3854.
1979	9145.	50849.	36335.	23311.	5350.	4248.	5302.	5715.	4786.
1980	54445.	29361.	43347.	22754.	9096.	6053.	7778.	6216.	4926.
1981	82272.	129933.	33180.	7957.	9422.	7659.	8190.	9583.	8035.
1982	188356.	114740.	96938.	24724.	9931.	8870.	8888.	9960.	9257.
1983	379566.	136018.	47474.	21783.	15300.	7277.	7929.	8825.	10131.
1984	63670.	245438.	45525.	39197.	27311.	15392.	10901.	9979.	11709.
1985	45772.	191822.	165226.	46803.	24359.	10773.	5635.	4657.	5378.
1986	230127.	110076.	70120.	40608.	10315.	13047.	7899.	5097.	4552.
1987	124497.	255355.	89010.	34467.	18134.	12578.	7685.	5691.	5627.
1988	370595.	141801.	182396.	38121.	14736.	13695.	13224.	10019.	7891.
1989	239946.	276890.	62981.	54329.	29364.	8759.	13267.	11655.	6503.
1990	201557.	177482.	121517.	85675.	50092.	13755.	10590.	11059.	9331.
1991	123044.	239888.	155400.	76351.	54900.	14811.	9510.	8182.	12964.
1992	183079.	450430.	289355.	78630.	27665.	16763.	14238.	9750.	9137.
1993	210770.	615623.	359708.	93435.	44172.	19782.	16177.	10154.	8537.
1994	416842.	438210.	197062.	62037.	39433.	33516.	27834.	25517.	18734.
1995	460908.	291796.	211114.	80221.	44855.	40862.	25246.	21728.	17796.
1996	591329.	405198.	333544.	226443.	63038.	24701.	15500.	15805.	16499.
1997	392307.	413066.	289251.	143907.	65273.	35409.	21202.	22088.	96400.

1998	272875.	344383.	468229.	223455.	83725.	25494.	13272.	23828.	16483.	74541.
1999	507545.	441999.	251154.	187862.	51324.	23091.	28064.	16919.	23229.	91508.
2000	116900.	314729.	209448.	154761.	45622.	31559.	26876.	25299.	33544.	112782.
2001	10466.	416259.	197939.	244682.	49197.	35252.	30157.	21928.	27228.	99193.
2002	42472.	516431.	309262.	110141.	41572.	30856.	17158.	19682.	17313.	109147.
2003	45101.	439604.	184662.	43013.	54363.	37134.	25734.	13797.	25320.	125383.
2004	109080.	222159.	204017.	56349.	27106.	23992.	43647.	24947.	14324.	144763.
2005	140745.	130298.	74687.	58411.	35351.	26204.	23804.	26310.	24060.	149041.
2006	41660.	49616.	105211.	100380.	59182.	48680.	28769.	27792.	38318.	125158.
2007	20643.	107366.	70135.	171083.	196899.	100124.	37978.	26783.	20848.	126969.
2008	2413.	125910.	49356.	66328.	71269.	30596.	20369.	16994.	13693.	38885.
2009	2546.	25543.	20683.	26369.	24672.	42200.	31952.	12301.	11300.	35971.
2010	1190.	19380.	20954.	25004.	30620.	17397.	17424.	8192.	7024.	14780.
2011	1.	5749.	7381.	13688.	23773.	10804.	6415.	8923.	6896.	23098.
2012	16.	537.	7550.	13124.	16075.	7886.	6211.	7477.	10568.	28882.
2013	44.	23182.	6927.	15568.	14873.	9004.	11145.	11063.	9779.	34599.
2014	1.	22936.	7648.	19132.	11000.	3770.	2859.	4974.	11149.	48316.
2015	2.	28328.	15998.	38150.	12410.	3553.	2859.	5114.	12999.	54886.

TABLE 4. SPAWNING STOCK FECUNDITY AND RECRUITMENT OF BFTE

year	spawning biomass	recruits from VPA
1968	131852.	1250593.
1969	163994.	915539.
1970	192114.	1206905.
1971	217033.	1728655.
1972	248689.	1392695.
1973	272581.	1306988.
1974	298229.	1410484.
1975	340876.	1150616.
1976	313674.	1301592.
1977	328628.	878911.
1978	314923.	762099.
1979	305337.	802686.
1980	291727.	1211996.
1981	272520.	1156094.
1982	268849.	1441261.
1983	245709.	2183990.
1984	232199.	1227214.
1985	226393.	1214326.
1986	222480.	1975132.
1987	201033.	1518123.
1988	195306.	2537343.
1989	191222.	2536484.
1990	179015.	2897806.
1991	167406.	3414555.
1992	176231.	3776471.
1993	179927.	4133624.
1994	171197.	3758964.
1995	172630.	4307053.
1996	174287.	4029914.
1997	179980.	3364224.
1998	190363.	4037283.
1999	194002.	3067990.
2000	192810.	2921999.
2001	192375.	2919133.
2002	201366.	3867086.
2003	193269.	3542279.
2004	183833.	4340764.
2005	180925.	3839311.
2006	183933.	3869127.
2007	192794.	4587920.
2008	226286.	2632433.
2009	277582.	1691644.
2010	341153.	1886215.
2011	417623.	2574260.
2012	466642.	4330926.
2013	511943.	7579498.
2014	553345.	6553802.
2015	609672.	405894.

TABLE 5. FITS TO INDEX DATA FOR BFTE

Year	Residuals	Standard	Q	Untransfrmd	Untransfrmd	Chi-square
Observed	Predicted	(Obs-pred)	Deviation	Catchabil.	Observed	Predicted

5.1 MOR_SP_TP
Lognormal dist.
average numbers
Ages 6 - 10
log-likelihood = 8.18
deviance = 32.65
Chi-sq. discrepancy= 27.86

1981 0.13349E+00 0.49841E+00 -36492E+00 0.45356E+00 0.82276E-03 0.63774E+03 0.91860E+03 0.61112E+00
1982 0.43440E+00 0.46890E+00 -.34500E-01 0.45356E+00 0.82276E-03 0.86164E+03 0.89189E+03 0.72117E-01
1983 0.48505E+00 0.41388E+00 0.71166E-01 0.45356E+00 0.82276E-03 0.90640E+03 0.84414E+03 0.42609E-02
1984 0.57954E+00 0.35307E+00 0.22646E+00 0.45356E+00 0.82276E-03 0.99622E+03 0.79434E+03 0.75788E-01
1985 0.19176E+00 0.29044E+00 -98683E-01 0.45356E+00 0.82276E-03 0.67600E+03 0.74611E+03 0.14587E+00
1986 -.53358E+00 0.21965E+00 -.75323E+00 0.45356E+00 0.82276E-03 0.32729E+03 0.69512E+03 0.14484E+01
1987 -.43880E+00 0.16271E+00 -.60151E+00 0.45356E+00 0.82276E-03 0.35983E+03 0.65664E+03 0.11191E+01
1988 0.41145E+00 0.11865E+00 0.29280E+00 0.45356E+00 0.82276E-03 0.84208E+03 0.62834E+03 0.19157E+00
1989 -.23515E+00 0.68154E-01 -.30331E+00 0.45356E+00 0.82276E-03 0.44110E+03 0.59740E+03 0.48783E+00
1990 -.90166E-01 0.25765E-01 -.11593E+00 0.45356E+00 0.82276E-03 0.50993E+03 0.57261E+03 0.16907E+00
1991 0.79345E-01 -.21979E-01 0.10132E+00 0.45356E+00 0.82276E-03 0.60412E+03 0.54591E+03 0.10294E-04
1992 -.76153E+00 -.79067E-01 -.68246E+00 0.45356E+00 0.82276E-03 0.26058E+03 0.51562E+03 0.12958E+01
1993 -.72583E+00 -.11789E+00 -.60795E+00 0.45356E+00 0.82276E-03 0.27005E+03 0.49599E+03 0.11332E+01
1994 -.67625E+00 -.18798E+00 0.48827E+00 0.45356E+00 0.82276E-03 0.28378E+03 0.46241E+03 0.87205E+00
1995 -.11017E+01 -.30608E+00 -.79559E+00 0.45356E+00 0.82276E-03 0.18545E+03 0.41090E+03 0.15385E+01
1996 -.58325E+00 -.36997E+00 -.21329E+00 0.45356E+00 0.82276E-03 0.31143E+03 0.38547E+03 0.32164E+00
1997 0.38937E+00 -.33449E+00 0.72386E+00 0.45356E+00 0.82276E-03 0.82370E+03 0.39939E+03 0.32441E+01
1998 0.31918E+00 -.23961E+00 0.55880E+00 0.45356E+00 0.82276E-03 0.76787E+03 0.43914E+03 0.14609E+01
1999 0.52578E+00 -.16090E+00 0.68668E+00 0.45356E+00 0.82276E-03 0.94408E+03 0.47510E+03 0.27524E+01
2000 0.94846E-01 -.96141E+00 0.19099E+00 0.45356E+00 0.82276E-03 0.61356E+03 0.50689E+03 0.37160E-01
2001 0.64745E+00 -.73397E-01 0.72085E+00 0.45356E+00 0.82276E-03 0.10662E+04 0.51855E+03 0.32021E+01
2002 0.51958E+00 -.43642E-01 0.56322E+00 0.45356E+00 0.82276E-03 0.93825E+03 0.53421E+03 0.14965E+01
2003 -.14501E-01 0.41474E-01 0.45356E+00 0.82276E-03 0.55001E+03 0.52784E+03 0.15681E-01
2004 -.70454E+00 -.12150E+00 -.58304E+00 0.45356E+00 0.82276E-03 0.27586E+03 0.49419E+03 0.10787E+01
2005 0.74836E-02 -.25378E+00 0.26126E+00 0.45356E+00 0.82276E-03 0.56223E+03 0.43296E+03 0.12898E+00
2006 -.58809E-01 -.35656E+00 0.29775E+00 0.45356E+00 0.82276E-03 0.52617E+03 0.39068E+03 0.20271E+00
2007 0.39759E+00 -.35368E+00 0.75127E+00 0.45356E+00 0.82276E-03 0.83050E+03 0.39180E+03 0.36455E+01
2008 -.58431E-01 -.27045E+00 0.21202E+00 0.45356E+00 0.82276E-03 0.52637E+03 0.42581E+03 0.58245E-01
2009 0.26541E+00 -.23765E-02 0.26779E+00 0.45356E+00 0.82276E-03 0.72767E+03 0.55672E+03 0.14077E+00
2010 0.43836E+00 0.26864E+00 0.16972E+00 0.45356E+00 0.82276E-03 0.86506E+03 0.73002E+03 0.20936E+01
2011 0.62401E-01 0.55685E+00 -.49445E+00 0.45356E+00 0.82276E-03 0.59397E+03 0.97387E+03 0.88542E+00

Selectivities by age

Year 6 7 8 9 10

1981 0.144 0.233 0.395 0.571 1.000
1982 0.144 0.233 0.395 0.571 1.000
1983 0.144 0.233 0.395 0.571 1.000
1984 0.144 0.233 0.395 0.571 1.000
1985 0.144 0.233 0.395 0.571 1.000
1986 0.144 0.233 0.395 0.571 1.000
1987 0.144 0.233 0.395 0.571 1.000
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2003 0.144 0.233 0.395 0.571 1.000
2004 0.144 0.233 0.395 0.571 1.000
2005 0.144 0.233 0.395 0.571 1.000
2006 0.144 0.233 0.395 0.571 1.000
2007 0.144 0.233 0.395 0.571 1.000
2008 0.144 0.233 0.395 0.571 1.000
2009 0.144 0.233 0.395 0.571 1.000
2010 0.144 0.233 0.395 0.571 1.000
2011 0.144 0.233 0.395 0.571 1.000

5.2 MOR_POR_TP

Lognormal dist.

average numbers

Ages 10 - 10

log-likelihood = 2.04

deviance = 2.25

Chi-sq. discrepancy= 2.06

Year	Residuals	Standard	Q	Untransfrmd	Untransfrmd	Chi-square		
Year	Observed	Predicted	(Obs-pred)	Deviation	Catchabil.	Observed	Predicted	Discrepancy
2012	-.32352E+00	-.44989E+00	0.12636E+00	0.45356E+00	0.42303E-04	0.34154E+02	0.30100E+02	0.24760E-02
2013	0.40634E+00	-.94072E-01	0.50042E+00	0.45356E+00	0.42303E-04	0.70864E+02	0.42963E+02	0.10434E+01
2014	-.15836E+00	0.17079E+00	-.32915E+00	0.45356E+00	0.42303E-04	0.40288E+02	0.55992E+02	0.53877E+00
2015	0.75539E-01	0.37317E+00	-.29763E+00	0.45356E+00	0.42303E-04	0.50905E+02	0.68552E+02	0.47680E+00

Selectivities by age

Year 10

2012 1.000

2013 1.000

2014 1.000

5.3 JPN_LL_EastMed

Lognormal dist.
average numbers
Ages 6 - 10
log-likelihood = 18.85
deviance = 34.52
Chi-sq. discrepancy= 32.61

Year	Residuals		Q	Untransfrmd		Chi-square		
	Observed	Standard		(Obs-pred)	Deviation			
1975	0.36116E+00	0.41434E+00	-0.53187E-01	0.35645E+00	0.12873E-05	0.16150E+01	0.17032E+01	0.89574E-01
1976	0.48477E+00	0.39207E+00	0.92700E-01	0.35645E+00	0.12873E-05	0.18275E+01	0.16657E+01	0.64677E-02
1977	0.98060E+00	0.36913E+00	0.61147E+00	0.35645E+00	0.12873E-05	0.30005E+01	0.16279E+01	0.39300E+01
1978	0.12477E+00	0.36918E+00	-0.24442E+00	0.35645E+00	0.12873E-05	0.12750E+01	0.16280E+01	0.51851E+00
1979	0.71255E+00	0.37518E+00	0.33737E+00	0.35645E+00	0.12873E-05	0.22950E+01	0.16378E+01	0.73241E+00
1980	0.24403E+00	0.37087E+00	-0.12684E+00	0.35645E+00	0.12873E-05	0.14365E+01	0.16308E+01	0.22180E+00
1981	0.20788E+00	0.35867E+00	-0.15078E+00	0.35645E+00	0.12873E-05	0.13855E+01	0.16110E+01	0.27466E+00
1982	0.91927E+00	0.31760E+00	0.60167E+00	0.35645E+00	0.12873E-05	0.28220E+01	0.15462E+01	0.37504E+01
1983	0.47072E+00	0.25721E+00	0.21351E+00	0.35645E+00	0.12873E-05	0.18020E+01	0.14556E+01	0.19325E+00
1984	0.20173E+00	0.18743E+00	0.014302E-01	0.35645E+00	0.12873E-05	0.13770E+01	0.13574E+01	0.17030E-01
1985	0.27892E+00	0.11053E+00	0.16839E+00	0.35645E+00	0.12873E-05	0.14875E+01	0.12570E+01	0.90218E-01
1986	-0.30663E-02	0.47527E-01	-0.50594E-01	0.35645E+00	0.12873E-05	0.11220E+01	0.11802E+01	0.85856E-01
1987	0.48941E+00	0.80792E-02	0.48133E+00	0.35645E+00	0.12873E-05	0.18360E+01	0.11346E+01	0.19853E+01
1988	0.19407E-01	-0.23692E-01	0.43098E-01	0.35645E+00	0.12873E-05	0.11475E+01	0.10991E+01	0.30185E-02
1989	-0.23191E+00	-0.67686E-01	-0.16422E+00	0.35645E+00	0.12873E-05	0.89250E+00	0.10518E+01	0.30620E+00
1990	0.62892E-01	-0.10314E+00	0.16600E+00	0.35645E+00	0.12873E-05	0.11985E+01	0.10152E+01	0.85950E-01
1991	-0.90078E-01	-0.15401E+00	0.63928E-01	0.35645E+00	0.12873E-05	0.10285E+01	0.96481E+00	0.11808E-05
1992	-0.25114E+00	-0.22062E+00	-0.30518E-01	0.35645E+00	0.12873E-05	0.87550E+00	0.90263E+00	0.59463E-01
1993	-0.24148E+00	-0.23901E+00	-0.24666E-02	0.35645E+00	0.12873E-05	0.88400E+00	0.88618E+00	0.30105E-01
1994	-0.16737E+00	-0.27890E+00	0.161135E+00	0.35645E+00	0.12873E-05	0.95200E+00	0.85153E+00	0.17850E-01
1995	0.69959E-01	-0.34557E+00	0.41553E+00	0.35645E+00	0.12873E-05	0.12070E+01	0.79661E+00	0.13139E+01
1996	-0.97385E+00	-0.33343E+00	-0.64042E+00	0.35645E+00	0.12873E-05	0.42500E+00	0.80634E+00	0.18851E+01
1997	-0.91558E+00	-0.27222E+00	-0.64335E+00	0.35645E+00	0.12873E-05	0.45050E+00	0.85723E+00	0.18960E+01
1998	-0.62319E+00	-0.17115E+00	-0.45204E+00	0.35645E+00	0.12873E-05	0.60350E+00	0.94841E+00	0.11978E+01
1999	-0.72699E+00	-0.89321E-01	-0.63766E+00	0.35645E+00	0.12873E-05	0.54400E+00	0.10293E+01	0.18750E+01
2000	-0.58180E+00	-0.29417E-01	-0.55239E+00	0.35645E+00	0.12873E-05	0.62900E+00	0.10928E+01	0.15608E+01
2001	-0.32152E+00	-0.38727E-01	-0.28279E+00	0.35645E+00	0.12873E-05	0.81600E+00	0.10827E+01	0.63243E+00
2002	0.43714E+00	-0.56562E+00	0.49370E+00	0.35645E+00	0.12873E-05	0.17425E+01	0.10636E+01	0.21327E+01
2003	0.24993E+00	-0.60638E-01	0.31057E+00	0.35645E+00	0.12873E-05	0.14450E+01	0.10592E+01	0.57963E+00
2004	-0.47915E+00	-0.14633E+00	-0.33282E+00	0.35645E+00	0.12873E-05	0.69700E+00	0.97225E+00	0.79036E+00
2005	-0.40853E+00	-0.23636E+00	-0.17217E+00	0.35645E+00	0.12873E-05	0.74800E+00	0.88854E+00	0.32546E+00
2006	0.36641E+00	-0.30517E+00	-0.67158E+00	0.35645E+00	0.12873E-05	0.16235E+01	0.82945E+00	0.51690E+01
2007	-0.34257E+00	-0.30432E+00	-0.38250E-01	0.35645E+00	0.12873E-05	0.79900E+00	0.83015E+00	0.69120E-01
2008	-0.81847E-01	-0.18682E+00	0.10497E+00	0.35645E+00	0.12873E-05	0.10370E+01	0.93366E+00	0.13215E-01
2009	-0.24148E+00	0.85238E-01	-0.32672E+00	0.35645E+00	0.12873E-05	0.88400E+00	0.12256E+01	0.77058E+00

Selectivities by age

Year 6 7 8 9 10

1975	0.240	0.408	0.644	0.933	1.000
1976	0.240	0.408	0.644	0.933	1.000
1977	0.240	0.408	0.644	0.933	1.000
1978	0.240	0.408	0.644	0.933	1.000
1979	0.240	0.408	0.644	0.933	1.000
1980	0.240	0.408	0.644	0.933	1.000
1981	0.240	0.408	0.644	0.933	1.000
1982	0.240	0.408	0.644	0.933	1.000
1983	0.240	0.408	0.644	0.933	1.000
1984	0.240	0.408	0.644	0.933	1.000
1985	0.240	0.408	0.644	0.933	1.000
1986	0.240	0.408	0.644	0.933	1.000
1987	0.240	0.408	0.644	0.933	1.000
1988	0.240	0.408	0.644	0.933	1.000
1989	0.240	0.408	0.644	0.933	1.000
1990	0.240	0.408	0.644	0.933	1.000
1991	0.240	0.408	0.644	0.933	1.000
1992	0.240	0.408	0.644	0.933	1.000
1993	0.240	0.408	0.644	0.933	1.000
1994	0.240	0.408	0.644	0.933	1.000
1995	0.240	0.408	0.644	0.933	1.000
1996	0.240	0.408	0.644	0.933	1.000
1997	0.240	0.408	0.644	0.933	1.000
1998	0.240	0.408	0.644	0.933	1.000
1999	0.240	0.408	0.644	0.933	1.000
2000	0.240	0.408	0.644	0.933	1.000
2001	0.240	0.408	0.644	0.933	1.000
2002	0.240	0.408	0.644	0.933	1.000
2003	0.240	0.408	0.644	0.933	1.000
2004	0.240	0.408	0.644	0.933	1.000
2005	0.240	0.408	0.644	0.933	1.000
2006	0.240	0.408	0.644	0.933	1.000
2007	0.240	0.408	0.644	0.933	1.000
2008	0.240	0.408	0.644	0.933	1.000
2009	0.240	0.408	0.644	0.933	1.000

5.4 JPN_LL1_NEA

Lognormal dist.
month 1 numbers
Ages 4 - 10
log-likelihood = 10.88
deviance = 19.50
Chi-sq. discrepancy= 34.47

Year	Residuals		Standard	Q	Untransfrmd	Untransfrmd	Chi-square	
	Observed	Predicted	(Obs-pred)	Deviation	Catchabil.	Observed	Predicted	Discrepancy
1990	-75538E+00	-21854E+00	-53683E+00	0.35645E+00	0.97866E-06	0.38678E+00	0.66162E+00	0.15039E+01
1991	-62857E+00	-25325E+00	-37532E+00	0.35645E+00	0.97866E-06	0.43907E+00	0.63905E+00	0.93137E+00
1992	-12534E+00	-28888E+00	-0.16354E+00	0.35645E+00	0.97866E-06	0.72625E+00	0.61668E+00	0.81664E-01
1993	-29426E+00	-25198E+00	-42286E-01	0.35645E+00	0.97866E-06	0.61337E+00	0.63986E+00	0.74415E-01
1994	-66531E-01	-19183E+00	0.12530E+00	0.35645E+00	0.97866E-06	0.77024E+00	0.67953E+00	0.29972E-01
1995	-20207E-01	-16337E+00	0.14317E+00	0.35645E+00	0.97866E-06	0.80676E+00	0.69915E+00	0.50722E-01
1996	0.10531E+01	-61500E-01	0.11146E+01	0.35645E+00	0.97866E-06	0.23597E+01	0.77412E+00	0.25552E+02
1997	0.41898E+00	0.19900E-01	0.39908E+00	0.35645E+00	0.97866E-06	0.12516E+01	0.83977E+00	0.11734E+01
1998	-13107E-01	0.86231E-01	-21730E+00	0.35645E+00	0.97866E-06	0.72210E+00	0.89737E+00	0.44248E+00
1999	0.23134E+00	0.15068E+00	0.80654E-01	0.35645E+00	0.97866E-06	0.10375E+01	0.95711E+00	0.22023E-02
2000	-99712E-02	0.18083E+00	-19080E+00	0.35645E+00	0.97866E-06	0.81506E+00	0.98640E+00	0.37222E+00
2001	0.60977E+00	0.14983E+00	0.45994E+00	0.35645E+00	0.97866E-06	0.15148E+01	0.95629E+00	0.17469E+01
2002	-18782E+00	0.84179E-01	-27200E+00	0.35645E+00	0.97866E-06	0.68226E+00	0.89553E+00	0.59970E+00
2003	0.10077E+00	0.74905E-01	0.25867E-01	0.35645E+00	0.97866E-06	0.91051E+00	0.88726E+00	0.10084E-01
2004	-16141E+00	-11539E-02	-16026E+00	0.35645E+00	0.97866E-06	0.70052E+00	0.82228E+00	0.29676E+00
2005	-27816E+00	0.67931E-03	-27884E+00	0.35645E+00	0.97866E-06	0.62333E+00	0.82379E+00	0.62037E+00
2006	-17453E+00	0.37491E-01	-21202E+00	0.35645E+00	0.97866E-06	0.69139E+00	0.85468E+00	0.42815E+00
2007	-16141E+00	0.78604E-01	-24001E+00	0.35645E+00	0.97866E-06	0.70052E+00	0.89055E+00	0.50590E+00
2008	0.16776E+00	0.17140E+00	-36415E-02	0.35645E+00	0.97866E-06	0.97359E+00	0.97714E+00	0.31150E-01
2009	0.41299E+00	0.39579E+00	0.17205E-01	0.35645E+00	0.97866E-06	0.12442E+01	0.12229E+01	0.15125E-01

Selectivities by age

Year	4	5	6	7	8	9	10
1990	0.045	0.127	0.319	0.510	0.723	1.000	0.559
1991	0.045	0.127	0.319	0.510	0.723	1.000	0.559
1992	0.045	0.127	0.319	0.510	0.723	1.000	0.559
1993	0.045	0.127	0.319	0.510	0.723	1.000	0.559
1994	0.045	0.127	0.319	0.510	0.723	1.000	0.559
1995	0.045	0.127	0.319	0.510	0.723	1.000	0.559
1996	0.045	0.127	0.319	0.510	0.723	1.000	0.559
1997	0.045	0.127	0.319	0.510	0.723	1.000	0.559
1998	0.045	0.127	0.319	0.510	0.723	1.000	0.559
1999	0.045	0.127	0.319	0.510	0.723	1.000	0.559
2000	0.045	0.127	0.319	0.510	0.723	1.000	0.559
2001	0.045	0.127	0.319	0.510	0.723	1.000	0.559
2002	0.045	0.127	0.319	0.510	0.723	1.000	0.559
2003	0.045	0.127	0.319	0.510	0.723	1.000	0.559
2004	0.045	0.127	0.319	0.510	0.723	1.000	0.559
2005	0.045	0.127	0.319	0.510	0.723	1.000	0.559
2006	0.045	0.127	0.319	0.510	0.723	1.000	0.559
2007	0.045	0.127	0.319	0.510	0.723	1.000	0.559
2008	0.045	0.127	0.319	0.510	0.723	1.000	0.559
2009	0.045	0.127	0.319	0.510	0.723	1.000	0.559

5.5 JPN_LL2_NEA

Lognormal dist.
month 1 numbers
Ages 4 - 10
log-likelihood = 2.54
deviance = 7.30
Chi-sq. discrepancy= 5.69

Year	Residuals		Standard	Q	Untransfrmd	Untransfrmd	Chi-square	
	Observed	Predicted	(Obs-pred)	Deviation	Catchabil.	Observed	Predicted	Discrepancy
2010	-11854E+01	-50485E+00	-68054E+00	0.35645E+00	0.32067E-05	0.13554E+01	0.26769E+01	0.20331E+01
2011	-79529E-01	-25228E+00	0.17275E+00	0.35645E+00	0.32067E-05	0.40958E+01	0.34460E+01	0.98317E-01
2012	0.44662E+00	0.31042E-02	0.44351E+00	0.35645E+00	0.32067E-05	0.69318E+01	0.44487E+01	0.15773E+01
2013	-50802E-01	0.17091E+00	-22171E+00	0.35645E+00	0.32067E-05	0.42152E+01	0.52615E+01	0.45458E+00
2014	0.69883E+00	0.28421E+00	0.41462E+00	0.35645E+00	0.32067E-05	0.89203E+01	0.58927E+01	0.13059E+01
2015	0.17027E+00	0.29890E+00	-0.12863E+00	0.35645E+00	0.32067E-05	0.52581E+01	0.59799E+01	0.22559E+00

Selectivities by age

Year	4	5	6	7	8	9	10
2010	0.000	0.000	0.011	0.212	0.644	1.000	0.448
2011	0.000	0.000	0.011	0.212	0.644	1.000	0.448
2012	0.000	0.000	0.011	0.212	0.644	1.000	0.448
2013	0.000	0.000	0.011	0.212	0.644	1.000	0.448
2014	0.000	0.000	0.011	0.212	0.644	1.000	0.448
2015	0.000	0.000	0.011	0.212	0.644	1.000	0.448

5.6 SP_BB1

Lognormal dist.

average biomass
Ages 2 - 3
log-likelihood = 4.14
deviance = 37.82
Chi-sq. discrepancy= 26.37

Year	Residuals	Standard	Q	Untransfrmd	Untransfrmd	Chi-square		
	Observed	Predicted	(Obs-pred)	Deviation	Catchabil.	Observed	Predicted	Discrepancy
1968	-53165E+00	0.65398E-01	-59704E+00	0.55377E+00	0.45080E-04	0.41571E+03	0.75524E+03	0.77625E+00
1969	-21973E+00	-39403E+00	0.17430E+00	0.55377E+00	0.45080E-04	0.56788E+03	0.47704E+03	0.12517E-02
1970	-24621E+00	-67862E+00	0.43241E+00	0.55377E+00	0.45080E-04	0.55303E+03	0.35889E+03	0.28874E+00
1971	-21209E-01	-45783E+00	0.43662E+00	0.55377E+00	0.45080E-04	0.69258E+03	0.44756E+03	0.29885E+00
1972	-36961E+00	-13029E+00	-23931E+00	0.55377E+00	0.45080E-04	0.48884E+03	0.62101E+03	0.29383E+00
1973	-35076E+00	-10645E+00	0.55377E+00	0.45080E-04	0.49814E+03	0.55409E+03	0.14584E+00	
1974	-11314E+01	-33711E+00	-79425E+00	0.55377E+00	0.45080E-04	0.22821E+03	0.50498E+03	0.10447E+01
1975	-45166E+00	-33240E+00	-11927E+00	0.55377E+00	0.45080E-04	0.45032E+03	0.50737E+03	0.15863E+00
1976	-45202E+00	-26187E+00	0.55377E+00	0.45080E-04	0.45008E+03	0.43845E+03	0.39720E-01	
1977	-32873E+00	-36281E+00	0.34077E-01	0.55377E+00	0.45080E-04	0.50923E+03	0.49217E+03	0.35214E-01
1978	-75638E-01	-71386E+00	0.63822E+00	0.55377E+00	0.45080E-04	0.65589E+03	0.34646E+03	0.10849E+01
1979	-19964E+00	-91102E+00	0.71138E+00	0.55377E+00	0.45080E-04	0.57940E+03	0.28446E+03	0.15559E+01
1980	-18088E+00	-90807E+00	0.72719E+00	0.55377E+00	0.45080E-04	0.59037E+03	0.28531E+03	0.16740E+01
1981	-39850E+00	-69040E+00	0.29190E+00	0.55377E+00	0.45080E-04	0.47491E+03	0.35469E+03	0.61551E-01
1982	-41206E+00	-53113E+00	0.11907E+00	0.55377E+00	0.45080E-04	0.46852E+03	0.41592E+03	0.31613E-02
1983	-19623E+00	-39152E+00	0.19529E+00	0.55377E+00	0.45080E-04	0.58138E+03	0.47824E+03	0.51165E-02
1984	-82994E+00	-11210E+00	-71785E+00	0.55377E+00	0.45080E-04	0.30849E+03	0.62341E+03	0.94234E+00
1985	-39199E+00	-49782E+00	0.88981E+00	0.55377E+00	0.45080E-04	0.10469E+04	0.43001E+03	0.33019E-01
1986	-12519E-01	-38577E+00	0.37325E+00	0.55377E+00	0.45080E-04	0.69863E+03	0.48100E+03	0.16859E+00
1987	0.28195E+00	-26492E+00	0.54686E+00	0.55377E+00	0.45080E-04	0.93784E+03	0.54279E+03	0.64790E+00
1988	0.60622E+00	-33341E+00	0.93963E+00	0.55377E+00	0.45080E-04	0.12971E+04	0.50685E+03	0.39808E+01
1989	0.52478E+00	-57027E-01	0.58180E+00	0.55377E+00	0.45080E-04	0.11956E+04	0.66821E+03	0.79728E+00
1990	0.25997E+00	0.25436E+00	0.56120E+02	0.55377E+00	0.45080E-04	0.91745E+03	0.91232E+03	0.52548E-01
1991	0.16952E+00	0.33193E+00	-16241E+00	0.55377E+00	0.45080E-04	0.83812E+03	0.98591E+03	0.20426E+00
1992	-90062E-01	0.58226E+00	-67232E+00	0.55377E+00	0.45080E-04	0.64650E+03	0.12663E+04	0.88023E+00
1993	0.10124E+01	0.50181E+00	0.51060E+00	0.55377E+00	0.45080E-04	0.19470E+04	0.11685E+04	0.51382E+00
1994	0.28056E+00	0.81729E+00	-53674E+00	0.55377E+00	0.45080E-04	0.93654E+03	0.16019E+04	0.69232E+00
1995	0.48536E+00	0.78791E+00	-30255E+00	0.55377E+00	0.45080E-04	0.11494E+04	0.15555E+04	0.37349E+00
1996	0.82703E+00	0.60661E+00	0.22042E+00	0.55377E+00	0.45080E-04	0.16175E+04	0.12976E+04	0.13417E-01
1997	0.10829E+01	0.61835E+00	0.46454E+00	0.55377E+00	0.45080E-04	0.20892E+04	0.13129E+04	0.37137E+00
1998	0.14516E+00	0.40283E+00	-25767E+00	0.55377E+00	0.45080E-04	0.81794E+03	0.10583E+04	0.31648E+00
1999	-80594E+00	0.56869E+00	-13746E+01	0.55377E+00	0.45080E-04	0.31599E+03	0.12493E+04	0.17084E+01
2000	0.23319E+00	0.35775E+00	-12456E+00	0.55377E+00	0.45080E-04	0.89321E+03	0.10117E+04	0.16402E+00
2001	-76730E-01	0.26249E+00	-33922E+00	0.55377E+00	0.45080E-04	0.65518E+03	0.91977E+03	0.42151E+00
2002	-10126E+00	0.38935E+00	-49061E+00	0.55377E+00	0.45080E-04	0.63930E+03	0.10442E+04	0.62811E+00
2003	-53633E+00	0.59774E+00	-11341E+01	0.55377E+00	0.45080E-04	0.41377E+03	0.12861E+04	0.14606E+01
2004	0.46455E+00	0.62450E+00	-15995E+00	0.55377E+00	0.45080E-04	0.11257E+04	0.13210E+04	0.20156E+00
2005	0.11422E+01	0.72146E+00	0.42069E+00	0.55377E+00	0.45080E-04	0.22167E+04	0.14555E+04	0.26178E+00
2006	0.11114E+00	0.72210E+00	-61096E+00	0.55377E+00	0.45080E-04	0.79058E+03	0.14564E+04	0.79557E+00

Selectivities by age

Year	2	3
1968	1.000	0.340
1969	1.000	0.340
1970	1.000	0.340
1971	1.000	0.340
1972	1.000	0.340
1973	1.000	0.340
1974	1.000	0.340
1975	1.000	0.340
1976	1.000	0.340
1977	1.000	0.340
1978	1.000	0.340
1979	1.000	0.340
1980	1.000	0.340
1981	1.000	0.340
1982	1.000	0.340
1983	1.000	0.340
1984	1.000	0.340
1985	1.000	0.340
1986	1.000	0.340
1987	1.000	0.340
1988	1.000	0.340
1989	1.000	0.340
1990	1.000	0.340
1991	1.000	0.340
1992	1.000	0.340
1993	1.000	0.340
1994	1.000	0.340
1995	1.000	0.340
1996	1.000	0.340
1997	1.000	0.340
1998	1.000	0.340
1999	1.000	0.340
2000	1.000	0.340
2001	1.000	0.340
2002	1.000	0.340
2003	1.000	0.340
2004	1.000	0.340
2005	1.000	0.340
2006	1.000	0.340

5.7 SP_BB2

Lognormal dist.
average biomass
Ages 3 - 6
log-likelihood = 0.05
deviance = 9.35
Chi-sq. discrepancy= 4.61

Year	Residuals		Q	Untransfrmd		Chi-square		
	Observed	Predicted		(Obs-pred)	Deviation			
2007	0.26085E+00	0.36528E-01	0.22432E+00	0.55377E+00	0.20273E-04	0.20274E+04	0.16200E+04	0.15081E-01
2008	0.24886E+00	0.49254E-01	0.19961E+00	0.55377E+00	0.20273E-04	0.20032E+04	0.16407E+04	0.62514E-02
2009	-0.58586E+00	0.20543E+00	-0.79129E+00	0.55377E+00	0.20273E-04	0.86939E+03	0.19181E+04	0.10408E+01
2010	0.30844E+00	0.11180E+00	0.19663E+00	0.55377E+00	0.20273E-04	0.21262E+04	0.17467E+04	0.54565E-02
2011	0.54806E+00	-0.11192E+00	0.65998E+00	0.55377E+00	0.20273E-04	0.27019E+04	0.13965E+04	0.12127E+01
2012	0.32817E+00	-0.26033E+00	0.58850E+00	0.55377E+00	0.20273E-04	0.21686E+04	0.12039E+04	0.82832E+00
2013	-0.11191E+00	-0.18582E+00	0.73906E-01	0.55377E+00	0.20273E-04	0.13965E+04	0.12970E+04	0.16244E+01
2014	-0.99660E+00	0.15505E+00	-0.11517E+01	0.55377E+00	0.20273E-04	0.57654E+03	0.18239E+04	0.14801E+01

Selectivities by age

Year 3 4 5 6

2007	1.000	0.691	0.307	0.163
2008	1.000	0.691	0.307	0.163
2009	1.000	0.691	0.307	0.163
2010	1.000	0.691	0.307	0.163
2011	1.000	0.691	0.307	0.163
2012	1.000	0.691	0.307	0.163
2013	1.000	0.691	0.307	0.163
2014	1.000	0.691	0.307	0.163

5.8 FR_AER1

Lognormal dist.
average numbers
Ages 2 - 4
log-likelihood = 2.84
deviance = 4.00
Chi-sq. discrepancy= 4.88

Year	Residuals		Q	Untransfrmd		Chi-square		
	Observed	Predicted		(Obs-pred)	Deviation			
2000	0.51986E+00	0.19634E-01	0.50023E+00	0.29797E+00	0.39242E-08	0.20000E-01	0.12128E-01	0.35918E+01
2001	-0.17329E+00	-0.13801E-01	-0.15949E+00	0.29797E+00	0.39242E-08	0.10000E-01	0.11729E-01	0.36638E+00
2002	-0.17329E+00	-0.10644E+00	-0.66848E-01	0.29797E+00	0.39242E-08	0.10000E-01	0.10691E-01	0.11937E+00
2003	-0.17329E+00	0.10061E+00	-0.27389E+00	0.29797E+00	0.39242E-08	0.10000E-01	0.13151E-01	0.80038E+00

Selectivities by age

Year 2 3 4

2000	1.000	1.000	1.000
2001	1.000	1.000	1.000
2002	1.000	1.000	1.000
2003	1.000	1.000	1.000

5.9 FR_AER2

Lognormal dist.
average numbers
Ages 2 - 4
log-likelihood = 2.17
deviance = 5.94
Chi-sq. discrepancy= 6.84

Year	Residuals		Q	Untransfrmd		Chi-square		
	Observed	Predicted		(Obs-pred)	Deviation			
2009	-0.17358E+00	0.38365E-01	-0.21194E+00	0.42504E+00	0.15606E-07	0.60000E-01	0.74164E-01	0.34367E+00
2010	-0.57904E+00	-0.21579E+00	-0.36325E+00	0.42504E+00	0.15606E-07	0.40000E-01	0.57520E-01	0.67154E+00
2011	0.23189E+00	-0.50368E+00	0.73556E+00	0.42504E+00	0.15606E-07	0.90000E-01	0.43131E-01	0.41493E+01
2012	-0.57904E+00	-0.43938E+00	-0.13966E+00	0.42504E+00	0.15606E-07	0.40000E-01	0.45995E-01	0.21319E+00
2014	0.86788E+00	0.46911E+00	0.39877E+00	0.42504E+00	0.15606E-07	0.17000E+00	0.11409E+00	0.65923E+00
2015	0.23189E+00	0.65137E+00	-0.41948E+00	0.42504E+00	0.15606E-07	0.90000E-01	0.13690E+00	0.80557E+00

Selectivities by age

Year 2 3 4

2009	1.000	1.000	1.000
2010	1.000	1.000	1.000
2011	1.000	1.000	1.000
2012	1.000	1.000	1.000
2014	1.000	1.000	1.000
2015	1.000	1.000	1.000

5.10 WMED_LARV

Lognormal dist.
average biomass
Ages 3 - 10
log-likelihood = -0.06
deviance = 9.00
Chi-sq. discrepancy= 5.37

Year	Observed	Standard Predicted	Q (Obs-pred)	Residuals	Untransfrmd Deviation	Untransfrmd Catchabil.	Chi-square	Observed	Predicted	Discrepancy
2001	-83043E+00	-40546E+00	-42498E+00	0.61037E+00	0.69502E-07	0.54970E+01	0.84080E+01	0.46330E+00		
2002	-15201E+01	-41478E+00	-11053E+01	0.61037E+00	0.69502E-07	0.27580E+01	0.83299E+01	0.11649E+01		
2003	0.60692E-01	-44550E+00	0.50620E+00	0.61037E+00	0.69502E-07	0.13401E+02	0.80779E+01	0.31487E+00		
2004	-33453E+00	-54273E+00	0.20820E+00	0.61037E+00	0.69502E-07	0.90260E+01	0.73295E+01	0.10882E-02		
2005	-12646E+01	-53637E+00	-72823E+00	0.61037E+00	0.69502E-07	0.35610E+01	0.73763E+01	0.79556E+00		
2012	0.11802E+01	0.49237E+00	0.68781E+00	0.61037E+00	0.69502E-07	0.41051E+02	0.20635E+02	0.93951E+00		
2013	0.54879E+00	0.57599E+00	-2.7207E-01	0.61037E+00	0.69502E-07	0.21833E+02	0.22435E+02	0.81859E-01		
2014	0.70039E+00	0.61665E+00	0.83738E-01	0.61037E+00	0.69502E-07	0.25407E+02	0.23366E+02	0.21039E-01		
2015	0.14596E+01	0.65982E+00	0.79982E+00	0.61037E+00	0.69502E-07	0.54287E+02	0.24397E+02	0.15891E+01		

Selectivities by age

Year 3 4 5 6 7 8 9 10

2001	0.049	0.160	0.469	0.621	0.726	0.818	1.000	0.451
2002	0.049	0.160	0.469	0.621	0.726	0.818	1.000	0.451
2003	0.049	0.160	0.469	0.621	0.726	0.818	1.000	0.451
2004	0.049	0.160	0.469	0.621	0.726	0.818	1.000	0.451
2005	0.049	0.160	0.469	0.621	0.726	0.818	1.000	0.451
2012	0.049	0.160	0.469	0.621	0.726	0.818	1.000	0.451
2013	0.049	0.160	0.469	0.621	0.726	0.818	1.000	0.451
2014	0.049	0.160	0.469	0.621	0.726	0.818	1.000	0.451
2015	0.049	0.160	0.469	0.621	0.726	0.818	1.000	0.451

TOTAL NUMBER OF FUNCTION EVALUATIONS = 14799

Appendix D. VPA-2BOX results file for western-origin bluefin tuna

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*****
VPA-2BOX
SUMMARY STATISTICS AND DIAGNOSTIC OUTPUT
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BFT West 1974 to 2015 Population-of-origin
12:55, 25 August 2017

Total objective function = 25.69
(with constants) = 207.64
Number of parameters (P) = 34
Number of data points (D) = 198
AIC : 2*objective+2P = 483.28
AICc: 2*objective+2P(...)= 497.88
BIC : 2*objective+Plog(D)= 595.08
Chi-square discrepancy = 507.38

Loglikelihoods (deviance)= -21.74 (-347.29)
effort data = -29.01 (-361.82)

Log-posteriors = 0.00
catchability = 7.27
f-ratio = 0.00
natural mortality = 0.00
mixing coeff. = 0.00

Constraints = -3.95
terminal F = -3.95
stock-rec./sex ratio = 0.00

Out of bounds penalty = 0.00

TABLE 1. FISHING MORTALITY RATE FOR BFTW

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
1974	0.108	0.323	0.016	0.174	0.138	0.012	0.047	0.036	0.099	0.066	0.083	0.035	0.061	0.116	0.174	0.174
1975	0.137	0.595	0.045	0.314	0.148	0.017	0.007	0.027	0.065	0.105	0.080	0.087	0.131	0.097	0.112	0.112
1976	0.041	0.234	0.486	0.164	0.096	0.056	0.008	0.010	0.023	0.055	0.097	0.136	0.231	0.158	0.142	0.142
1977	0.009	0.163	0.118	0.298	0.434	0.123	0.149	0.051	0.058	0.033	0.052	0.076	0.164	0.222	0.219	0.219
1978	0.049	0.110	0.164	0.285	0.296	0.216	0.039	0.018	0.027	0.023	0.053	0.067	0.158	0.111	0.235	0.235
1979	0.016	0.068	0.187	0.286	0.436	0.078	0.098	0.071	0.039	0.036	0.091	0.183	0.274	0.232	0.240	0.240
1980	0.046	0.099	0.278	0.192	0.219	0.065	0.064	0.164	0.064	0.022	0.055	0.089	0.137	0.222	0.268	0.268
1981	0.090	0.095	0.399	0.023	0.244	0.118	0.081	0.098	0.144	0.104	0.088	0.179	0.222	0.250	0.306	0.306
1982	0.025	0.053	0.054	0.037	0.018	0.036	0.055	0.069	0.078	0.121	0.135	0.100	0.083	0.111	0.128	0.128
1983	0.124	0.049	0.044	0.045	0.042	0.059	0.071	0.097	0.107	0.098	0.125	0.136	0.159	0.218	0.207	0.207
1984	0.008	0.114	0.053	0.054	0.118	0.066	0.050	0.063	0.138	0.107	0.120	0.135	0.144	0.150	0.197	0.197
1985	0.010	0.089	0.114	0.108	0.137	0.188	0.146	0.053	0.047	0.075	0.111	0.178	0.188	0.203	0.193	0.193
1986	0.068	0.079	0.105	0.067	0.148	0.111	0.086	0.093	0.048	0.053	0.078	0.120	0.140	0.143	0.139	0.139
1987	0.018	0.165	0.127	0.120	0.160	0.132	0.089	0.089	0.079	0.064	0.115	0.110	0.154	0.115	0.115	0.115
1988	0.113	0.075	0.194	0.115	0.107	0.139	0.137	0.137	0.128	0.141	0.098	0.107	0.118	0.157	0.151	0.151
1989	0.064	0.096	0.099	0.036	0.083	0.031	0.063	0.110	0.126	0.148	0.147	0.118	0.088	0.132	0.116	0.116
1990	0.035	0.043	0.230	0.088	0.079	0.081	0.061	0.124	0.188	0.162	0.158	0.143	0.112	0.140	0.155	0.155
1991	0.027	0.068	0.236	0.058	0.076	0.058	0.086	0.122	0.190	0.183	0.189	0.161	0.145	0.131	0.090	0.090
1992	0.012	0.064	0.069	0.010	0.029	0.025	0.037	0.078	0.095	0.152	0.193	0.250	0.149	0.179	0.103	0.103
1993	0.022	0.135	0.077	0.102	0.058	0.017	0.064	0.086	0.184	0.124	0.126	0.118	0.147	0.158	0.125	0.125
1994	0.058	0.054	0.030	0.042	0.066	0.059	0.069	0.138	0.121	0.159	0.112	0.107	0.087	0.147	0.100	0.100
1995	0.070	0.069	0.087	0.077	0.084	0.095	0.044	0.065	0.157	0.144	0.118	0.091	0.092	0.130	0.156	0.156
1996	0.122	0.075	0.182	0.129	0.107	0.033	0.050	0.091	0.077	0.119	0.130	0.125	0.079	0.124	0.114	0.114
1997	0.147	0.096	0.161	0.119	0.078	0.062	0.052	0.113	0.117	0.067	0.109	0.148	0.132	0.139	0.096	0.096
1998	0.027	0.056	0.048	0.046	0.035	0.026	0.062	0.098	0.099	0.100	0.061	0.085	0.115	0.103	0.052	0.052
1999	0.003	0.007	0.019	0.051	0.054	0.063	0.065	0.101	0.144	0.190	0.155	0.095	0.087	0.123	0.102	0.102
2000	0.021	0.023	0.021	0.017	0.029	0.029	0.041	0.088	0.184	0.142	0.147	0.134	0.098	0.093	0.111	0.111
2001	0.008	0.079	0.044	0.078	0.071	0.074	0.063	0.113	0.140	0.158	0.183	0.182	0.134	0.106	0.087	0.087
2002	0.012	0.085	0.110	0.086	0.149	0.101	0.090	0.176	0.188	0.144	0.166	0.226	0.221	0.192	0.095	0.095
2003	0.003	0.027	0.053	0.101	0.084	0.068	0.043	0.123	0.205	0.167	0.099	0.132	0.180	0.214	0.093	0.093
2004	0.018	0.038	0.048	0.092	0.058	0.021	0.075	0.075	0.102	0.126	0.109	0.120	0.108	0.129	0.099	0.099
2005	0.073	0.039	0.036	0.046	0.033	0.034	0.065	0.093	0.133	0.122	0.166	0.174	0.135	0.116	0.108	0.108
2006	0.015	0.020	0.018	0.017	0.053	0.065	0.082	0.134	0.126	0.114	0.103	0.095	0.163	0.157	0.095	0.095
2007	0.013	0.027	0.046	0.148	0.047	0.075	0.076	0.098	0.092	0.065	0.073	0.073	0.088	0.121	0.100	0.100
2008	0.001	0.054	0.047	0.058	0.078	0.017	0.040	0.061	0.086	0.084	0.049	0.072	0.092	0.075	0.118	0.118
2009	0.000	0.023	0.042	0.039	0.036	0.137	0.048	0.067	0.111	0.089	0.077	0.066	0.118	0.087	0.103	0.103
2010	0.000	0.004	0.021	0.036	0.028	0.028	0.080	0.081	0.072	0.101	0.074	0.069	0.079	0.093	0.071	0.071
2011	0.000	0.003	0.008	0.088	0.043	0.029	0.019	0.068	0.035	0.035	0.055	0.061	0.060	0.050	0.058	0.058
2012	0.001	0.003	0.018	0.023	0.032	0.022	0.022	0.054	0.069	0.049	0.030	0.056	0.061	0.072	0.053	0.053
2013	0.000	0.002	0.007	0.025	0.008	0.032	0.027	0.070	0.067	0.057	0.046	0.035	0.048	0.055	0.057	0.057
2014	0.000	0.003	0.012	0.028	0.011	0.012	0.006	0.024	0.035	0.046	0.023	0.018	0.020	0.026	0.020	0.020
2015	0.000	0.001	0.009	0.022	0.015	0.011	0.014	0.061	0.047	0.051	0.058	0.037	0.031	0.037	0.039	0.039

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

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
1974	660856.	335427.	97341.	58420.	21387.	14210.	16398.	19725.	22277.	27950.	22572.	21556.	24026.	16088.	11266.	36799.

1975	346377.	405574.	179896.	75341.	40196.	15565.	11969.	13607.	16702.	17901.	23209.	18603.	18648.	20249.	12956.	36557.
1976	248902.	206611.	165675.	135286.	45050.	28966.	13045.	10328.	11633.	13882.	14297.	19191.	15279.	14651.	16635.	40059.
1977	208783.	163456.	121177.	80145.	94036.	34168.	23339.	11256.	8983.	10079.	11652.	11626.	15008.	10866.	11316.	44503.
1978	144268.	141475.	102832.	84718.	48712.	50890.	25749.	17477.	9394.	7520.	8651.	9909.	9653.	11413.	7877.	40554.
1979	181999.	93957.	93844.	68654.	52154.	30273.	34929.	21521.	15067.	8113.	6520.	7351.	8305.	7385.	9242.	34637.
1980	148875.	122532.	65041.	61240.	42209.	28164.	23854.	27526.	17602.	12858.	6938.	5335.	5483.	5656.	5301.	31219.
1981	136397.	97235.	82204.	38737.	41361.	28314.	22499.	19453.	20514.	14650.	11157.	5881.	4373.	4281.	4101.	25279.
1982	197334.	85257.	65530.	43410.	30986.	27055.	21436.	18032.	15485.	15747.	11714.	9156.	4407.	3139.	3016.	19571.
1983	222396.	131662.	59907.	48834.	34235.	25429.	22233.	17641.	14777.	12700.	12380.	9173.	7423.	3633.	2543.	17977.
1984	183663.	134379.	92896.	45097.	38205.	27432.	20425.	18011.	14061.	11778.	10211.	9790.	7170.	5671.	2643.	15089.
1985	175442.	124539.	88812.	69274.	34965.	28365.	21891.	16896.	14853.	10858.	9390.	8112.	7662.	5562.	4417.	13179.
1986	189676.	118803.	84395.	62352.	50913.	25474.	20028.	16441.	14066.	12565.	8934.	7530.	6084.	5689.	4107.	13123.
1987	184725.	121176.	81343.	59763.	47725.	36693.	19428.	15969.	13158.	11917.	10574.	7401.	5981.	4736.	4461.	13567.
1988	219335.	124119.	76100.	56343.	43409.	33982.	27394.	15459.	12831.	10580.	9767.	8888.	5907.	4799.	3673.	14536.
1989	208700.	134007.	85293.	49309.	41125.	32587.	25196.	20768.	11838.	10010.	8153.	7932.	7157.	4703.	3710.	14159.
1990	192227.	133858.	90162.	60761.	38951.	31600.	26922.	20576.	16339.	9258.	7657.	6308.	6317.	5872.	3729.	14403.
1991	145348.	126880.	94973.	56369.	45562.	30073.	24832.	22021.	15956.	12012.	6982.	5855.	4896.	5057.	4617.	14057.
1992	155781.	96757.	87792.	59005.	43568.	35257.	24171.	19817.	17110.	11700.	8872.	5179.	4464.	3792.	4012.	15437.
1993	126186.	105257.	67236.	64438.	47824.	35358.	29304.	20252.	16102.	13798.	8915.	6551.	3615.	3446.	2869.	15880.
1994	160488.	84447.	68103.	48978.	47665.	37714.	29637.	23888.	16322.	11877.	10809.	7040.	5215.	2795.	2661.	14966.
1995	201392.	103597.	59277.	51975.	38444.	37262.	30288.	24046.	18281.	12828.	8981.	8655.	5667.	4282.	2184.	14428.
1996	179735.	128453.	71610.	42743.	39412.	29522.	28873.	25189.	19781.	13856.	9855.	7152.	7079.	4630.	3400.	12858.
1997	143558.	108812.	88247.	46977.	30746.	29593.	24329.	23867.	20197.	16237.	10911.	7750.	5657.	5857.	3702.	13130.
1998	163813.	84729.	73202.	59095.	34131.	23752.	23709.	20078.	18727.	15937.	13471.	8766.	5988.	4443.	4610.	13831.
1999	130138.	108994.	59329.	54896.	45329.	27527.	19728.	19369.	15984.	15038.	12792.	11356.	7210.	4782.	3628.	15835.
2000	169856.	88689.	80189.	45801.	42710.	35867.	22035.	16074.	15369.	12271.	11034.	9812.	9254.	5922.	3825.	15909.
2001	187475.	113729.	64216.	61754.	36872.	34642.	29698.	18389.	12929.	11344.	9447.	8535.	7686.	7517.	4882.	15983.
2002	216415.	127208.	77855.	48340.	46753.	28694.	27411.	24234.	14417.	9968.	8587.	7048.	6373.	6019.	6116.	17309.
2003	248674.	146225.	86545.	54864.	36311.	33633.	22107.	21778.	17852.	10592.	7658.	6513.	5037.	4576.	4496.	19271.
2004	302202.	169586.	105493.	64540.	40594.	27877.	26766.	18402.	16904.	12894.	7953.	6216.	5113.	3770.	3341.	19592.
2005	166920.	202885.	120952.	79104.	48187.	32010.	23260.	21590.	14991.	13544.	10082.	6387.	4941.	4111.	2999.	18795.
2006	179212.	106131.	144573.	91774.	61851.	38952.	26363.	18942.	17282.	11636.	10628.	7654.	4810.	3867.	3311.	17698.
2007	126399.	120694.	77055.	111751.	73882.	48991.	31103.	21106.	14548.	13514.	9207.	8591.	6234.	3661.	2990.	17280.
2008	90780.	85306.	87032.	57867.	78904.	58899.	38739.	25062.	16802.	11766.	11232.	7665.	7155.	5112.	2934.	16590.
2009	214696.	62009.	59899.	65314.	44726.	60987.	49352.	32346.	20696.	13678.	9598.	9581.	6389.	5848.	4290.	15707.
2010	122646.	146798.	44895.	45198.	51427.	36053.	45336.	40886.	26554.	16430.	11101.	7959.	8034.	5086.	4853.	16319.
2011	79494.	83848.	108364.	34580.	35712.	41774.	29884.	36384.	33097.	21907.	13167.	9232.	6658.	6650.	4192.	17843.
2012	96356.	54362.	61902.	84588.	25938.	28575.	34583.	25480.	29851.	28346.	18753.	11168.	7783.	5618.	5722.	18809.
2013	231023.	65856.	40152.	47838.	67675.	20973.	23815.	29401.	21194.	24715.	23936.	16300.	9462.	6560.	4728.	21047.
2014	71542.	157980.	48675.	31365.	38209.	56077.	17316.	20145.	24066.	17586.	20701.	20488.	14093.	8079.	5617.	22038.
2015	5423.	48916.	116675.	37842.	24968.	31553.	47211.	14964.	17263.	20601.	14895.	18118.	18020.	12370.	7121.	24538.
2016	3708.	36207.	90929.	30305.	20554.	26588.	40475.	12366.	14610.	17369.	12592.	15637.	15642.	10788.	27557.	

TABLE 3. CATCH OF BFTW

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	
1974	56591.	80640.	1391.	8475.	2524.	152.	697.	660.	1975.	1681.	1711.	701.	1348.	1685.	1712.	5592.
1975	36975.	159512.	7042.	18511.	5061.	237.	83.	337.	990.	1680.	1693.	1467.	2174.	1776.	1306.	3685.
1976	8232.	37400.	57263.	18567.	3797.	1459.	91.	92.	253.	702.	1251.	2311.	2989.	2044.	2100.	5057.
1977	1587.	21381.	12013.	18808.	30498.	3658.	3025.	523.	475.	307.	560.	806.	2151.	2060.	2126.	8361.
1978	5729.	12820.	13875.	19138.	11461.	9175.	928.	298.	233.	159.	422.	605.	1336.	1142.	1574.	8104.
1979	2350.	5332.	14272.	16982.	2109.	3052.	1384.	537.	274.	535.	1167.	1890.	1456.	1883.	7057.	
1980	5573.	10019.	14122.	9748.	7631.	1629.	1380.	3912.	1023.	263.	353.	430.	667.	1072.	1188.	6997.
1981	9784.	7603.	24213.	807.	8240.	2924.	1641.	1707.	2604.	1360.	887.	912.	825.	904.	1032.	6362.
1982	4003.	3799.	3070.	1447.	497.	891.	1068.	1130.	1099.	1687.	1398.	824.	333.	313.	346.	2245.
1983	21628.	5419.	2293.	1969.	1275.	1350.	1415.	1528.	1412.	1120.	1376.	1109.	1037.	679.	454.	3210.
1984	1291.	12559.	4300.	2169.	3892.	1612.	924.	1029.	1716.	1124.	1096.	1173.	911.	752.	450.	2569.
1985	1430.	9193.	8507.	6436.	4096.	4504.	2785.	823.	647.	740.	933.	1252.	1244.	975.	740.	2208.
1986	10408.	7792.	17503.	3684.	6406.	2476.	1550.	1367.	594.	606.	638.	809.	756.	723.	508.	1623.
1987	2687.	16007.	8661.	6124.	6459.	4208.	1538.	1274.	1159.	853.	618.	765.	592.	645.	463.	1408.
1988	19518.	7778.	11974.	5551.	4029.	4087.	3276.	1857.	1457.	1310.	865.	852.	623.	665.	492.	1947.
1989	10804.	10653.	7172.	1573.	3017.	918.	1427.	2029.	1320.	1299.	1054.	835.	571.	554.	386.	1473.
1990	5573.	4893.	16525.	4639.	2700.	2275.	1487.	2258.	2639.	1308.	1064.	799.	637.	733.	509.	1966.
1991	3215.	7246.	17832.	2862.	3071.	1579.	1903.	2381.	2610.	1896.	1139.	826.	593.	380.	1157.	
1992	1552.	5231.	537.	1133.	803.	181.	1389.	1464.	1555.	1479.	1086.	586.	592.	373.	1435.	
1993	2247.	11554.	4428.	5647.	2448.	535.	1705.	1562.	2559.	1520.	1002.	692.	469.	481.	322.	1782.
1994	7500.	3834.	1806.	1834.	2797.	2007.	1847.	2882.	1753.	1652.	1088.	677.	413.	363.	242.	1361.
1995	11304.	6001.	4399.	3482.	2841.	3127.	1227.	1425.	2509.	1620.	946.	714.				

TABLE 4. SPAWNING STOCK FECUNDITY AND RECRUITMENT OF BFTW

year	spawning biomass	recruits from VPA
1974	44348.	660856.
1975	40822.	346377.
1976	38710.	248902.
1977	35454.	208783.
1978	32763.	144268.
1979	29716.	181999.
1980	27135.	148875.
1981	25035.	136397.
1982	23677.	197334.
1983	23012.	222396.
1984	22294.	183663.
1985	20277.	175442.
1986	21487.	189676.
1987	21660.	184725.
1988	21491.	219335.
1989	21605.	208700.
1990	21598.	192227.
1991	22233.	145348.
1992	22059.	155781.
1993	22606.	126186.
1994	22362.	160488.
1995	23453.	201392.
1996	23468.	179735.
1997	23558.	143558.
1998	24077.	163813.
1999	25119.	130138.
2000	24780.	169856.
2001	24828.	187475.
2002	23909.	216415.
2003	23733.	248674.
2004	23020.	302202.
2005	23345.	166920.
2006	24695.	179212.
2007	26416.	126399.
2008	29720.	90780.
2009	29718.	214696.
2010	30849.	122646.
2011	31467.	79494.
2012	33606.	96356.
2013	34803.	231023.
2014	36558.	71542.
2015	37923.	5423.

TABLE 5. FITS TO INDEX DATA FOR BFTW

5.1 CAN_Combined_RR						
Not used						
5.2 CAN_GSL_Acoustic						
Lognormal dist. average numbers Ages 8 - 16 log-likelihood = -14.11 deviance = 82.16 Chi-sq. discrepancy= 49.86						
Residuals Standard Q Untransfrmd Untransfrmd Chi-square Year Observed Predicted (Obs-pred) Deviation Catchabil. Observed Predicted Discrepancy						

1994	-35401E+00	-19851E+00	-15549E+00	0.29356E+00	0.52277E-06	0.20800E-01	0.24299E-01	0.36044E+00
1995	-85743E-01	-17260E+00	0.86854E-01	0.29356E+00	0.52277E-06	0.27200E-01	0.24937E-01	0.22238E+01
1996	0.27101E+00	-13415E+00	0.40516E+00	0.29356E+00	0.52277E-06	0.38860E-01	0.25915E-01	0.21151E+01
1997	-10243E+01	-89538E-01	-93480E+00	0.29356E+00	0.52277E-06	0.10640E-01	0.27097E-01	0.43250E+01
1998	-19539E+01	-60011E-01	-18939E+01	0.29356E+00	0.52277E-06	0.42000E-02	0.27909E-01	0.81388E+01
1999	-56755E-01	-55041E-01	-17148E-02	0.29356E+00	0.52277E-06	0.28000E-01	0.28048E-01	0.21330E-01
2000	-66766E+00	-94747E-01	-57292E+00	0.29356E+00	0.52277E-06	0.15200E-01	0.26956E-01	0.23501E+01
2001	-11856E-02	-12523E+00	0.12404E+00	0.29356E+00	0.52277E-06	0.29600E-01	0.26147E-01	0.79000E+01
2002	-61637E+00	-12884E+00	-48753E+00	0.29356E+00	0.52277E-06	0.16000E-01	0.26053E-01	0.18838E+01
2003	-28585E-01	-13195E+00	0.10336E+00	0.29356E+00	0.52277E-06	0.28800E-01	0.25972E-01	0.42890E-01
2004	0.25448E-01	-13676E+00	0.16224E+00	0.29356E+00	0.52277E-06	0.30400E-01	0.25847E-01	0.17792E+00
2005	0.31972E+00	-13227E+00	0.45199E+00	0.29356E+00	0.52277E-06	0.40800E-01	0.25963E-01	0.28355E+01
2006	0.51503E+00	-14079E+00	0.65582E+00	0.29356E+00	0.52277E-06	0.49600E-01	0.25743E-01	0.79424E+01
2007	0.12557E+00	-12621E+00	0.25178E+00	0.29356E+00	0.52277E-06	0.33600E-01	0.26121E-01	0.59835E+00
2008	-85743E-01	-81935E-01	-38076E-02	0.29356E+00	0.52277E-06	0.27200E-01	0.27304E-01	0.23321E-01
2009	0.43095E+00	-31966E-02	0.43414E+00	0.29356E+00	0.52277E-06	0.45600E-01	0.29541E-01	0.25445E+01
2010	0.56228E+00	0.11885E+00	0.44344E+00	0.29356E+00	0.52277E-06	0.52000E-01	0.33375E-01	0.26934E+01
2011	0.39523E+00	0.23818E+00	0.15705E+00	0.29356E+00	0.52277E-06	0.44000E-01	0.37605E-01	0.16190E+00

2012	0.10753E+01	0.30886E+00	0.76648E+00	0.29356E+00	0.52277E-06	0.86860E-01	0.40359E-01	0.12518E+02
2013	0.51986E+00	0.36094E+00	0.15891E+00	0.29356E+00	0.52277E-06	0.49840E-01	0.42517E-01	0.16756E+00
2014	0.12079E+00	0.38697E+00	-0.26618E+00	0.29356E+00	0.52277E-06	0.33440E-01	0.43638E-01	0.78627E+00
2015	0.51301E+00	0.39444E+00	0.11858E+00	0.29356E+00	0.52277E-06	0.49500E-01	0.43965E-01	0.68310E-01

Selectivities by age

Year	8	9	10	11	12	13	14	15	16
1994	0.257	0.433	0.545	0.583	0.588	0.611	0.653	0.717	1.000
1995	0.257	0.433	0.545	0.583	0.588	0.611	0.653	0.717	1.000
1996	0.257	0.433	0.545	0.583	0.588	0.611	0.653	0.717	1.000
1997	0.257	0.433	0.545	0.583	0.588	0.611	0.653	0.717	1.000
1998	0.257	0.433	0.545	0.583	0.588	0.611	0.653	0.717	1.000
1999	0.257	0.433	0.545	0.583	0.588	0.611	0.653	0.717	1.000
2000	0.257	0.433	0.545	0.583	0.588	0.611	0.653	0.717	1.000
2001	0.257	0.433	0.545	0.583	0.588	0.611	0.653	0.717	1.000
2002	0.257	0.433	0.545	0.583	0.588	0.611	0.653	0.717	1.000
2003	0.257	0.433	0.545	0.583	0.588	0.611	0.653	0.717	1.000
2004	0.257	0.433	0.545	0.583	0.588	0.611	0.653	0.717	1.000
2005	0.257	0.433	0.545	0.583	0.588	0.611	0.653	0.717	1.000
2006	0.257	0.433	0.545	0.583	0.588	0.611	0.653	0.717	1.000
2007	0.257	0.433	0.545	0.583	0.588	0.611	0.653	0.717	1.000
2008	0.257	0.433	0.545	0.583	0.588	0.611	0.653	0.717	1.000
2009	0.257	0.433	0.545	0.583	0.588	0.611	0.653	0.717	1.000
2010	0.257	0.433	0.545	0.583	0.588	0.611	0.653	0.717	1.000
2011	0.257	0.433	0.545	0.583	0.588	0.611	0.653	0.717	1.000
2012	0.257	0.433	0.545	0.583	0.588	0.611	0.653	0.717	1.000
2013	0.257	0.433	0.545	0.583	0.588	0.611	0.653	0.717	1.000
2014	0.257	0.433	0.545	0.583	0.588	0.611	0.653	0.717	1.000
2015	0.257	0.433	0.545	0.583	0.588	0.611	0.653	0.717	1.000

5.3 US_RR<145

Lognormal dist.
average numbers
Ages 1 - 5
log-likelihood = 3.26
deviance = 5.08
Chi-sq. discrepancy= 5.60

Year	Residuals	Standard	Q	Untransfrmd	Untransfrmd	Chi-square		
Year	Observed	Predicted	(Obs-pred)	Deviation	Catchabil.	Observed	Predicted	Discrepancy
1980	-0.14834E+00	-0.77914E-01	-0.70431E-01	0.62827E+00	0.53414E-05	0.60000E+00	0.64378E+00	0.11404E+00
1981	-0.84149E+00	-0.10743E+00	-0.73407E+00	0.68146E+00	0.53414E-05	0.30000E+00	0.62506E+00	0.64932E+00
1982	0.81674E+00	-0.12234E+00	0.93908E+00	0.57309E+00	0.53414E-05	0.15750E+01	0.61581E+00	0.35227E+01
1983	0.17916E+00	-0.14549E-01	0.19371E+00	0.53896E+00	0.53414E-05	0.83250E+00	0.68590E+00	0.73181E-02
1985	-0.38724E+00	0.13666E+00	-0.52389E+00	0.75390E+00	0.53414E-05	0.47250E+00	0.79786E+00	0.40141E+00
1986	-0.17366E+00	0.11435E+00	-0.28801E+00	0.62827E+00	0.53414E-05	0.58500E+00	0.78026E+00	0.30553E+00
1987	0.27365E+00	0.75587E-01	0.19806E+00	0.61113E+00	0.53414E-05	0.91500E+00	0.75059E+00	0.28635E-03
1988	0.64748E-01	0.053991E-01	0.59995E+00	0.53414E-05	0.74250E+00	0.73456E+00	0.55935E-01	
1989	0.64748E-01	0.13337E+00	-0.68622E-01	0.62827E+00	0.53414E-05	0.74250E+00	0.79524E+00	0.11270E+00
1990	-0.30562E-01	0.14382E+00	-0.17438E+00	0.57832E+00	0.53414E-05	0.67500E+00	0.80359E+00	0.21083E+00
1991	0.30591E+00	0.02570E+00	0.18021E+00	0.58362E+00	0.53414E-05	0.94500E+00	0.78916E+00	0.24409E-03
1992	-0.12365E+00	0.71948E-01	-0.19560E+00	0.62251E+00	0.53414E-05	0.61500E+00	0.74787E+00	0.21975E+00

Selectivities by age

Year	1	2	3	4	5
1980	0.100	0.376	1.000	0.269	0.171
1981	0.100	0.376	1.000	0.269	0.171
1982	0.100	0.376	1.000	0.269	0.171
1983	0.100	0.376	1.000	0.269	0.171
1985	0.100	0.376	1.000	0.269	0.171
1986	0.100	0.376	1.000	0.269	0.171
1987	0.100	0.376	1.000	0.269	0.171
1988	0.100	0.376	1.000	0.269	0.171
1989	0.100	0.376	1.000	0.269	0.171
1990	0.100	0.376	1.000	0.269	0.171
1991	0.100	0.376	1.000	0.269	0.171
1992	0.100	0.376	1.000	0.269	0.171

5.4 US_RR_66_114

Lognormal dist.
average numbers
Ages 2 - 4
log-likelihood = -2.48
deviance = 29.43
Chi-sq. discrepancy= 25.46

Year	Residuals	Standard	Q	Untransfrmd	Untransfrmd	Chi-square		
Year	Observed	Predicted	(Obs-pred)	Deviation	Catchabil.	Observed	Predicted	Discrepancy
1993	0.38466E+00	-0.14463E-01	0.39912E+00	0.58900E+00	0.52083E-05	0.87000E+00	0.58369E+00	0.15453E+00
1994	-0.10731E+01	-0.13927E+00	-0.93382E+00	0.63406E+00	0.52083E-05	0.20250E+00	0.51520E+00	0.93036E+00
1995	0.37600E+00	-0.15904E+00	0.53504E+00	0.57832E+00	0.52083E-05	0.86250E+00	0.50512E+00	0.49763E+00
1996	0.77273E+00	-0.15629E+00	0.92903E+00	0.59444E+00	0.52083E-05	0.12825E+01	0.50651E+00	0.29696E+01
1997	0.11405E+01	-0.48784E-01	0.11892E+01	0.56793E+00	0.52083E-05	0.18525E+01	0.56400E+00	0.84682E+01

1998 -27727E-01 -31389E-01 0.36616E-02 0.58900E+00 0.52083E-05 0.57600E+00 0.57389E+00 0.58808E-01
 1999 0.56554E+00 -10246E+00 0.66800E+00 0.62251E+00 0.52083E-05 0.10425E+01 0.53453E+00 0.77790E+00
 2000 0.22619E+00 -77176E-01 0.30336E+00 0.66948E+00 0.52083E-05 0.74250E+00 0.54821E+00 0.12033E-01
 2001 -49773E+00 -26389E-01 -47134E+00 0.57832E+00 0.52083E-05 0.36000E+00 0.57677E+00 0.56081E+00
 2002 0.70724E+00 -53013E-01 0.76025E+00 0.60551E+00 0.52083E-05 0.12012E+01 0.56162E+00 0.13757E+01
 2003 -63126E+00 0.80478E-01 -71174E+00 0.57309E+00 0.52083E-05 0.31500E+00 0.64182E+00 0.87584E+00
 2004 0.10735E+01 0.25804E+00 0.81545E+00 0.56287E+00 0.52083E-05 0.17325E+01 0.76653E+00 0.23157E+01
 2005 0.10516E+01 0.43900E+00 0.61260E+00 0.55789E+00 0.52083E-05 0.16950E+01 0.91859E+00 0.91913E+00
 2006 -0.25806E+00 0.51430E+00 -77236E+00 0.57309E+00 0.52083E-05 0.45750E+00 0.99042E+00 0.95092E+00
 2007 -54029E+00 0.34567E+00 -88596E+00 0.55789E+00 0.52083E-05 0.34500E+00 0.83673E+00 0.11469E+01
 2008 -78541E+00 0.37649E-01 -82306E+00 0.56793E+00 0.52083E-05 0.27000E+00 0.61491E+00 0.10305E+01
 2009 -78541E+00 -80016E-01 -70540E+00 0.56287E+00 0.52083E-05 0.27000E+00 0.54666E+00 0.89764E+00
 2010 -13657E+00 -22369E+00 0.87122E-01 0.56793E+00 0.52083E-05 0.51660E+00 0.47350E+00 0.13419E-01
 2011 0.17465E+00 -16733E-01 0.19138E+00 0.57832E+00 0.52083E-05 0.70520E+00 0.58237E+00 0.15048E-02
 2012 -68239E+00 0.81155E-01 -76354E+00 0.61113E+00 0.52083E-05 0.29930E+00 0.64226E+00 0.83091E+00
 2013 -27392E+00 -37156E+00 0.97639E-01 0.58362E+00 0.52083E-05 0.45030E+00 0.40841E+00 0.12106E-01
 2014 -21842E+00 -31575E+00 0.97333E-01 0.59444E+00 0.52083E-05 0.47600E+00 0.43185E+00 0.13729E-01
 2015 -56227E+00 0.17102E-01 -57937E+00 0.60551E+00 0.52083E-05 0.33750E+00 0.60241E+00 0.64287E+00

Selectivities by age

Year	2	3	4
1993	0.175	0.720	1.000
1994	0.175	0.720	1.000
1995	0.175	0.720	1.000
1996	0.175	0.720	1.000
1997	0.175	0.720	1.000
1998	0.175	0.720	1.000
1999	0.175	0.720	1.000
2000	0.175	0.720	1.000
2001	0.175	0.720	1.000
2002	0.175	0.720	1.000
2003	0.175	0.720	1.000
2004	0.175	0.720	1.000
2005	0.175	0.720	1.000
2006	0.175	0.720	1.000
2007	0.175	0.720	1.000
2008	0.175	0.720	1.000
2009	0.175	0.720	1.000
2010	0.175	0.720	1.000
2011	0.175	0.720	1.000
2012	0.175	0.720	1.000
2013	0.175	0.720	1.000
2014	0.175	0.720	1.000
2015	0.175	0.720	1.000

5.5 US_RR_115_144

Lognormal dist.
 average numbers
 Ages 4 - 6
 log-likelihood = 2.76
 deviance = 23.83
 Chi-sq. discrepancy= 21.90

Year	Residuals		Standard	Q	Untransfrmd	Untransfrmd	Chi-square	
	Observed	Predicted	(Obs-pred)	Deviation	Catchabil.	Observed	Predicted	Discrepancy
1993	0.27433E+00	0.10700E+00	0.16733E+00	0.51789E+00	0.10014E-04	0.82500E+00	0.69788E+00	0.37103E-02
1994	-10939E+01	0.26084E-01	-11200E+01	0.59995E+00	0.10014E-04	0.21000E+00	0.64364E+00	0.12215E+01
1995	-31527E+00	-10214E+00	-21314E+00	0.52185E+00	0.10014E-04	0.45750E+00	0.56618E+00	0.27768E+00
1996	-13569E+00	-17509E+00	0.39400E-01	0.52185E+00	0.10014E-04	0.54750E+00	0.52635E+00	0.27175E-01
1997	-13816E+01	-28687E+00	-10947E+01	0.58362E+00	0.10014E-04	0.15750E+00	0.47068E+00	0.12696E+01
1998	-71095E+00	-12615E+00	-58480E+00	0.50354E+00	0.10014E-04	0.30800E+00	0.55275E+00	0.89820E+00
1999	0.16506E-01	0.17697E-01	-11915E-02	0.56287E+00	0.10014E-04	0.63750E+00	0.63826E+00	0.58379E-01
2000	0.46420E+00	-52058E-01	0.51626E+00	0.60551E+00	0.10014E-04	0.99750E+00	0.59526E+00	0.35240E+00
2001	0.64276E+00	-62192E-01	0.70495E+00	0.51408E+00	0.10014E-04	0.11925E+01	0.58925E+00	0.19766E+01
2002	0.11543E+01	-36034E-01	0.11904E+01	0.53896E+00	0.10014E-04	0.19890E+01	0.60487E+00	0.10086E+02
2003	-28301E+00	-12538E+00	-15763E+00	0.49730E+00	0.10014E-04	0.47250E+00	0.55317E+00	0.21426E+00
2004	-31527E+00	0.18794E-02	-31715E+00	0.51041E+00	0.10014E-04	0.45750E+00	0.62824E+00	0.43721E+00
2005	-38309E+00	0.19980E+00	-58289E+00	0.50690E+00	0.10014E-04	0.42750E+00	0.76574E+00	0.88441E+00
2006	0.55059E+00	0.40763E+00	0.14296E+00	0.51041E+00	0.10014E-04	0.10875E+01	0.94263E+00	0.54858E-03
2007	0.67980E+00	0.57278E+00	0.10702E+00	0.49175E+00	0.10014E-04	0.12375E+01	0.11119E+01	0.69535E-03
2008	0.31005E+00	0.43514E+00	-12508E+00	0.50034E+00	0.10014E-04	0.85500E+00	0.96892E+00	0.17231E+00
2009	-51412E+00	0.11669E+00	-63082E+00	0.51408E+00	0.10014E-04	0.37500E+00	0.70468E+00	0.94168E+00
2010	0.45058E+00	0.67137E+01	0.38344E+00	0.50354E+00	0.10014E-04	0.98400E+00	0.67061E+00	0.29669E+00
2011	0.37415E+00	-25279E+00	0.62695E+00	0.51789E+00	0.10014E-04	0.91160E+00	0.48699E+00	0.13189E+01
2012	0.26532E+00	-66307E+01	0.33163E+00	0.52594E+00	0.10014E-04	0.81760E+00	0.58683E+00	0.14275E+00
2013	0.80196E+00	0.26988E+00	0.53208E+00	0.51408E+00	0.10014E-04	0.13983E+01	0.82134E+00	0.79937E+00
2014	0.19169E-01	-18935E+00	0.20852E+00	0.53896E+00	0.10014E-04	0.63920E+00	0.51889E+00	0.12662E-01
2015	-87080E+00	-44526E+00	-42554E+00	0.57309E+00	0.10014E-04	0.26250E+00	0.40173E+00	0.51057E+00

Selectivities by age

Year	4	5	6
1993	0.432	1.000	0.096
1994	0.432	1.000	0.096
1995	0.432	1.000	0.096
1996	0.432	1.000	0.096
1997	0.432	1.000	0.096
1998	0.432	1.000	0.096

1999	0.432	1.000	0.096
2000	0.432	1.000	0.096
2001	0.432	1.000	0.096
2002	0.432	1.000	0.096
2003	0.432	1.000	0.096
2004	0.432	1.000	0.096
2005	0.432	1.000	0.096
2006	0.432	1.000	0.096
2007	0.432	1.000	0.096
2008	0.432	1.000	0.096
2009	0.432	1.000	0.096
2010	0.432	1.000	0.096
2011	0.432	1.000	0.096
2012	0.432	1.000	0.096
2013	0.432	1.000	0.096
2014	0.432	1.000	0.096
2015	0.432	1.000	0.096

5.6 US_RR_145_177

Not used

5.7 US_RR>195

Lognormal dist.
average numbers
Ages 9 - 16
log-likelihood = 2.17
deviance = 7.95
Chi-sq. discrepancy= 12.36

Year	Residuals		Q	Untransfrmd		Chi-square		
	Observed	Predicted		(Obs-pred)	Deviation			
1983	0.11645E+01	0.20557E+00	0.95898E+00	0.42156E+00	0.19788E-04	0.21075E+01	0.80777E+00	0.98946E+01
1984	0.35451E+00	0.17936E+00	0.17515E+00	0.45081E+00	0.19788E-04	0.93750E+00	0.78688E+00	0.25836E-01
1985	-0.19460E-01	0.15325E+00	-0.17271E+00	0.50393E-00	0.19788E-04	0.64500E+00	0.76660E+00	0.23194E+00
1986	-0.56178E+00	0.13853E+00	-0.70032E+00	0.98018E+00	0.19788E-04	0.37500E+00	0.75540E+00	0.29756E+00
1987	-0.50352E+00	0.13881E+00	-0.64233E+00	0.61246E+00	0.19788E-04	0.39750E+00	0.75561E+00	0.69864E+00
1988	0.69488E-01	0.12208E+00	-0.52595E-01	0.53817E+00	0.19788E-04	0.70500E+00	0.74307E+00	0.95535E-01
1989	-0.14307E+00	0.90442E-01	-0.23352E+00	0.53817E+00	0.19788E-04	0.57000E+00	0.71993E+00	0.29537E+00
1990	-0.33067E+00	0.85023E-01	-0.41570E+00	0.52646E+00	0.19788E-04	0.47250E+00	0.71604E+00	0.56692E+00
1991	-0.67088E-01	0.68345E-01	-0.13543E+00	0.49320E+00	0.19788E-04	0.61500E+00	0.70419E+00	0.18658E+00
1992	0.37052E-01	0.56356E-01	-0.19304E-01	0.49320E+00	0.19788E-04	0.68250E+00	0.69580E+00	0.62742E-01

Selectivities by age
Year 9 10 11 12 13 14 15 16

Year	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992
9	0.297	0.297	0.297	0.297	0.297	0.297	0.297	0.297	0.297	0.297
10	0.409	0.409	0.409	0.409	0.409	0.409	0.409	0.409	0.409	0.409
11	0.571	0.571	0.571	0.571	0.571	0.571	0.571	0.571	0.571	0.571
12	0.693	0.693	0.693	0.693	0.693	0.693	0.693	0.693	0.693	0.693
13	0.726	0.726	0.726	0.726	0.726	0.726	0.726	0.726	0.726	0.726
14	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
15	0.970	0.970	0.970	0.970	0.970	0.970	0.970	0.970	0.970	0.970
16	0.668	0.668	0.668	0.668	0.668	0.668	0.668	0.668	0.668	0.668

5.8 US_RR>195_COMB

Not used

5.9 US_RR>177

Not used

5.10 JLL_AREA_2_(WEST)

Lognormal dist.
month 0 numbers
Ages 2 - 16
log-likelihood = 4.99
deviance = 40.92
Chi-sq. discrepancy= 24.99

Year	Residuals		Q	Untransfrmd		Chi-square		
	Observed	Predicted		(Obs-pred)	Deviation			
1976	-0.68419E+00	0.15489E+00	-0.83909E+00	0.52158E+00	0.20415E-05	0.12870E+00	0.29784E+00	0.12408E+01
1977	0.14088E+00	0.29680E+00	-0.15592E+00	0.46409E+00	0.20415E-05	0.29370E+00	0.34326E+00	0.22342E+00
1978	-0.57297E-01	0.26193E+00	-0.31923E+00	0.47644E+00	0.20415E-05	0.24090E+00	0.33150E+00	0.48421E+00
1979	0.58963E-01	0.22674E+00	-0.16778E+00	0.44621E+00	0.20415E-05	0.27060E+00	0.32003E+00	0.24978E+00
1980	0.59389E+00	0.13500E+00	0.45888E+00	0.44621E+00	0.20415E-05	0.46200E+00	0.29198E+00	0.84857E+00
1981	0.36177E+00	0.61580E-01	0.30019E+00	0.43478E+00	0.20415E-05	0.36630E+00	0.27131E+00	0.25060E+00
1982	0.89526E-02	-0.41264E-01	0.50216E-01	0.44044E+00	0.20415E-05	0.25740E+00	0.24479E+00	0.97558E-02

1983 -51911E+00 -36934E-01 -48218E+00 0.48272E+00 0.20415E-05 0.15180E+00 0.24586E+00 0.77333E+00
 1984 -14306E+00 -23512E-01 -11955E+00 0.45208E+00 0.20415E-05 0.22110E+00 0.24918E+00 0.17442E+00
 1985 0.71084E-01 -18615E-02 0.72946E-01 0.44044E+00 0.20415E-05 0.27390E+00 0.25463E+00 0.26373E-02
 1986 -43478E+01 0.94865E-02 -43572E+01 0.11611E+01 0.20415E-05 0.33000E-02 0.25754E+00 0.34628E+00
 1987 -73684E+00 0.55902E-01 -79274E+00 0.47644E+00 0.20415E-05 0.12210E+00 0.26977E+00 0.13938E+01
 1988 -79241E+00 0.67080E-01 -85949E+00 0.50192E+00 0.20415E-05 0.11550E+00 0.27281E+00 0.13710E+01
 1989 -11365E+00 0.54991E-01 -16864E+00 0.45804E+00 0.20415E-05 0.22770E+00 0.26953E+00 0.24535E+00
 1990 -47656E+00 0.86140E-01 -56270E+00 0.47023E+00 0.20415E-05 0.15840E+00 0.27805E+00 0.97005E+00
 1991 -25341E+00 0.93089E-01 -34650E+00 0.45804E+00 0.20415E-05 0.19800E+00 0.27999E+00 0.56531E+00
 1992 0.34359E+00 0.10406E+00 0.23953E+00 0.43478E+00 0.20415E-05 0.35970E+00 0.28308E+00 0.11703E+00
 1993 0.23721E+00 0.15904E+00 0.78174E-01 0.44044E+00 0.20415E-05 0.32340E+00 0.29908E+00 0.16236E-02
 1994 0.15205E+00 0.18126E+00 -29207E-01 0.44044E+00 0.20415E-05 0.29700E+00 0.30580E+00 0.65662E-01
 1995 -27022E+00 0.16539E+00 -43561E+00 0.48272E+00 0.20415E-05 0.19470E+00 0.30099E+00 0.68599E+00
 1996 0.10639E+01 0.12776E+00 0.93613E+00 0.44044E+00 0.20415E-05 0.73920E+00 0.28987E+00 0.80696E+01
 1997 0.75211E+00 0.76875E+00 0.67524E+00 0.43478E+00 0.20415E-05 0.54120E+00 0.27549E+00 0.29789E+01
 1998 -17023E-01 0.27476E-01 -44498E-01 0.45208E+00 0.20415E-05 0.25080E+00 0.26221E+00 0.82089E-01
 1999 0.38844E+00 0.41758E-01 0.34668E+00 0.43478E+00 0.20415E-05 0.37620E+00 0.26598E+00 0.39532E+00
 2000 0.37963E+00 0.61347E-01 0.31828E+00 0.44044E+00 0.20415E-05 0.37290E+00 0.27125E+00 0.28656E+00
 2001 0.17403E+00 0.98180E-01 0.75852E-01 0.44044E+00 0.20415E-05 0.30360E+00 0.28142E+00 0.20443E-02
 2002 0.89526E-02 0.11056E+00 -.10161E+00 0.44621E+00 0.20415E-05 0.25740E+00 0.28493E+00 0.15072E+00
 2003 0.46443E+00 0.72010E+01 0.39242E+00 0.45208E+00 0.20415E-05 0.40590E+00 0.27415E+00 0.50006E+00
 2004 0.36177E+00 0.82089E-01 0.27968E+00 0.45804E+00 0.20415E-05 0.36630E+00 0.27693E+00 0.15626E+00
 2005 0.24736E+00 0.15266E+00 0.94699E-01 0.43478E+00 0.20415E-05 0.32670E+00 0.29718E+00 0.15723E-06
 2006 0.68268E+00 0.26391E+00 0.41877E+00 0.45208E+00 0.20415E-05 0.50490E+00 0.33215E+00 0.61168E+00
 2007 0.24736E+00 0.38148E+00 -.13411E+00 0.52158E+00 0.20415E-05 0.32670E+00 0.37359E+00 0.17924E+00
 2008 0.56490E+00 0.46410E+00 0.10080E+00 0.55500E+00 0.20415E-05 0.44880E+00 0.40577E+00 0.74458E-02
 2009 0.11076E+01 0.48904E+00 0.61852E+00 0.48906E+00 0.20415E-05 0.77220E+00 0.41602E+00 0.15490E+01

Selectivities by age

Year	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
1976	0.009	0.051	0.163	0.515	0.863	1.000	0.965	0.729	0.407	0.345	0.246	0.234	0.200	0.188	0.227
1977	0.009	0.051	0.163	0.515	0.863	1.000	0.965	0.729	0.407	0.345	0.246	0.234	0.200	0.188	0.227
1978	0.009	0.051	0.163	0.515	0.863	1.000	0.965	0.729	0.407	0.345	0.246	0.234	0.200	0.188	0.227
1979	0.009	0.051	0.163	0.515	0.863	1.000	0.965	0.729	0.407	0.345	0.246	0.234	0.200	0.188	0.227
1980	0.009	0.051	0.163	0.515	0.863	1.000	0.965	0.729	0.407	0.345	0.246	0.234	0.200	0.188	0.227
1981	0.009	0.051	0.163	0.515	0.863	1.000	0.965	0.729	0.407	0.345	0.246	0.234	0.200	0.188	0.227
1982	0.009	0.051	0.163	0.515	0.863	1.000	0.965	0.729	0.407	0.345	0.246	0.234	0.200	0.188	0.227
1983	0.009	0.051	0.163	0.515	0.863	1.000	0.965	0.729	0.407	0.345	0.246	0.234	0.200	0.188	0.227
1984	0.009	0.051	0.163	0.515	0.863	1.000	0.965	0.729	0.407	0.345	0.246	0.234	0.200	0.188	0.227
1985	0.009	0.051	0.163	0.515	0.863	1.000	0.965	0.729	0.407	0.345	0.246	0.234	0.200	0.188	0.227
1986	0.009	0.051	0.163	0.515	0.863	1.000	0.965	0.729	0.407	0.345	0.246	0.234	0.200	0.188	0.227
1987	0.009	0.051	0.163	0.515	0.863	1.000	0.965	0.729	0.407	0.345	0.246	0.234	0.200	0.188	0.227
1988	0.009	0.051	0.163	0.515	0.863	1.000	0.965	0.729	0.407	0.345	0.246	0.234	0.200	0.188	0.227
1989	0.009	0.051	0.163	0.515	0.863	1.000	0.965	0.729	0.407	0.345	0.246	0.234	0.200	0.188	0.227
1990	0.009	0.051	0.163	0.515	0.863	1.000	0.965	0.729	0.407	0.345	0.246	0.234	0.200	0.188	0.227
1991	0.009	0.051	0.163	0.515	0.863	1.000	0.965	0.729	0.407	0.345	0.246	0.234	0.200	0.188	0.227
1992	0.009	0.051	0.163	0.515	0.863	1.000	0.965	0.729	0.407	0.345	0.246	0.234	0.200	0.188	0.227
1993	0.009	0.051	0.163	0.515	0.863	1.000	0.965	0.729	0.407	0.345	0.246	0.234	0.200	0.188	0.227
1994	0.009	0.051	0.163	0.515	0.863	1.000	0.965	0.729	0.407	0.345	0.246	0.234	0.200	0.188	0.227
1995	0.009	0.051	0.163	0.515	0.863	1.000	0.965	0.729	0.407	0.345	0.246	0.234	0.200	0.188	0.227
1996	0.009	0.051	0.163	0.515	0.863	1.000	0.965	0.729	0.407	0.345	0.246	0.234	0.200	0.188	0.227
1997	0.009	0.051	0.163	0.515	0.863	1.000	0.965	0.729	0.407	0.345	0.246	0.234	0.200	0.188	0.227
1998	0.009	0.051	0.163	0.515	0.863	1.000	0.965	0.729	0.407	0.345	0.246	0.234	0.200	0.188	0.227
1999	0.009	0.051	0.163	0.515	0.863	1.000	0.965	0.729	0.407	0.345	0.246	0.234	0.200	0.188	0.227
2000	0.009	0.051	0.163	0.515	0.863	1.000	0.965	0.729	0.407	0.345	0.246	0.234	0.200	0.188	0.227
2001	0.009	0.051	0.163	0.515	0.863	1.000	0.965	0.729	0.407	0.345	0.246	0.234	0.200	0.188	0.227
2002	0.009	0.051	0.163	0.515	0.863	1.000	0.965	0.729	0.407	0.345	0.246	0.234	0.200	0.188	0.227
2003	0.009	0.051	0.163	0.515	0.863	1.000	0.965	0.729	0.407	0.345	0.246	0.234	0.200	0.188	0.227
2004	0.009	0.051	0.163	0.515	0.863	1.000	0.965	0.729	0.407	0.345	0.246	0.234	0.200	0.188	0.227
2005	0.009	0.051	0.163	0.515	0.863	1.000	0.965	0.729	0.407	0.345	0.246	0.234	0.200	0.188	0.227
2006	0.009	0.051	0.163	0.515	0.863	1.000	0.965	0.729	0.407	0.345	0.246	0.234	0.200	0.188	0.227
2007	0.009	0.051	0.163	0.515	0.863	1.000	0.965	0.729	0.407	0.345	0.246	0.234	0.200	0.188	0.227
2008	0.009	0.051	0.163	0.515	0.863	1.000	0.965	0.729	0.407	0.345	0.246	0.234	0.200	0.188	0.227
2009	0.009	0.051	0.163	0.515	0.863	1.000	0.965	0.729	0.407	0.345	0.246	0.234	0.200	0.188	0.227

5.11 JLL_AREA_3_(31+32)

Not used

5.12 JLL.Areas_17+18

Not used

5.13 LARVAL_ZERO_INFATED

Lognormal dist.

average biomass

Ages 8 - 16

log-likelihood = -32.92

deviance = 128.90

Chi-sq. discrepancy= 329.98

Year	Residuals	Standard	Q	Untransfrmd	Untransfrmd	Chi-square		
Year	Observed	Predicted	(Obs-pred)	Deviation	Catchabil.	Observed	Predicted	Discrepancy
1977	0.15853E+01	0.78825E+00	0.79704E+00	0.45535E+00	0.59481E-07	0.24200E+01	0.10906E+01	0.43441E+01
1978	0.22341E+01	0.64649E+00	0.15876E+01	0.22704E+00	0.59481E-07	0.46300E+01	0.94646E+00	0.26831E+03
1981	0.84128E+00	0.12520E+00	0.71608E+00	0.71026E+00	0.59481E-07	0.11500E+01	0.56197E+00	0.53087E+00

1982 0.10090E+01 -1.2897E-04 0.10090E+01 0.94446E+00 0.59481E-07 0.13600E+01 0.49583E+00 0.39686E+00
 1983 0.59616E+00 -2.3918E-01 0.62007E+00 0.84448E+00 0.59481E-07 0.90000E+00 0.48411E+00 0.87360E-01
 1984 -.46967E+00 -.59339E-01 -.41033E+00 0.31223E+00 0.59481E-07 0.31000E+00 0.46727E+00 0.13234E+01
 1986 -.37729E+00 -.13555E+00 -.24175E+00 0.40306E+00 0.59481E-07 0.34000E+00 0.43298E+00 0.43186E+00
 1987 -.46967E+00 -.12529E+00 -.34438E+00 0.43811E+00 0.59481E-07 0.31000E+00 0.43745E+00 0.5958E+00
 1988 0.82373E+00 -.12687E+00 0.95060E+00 0.31223E+00 0.59481E-07 0.11300E+01 0.43675E+00 0.20936E+02
 1989 0.34484E+00 -.11923E+00 0.46407E+00 0.34909E+00 0.59481E-07 0.70000E+00 0.44010E+00 0.19022E+01
 1990 -.37729E+00 -.14054E+00 -.23676E+00 0.33994E+00 0.59481E-07 0.34000E+00 0.43083E+00 0.53133E+00
 1991 -.46967E+00 -.14508E+00 -.32459E+00 0.53041E+00 0.59481E-07 0.31000E+00 0.42887E+00 0.42598E+00
 1992 -.14245E+00 -.17363E+00 0.31173E-01 0.33075E+00 0.59481E-07 0.43000E+00 0.41680E+00 0.46755E-02
 1993 -.53506E-01 -.20425E+00 0.15074E+00 0.60132E+00 0.59481E-07 0.47000E+00 0.40423E+00 0.20121E-02
 1994 0.66638E-01 -.20276E+00 0.26940E+00 0.33075E+00 0.59481E-07 0.53000E+00 0.40483E+00 0.49617E+00
 1995 -.76816E+00 -.17175E+00 -.59641E+00 0.50585E+00 0.59481E-07 0.23000E+00 0.41759E+00 0.91083E+00
 1996 0.45306E+00 -.13869E+00 0.59175E+00 0.46389E+00 0.59481E-07 0.78000E+00 0.43162E+00 0.16155E+01
 1997 -.37729E+00 -.11384E+00 -.26346E+00 0.36726E+00 0.59481E-07 0.34000E+00 0.44248E+00 0.54963E+00
 1998 -.15058E+01 -.49625E-01 -.14561E+01 0.50585E+00 0.59481E-07 0.11000E+00 0.47183E+00 0.21667E+01
 1999 -.75012E-01 0.44048E-01 -.11906E+00 0.48082E+00 0.59481E-07 0.46000E+00 0.51816E+00 0.16819E+00
 2000 -.72560E+00 0.10062E+00 0.28622E+00 0.48082E+00 0.59481E-07 0.24000E+00 0.54832E+00 0.14310E+01
 2001 -.11946E+00 0.91349E-01 -.21081E+00 0.31223E+00 0.59481E-07 0.44000E+00 0.54326E+00 0.51037E+00
 2002 -.72560E+00 0.70897E-01 -.79650E+00 0.57032E+00 0.59481E-07 0.24000E+00 0.53226E+00 0.98962E+00
 2003 0.44015E+00 0.89665E-02 0.43119E+00 0.37628E+00 0.59481E-07 0.77000E+00 0.50030E+00 0.12377E+01
 2004 0.83692E-02 -.26631E-01 0.35000E-01 0.60894E+00 0.59481E-07 0.50000E+00 0.48280E+00 0.43437E-01
 2005 -.10133E+01 -.45720E-01 -.96756E+00 0.28417E+00 0.59481E-07 0.18000E+00 0.47367E+00 0.47950E+01
 2006 0.83692E-02 -.56099E-01 0.64468E+00 0.33994E+00 0.59481E-07 0.50000E+00 0.46878E+00 0.36772E-03
 2007 -.75012E-01 -.24107E-01 -.50905E-01 0.36726E+00 0.59481E-07 0.46000E+00 0.48402E+00 0.86268E-01
 2008 -.43792E+00 0.12174E-01 -.45009E+00 0.36726E+00 0.59481E-07 0.32000E+00 0.50191E+00 0.11304E+01
 2009 0.17388E+00 0.26897E-01 0.14699E+00 0.31223E+00 0.59481E-07 0.59000E+00 0.50935E+00 0.10407E-00
 2010 -.37729E+00 0.78527E-01 -.45582E+00 0.48082E+00 0.59481E-07 0.34000E+00 0.53634E+00 0.72843E+00
 2011 0.74074E+00 0.13989E+00 0.60085E+00 0.37628E+00 0.59481E-07 0.10400E+01 0.57028E+00 0.32126E+01
 2012 -.57145E+00 0.25303E+00 -.82448E+00 0.44675E+00 0.59481E-07 0.28000E+00 0.63860E+00 0.16470E+01
 2013 0.69147E+00 0.36557E+00 0.32589E+00 0.33075E+00 0.59481E-07 0.99000E+00 0.71466E+00 0.83956E+00
 2014 -.64556E+00 0.51560E+00 -.11612E+01 0.35820E+00 0.59481E-07 0.26000E+00 0.83034E+00 0.36443E+01
 2015 -.24009E+00 0.65084E+00 -.89093E+00 0.30292E+00 0.59481E-07 0.39000E+00 0.95058E+00 0.38482E+01

Selectivities by age																
Year	8	9	10	11	12	13	14	15	16							
1977	0.027	0.057	0.113	0.204	0.397	0.774	0.777	1.000	0.756							
1978	0.027	0.057	0.113	0.204	0.397	0.774	0.777	1.000	0.756							
1981	0.027	0.057	0.113	0.204	0.397	0.774	0.777	1.000	0.756							
1982	0.027	0.057	0.113	0.204	0.397	0.774	0.777	1.000	0.756							
1983	0.027	0.057	0.113	0.204	0.397	0.774	0.777	1.000	0.756							
1984	0.027	0.057	0.113	0.204	0.397	0.774	0.777	1.000	0.756							
1986	0.027	0.057	0.113	0.204	0.397	0.774	0.777	1.000	0.756							
1987	0.027	0.057	0.113	0.204	0.397	0.774	0.777	1.000	0.756							
1988	0.027	0.057	0.113	0.204	0.397	0.774	0.777	1.000	0.756							
1989	0.027	0.057	0.113	0.204	0.397	0.774	0.777	1.000	0.756							
1990	0.027	0.057	0.113	0.204	0.397	0.774	0.777	1.000	0.756							
1991	0.027	0.057	0.113	0.204	0.397	0.774	0.777	1.000	0.756							
1992	0.027	0.057	0.113	0.204	0.397	0.774	0.777	1.000	0.756							
1993	0.027	0.057	0.113	0.204	0.397	0.774	0.777	1.000	0.756							
1994	0.027	0.057	0.113	0.204	0.397	0.774	0.777	1.000	0.756							
1995	0.027	0.057	0.113	0.204	0.397	0.774	0.777	1.000	0.756							
1996	0.027	0.057	0.113	0.204	0.397	0.774	0.777	1.000	0.756							
1997	0.027	0.057	0.113	0.204	0.397	0.774	0.777	1.000	0.756							
1998	0.027	0.057	0.113	0.204	0.397	0.774	0.777	1.000	0.756							
1999	0.027	0.057	0.113	0.204	0.397	0.774	0.777	1.000	0.756							
2000	0.027	0.057	0.113	0.204	0.397	0.774	0.777	1.000	0.756							
2001	0.027	0.057	0.113	0.204	0.397	0.774	0.777	1.000	0.756							
2002	0.027	0.057	0.113	0.204	0.397	0.774	0.777	1.000	0.756							
2003	0.027	0.057	0.113	0.204	0.397	0.774	0.777	1.000	0.756							
2004	0.027	0.057	0.113	0.204	0.397	0.774	0.777	1.000	0.756							
2005	0.027	0.057	0.113	0.204	0.397	0.774	0.777	1.000	0.756							
2006	0.027	0.057	0.113	0.204	0.397	0.774	0.777	1.000	0.756							
2007	0.027	0.057	0.113	0.204	0.397	0.774	0.777	1.000	0.756							
2008	0.027	0.057	0.113	0.204	0.397	0.774	0.777	1.000	0.756							
2009	0.027	0.057	0.113	0.204	0.397	0.774	0.777	1.000	0.756							
2010	0.027	0.057	0.113	0.204	0.397	0.774	0.777	1.000	0.756							
2011	0.027	0.057	0.113	0.204	0.397	0.774	0.777	1.000	0.756							
2012	0.027	0.057	0.113	0.204	0.397	0.774	0.777	1.000	0.756							
2013	0.027	0.057	0.113	0.204	0.397	0.774	0.777	1.000	0.756							
2014	0.027	0.057	0.113	0.204	0.397	0.774	0.777	1.000	0.756							
2015	0.027	0.057	0.113	0.204	0.397	0.774	0.777	1.000	0.756							

5.14 GOM_PLL_1-6

Lognormal dist.
 month 0 numbers
 Ages 8 - 16
 log-likelihood = 5.58
 deviance = 23.73
 Chi-sq. discrepancy= 23.22

Year	Residuals		Standard		Q		Untransfrmd		Untransfrmd		Chi-square		Discrepancy
	Observed	Predicted	(Obs-pred)	Deviation	Catchabil.	Observed	Predicted						
1992	0.27464E+00	-0.22686E+00	0.50150E+00	0.46703E+00	0.23442E-04	0.11400E+01	0.69041E+00	0.94765E+00					
1993	-0.30268E+00	-0.22951E+00	-0.73172E-01	0.47373E+00	0.23442E-04	0.64000E+00	0.68859E+00	0.11381E+00					
1994	-0.61141E+00	-0.19596E+00	-0.41545E+00	0.49411E+00	0.23442E-04	0.47000E+00	0.71207E+00	0.62523E+00					
1995	-0.67737E+00	-0.12573E+00	-0.55164E+00	0.49411E+00	0.23442E-04	0.44000E+00	0.76388E+00	0.86893E+00					
1996	-1.2035E+01	-0.59819E-01	-0.11436E+01	0.50098E+00	0.23442E-04	0.26000E+00	0.81593E+00	0.18117E+01					

1997 -.63292E+00 -.20420E-01 -.61250E+00 0.47373E+00 0.23442E-04 0.46000E+00 0.84872E+00 0.10564E+01
 1998 -.54954E+00 -.13817E-01 -.53572E+00 0.48048E+00 0.23442E-04 0.50000E+00 0.85434E+00 0.88190E+00
 1999 -.18910E-01 0.32132E-01 -.51042E-01 0.45379E+00 0.23442E-04 0.85000E+00 0.89451E+00 0.89094E-01
 2000 0.35872E+00 0.36552E-01 0.32217E+00 0.45379E+00 0.23442E-04 0.12400E+01 0.89847E+00 0.26270E+00
 2001 -.19888E+00 0.41572E-02 -.20304E+00 0.48728E+00 0.23442E-04 0.71000E+00 0.86983E+00 0.28245E+00
 2002 -.27191E+00 -.55775E-01 -.21613E+00 0.49411E+00 0.23442E-04 0.66000E+00 0.81923E+00 0.29776E+00
 2003 0.31756E+00 -.13775E+00 0.45532E+00 0.44727E+00 0.23442E-04 0.11900E+01 0.75475E+00 0.82176E+00
 2004 0.22057E+00 -.15647E+00 0.37704E+00 0.44727E+00 0.23442E-04 0.10800E+01 0.74076E+00 0.46006E+00
 2005 -.54842E-01 -.13255E+00 0.77712E-01 0.46038E+00 0.23442E-04 0.82000E+00 0.75869E+00 0.32893E-02
 2006 -.40112E+00 -.15283E+00 -.24828E+00 0.49411E+00 0.23442E-04 0.58000E+00 0.74346E+00 0.34643E+00
 2007 -.10485E+00 -.10054E+00 -.43094E-02 0.48728E+00 0.23442E-04 0.78000E+00 0.78337E+00 0.50003E-01
 2008 0.72022E+00 -.42042E-01 0.76226E+00 0.45379E+00 0.23442E-04 0.17800E+01 0.83056E+00 0.38105E+01
 2009 0.52205E+00 0.37620E-01 0.48443E+00 0.46703E+00 0.23442E-04 0.14600E+01 0.89943E+00 0.85137E+00
 2010 0.34246E+00 0.14363E+00 0.19883E+00 0.46038E+00 0.23442E-04 0.12200E+01 0.10000E+01 0.40106E-01
 2011 0.22979E+00 0.23631E+00 0.65193E-02 0.55668E+00 0.23442E-04 0.10900E+01 0.10971E+01 0.61199E-01
 2012 0.13644E+01 0.33854E+00 0.10259E+01 0.48048E+00 0.23442E-04 0.33900E+01 0.12152E+01 0.84974E+01
 2013 0.35062E+00 0.41257E+00 -.61947E-01 0.51480E+00 0.23442E-04 0.12300E+01 0.13086E+01 0.10291E+00
 2014 0.16341E+00 0.47616E+00 -.31275E+00 0.52871E+00 0.23442E-04 0.10200E+01 0.13945E+01 0.41077E+00
 2015 0.16341E+00 0.57389E+00 -.41048E+00 0.54968E+00 0.23442E-04 0.10200E+01 0.15377E+01 0.52337E+00

Selectivities by age

Year	8	9	10	11	12	13	14	15	16
1992	0.117	0.143	0.460	0.284	0.450	1.000	0.825	0.509	0.313
1993	0.117	0.143	0.460	0.284	0.450	1.000	0.825	0.509	0.313
1994	0.117	0.143	0.460	0.284	0.450	1.000	0.825	0.509	0.313
1995	0.117	0.143	0.460	0.284	0.450	1.000	0.825	0.509	0.313
1996	0.117	0.143	0.460	0.284	0.450	1.000	0.825	0.509	0.313
1997	0.117	0.143	0.460	0.284	0.450	1.000	0.825	0.509	0.313
1998	0.117	0.143	0.460	0.284	0.450	1.000	0.825	0.509	0.313
1999	0.117	0.143	0.460	0.284	0.450	1.000	0.825	0.509	0.313
2000	0.117	0.143	0.460	0.284	0.450	1.000	0.825	0.509	0.313
2001	0.117	0.143	0.460	0.284	0.450	1.000	0.825	0.509	0.313
2002	0.117	0.143	0.460	0.284	0.450	1.000	0.825	0.509	0.313
2003	0.117	0.143	0.460	0.284	0.450	1.000	0.825	0.509	0.313
2004	0.117	0.143	0.460	0.284	0.450	1.000	0.825	0.509	0.313
2005	0.117	0.143	0.460	0.284	0.450	1.000	0.825	0.509	0.313
2006	0.117	0.143	0.460	0.284	0.450	1.000	0.825	0.509	0.313
2007	0.117	0.143	0.460	0.284	0.450	1.000	0.825	0.509	0.313
2008	0.117	0.143	0.460	0.284	0.450	1.000	0.825	0.509	0.313
2009	0.117	0.143	0.460	0.284	0.450	1.000	0.825	0.509	0.313
2010	0.117	0.143	0.460	0.284	0.450	1.000	0.825	0.509	0.313
2011	0.117	0.143	0.460	0.284	0.450	1.000	0.825	0.509	0.313
2012	0.117	0.143	0.460	0.284	0.450	1.000	0.825	0.509	0.313
2013	0.117	0.143	0.460	0.284	0.450	1.000	0.825	0.509	0.313
2014	0.117	0.143	0.460	0.284	0.450	1.000	0.825	0.509	0.313
2015	0.117	0.143	0.460	0.284	0.450	1.000	0.825	0.509	0.313

5.15 JLL_GOM

Lognormal dist.
 month 0 numbers
 Ages 8 - 16
 log-likelihood = 2.02
 deviance = 9.67
 Chi-sq. discrepancy= 8.96

Year	Residuals		Q	Untransfrmd		Chi-square
	Observed	Predicted		(Obs-pred)	Deviation	
1974	0.15488E+00	0.32605E+00	-17117E+00	0.44044E+00	0.11954E-04	0.97000E+00
1975	-.44954E+00	0.29398E+00	-74352E+00	0.40838E+00	0.11954E-04	0.53000E+00
1976	-.21514E+00	0.24583E+00	-46097E+00	0.40838E+00	0.11954E-04	0.67000E+00
1977	0.91031E-01	0.11928E+00	-28253E-01	0.41339E+00	0.11954E-04	0.91000E+00
1978	0.57508E-01	0.11108E+00	-41853E+00	0.11954E-04	0.88000E+00	0.78748E+00
1979	0.43998E+00	-19658E+00	0.63656E+00	0.44621E+00	0.11954E-04	0.12900E+01
1980	0.33376E+00	-39490E+00	0.72866E+00	0.44044E+00	0.11954E-04	0.11600E+01
1981	-.41250E+00	-53397E+00	0.12147E+00	0.42382E+00	0.11954E-04	0.55000E+00

Selectivities by age

Year	8	9	10	11	12	13	14	15	16
1974	0.029	0.084	0.132	0.276	0.508	0.865	0.818	1.000	0.755
1975	0.029	0.084	0.132	0.276	0.508	0.865	0.818	1.000	0.755
1976	0.029	0.084	0.132	0.276	0.508	0.865	0.818	1.000	0.755
1977	0.029	0.084	0.132	0.276	0.508	0.865	0.818	1.000	0.755
1978	0.029	0.084	0.132	0.276	0.508	0.865	0.818	1.000	0.755
1979	0.029	0.084	0.132	0.276	0.508	0.865	0.818	1.000	0.755
1980	0.029	0.084	0.132	0.276	0.508	0.865	0.818	1.000	0.755
1981	0.029	0.084	0.132	0.276	0.508	0.865	0.818	1.000	0.755

5.16 TAGGING

Not used

5.17 JLL_RECENT

Lognormal dist.

month 0 numbers
Ages 5 -16
log-likelihood = -0.27
deviance = 10.15
Chi-sq. discrepancy= 5.06

Year	Residuals		Standard	Q	Untransfrmd	Untransfrmd	Chi-square	
	Observed	Predicted	(Obs-pred)	Deviation	Catchabil.	Observed	Predicted	Discrepancy
2010	-11726E+01	0.13884E+00	-.13114E+01	0.50192E+00	0.58697E-05	0.19800E+00	0.73486E+00	0.20290E+01
2011	0.36136E+00	0.44005E-01	0.31736E+00	0.43478E+00	0.71978E-05	0.91800E+00	0.66837E+00	0.29944E+00
2012	0.90105E+00	0.29587E+00	0.60517E+00	0.44044E+00	0.82346E-05	0.15748E+01	0.85981E+00	0.20487E+01
2013	0.44010E+00	0.20089E+00	0.23920E+00	0.43478E+00	0.82931E-05	0.99320E+00	0.78190E+00	0.11646E+00
2014	-.24663E+00	0.90489E-01	-.33712E+00	0.44621E+00	0.78859E-05	0.49980E+00	0.70017E+00	0.56823E+00
2015	-.28331E+00	-.35598E+00	0.72669E-01	0.44044E+00	0.80140E-05	0.48180E+00	0.44803E+00	0.26977E-02

Selectivities by age

Year	5	6	7	8	9	10	11	12	13	14	15	16
2010	0.276	0.097	0.662	0.390	0.224	0.712	0.871	1.000	0.664	0.597	0.693	0.891
2011	0.151	0.474	0.294	1.000	0.243	0.146	0.293	0.275	0.201	0.163	0.196	0.092
2012	0.244	0.511	0.287	0.312	1.000	0.493	0.308	0.384	0.352	0.497	0.311	0.234
2013	0.000	0.034	0.092	0.238	0.435	1.000	0.912	0.672	0.756	0.461	0.378	0.271
2014	0.003	0.013	0.148	0.205	0.450	0.863	1.000	0.762	0.654	0.346	0.316	0.234
2015	0.000	0.000	0.002	0.088	0.260	0.539	1.000	0.590	0.311	0.216	0.225	0.141

TOTAL NUMBER OF FUNCTION EVALUATIONS = 50234