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Revisions and Further Evaluations of the Right Whale Abundance Model: Improvements for HypothesisTesting

US DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
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Revisions and Further Evaluations of the Right Whale Abundance Model: Improvements for HypothesisTesting

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Editorial Notes

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ABSTRACT

The National Marine Fisheries Service relies upon a published Bayesian state-space model to estimate annual abundance and uses that to characterize the status of the North Atlantic right whale (*Eubalaena glacialis*) population. I developed modifications to that model that differently characterize annual estimates of age-specific survival and may better represent population demography over time. In particular, I added an indicator variable within the survival process to test the hypothesis that mean survival changed following dramatic changes in right whale area-use patterns beginning in 2011, which I refer to as a regime change. A similar modification could be used to test if survival rates differ following some future mitigation measure(s) designed to reduce threats to right whales. I show that the addition of the "regime" parameter, while providing strong evidence of a change in mean survival, had little effect on 3 important estimates of the abundance model: population size, the number of new entrants, and adult female survival. I discuss future modification that should be accomplished that would allow testing other demographic effects over time.

INTRODUCTION

North Atlantic right whales (*Eubalaena glacialis*) hereafter right whales, have been characterized as critically endangered (Kraus et al. 2016; IUCN 2020) officially downgraded their status on the international Red List to Critically Endangered. Their population demographics have been heavily influenced by human-caused mortality (Corkeron et al. 2018). Right whales frequent waters along the US Atlantic coast and, given their protected status, they have received considerable attention from US National Marine Fisheries Service (NMFS) because some commercial fishing activities can cause mortality and serious injury to large whales when they become entangled in gear (Knowlton and Kraus 2001; Moore et al. 2004; Glass et al. 2009; Sharp et al. 2019).

Interest in right whale conservation has been a focal point for numerous nongovernmental organizations that, together with several state agencies, NMFS, other US federal agencies, and representatives of Fisheries and Oceans Canada, have created a consortium dedicated to sharing survey data and research products. It was with these shared data in mind that document the re-sighting histories of individually identifiable whales that Pace et al. (2017) developed a statistically based abundance estimation procedure. The Pace et al. (2017) model uses the ideas of a Jolly (1965) and Seber (1965) as adapted from Kéry and Schaub (2011) to simultaneously estimate abundance, survival and the number of new entrants to a study population. Estimates of abundance from that model have formed the basis of an annually updated evaluation of the status of right whales since 2017 (Hayes et al. 2019).

Two aspects of the original Pace et al. (2017) model piqued my interest. First, model structure relative to time-varying survival rates is quite flexible. It allows for hypothesis testing of time-specific changes to the survival schedules of right whales that might be due to mechanistic changes in their environment, including changes to threats through the application of mitigation measures. Although such tests do not share the strong inference of designed experiments with proper controls, they are a common approach used to distill information from observational studies. An example of a well-documented change in right whale area-use patterns occurred around 2010 and 2011 (Davis et al. 2017; Davies et al. 2019).

Second, the Pace et al. (2017) model incorporated the potential for age to affect survival rates. That model relied on a convenient simplifying approach to circumvent the presence of unknown ages common among the animals in the marked set. Although Pace et al. (2017) realized that lumping unknown-age animals into the same age class as adults might bias the estimates of survival for animals 5 years and older slightly downward, the effect would be small because the number of new entrants of unknown age is small during any year after 1990. In addition, the original model constrains survival to be a linear (in the logit) change from calf to age 5+, and it may be of interest to reduce that constraint and allow more flexible estimates of age-specific survival. Herein, I offer modifications to the Pace et al. (2017) model that more easily accommodate the testing of certain hypotheses about right whale demography. In the following, I separated the modifications into 2 sections: the first is a presentation of the "regime model," which has already been implemented as the principal abundance model for determining the status of the stock, and the second section describes newly proposed modifications to the model described in Pace et al. (2017).

I. THE REGIME MODEL

Methods

The data used to create estimates of right whale abundance were extracted on 07 January 2021 from the North Atlantic Right Catalog maintained at the Anderson Cabot Center for Ocean Life, a research department of the New England Aquarium (Boston, MA). These data included a listing of all uniquely identified right whales (Hamilton et al. 2007) including first year seen, last year seen, and, if known, year of death, sex, and year of birth. In addition to the list of whales, records of all photo-verified documented sightings of each individual are available to create capture histories (seen or not seen by year) through time.

By using the first and last sighting with information on birth year and death year, I constructed a matrix of known states (not yet entered, alive, dead, or not available) for all whales seen at least once after 1 November 1989. Thus, I followed Pace et al. (2017) and made 1990 the start of the study period, and using the additional years of data accumulated since the analysis in Pace et al. (2017), I created abundance estimates out through 2019. That is, the final estimate represents an accounting of all animals alive at some time during the 2019 sample year. Any sighting information available during 2020 was used to inform the known states of whales not seen during 2019. The sighting histories of unique whales seen between 1 December (the defined start of the capture year) 1989 and 30 November 2019 included many whales known to be alive prior to 1 November 1989—very few of which were of unknown age and likely less than 5 years old. The knowledge of their presence in the population also helped inform the states of whales prior to their first capture during the study period.

The list of known whales extant in the catalog as of 07 January 2021 and seen at least once between 1 December 1989 and 30 November 2019 included 712 individuals. The list included 306 females, 355 males, and 51 animals for which sex was unknown. Of the 712 individuals, 247 (171 of unknown age) were known to be alive prior to 1990. Of those first seen after 1989, 107 were of unknown, age whereas 358 had known birth years.

Regime Parameter

An important concept used in a state-space, open-population abundance model such as described in Pace et al. (2017), hereafter called the "original model," or the modification, hereafter called the "regime model," is that the biological processes can be modeled in a formulation separate from equations characterizing the observation processes. Here, the biological processes that I modeled are the number of animals entering the population (ostensibly births for right whales but could include immigrants in other settings) and the number of animals leaving the population (deaths for right whales but possibly permanent emigration in other settings). The observation process documents whether or not an animal is seen, and the probability of seeing an animal is conditional upon whether or not it has entered the population and is still alive. Although I have changed the names of some of parameters from Pace et al. (2017) and condensed adult female to a single value, the math is the same. The original model characterizes the probability of surviving (Φ) in a linear logit as follows:

$$\log(\Phi[\mathbf{i},\mathbf{t}]/(1-\Phi[\mathbf{i},\mathbf{t}]) = \text{MuSurv} + \text{AdultAF}*\text{AdultF}[\mathbf{i},\mathbf{t}] + \text{BetaAge}*\text{Age}[\mathbf{i},\mathbf{t}] + \text{eta}[\mathbf{t}].$$

Whereas, the regime model characterizes survival as:

$$\log(\Phi[\mathbf{i},\mathbf{t}]/(1-\Phi[\mathbf{i},\mathbf{t}])) = \mathrm{MuSurv} + \mathrm{AdultAF}*\mathrm{AdultF}[\mathbf{i},\mathbf{t}] + \mathrm{BetaAge}*\mathrm{Age}[\mathbf{i},\mathbf{t}] + \mathrm{gmif}*\mathrm{Regime}[\mathbf{t}] + \mathrm{eta}[\mathbf{t}],$$

where,

i and **t** referencing the individual and time, respectively,
MuSurv (β_1) is the intercept for survival (logit scale),
AdultAF (β_2) is the effect of being a female (sex[i]) aged 5 years or older (AdultF[**i**,**t**]),
BetaAge (β_3) is the linear (logit scale) change in the probability of survival with age (Age[**i**,**t**]),
gmif (β_4) is the change (logit scale) in mean survival after 2010 (Regime[t]), and
eta[**t**] is the random effect (normal[0, sigma]) of year **t** on survival.

Adult (0 or 1), sex (male = 0, female = 1, NA for unknown) and Age (0, 1, 2, 3, 4, or 5) are data that characterize individual whales through time. Because some sexes are unknown and calculated within the Bayesian framework, the input matrix AdultF[i,t]) is calculated following imputation of sex[i]. Regime[t] is an indicator variable that characterized time valued at 0 for 1990–2010 and 1 afterwards. The purpose of this modification is to test the hypothesis that mean survival changed following the substantial observed changes in whale area-use patterns but parameterized in an effects model format (Intercept and deviation). The observation process is detailed in Pace et al. (2017) and is parameterized exactly the same in both model runs described here.

Fitting the Models

Following Pace et al. (2017), I developed and computed all data preparations and hierarchical models with R (R Development Core Team 2009). Markov chain Monte Carlo (MCMC) procedures were implemented using the JAGS (version 4.3) language (Plummer 2003) accessed through the R runjags package (Denwood 2016). Three MCMC chains were created from 10,000 iterations following a 1,000-iteration adaptation phase and a 4,000-iteration burn-in phase. To accommodate the possibility that animals might enter the and leave population without ever being observed, I augmented the list of capture histories (Royle 2009; Royle and Dorazio 2010) with 300 potential individuals designated as having unknown states and never being seen. The complete JAGS model language is included as Appendix A. I used the standard summary procedures available in the runjags package to evaluate model fit and extract parameters of interest for comparison between the original and regime models.

To examine model robustness, I looked at comparisons between parameters of interest produced by the 2 models, and I also performed a retrospective analysis of the regime model. For comparison purposes, I focused on 3 sets of parameters important in evaluating the status of the stock: abundance, adult female survival, and the number of new entrants. For each of these 3, I overlaid plots of parameter estimates (direct or derived) from the 2 models. The retrospective analysis consisted of computing the regime model on 6 subsets of the same data. These subsets are those sighting data for the period 1990- terminal year of the subset as those data were received usually in mid-October from each of 2016–2020 (last year estimate of abundance for each would be, 2014, 2015, 2016, 2017, 2018, and 2019). I then created an overlay of plots, often referred to as spaghetti plots, of estimates generated for each series. In addition, I plotted the gmif parameter (the change in mean survival after 2010) through time.

Model Fit and Comparisons

Both models showed excellent convergence properties, and the posteriors of all parameters included in the model, being shown significantly away from zero, proved them to be important in characterizing both the biological and observation processes (Appendix B, Tables B1 and B2). The 1 parameter that was different between the 2 models (labeled gmif) was included to test the hypothesis of a change in mean survival rates which could possibly be related to dramatic changes observed in whale area-use patterns after 2010 (Figure 1). By using the median of the posterior distribution as a characterizing metric (Median gmif = 0.75844, 95% CI = [–1.20299, –0.34576]), the model found that the overall odds of a whale surviving during 2011–2019 was 78% of that during 1990–2011. There was no expectation that the addition of the gmif parameter would greatly affect overall fit because the parameterization of the original model allowed for considerable freedom in the estimation of annual deviations in mean survival rates. The gmif parameter was added merely as a test of the hypothesis that survival rates changed on average since right whales altered their area-use patterns after 2010.

Only minor differences were present in the parameter estimates of primary importance to the assessment of right whale status: total abundance (Figure 2), adult female survival (Figure 3), and number of new entrants (Figure 4). In particular, the median of the posterior of the 2019 abundance estimate (and 95% credible intervals) from the regime model was 368 (356, 378) versus 371 (359, 381) from the original model, which are practically indistinguishable given their uncertainties. As expected, survival estimates for the regime model showed an increase from the base model before the regime change and a decrease after the regime change (Figure 3). No differences occurred in median counts of new entrants between the 2 models.

The retrospective analysis revealed a high degree of consistency among estimates of abundance among regime shift model runs with data retrospectively limited 1 year back at a time (Figure 5A). The last estimated survival rate of adult females showed some modest variability among runs (Figure 5B). This variability is likely due to considerable uncertainty in survival rate in the final year of a series for models in which capture rate and survival rate are allowed to vary over time.

Although the retrospective analysis was conducted to examine model consistency through time, it allowed for the examination of variation in the gmif parameter with each year's data since the changes in whale area-use patterns. The gmif parameter varied considerably over time as mean survival rate changed (Figure 6). The power of the gmif adjustment increases as time extends beyond the hypothesized cut point (ca. 2010), demarcating the abrupt change in area-use patterns observed for right whales. How much of this observed lag is actually a lag in survival matching the distributional shift and how much is an artifact of model structure remains a question of interest. There will be considerable interest if this new distribution should reflect a continued decline in survival.

Discussion

The state-space model to estimate abundance of right whales showed considerable consistency over time. In addition, the inclusion of a parameter to test the hypothesis of a change in mean survival had little effect on the most important parameter and its trend in the model: abundance. By choosing a state-space formulation to estimate abundance, Pace et al. (2017) recognized the benefits that accrue to Mark-Recapture-Resight (MRR) models when ancillary information can be used relative to the alive or dead state of individuals in the marked population. This approach particularly beneificial with these right whale data. There is a lag in processing the thousands of photographs submitted annually for validation of to individual identities, and error checking the metadata accompanying those photos. This lag means the most current abundance estimate available is not for the most recent sighting year. However, we can use partial, ancillary data collected during the interim to reduce uncertainty and potential bias in the estimated number during the last year of the analysis period.

The regime model produced a median posterior of the 2019 abundance estimates (and 95% credible intervals) of 368 (356, 378). The strength of evidence for a significant change in mean survival since 2010 was substantial. While this change correlates well with the observed changes in area-use patterns by right whales, it is by no means a test of causation. One benefit of this test was that it offers strong support for the unusual mortality event that had been declared on the basis of carcass counts (https://www.fisheries.noaa.gov/national/marine-life-distress/2017-2021-north-atlantic-right-whale-unusual-mortality-event). Pace et al. (2021) demonstrated that right whale carcass counts over a short period, especially in a single year, are poor predictors of the number of whales dying. The estimates produced by the regime model left no doubt that during 2011–2018, life became more hazardous for right whales than it was during 1990–2010. Based upon this more realistic characterization, I recommend the application of the regime model for this and future assessments.

Some clarification seems warranted about how the original and regime models and data structure affect interpretation of abundance estimates, especially in the final year of the time series. The abundance estimate does not coincide with a definitive calendar date of the referenced year. In order to get the most complete picture of abundance, I include any whale known to be alive between 1 December of year t-1 and 30 November of year t as alive in year t. This means if a whale is recovered dead on, for example, April 1 of year t, then its known states were coded as 2 (meaning alive) for year t and 3 (meaning dead) for years t+1 through to the end of the study period. However, new entrants appearing in whale year t will be recorded in whale year t. The common practice of subtracting the carcass counts observed during the last year in the time series of estimates from median of the posterior estimated abundance is not entirely consistent with a statistically based model. That calculation will serve as a more conservative alternative to the median by itself for all those who can only discuss population status on the basis of a single value. However, as Pace et al. (2017) revealed through simulation, the final estimate of abundance already is likely biased slightly low.

Of further interest was the high variability in estimated annual recapture rates during 2011-2017 capture intervals probably related to survey coverage adapting to ever changing area-use patterns by whales during that time frame (Figure 7). The last 3 time periods in the study were remarkable in having very high recapture rates. Several more years of survey effort to will be necessary to test whether reexamination of estimated "catchability" coefficients is needed since the change in area-use patterns.

II. FREEDOM FROM AGE CONSTRAINTS

Model Considerations

Most models of biological phenomena take liberties in an effort to simplify the characterization of nature. One commonly employed idea is to reduce the number of parameters to be estimated by using a continuous function, as in a regression line, in place of a factorial characterization.. In the logistic formula for survival, the Pace et al. (2017) model constrains age variation to be linear from ages 0 (calf) to 5, and animals age 5 and above have similar rates. A comparison of models with age (0–5+) as a categorical predictor provided very little additional information at the cost of estimating 4 more parameters. The simplified structure does not allow for testing hypotheses concerning inconstant effects of regimes, mitigation measures, or simply random time variation on individual age classes, which may be of interest to ecologists. The problem, of course, becomes choosing (stochastically) the age of animals of unknown birth year as they enter the population in a manner that captures the uncertainty of that choice. For animals of known time of first capture, this is not an issue. One can build a set of priors for the probability of any of the ages 1–5 (age 0 calves are obvious by size and would not be of unknown age), then choose an age for any unknown age animal. This, however, becomes an issue under data augmentation. Data augmentation is essential in an abundance model to account for animals that enter the population but are never seen. The entry occasion of a never-seen individual is not known prior to an iteration of the stochastic simulation. One can track the time of first entry within the JAGS code for estimation.

All the effort to better characterize the survival process within a model focused on the estimation of abundance seems misspent unless one can show that this nuanced characterization improves the abundance estimates. When attempting to test hypotheses concerning survival rates, the estimation of abundance becomes a nuisance. As Cormack (1964) recognized, conditioning survival on the first capture is a liberating assumption. Although abundance cannot be estimated under this assumption, increased robustness in the estimation of survival rates can be achieved. Thus, in other models of right whale demographic patterns, I have chosen to forgo estimating abundance by adopting this convention. First, one takes the age of an individual upon first capture, SFAge[i], and the occasion of first capture, f[i]. Below is part of the JAGS code to implement age imputation in the estimation of survival assuming 6 age classes (0–5+) are of interest:

```
LAge1~dnorm(0.6,10)

LAge2~dnorm(0.2,10)

LAge3~dnorm(0.05,10)

LAge4~dnorm(0.01,10)

page1<-exp(LAge1)/(1+exp(LAge1)+exp(LAge2)+exp(LAge3)+exp(LAge4))

page2<-exp(LAge2)/(1+exp(LAge1)+exp(LAge2)+exp(LAge3)+exp(LAge4))

page3<-exp(LAge3)/(1+exp(LAge1)+exp(LAge2)+exp(LAge3)+exp(LAge4))

page4<-exp(LAge4)/(1+exp(LAge1)+exp(LAge2)+exp(LAge3)+exp(LAge4))

page5<- 1- page1-page2-page3-page4

for (i in 1:n.ind)

    {

    SFage[i]~dcat(c(page1,page2,page3,page4,page5))

    }
```

Whatever manipulations that need to be done with the starting age (e.g., aging the animal from f[i] on) can be accomplished within the JAGS code. Future examinations of right whale survival rates over time for specific age classes should consider such an imputation procedure to make a more complete characterization of the uncertainty of hypothesis testing with a mixture of known and unknown ages.

ACKNOWLEDGEMENTS

The data analyzed herein represent the tremendous cooperative effort of numerous institutions collaborating as the North Atlantic Right Whale Consortium—including among others New England Aquarium, National Marine Fisheries Service, Center for Coastal Studies, Whale Center of New England, Georgia Department of Natural Resources, and Florida Fish and Wildlife Research Institute. I thank the Atlantic Scientific Review Group, a panel of scientists convened by NMFS who volunteer their time and expertise advising marine mammal science conducted by NMFS, and C. Legault (Northease Fisheries Science Center, Woods Hole, MA) for their stimulating discussion on retrospective analyses. Although this model evaluation tool may seem mismatched to mark-recapture models, the inclusion herein may give comfort as to the robustness of the regime model to those practitioners familiar with its application to resource production models. I especially thank Y. Chen, J. Lawson, R. Kenney, and R. Merrick for their reviews of the manuscript and excellent editorial advice.

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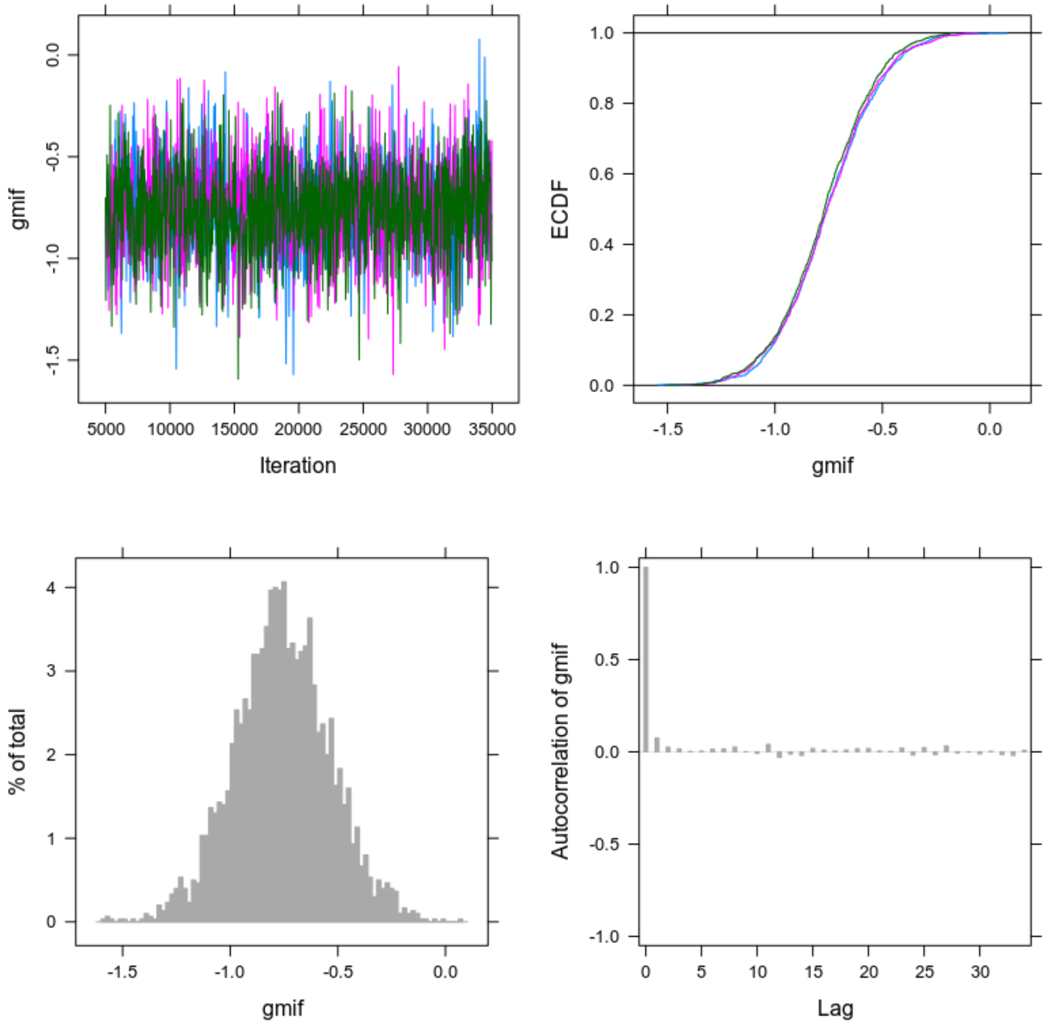

Figure 1. Performance characteristics for the added "regime" parameter (gmif) measuring the effect size of a shift in mean survival from 2011 to 2019 in a model of North Atlantic right whale (*Eubalaena glacialis*) mark-recapture data. The choice of a change point was based on a substantial change in observed area-use patterns among whales foraging across waters off the Northeast United States and Atlantic Canada. ECDF stands for Empirical Cumulative Distribution Function. Note that the trace plot (upper left) accounts for the 30,000 iterations from 3 chains of 10,000 each. The prior distribution for gmif was normal (0, 10) which is contains about 95% of the probability almost uniformly between the values of -10 and 10.

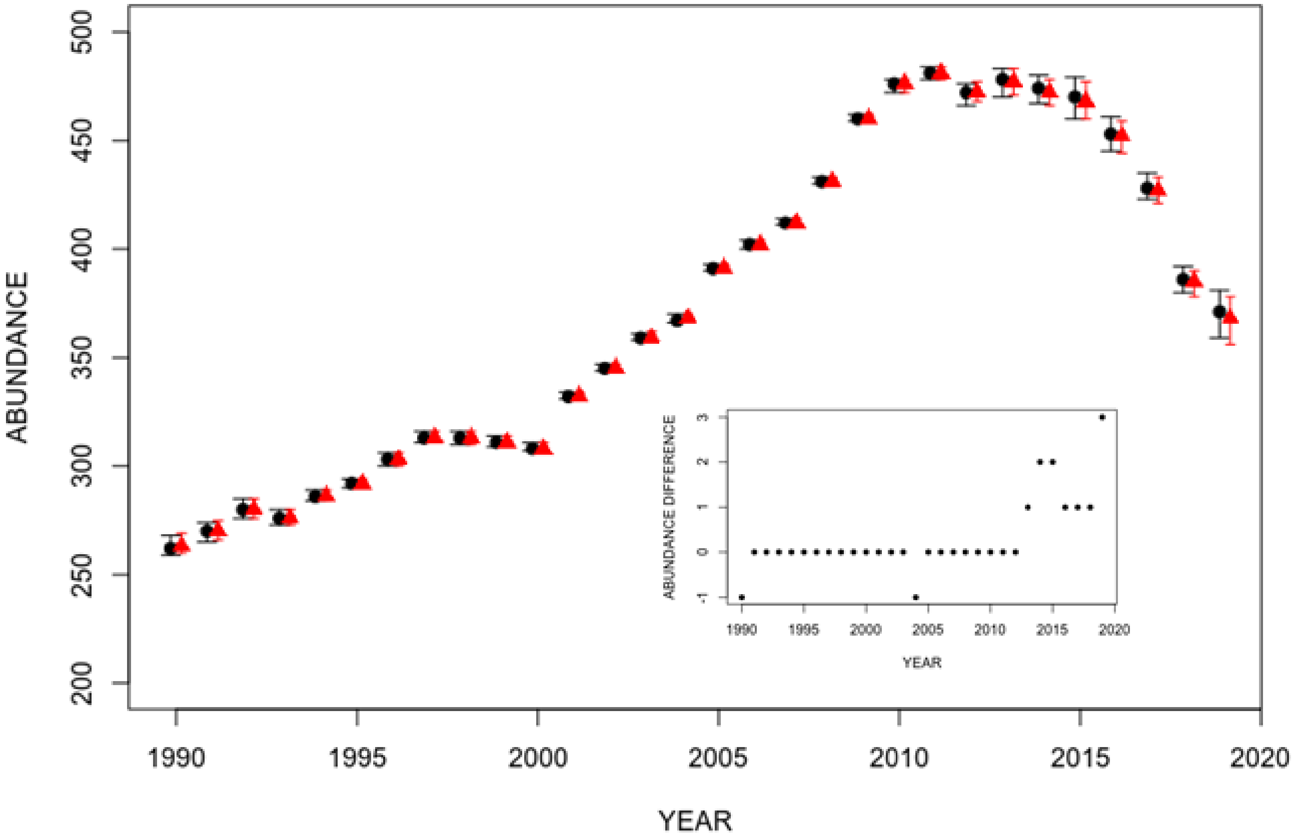

Figure 2. Abundance estimates (medians and 95% credible intervals) from 2 hierarchical state-space models of North Atlantic right whale (*Eubalaena glacialis*) mark-resight data differing in a single parameter (gmif) to test the hypothesis of a change in mean survival 2011–2019. Black circles are medians from the original model, and red triangles are results from the regime model. Symbol pairs are slightly offset horizontally for clarity. Inset plot shows the differences in median estimates between the 2 models.

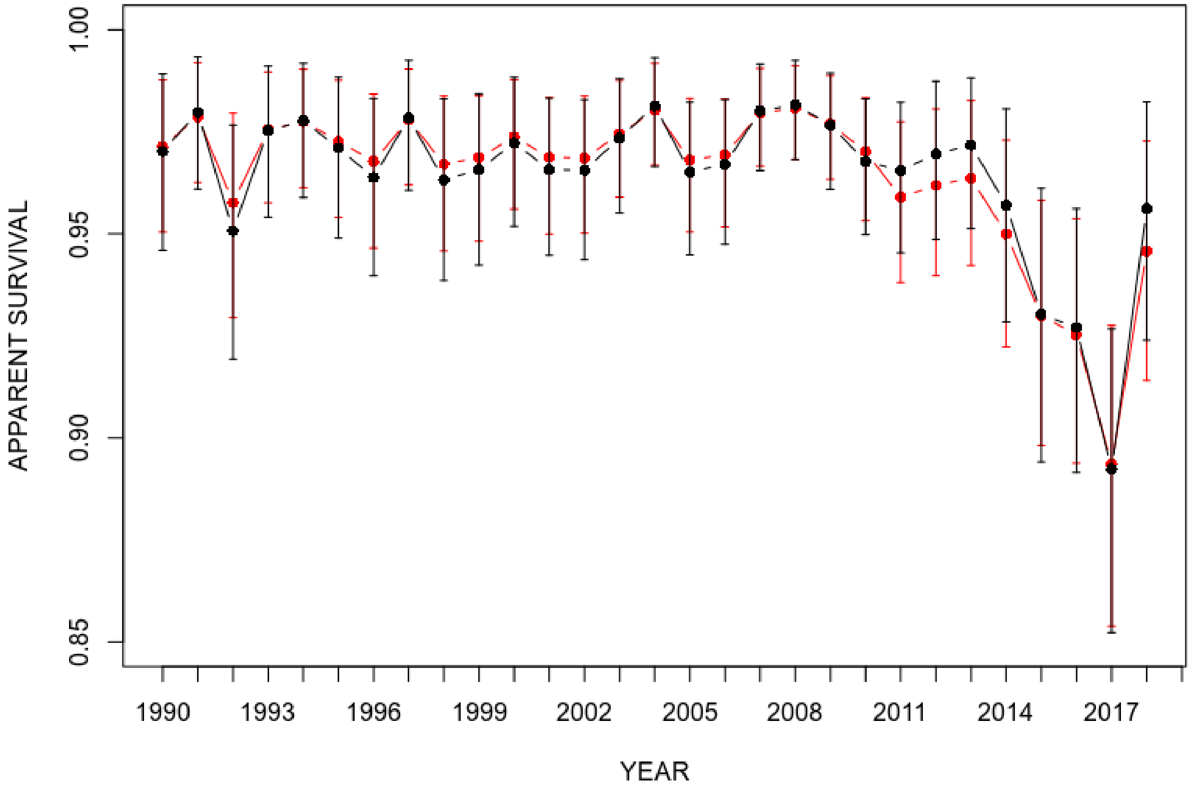

Figure 3. Estimated adult female survival rates (medians and 95% credible intervals) from 2 hierarchical state-space models of North Atlantic right whale (*Eubalaena glacialis*) mark-resight data differing in a single parameter (gmif) to test the hypothesis of a change in mean survival during 2011–2019. Black circles are medians from the original model, and red circles are results from the regime model.

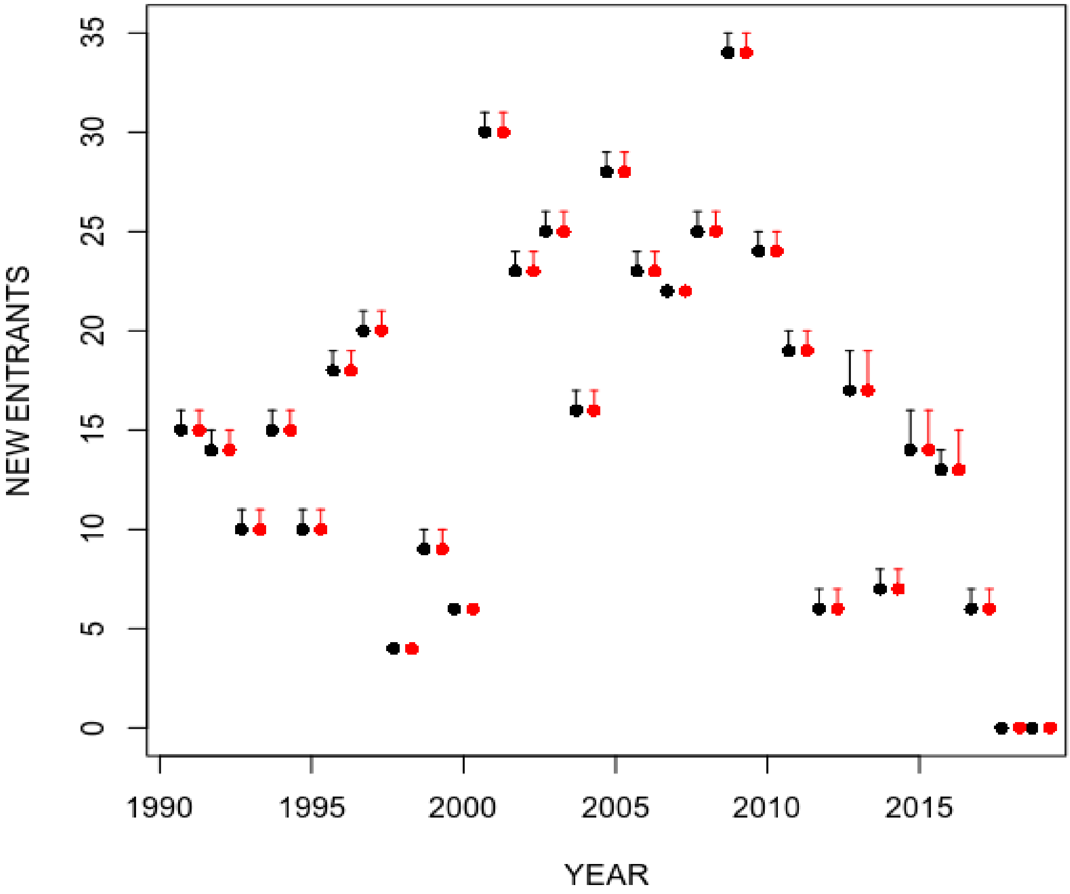

Figure 4. Estimated number of new entrants (medians and 95% credible intervals) from 2 hierarchical states-space models of North Atlantic right whale (*Eubalaena glacialis*) mark-resight data differing in a single parameter (gmif) to test the hypothesis of a change in mean survival 2011-2019. Symbol pairs are slightly offset horizontally for clarity. Black circles are medians from the original model, and red circles are results from the regime model.

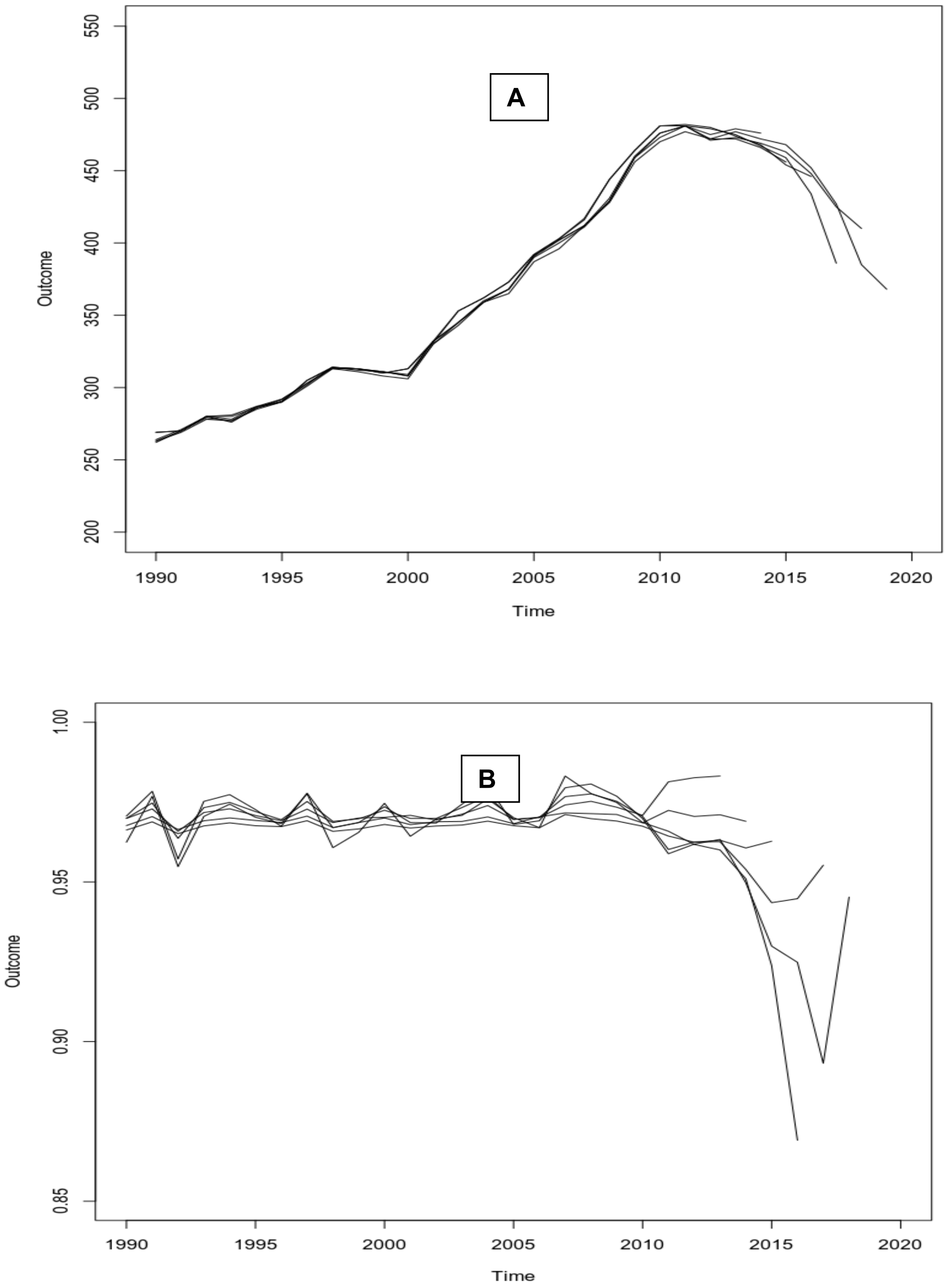

Figure 5. Spaghetti plots of estimates of North Atlantic right whale (*Eubalaena glacialis*) abundance (A) and adult female survival estimates (B) from the regime model and 5 retrogressive fits (data received in each year from 1990 to 2020).

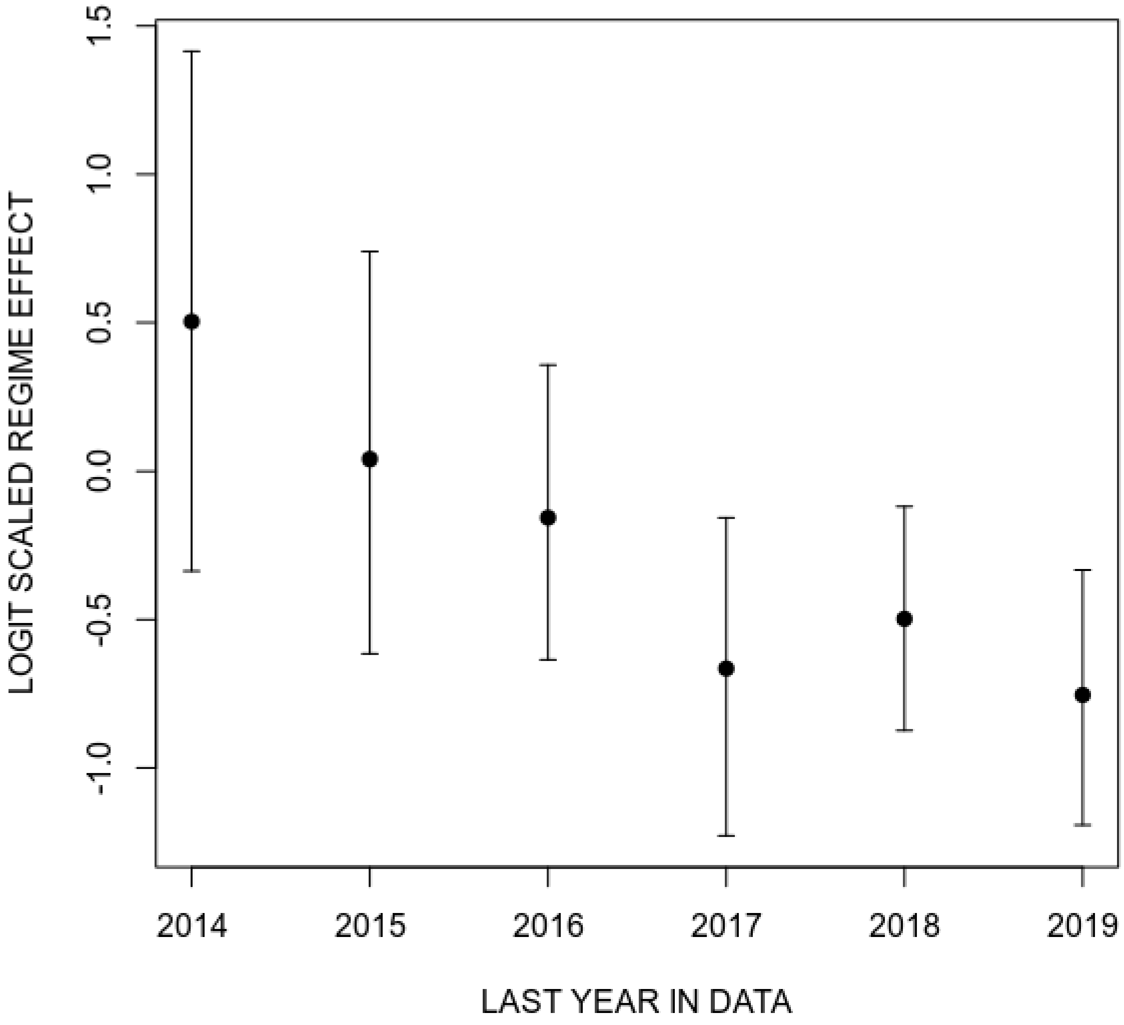

Figure 6. Estimated gmif parameter (medians and 95% credible intervals) from 6 runs of the regime model using data as received during 2015, 2016, 2017, 2018, 2019, 2020 in a state-space formulation constructed to estimate abundance of North Atlantic right whales (*Eubalaena glacialis*). Note that all model runs had estimates starting in 1990 and the regime change starting 2011.

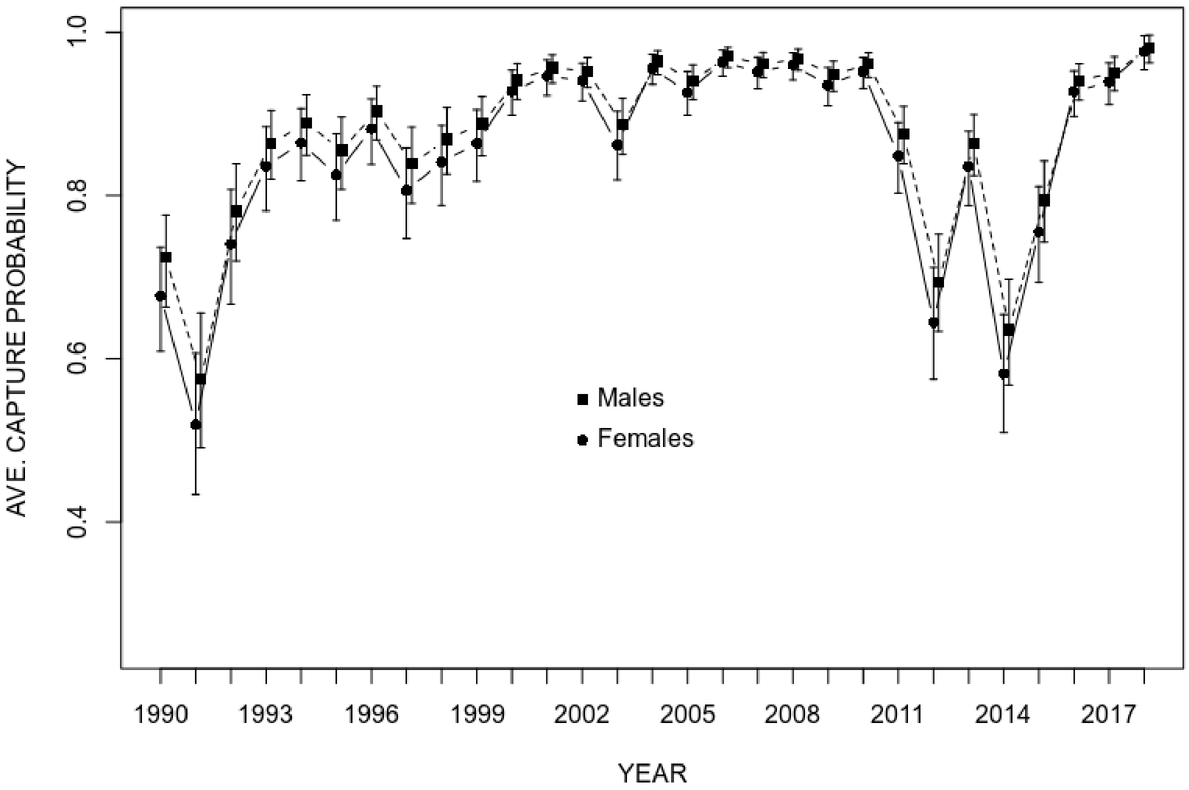

Figure 7. Estimated recapture probabilities (medians and 95% credible intervals) from the hierarchical state-space models of North Atlantic right whale (*Eubalaena glacialis*) mark-resight data constructed to estimate abundance and including consideration of a change in mean survival after 2010.

APPENDIX A. JAGS CODE REGIME MODEL

```
###### Made to run in r package runjags  #####
## Reader should be aware that some line feeds appearing below may be due to line-length
        limitations in this document and do not represent proper JAGS code
#-------------------------------------
# Parameters:
# phi: survival probability
# gamma: removal entry probability
# p: capture probability
#-------------------------------------
# States (S):
# 1 not yet entered
# 2 alive
# 3 dead
# Observations (O):
# 1 seen
# 2 not seen
#-------------------------------------

   model {

   epsilon ~ dunif(0.01, 10)       ###  prior on standard deviation of catchability  original .....
         dunif(0.0001,4)
   omega<- 1/(epsilon*epsilon)     ###  precision for use in jags/bugs

   for (i in 1:(M))
    {
      Gotcha[i]~dnorm(0,omega)     ###  prior on random catchability of individuals
    }

   # Priors and constraints
   sigma~dunif(0.001,10)              #######   prior for sd of random year effect on phi
   tau<-1/(sigma*sigma)

   #### for pcap, Male becomes the intercept and is the value sex at t=0 or 1990

   pie~dbeta(5,5)                        # prior for sex
   MuCap ~ dnorm(0,0.1)       # Prior for intecepts rate
   AlphaSex ~ dnorm(0,0.1)    # Prior for sex effect on recapture rate
   AlphaTime[1]<-0
   AlphaTime[2]<-0
   for (t in 3:(n.occasions-1)) {
     AlphaTime[t]~dunif(-10, 10)
   }

   # for survival parameters

   for (t in 1:(n.occasions-1)){
```

```
 gamma[t] ~ dunif(0, 1)                    # Prior for entry probabilities
} #t

eta[1]<-0    #### can only have entry at step 2, so ps[1,i,1,x] does not depend on phi
for (t in 2:(n.occasions-1)){
eta[t]~dnorm(0,tau)
} #t

MuSurv ~ dnorm(0,0.1)              # Priors for sex effects on survival
AdultAF ~ dnorm(0,0.1)
BetaAge ~ dnorm(0,0.1)
gmif~ dnorm(0,0.1)

#########  Probability models

for (i in 1:M){
sex[i]~dbern(pie)
for (t in 1:(n.occasions-1)){
  logit(phi[i,t]) <- MuSurv + BetaAge*Age[i,t] + AdultAF*AdultF[i,t] + gmif*Regime[t] + eta[t]
  logit(pcap[i,t])<- MuCap + AlphaSex*(sex[i]) + AlphaTime[t] + Gotcha[i]
} #t
} #i

 # Define state-transition and observation matrices
for (i in 1:M){
  # Define probabilities of state S(t+1) given S(t)
  for (t in 1:(n.occasions-1)){
    ps[1,i,t,1] <- 1-gamma[t]
    ps[1,i,t,2] <- gamma[t]
    ps[1,i,t,3] <- 0
    ps[2,i,t,1] <- 0
    ps[2,i,t,2] <- phi[i,t]
    ps[2,i,t,3] <- 1-phi[i,t]
    ps[3,i,t,1] <- 0
    ps[3,i,t,2] <- 0
    ps[3,i,t,3] <- 1

    # Define probabilities of O(t) given S(t)
    po[1,i,t,1] <- 0
    po[1,i,t,2] <- 1
    po[2,i,t,1] <- pcap[i,t]
    po[2,i,t,2] <- 1-pcap[i,t]
    po[3,i,t,1] <- 0
    po[3,i,t,2] <- 1
    } #t
  } #i

    # for logistic parameters
  for (t in 2:(n.occasions-1)){
  pcap1[t-1] <- 1 / (1+exp(-MuCap - AlphaTime[t]))    # Back-transformed recapture of females
  pcap2[t-1] <- 1 / (1+exp(-MuCap - AlphaSex - AlphaTime[t]))              # Back-transformed
```

```
recapture of males
   phi0[t-1] <- 1 / (1+exp(-MuSurv - eta[t]))                          # Back-transformed survival of calves
   phi1[t-1] <- 1 / (1+exp(-MuSurv - BetaAge*1 - gmif*Regime[t] - eta[t]))               # Back-transformed survival of yearlings
   phi2[t-1] <- 1 / (1+exp(-MuSurv - BetaAge*2 - gmif*Regime[t] - eta[t]))               # Back-transformed survival of 2-year-olds
   phi3[t-1] <- 1 / (1+exp(-MuSurv - BetaAge*3 - gmif*Regime[t] - eta[t]))               # Back-transformed survival of 3-year-olds
   phi4[t-1] <- 1 / (1+exp(-MuSurv - BetaAge*4 - gmif*Regime[t] - eta[t]))               # Back-transformed survival of 4-year-olds
   phiaf[t-1] <- 1 / (1+exp(-MuSurv - AdultAF- BetaAge*5 - gmif*Regime[t] - eta[t]))     # Back-transformed survival of adult females
   phiam[t-1] <- 1 / (1+exp(-MuSurv - BetaAge*5 - gmif*Regime[t] - eta[t]))              # Back-transformed survival of adult males
    }


# Likelihood
for (i in 1:M){
  # Define latent state at first occasion  ... in BPA this is always 1, but for RIWH I we have prior data about any individuals
  z[i,1] <- 1   # Make sure that all M individuals are in state 1 at t=1
  for (t in 2:n.occasions){
    # State process: draw S(t) given S(t-1)
    z[i,t] ~ dcat(ps[z[i,t-1], i, t-1,])
    # Observation process: draw O(t) given S(t)
    y[i,t] ~ dcat(po[z[i,t], i, t-1,])
    } #t
  } #i


# Calculate derived population parameters
for (t in 1:(n.occasions-1)){
  qgamma[t] <- 1-gamma[t]
  }
cprob[1] <- gamma[1]            ###### BPA parameterization
for (t in 2:(n.occasions-1)){
  cprob[t] <- gamma[t] * prod(qgamma[1:(t-1)])
  } #t
psi <- sum(cprob[])           # Inclusion probability
for (t in 1:(n.occasions-1)){
  b[t] <- cprob[t] / psi      # Entry probability
  } #t

for (i in 1:M){
  for (t in 2:n.occasions){
    al[i,t-1] <- equals(z[i,t], 2)
    alm[i,t-1]<- al[i,t-1]*sex[i]
    alf[i,t-1]<- al[i,t-1]*(1-sex[i])
#      al[i,t-1] <- ifelse(z[i,t]=2,1,0)
```

```
      } #t
    for (t in 1:(n.occasions-1)){
      d[i,t] <- equals(z[i,t]-al[i,t],0)
      } #t
    alive[i] <- sum(al[i,])
    } #i

  for (t in 1:(n.occasions-1)){
    N[t] <- sum(al[,t])        # Actual population size
    NF[t] <- sum(alf[,t])
    NM[t] <- sum(alm[,t])
    B[t] <- sum(d[,t])         # Number of entries
    } #t
  for (t in 1:(n.occasions-2)){
    D[t]<- N[t]-N[t+1] + B[t]
    }

  for (i in 1:M){
    w[i] <- 1-equals(alive[i],0)
    } #i
  #  Nsuper <- sum(w[1:M])            # Superpopulation size

   }
```

APPENDIX B. OUTPUT FROM ORIGINAL AND REGIME MODELS ON RIGHT WHALE SIGHTINGS DATA (EXTRACTED 07 JANUARY 2021)

Table 1. Estimated parameters and their characteristics produced from the original model from Pace et al. (2017)

	Lower95	Median	Upper95	Mean	SD	Mode	MCerr	MC%ofSD	SSeff	AC.10	psrf
phiaf[1]	0.946039	0.970246	0.989216	0.968757	0.011513	NA	0.000167	1.5	4727	0.088057	1.033908
phiaf[2]	0.960996	0.979793	0.993406	0.978619	0.008739	NA	9.24E-05	1.1	8941	0.018809	1.008825
phiaf[3]	0.9193	0.950717	0.976689	0.949086	0.015164	NA	0.000177	1.2	7367	0.034884	1.011808
phiaf[4]	0.954102	0.97531	0.991084	0.974019	0.009866	NA	9.79E-05	1	10152	0.002879	1.004373
phiaf[5]	0.95891	0.97769	0.9918	0.97661	0.008743	NA	8.36E-05	1	10939	0.017792	1.001817
phiaf[6]	0.949006	0.971055	0.98837	0.969768	0.010459	NA	9.41E-05	0.9	12349	0.011872	1.002701
phiaf[7]	0.93981	0.963823	0.983196	0.962684	0.011556	NA	0.00011	1	10968	0.014823	1.002121
phiaf[8]	0.960691	0.978427	0.992545	0.977439	0.008454	NA	7.87E-05	0.9	11530	0.003977	1.002475
phiaf[9]	0.938589	0.963262	0.98309	0.961963	0.011749	NA	0.000107	0.9	12017	0.011884	1.001294
phiaf[10]	0.94239	0.965769	0.984329	0.964488	0.011067	NA	9.55E-05	0.9	13428	0.001038	1.001382
phiaf[11]	0.951868	0.972239	0.988367	0.971071	0.009692	NA	8.09E-05	0.8	14340	0.005803	1.00111
phiaf[12]	0.944765	0.9658	0.983298	0.964801	0.010074	NA	8.07E-05	0.8	15576	-0.00186	1.001121
phiaf[13]	0.943652	0.965611	0.982901	0.964633	0.010266	NA	8.66E-05	0.8	14055	0.001789	1.000728
phiaf[14]	0.955153	0.97345	0.987982	0.972603	0.008655	NA	7.23E-05	0.8	14344	-0.00221	1.002504
phiaf[15]	0.966492	0.981367	0.99322	0.980481	0.007124	NA	6.67E-05	0.9	11403	0.015886	1.00247
phiaf[16]	0.944874	0.965166	0.98226	0.964267	0.00977	NA	8.10E-05	0.8	14536	0.006835	1.002578
phiaf[17]	0.947442	0.967027	0.98292	0.966096	0.009311	NA	7.70E-05	0.8	14614	0.001475	1.001357
phiaf[18]	0.965514	0.980145	0.991621	0.979396	0.006884	NA	6.36E-05	0.9	11710	0.015769	1.002232
phiaf[19]	0.968274	0.981669	0.992528	0.980966	0.006416	NA	6.00E-05	0.9	11425	0.024754	1.000703
phiaf[20]	0.960957	0.976665	0.989429	0.975852	0.007439	NA	7.05E-05	0.9	11147	0.012977	1.001596
phiaf[21]	0.94979	0.967738	0.983124	0.966878	0.008754	NA	7.85E-05	0.9	12439	0.001462	1.001139
phiaf[22]	0.945383	0.965564	0.982243	0.96468	0.009677	NA	0.000109	1.1	7890	0.043699	1.001533
phiaf[23]	0.948664	0.969581	0.987411	0.968628	0.01019	NA	0.000122	1.2	6933	0.037014	1.000227
phiaf[24]	0.951322	0.971783	0.988197	0.970728	0.009805	NA	0.000118	1.2	6853	0.037827	1.000476
phiaf[25]	0.928422	0.957062	0.980678	0.955892	0.013686	NA	0.000176	1.3	6013	0.023831	1.001799
phiaf[26]	0.894108	0.930281	0.96122	0.928999	0.017415	NA	0.00022	1.3	6281	0.033359	1.002205
phiaf[27]	0.891562	0.927047	0.956197	0.925873	0.016655	NA	0.000187	1.1	7935	0.024849	1.002212
phiaf[28]	0.852322	0.892339	0.926756	0.8912	0.01928	NA	0.000222	1.2	7543	0.039251	1.001422

phiaf[29]	0.924027	0.956194	0.982334	0.954517	0.015526	NA	0.000238	1.5	4265	0.106405	1.000821
phiam[1]	0.96634	0.981482	0.993504	0.980523	0.007264	NA	0.000113	1.6	4111	0.094158	1.02854
phiam[2]	0.975817	0.987498	0.996038	0.986727	0.005452	NA	6.09E-05	1.1	8005	0.032927	1.006697
phiam[3]	0.948872	0.969071	0.98534	0.968012	0.009682	NA	0.00012	1.2	6480	0.047602	1.008733
phiam[4]	0.971198	0.984663	0.994365	0.983839	0.006186	NA	6.44E-05	1	9225	0.013397	1.002671
phiam[5]	0.974521	0.986164	0.995113	0.985469	0.005485	NA	5.38E-05	1	10395	0.026439	1.000671
phiam[6]	0.968017	0.981964	0.992898	0.981151	0.006632	NA	6.14E-05	0.9	11664	0.016525	1.001947
phiam[7]	0.96174	0.977491	0.989778	0.976651	0.007445	NA	7.73E-05	1	9270	0.028666	1.000971
phiam[8]	0.975652	0.986642	0.995586	0.985983	0.005321	NA	5.13E-05	1	10743	0.008301	1.001394
phiam[9]	0.961684	0.977024	0.990057	0.976216	0.007462	NA	7.11E-05	1	11025	0.019879	1.000267
phiam[10]	0.963633	0.978605	0.990153	0.977824	0.007017	NA	6.36E-05	0.9	12165	0.007336	1.000276
phiam[11]	0.970147	0.98275	0.993073	0.981986	0.006102	NA	5.26E-05	0.9	13482	0.010453	1.000216
phiam[12]	0.964955	0.978694	0.989456	0.97801	0.006448	NA	5.55E-05	0.9	13499	0.014676	1.000478
phiam[13]	0.964953	0.978556	0.98967	0.977925	0.006471	NA	5.77E-05	0.9	12585	0.005861	1.000073
phiam[14]	0.972026	0.983584	0.992748	0.982948	0.005465	NA	4.79E-05	0.9	13021	0.011711	1.001251
phiam[15]	0.978969	0.988459	0.99557	0.987896	0.004429	NA	4.42E-05	1	10063	0.02229	1.001019
phiam[16]	0.965108	0.978265	0.988742	0.977685	0.006204	NA	5.75E-05	0.9	11626	0.020484	1.001172
phiam[17]	0.967349	0.979451	0.989722	0.978847	0.00589	NA	5.61E-05	1	11009	0.027702	1.000628
phiam[18]	0.978373	0.987707	0.994716	0.987214	0.004307	NA	4.20E-05	1	10528	0.027863	1.000637
phiam[19]	0.980107	0.988652	0.995297	0.988194	0.00402	NA	4.19E-05	1	9207	0.042003	1.00006
phiam[20]	0.975441	0.985493	0.993181	0.985001	0.00464	NA	4.95E-05	1.1	8804	0.033729	1.000397
phiam[21]	0.968251	0.979887	0.989408	0.979338	0.005543	NA	5.47E-05	1	10274	0.016196	1.000111
phiam[22]	0.966071	0.978524	0.989187	0.977965	0.006064	NA	7.32E-05	1.2	6855	0.049317	1.000419
phiam[23]	0.967709	0.981093	0.992003	0.980453	0.006385	NA	7.96E-05	1.2	6438	0.04619	1.000117
phiam[24]	0.96926	0.982469	0.992613	0.981773	0.006168	NA	7.67E-05	1.2	6464	0.049734	1.000234
phiam[25]	0.954884	0.973201	0.988139	0.972359	0.008725	NA	0.000115	1.3	5771	0.02696	1.000721
phiam[26]	0.932448	0.955947	0.97621	0.955003	0.011398	NA	0.000147	1.3	5975	0.043618	1.000432
phiam[27]	0.930941	0.953891	0.972834	0.952996	0.010864	NA	0.00013	1.2	7032	0.033102	1.000311
phiam[28]	0.904138	0.930915	0.954211	0.930045	0.012938	NA	0.000159	1.2	6654	0.05601	1.000423
phiam[29]	0.951489	0.972534	0.98927	0.971411	0.0101	NA	0.000161	1.6	3919	0.124123	1.000917
phi0[1]	0.906139	0.947571	0.980696	0.945279	0.019689	NA	0.000326	1.7	3640	0.110104	1.015223
phi0[2]	0.930855	0.964376	0.988835	0.962147	0.015547	NA	0.000204	1.3	5811	0.069709	1.001828
phi0[3]	0.859879	0.914556	0.960821	0.911869	0.026621	NA	0.000412	1.5	4172	0.106272	1.001444
phi0[4]	0.918323	0.95645	0.985172	0.954035	0.018016	NA	0.000238	1.3	5748	0.073455	1.000905

phi0[5]	0.926918	0.960658	0.987497	0.958455	0.016258	NA	0.00023	1.4	4980	0.089757	1.000669
phi0[6]	0.90659	0.949181	0.98009	0.946506	0.019753	NA	0.000306	1.5	4178	0.108507	1.000165
phi0[7]	0.892456	0.936925	0.973799	0.934381	0.021791	NA	0.000346	1.6	3972	0.115057	1.00041
phi0[8]	0.928365	0.962005	0.986783	0.959932	0.015679	NA	0.000226	1.4	4792	0.081107	1.000431
phi0[9]	0.889814	0.935955	0.972565	0.933205	0.022038	NA	0.000345	1.6	4090	0.111429	1.003185
phi0[10]	0.895242	0.939996	0.973957	0.937461	0.020905	NA	0.000347	1.7	3626	0.117887	1.001249
phi0[11]	0.912723	0.951156	0.981394	0.948743	0.018449	NA	0.000296	1.6	3882	0.108079	1.001631
phi0[12]	0.900333	0.940332	0.973047	0.938048	0.0191	NA	0.000322	1.7	3510	0.117576	1.001205
phi0[13]	0.900088	0.939891	0.973431	0.937794	0.019254	NA	0.000299	1.6	4141	0.109268	1.001994
phi0[14]	0.919341	0.953411	0.980749	0.951494	0.016284	NA	0.000249	1.5	4277	0.09702	1.000255
phi0[15]	0.939154	0.966972	0.988229	0.965269	0.013165	NA	0.000186	1.4	4998	0.085885	1.000602
phi0[16]	0.900221	0.938997	0.969526	0.937194	0.018312	NA	0.00029	1.6	3988	0.123171	1.000691
phi0[17]	0.906391	0.942162	0.972297	0.940347	0.017397	NA	0.000273	1.6	4068	0.122522	1.001394
phi0[18]	0.937948	0.964875	0.986106	0.963354	0.012825	NA	0.000188	1.5	4677	0.107705	1.002004
phi0[19]	0.942696	0.967547	0.987535	0.966109	0.011943	NA	0.000183	1.5	4264	0.111232	1.001635
phi0[20]	0.929702	0.958773	0.981058	0.957245	0.013637	NA	0.00021	1.5	4214	0.104626	1.001159
phi0[21]	0.909065	0.943394	0.971939	0.941659	0.016536	NA	0.000259	1.6	4084	0.115061	1.002496
phi0[22]	0.902195	0.939706	0.970838	0.937937	0.017963	NA	0.000304	1.7	3482	0.137195	1.001606
phi0[23]	0.906658	0.946793	0.97838	0.94464	0.018957	NA	0.000318	1.7	3559	0.13201	1.00225
phi0[24]	0.911806	0.950549	0.980452	0.948262	0.018306	NA	0.000304	1.7	3638	0.128778	1.001487
phi0[25]	0.87129	0.925723	0.968272	0.922891	0.025722	NA	0.000441	1.7	3405	0.123264	1.000971
phi0[26]	0.812994	0.88141	0.937073	0.87857	0.032334	NA	0.000584	1.8	3064	0.157219	1.00179
phi0[27]	0.809791	0.876067	0.929887	0.87355	0.031227	NA	0.000599	1.9	2721	0.178266	1.00316
phi0[28]	0.744996	0.821551	0.890202	0.819145	0.037412	NA	0.000833	2.2	2019	0.247761	1.003383
phi0[29]	0.864718	0.924234	0.970977	0.920678	0.028417	NA	0.00053	1.9	2871	0.183469	1.001172
phi1[1]	0.923082	0.957293	0.983188	0.955454	0.015807	NA	0.000241	1.5	4318	0.088598	1.018282
phi1[2]	0.943758	0.971008	0.9901	0.969311	0.012385	NA	0.000149	1.2	6928	0.046507	1.002574
phi1[3]	0.886115	0.929962	0.966743	0.927806	0.021263	NA	0.000294	1.4	5223	0.070564	1.002423
phi1[4]	0.93453	0.964542	0.987829	0.962691	0.014292	NA	0.000168	1.2	7261	0.045769	1.000975
phi1[5]	0.940924	0.968003	0.989014	0.966326	0.012838	NA	0.000157	1.2	6679	0.061551	1.000397
phi1[6]	0.924579	0.958568	0.98282	0.956537	0.015588	NA	0.000211	1.4	5476	0.074338	1.000176
phi1[7]	0.912841	0.948485	0.977315	0.946538	0.017215	NA	0.000238	1.4	5235	0.078575	1.000091
phi1[8]	0.94317	0.969108	0.989697	0.967525	0.012394	NA	0.000151	1.2	6776	0.051043	1.000368
phi1[9]	0.911336	0.947641	0.977097	0.945567	0.017376	NA	0.000235	1.4	5482	0.074191	1.002391

phi1[10]	0.916155	0.951053	0.97831	0.949093	0.016458	NA	0.000228	1.4	5227	0.078235	1.000731
phi1[11]	0.929619	0.960171	0.983718	0.958383	0.014505	NA	0.0002	1.4	5264	0.072697	1.001076
phi1[12]	0.919494	0.951236	0.976472	0.949567	0.014973	NA	0.00021	1.4	5074	0.074651	1.000657
phi1[13]	0.919475	0.950924	0.976872	0.949362	0.015084	NA	0.000194	1.3	6057	0.065831	1.001283
phi1[14]	0.934911	0.961991	0.983064	0.960626	0.012775	NA	0.000163	1.3	6154	0.059583	1.000014
phi1[15]	0.950965	0.97317	0.989964	0.971884	0.010367	NA	0.000129	1.2	6504	0.05649	1.000383
phi1[16]	0.920222	0.950227	0.97466	0.948862	0.014312	NA	0.000188	1.3	5781	0.077215	1.000306
phi1[17]	0.924815	0.952793	0.976457	0.951461	0.01358	NA	0.000178	1.3	5798	0.078182	1.000796
phi1[18]	0.950553	0.971446	0.988479	0.970325	0.010058	NA	0.000125	1.2	6444	0.073327	1.001446
phi1[19]	0.95394	0.973644	0.989316	0.97257	0.009363	NA	0.000124	1.3	5692	0.0783	1.001021
phi1[20]	0.943714	0.966425	0.984373	0.965327	0.010674	NA	0.00014	1.3	5853	0.067315	1.000614
phi1[21]	0.92686	0.95379	0.975933	0.952545	0.012845	NA	0.000176	1.4	5325	0.067452	1.001654
phi1[22]	0.921032	0.950739	0.974826	0.949477	0.014028	NA	0.000205	1.5	4699	0.095386	1.000991
phi1[23]	0.925252	0.956564	0.981967	0.954998	0.014935	NA	0.000228	1.5	4289	0.098186	1.001598
phi1[24]	0.929622	0.95962	0.983974	0.957973	0.014421	NA	0.000217	1.5	4430	0.096208	1.000986
phi1[25]	0.897212	0.939044	0.974402	0.937028	0.020343	NA	0.000306	1.5	4424	0.0871	1.000597
phi1[26]	0.848203	0.902054	0.946656	0.899887	0.025673	NA	0.000393	1.5	4267	0.111972	1.001108
phi1[27]	0.847083	0.8975	0.941485	0.895657	0.024591	NA	0.000402	1.6	3749	0.12509	1.002255
phi1[28]	0.790619	0.851072	0.904157	0.849067	0.0294	NA	0.000582	2	2551	0.190171	1.002389
phi1[29]	0.890843	0.937877	0.976251	0.935139	0.022763	NA	0.0004	1.8	3245	0.158702	1.000858
phi2[1]	0.937383	0.965242	0.986035	0.96377	0.012797	NA	0.000178	1.4	5163	0.07497	1.021363
phi2[2]	0.954573	0.976446	0.991714	0.975126	0.009939	NA	0.00011	1.1	8190	0.02978	1.003478
phi2[3]	0.90669	0.942678	0.971517	0.940999	0.01711	NA	0.00021	1.2	6630	0.043126	1.003739
phi2[4]	0.946918	0.971169	0.989758	0.969737	0.011414	NA	0.000124	1.1	8507	0.02385	1.001191
phi2[5]	0.952393	0.973974	0.990666	0.972717	0.010211	NA	0.000107	1.1	9038	0.038888	1.000244
phi2[6]	0.940132	0.966258	0.98651	0.964722	0.012379	NA	0.000143	1.2	7453	0.044962	1.000354
phi2[7]	0.929265	0.958017	0.980624	0.956506	0.013696	NA	0.000159	1.2	7436	0.047974	0.999959
phi2[8]	0.954332	0.974909	0.991433	0.973689	0.00987	NA	0.000102	1	9325	0.026467	1.00043
phi2[9]	0.92806	0.957312	0.980418	0.955709	0.013792	NA	0.000155	1.1	7969	0.042385	1.001631
phi2[10]	0.93242	0.96008	0.981832	0.958617	0.013044	NA	0.000151	1.2	7506	0.043279	1.000325
phi2[11]	0.943252	0.967673	0.986315	0.96624	0.011479	NA	0.000133	1.2	7448	0.041929	1.000609
phi2[12]	0.935512	0.960247	0.980536	0.958997	0.011844	NA	0.000128	1.1	8625	0.037815	1.000253
phi2[13]	0.934519	0.960008	0.980047	0.958831	0.011921	NA	0.000121	1	9684	0.028605	1.00066
phi2[14]	0.948145	0.969151	0.986365	0.968062	0.010112	NA	0.0001	1	10127	0.028527	0.999978

phi2[15]	0.96099	0.978195	0.992023	0.977242	0.008233	NA	8.72E-05	1.1	8910	0.03308	1.000303
phi2[16]	0.936171	0.95943	0.979225	0.958416	0.011304	NA	0.000118	1	9207	0.038029	1.000125
phi2[17]	0.939466	0.961511	0.980279	0.960548	0.010718	NA	0.000114	1.1	8896	0.040836	1.000355
phi2[18]	0.959949	0.976835	0.990038	0.975973	0.007966	NA	8.51E-05	1.1	8758	0.045019	1.000989
phi2[19]	0.963003	0.978569	0.991204	0.977801	0.007416	NA	8.35E-05	1.1	7882	0.05192	1.000511
phi2[20]	0.955389	0.97272	0.987731	0.971892	0.008452	NA	9.23E-05	1.1	8392	0.037731	1.000214
phi2[21]	0.94118	0.962351	0.979788	0.961441	0.010099	NA	0.000115	1.1	7677	0.027194	1.000877
phi2[22]	0.9368	0.959892	0.979399	0.958922	0.01107	NA	0.000138	1.2	6404	0.060285	1.000498
phi2[23]	0.940704	0.964636	0.985748	0.963456	0.011852	NA	0.000162	1.4	5321	0.069457	1.001004
phi2[24]	0.942648	0.967144	0.985922	0.965891	0.011446	NA	0.000157	1.4	5343	0.06889	1.000571
phi2[25]	0.9161	0.950213	0.977689	0.948676	0.016169	NA	0.000228	1.4	5044	0.055393	1.000357
phi2[26]	0.877555	0.919566	0.956229	0.917765	0.020478	NA	0.000287	1.4	5083	0.071282	1.000537
phi2[27]	0.875995	0.915731	0.951001	0.914228	0.019475	NA	0.000267	1.4	5332	0.074674	1.00137
phi2[28]	0.828237	0.876305	0.917659	0.874757	0.023121	NA	0.000386	1.7	3591	0.12853	1.00136
phi2[29]	0.910696	0.949159	0.979485	0.947075	0.018313	NA	0.000305	1.7	3614	0.13826	1.000658
phi3[1]	0.94893	0.97178	0.988622	0.970546	0.010471	NA	0.000144	1.4	5253	0.071195	1.024234
phi3[2]	0.963683	0.980906	0.993765	0.979836	0.00805	NA	8.44E-05	1	9099	0.021419	1.004503
phi3[3]	0.923969	0.95324	0.976779	0.951855	0.013936	NA	0.000161	1.2	7516	0.028698	1.005327
phi3[4]	0.95714	0.976603	0.991646	0.975456	0.0092	NA	9.44E-05	1	9502	0.010185	1.001556
phi3[5]	0.961233	0.978891	0.992125	0.977895	0.008201	NA	8.01E-05	1	10483	0.024408	1.000234
phi3[6]	0.951843	0.972593	0.989048	0.971378	0.009926	NA	9.43E-05	1	11069	0.023845	1.000716
phi3[7]	0.943143	0.965825	0.984419	0.964646	0.011016	NA	0.000116	1.1	9033	0.027563	1.000061
phi3[8]	0.962698	0.979623	0.992591	0.978682	0.007937	NA	7.58E-05	1	10967	0.01006	1.000625
phi3[9]	0.941822	0.965192	0.983856	0.963993	0.01107	NA	0.000106	1	10970	0.020584	1.000979
phi3[10]	0.94514	0.967518	0.984746	0.966384	0.010453	NA	9.76E-05	0.9	11463	0.017532	1.00009
phi3[11]	0.954458	0.973759	0.98895	0.972623	0.009176	NA	8.47E-05	0.9	11745	0.019437	1.000286
phi3[12]	0.947814	0.967633	0.983909	0.966685	0.0095	NA	7.99E-05	0.8	14121	0.01295	1.000066
phi3[13]	0.947191	0.967477	0.983718	0.966552	0.009552	NA	8.33E-05	0.9	13139	0.003544	1.000212
phi3[14]	0.957962	0.974982	0.988693	0.974098	0.008107	NA	7.01E-05	0.9	13376	0.008335	1.00018
phi3[15]	0.968492	0.982329	0.993401	0.981574	0.00661	NA	6.23E-05	0.9	11265	0.018482	1.000384
phi3[16]	0.947958	0.966974	0.982612	0.966206	0.009071	NA	7.86E-05	0.9	13321	0.012609	1.000209
phi3[17]	0.951189	0.968705	0.984006	0.967951	0.0086	NA	7.35E-05	0.9	13695	0.017289	1.000159
phi3[18]	0.967592	0.981217	0.991809	0.980542	0.006392	NA	6.05E-05	0.9	11145	0.026532	1.000683
phi3[19]	0.970436	0.982628	0.993041	0.982027	0.005954	NA	5.94E-05	1	10046	0.035768	1.000161

phi3[20]	0.963387	0.977871	0.989478	0.977212	0.006797	NA	6.36E-05	0.9	11440	0.020721	1.000027
phi3[21]	0.952118	0.969415	0.983093	0.968684	0.008085	NA	7.47E-05	0.9	11713	0.002184	1.000296
phi3[22]	0.948653	0.967403	0.982883	0.966622	0.008877	NA	0.000101	1.1	7688	0.038335	1.000207
phi3[23]	0.951481	0.971266	0.987756	0.970339	0.009509	NA	0.000121	1.3	6195	0.049539	1.000529
phi3[24]	0.953521	0.97328	0.988325	0.972327	0.009185	NA	0.000115	1.3	6397	0.050437	1.000287
phi3[25]	0.931885	0.959455	0.981427	0.958223	0.012977	NA	0.000175	1.3	5527	0.032498	1.000289
phi3[26]	0.899707	0.933882	0.963357	0.932631	0.01653	NA	0.000217	1.3	5776	0.042467	1.000188
phi3[27]	0.899096	0.930822	0.959231	0.929691	0.015655	NA	0.000184	1.2	7233	0.036883	1.000657
phi3[28]	0.858934	0.897662	0.930551	0.896539	0.01846	NA	0.000252	1.4	5363	0.07525	1.000528
phi3[29]	0.927155	0.958477	0.982997	0.956872	0.014851	NA	0.000239	1.6	3874	0.124624	1.000597
phi4[1]	0.958519	0.977104	0.991194	0.976053	0.008669	NA	0.000127	1.5	4675	0.077906	1.026678
phi4[2]	0.970371	0.984545	0.994953	0.983646	0.006588	NA	7.10E-05	1.1	8620	0.02249	1.005596
phi4[3]	0.93768	0.961922	0.981162	0.960749	0.011523	NA	0.000133	1.2	7524	0.030241	1.007049
phi4[4]	0.964797	0.981026	0.992963	0.980089	0.007498	NA	7.60E-05	1	9742	0.006533	1.002059
phi4[5]	0.968526	0.982889	0.993587	0.982084	0.006664	NA	6.25E-05	0.9	11355	0.020046	1.000378
phi4[6]	0.960818	0.977748	0.991013	0.976777	0.008058	NA	7.38E-05	0.9	11931	0.013893	1.001257
phi4[7]	0.953279	0.972212	0.987171	0.971271	0.008986	NA	8.90E-05	1	10197	0.020731	1.000409
phi4[8]	0.970297	0.983492	0.994601	0.98272	0.006458	NA	6.06E-05	0.9	11341	0.003782	1.000952
phi4[9]	0.953567	0.971658	0.987849	0.970737	0.009015	NA	8.23E-05	0.9	12011	0.012574	1.000509
phi4[10]	0.955551	0.973637	0.987631	0.972699	0.008496	NA	7.45E-05	0.9	13008	0.004915	1.00007
phi4[11]	0.96325	0.978718	0.991195	0.977797	0.00743	NA	6.36E-05	0.9	13640	0.008394	1.000149
phi4[12]	0.957196	0.973716	0.986702	0.972936	0.007753	NA	6.24E-05	0.8	15446	0.004754	1.000142
phi4[13]	0.957385	0.973573	0.987177	0.97283	0.007788	NA	6.58E-05	0.8	14030	-0.00455	1.000008
phi4[14]	0.965681	0.979712	0.990694	0.978989	0.006601	NA	5.60E-05	0.8	13887	0.002402	1.00062
phi4[15]	0.974334	0.985688	0.994538	0.985072	0.005375	NA	4.97E-05	0.9	11686	0.014704	1.000629
phi4[16]	0.957982	0.973184	0.986363	0.972542	0.007424	NA	6.19E-05	0.8	14403	0.006371	1.000572
phi4[17]	0.960203	0.974622	0.987037	0.973967	0.007042	NA	5.83E-05	0.8	14598	0.012632	1.000255
phi4[18]	0.973844	0.984807	0.993652	0.984233	0.005206	NA	4.87E-05	0.9	11445	0.020583	1.000564
phi4[19]	0.975946	0.985966	0.99432	0.98544	0.004854	NA	4.78E-05	1	10325	0.032332	1.000007
phi4[20]	0.970296	0.982082	0.991605	0.981518	0.005565	NA	5.20E-05	0.9	11436	0.019387	1.000091
phi4[21]	0.961334	0.975181	0.98668	0.974568	0.006618	NA	5.89E-05	0.9	12631	-0.00171	1.000025
phi4[22]	0.958525	0.973534	0.986324	0.972883	0.007261	NA	8.09E-05	1.1	8051	0.034396	1.000177
phi4[23]	0.960741	0.97664	0.990141	0.975925	0.007734	NA	9.49E-05	1.2	6641	0.041398	1.000223
phi4[24]	0.962807	0.978356	0.991034	0.977546	0.007471	NA	9.11E-05	1.2	6732	0.043694	1.00017

phi4[25]	0.945236	0.967011	0.985392	0.966015	0.010557	NA	0.000138	1.3	5829	0.022348	1.000413
phi4[26]	0.917939	0.945925	0.970312	0.944911	0.013584	NA	0.000173	1.3	6134	0.032305	1.000146
phi4[27]	0.916902	0.943472	0.966327	0.942477	0.012872	NA	0.000144	1.1	7973	0.021615	1.000278
phi4[28]	0.884767	0.915751	0.943558	0.914822	0.015173	NA	0.00018	1.2	7142	0.047503	1.000171
phi4[29]	0.941706	0.966181	0.987429	0.964882	0.012173	NA	0.000193	1.6	3987	0.119686	1.000686
BetaAge	0.132831	0.21539	0.294249	0.214664	0.040815	NA	0.001247	3.1	1071	0.495524	1.007753
BetaSex[1]	2.42565	2.80499	3.1915	2.810225	0.195875	NA	0.006476	3.3	915	0.539203	1.002202
BetaSex[2]	-0.74518	-0.48557	-0.22776	-0.48584	0.132511	NA	0.001891	1.4	4910	0.074529	1.003299
pcap1[1]	0.608812	0.676945	0.736394	0.676433	0.032789	NA	0.001049	3.2	977	0.52743	1.025601
pcap1[2]	0.43344	0.519086	0.606678	0.51922	0.044515	NA	0.00069	1.5	4168	0.114452	1.007472
pcap1[3]	0.666982	0.74049	0.807598	0.738991	0.035938	NA	0.000546	1.5	4327	0.120701	1.005434
pcap1[4]	0.781024	0.835573	0.884347	0.834096	0.026506	NA	0.000422	1.6	3954	0.113539	1.006492
pcap1[5]	0.817878	0.864512	0.906606	0.863125	0.022907	NA	0.000337	1.5	4621	0.11352	1.005917
pcap1[6]	0.769412	0.825343	0.87562	0.824077	0.027225	NA	0.000418	1.5	4236	0.11571	1.007939
pcap1[7]	0.838223	0.881853	0.918577	0.88054	0.020702	NA	0.000302	1.5	4708	0.105143	1.005538
pcap1[8]	0.747209	0.806386	0.858298	0.804989	0.028564	NA	0.000444	1.6	4142	0.128791	1.006668
pcap1[9]	0.787853	0.840889	0.886078	0.839604	0.025198	NA	0.000391	1.6	4144	0.11612	1.006612
pcap1[10]	0.817274	0.863934	0.905157	0.862536	0.022733	NA	0.000368	1.6	3821	0.121583	1.004448
pcap1[11]	0.898432	0.92802	0.953523	0.9269	0.014252	NA	0.000203	1.4	4920	0.094919	1.003205
pcap1[12]	0.922499	0.94641	0.966483	0.94544	0.011357	NA	0.000153	1.3	5504	0.084086	1.006127
pcap1[13]	0.916067	0.94087	0.962148	0.939968	0.011997	NA	0.00017	1.4	4990	0.103207	1.004997
pcap1[14]	0.819068	0.862042	0.90349	0.860864	0.021751	NA	0.000344	1.6	3993	0.13612	1.005298
pcap1[15]	0.936107	0.955857	0.97294	0.954975	0.009631	NA	0.000134	1.4	5131	0.095024	1.003839
pcap1[16]	0.898357	0.926295	0.951927	0.925341	0.013763	NA	0.000195	1.4	4957	0.102677	1.005896
pcap1[17]	0.946383	0.963537	0.978335	0.962833	0.008319	NA	0.000116	1.4	5166	0.081483	1.003975
pcap1[18]	0.93076	0.951531	0.969555	0.950796	0.010061	NA	0.000142	1.4	4999	0.08793	1.004061
pcap1[19]	0.941527	0.959862	0.974965	0.959069	0.008657	NA	0.000123	1.4	4920	0.093012	1.002586
pcap1[20]	0.90983	0.935378	0.956797	0.934476	0.012171	NA	0.000187	1.5	4247	0.098759	1.005921
pcap1[21]	0.931212	0.951801	0.969283	0.951022	0.00989	NA	0.000148	1.5	4473	0.09412	1.007395
pcap1[22]	0.802957	0.848559	0.889318	0.847469	0.02214	NA	0.000359	1.6	3799	0.130095	1.005733
pcap1[23]	0.574734	0.644512	0.711984	0.643803	0.034861	NA	0.000629	1.8	3073	0.154068	1.008861
pcap1[24]	0.787738	0.835772	0.878658	0.834609	0.023378	NA	0.000384	1.6	3712	0.130674	1.010084
pcap1[25]	0.509634	0.581614	0.65416	0.581647	0.036821	NA	0.000646	1.8	3251	0.153133	1.008763
pcap1[26]	0.693482	0.755377	0.810939	0.754429	0.030114	NA	0.0005	1.7	3624	0.124774	1.008019

pcap1[27]	0.896871	0.927203	0.95268	0.926169	0.014467	NA	0.000208	1.4	4857	0.101483	1.00666
pcap1[28]	0.911362	0.939222	0.962704	0.938058	0.01346	NA	0.0002	1.5	4543	0.10508	1.003127
pcap1[29]	0.953902	0.976616	0.996088	0.975501	0.010984	NA	0.000253	2.3	1881	0.261869	1.004189
pcap2[1]	0.663318	0.724239	0.776182	0.723086	0.02898	NA	0.001363	4.7	452	0.744262	1.015328
pcap2[2]	0.490745	0.574329	0.655767	0.574048	0.042373	NA	0.000742	1.8	3263	0.155501	1.003616
pcap2[3]	0.719437	0.780895	0.839114	0.779559	0.030865	NA	0.000546	1.8	3196	0.152587	1.002759
pcap2[4]	0.820093	0.863915	0.904409	0.862707	0.021871	NA	0.000385	1.8	3220	0.14638	1.003232
pcap2[5]	0.849203	0.888578	0.923306	0.887368	0.019094	NA	0.000332	1.7	3303	0.154761	1.00292
pcap2[6]	0.807586	0.855425	0.896128	0.854075	0.022806	NA	0.000391	1.7	3400	0.147629	1.003538
pcap2[7]	0.868159	0.903266	0.934064	0.902068	0.017068	NA	0.000288	1.7	3520	0.144219	1.002875
pcap2[8]	0.790429	0.838797	0.883936	0.837603	0.023919	NA	0.000423	1.8	3196	0.163031	1.003258
pcap2[9]	0.826195	0.868629	0.907779	0.867391	0.020994	NA	0.000365	1.7	3317	0.155746	1.003104
pcap2[10]	0.848569	0.888023	0.921098	0.886906	0.018659	NA	0.000325	1.7	3296	0.146971	1.001652
pcap2[11]	0.917857	0.941622	0.961859	0.940661	0.011483	NA	0.000178	1.5	4167	0.118493	1.001325
pcap2[12]	0.937739	0.956577	0.972301	0.955893	0.009015	NA	0.000138	1.5	4298	0.106842	1.003366
pcap2[13]	0.932452	0.952128	0.969119	0.951418	0.00955	NA	0.000147	1.5	4222	0.128723	1.002434
pcap2[14]	0.850298	0.886581	0.919201	0.885506	0.017807	NA	0.000317	1.8	3159	0.173484	1.001999
pcap2[15]	0.948166	0.96434	0.977603	0.963668	0.007667	NA	0.000119	1.6	4162	0.12169	1.001755
pcap2[16]	0.917801	0.940199	0.960125	0.939393	0.010995	NA	0.000172	1.6	4104	0.128921	1.002912
pcap2[17]	0.956604	0.970656	0.981858	0.970068	0.00659	NA	9.42E-05	1.4	4898	0.092254	1.001834
pcap2[18]	0.944635	0.960881	0.975326	0.960276	0.007937	NA	0.000115	1.4	4762	0.105948	1.002054
pcap2[19]	0.953361	0.967624	0.9797	0.966998	0.006889	NA	0.000111	1.6	3871	0.116917	1.001098
pcap2[20]	0.927613	0.947557	0.96481	0.946916	0.009655	NA	0.000158	1.6	3734	0.118859	1.003218
pcap2[21]	0.944663	0.961132	0.975078	0.96045	0.007879	NA	0.000124	1.6	4015	0.11249	1.004049
pcap2[22]	0.839093	0.875002	0.909125	0.874153	0.017964	NA	0.000325	1.8	3051	0.160809	1.002769
pcap2[23]	0.633483	0.693667	0.75244	0.693026	0.030619	NA	0.000598	2	2625	0.195266	1.004373
pcap2[24]	0.82438	0.863957	0.899255	0.863145	0.019262	NA	0.000336	1.7	3293	0.157376	1.005597
pcap2[25]	0.567632	0.635449	0.697465	0.634536	0.033226	NA	0.000634	1.9	2745	0.18897	1.004585
pcap2[26]	0.742965	0.794227	0.842267	0.793334	0.02542	NA	0.000461	1.8	3037	0.154319	1.00422
pcap2[27]	0.916987	0.940934	0.961555	0.940059	0.011668	NA	0.000187	1.6	3884	0.123821	1.004194
pcap2[28]	0.928342	0.950756	0.970176	0.949828	0.010872	NA	0.000175	1.6	3858	0.129596	1.001499
pcap2[29]	0.962711	0.981153	0.996724	0.980281	0.008872	NA	0.000211	2.4	1770	0.278319	1.003238
pie	0.427831	0.466984	0.503348	0.467001	0.01925	NA	0.00016	0.8	14415	0.005478	1.001435
AlphaSex[1]	0.672111	0.965586	1.23746	0.964516	0.145306	NA	0.006841	4.7	451	0.743797	1.015742

AlphaSex[2]	-0.50041	-0.22356	0.062626	-0.22307	0.144264	NA	0.004672	3.2	953	0.533757	1.001482
AlphaTime[1]	0	0	0	0	0	0	NA	NA	NA	NA	NA
AlphaTime[2]	0	0	0	0	0	0	NA	NA	NA	NA	NA
AlphaTime[3]	-1.00018	-0.66311	-0.30754	-0.66389	0.17866	NA	0.003873	2.2	2127	0.208234	1.002152
AlphaTime[4]	-0.05782	0.30423	0.67502	0.307646	0.186034	NA	0.004148	2.2	2011	0.203251	1.003135
AlphaTime[5]	0.508674	0.884782	1.25337	0.885817	0.190054	NA	0.004159	2.2	2089	0.205232	1.001535
AlphaTime[6]	0.732805	1.113045	1.49163	1.113693	0.194167	NA	0.004103	2.1	2239	0.193571	1.002199
AlphaTime[7]	0.442882	0.810912	1.17929	0.814281	0.188985	NA	0.004305	2.3	1927	0.20216	1.001475
AlphaTime[8]	0.87707	1.26996	1.65277	1.270863	0.198278	NA	0.003999	2	2459	0.193209	1.002204
AlphaTime[9]	0.346186	0.686013	1.06212	0.686468	0.183081	NA	0.004209	2.3	1892	0.230165	1.002227
AlphaTime[10]	0.564192	0.921524	1.30201	0.925837	0.188094	NA	0.004087	2.2	2118	0.214334	1.001766
AlphaTime[11]	0.729922	1.10554	1.48495	1.108409	0.192859	NA	0.004131	2.1	2179	0.207791	1.003277
AlphaTime[12]	1.40102	1.816385	2.22662	1.817324	0.211704	NA	0.004338	2	2382	0.175177	1.00282
AlphaTime[13]	1.70643	2.129125	2.56737	2.132307	0.221305	NA	0.004497	2	2421	0.16867	1.001075
AlphaTime[14]	1.61017	2.02777	2.44651	2.02937	0.213421	NA	0.004279	2	2488	0.185236	1.001424
AlphaTime[15]	0.721531	1.0911	1.44024	1.093	0.183447	NA	0.004073	2.2	2029	0.246589	1.003271
AlphaTime[16]	1.89987	2.334605	2.77629	2.335589	0.223915	NA	0.004119	1.8	2956	0.162121	1.001732
AlphaTime[17]	1.40318	1.788715	2.19339	1.792605	0.201853	NA	0.004504	2.2	2009	0.208104	1.001834
AlphaTime[18]	2.0729	2.5331	2.98587	2.537978	0.234614	NA	0.004209	1.8	3107	0.148084	1.001712
AlphaTime[19]	1.81611	2.23833	2.66986	2.240675	0.2174	NA	0.004371	2	2473	0.177537	1.001963
AlphaTime[20]	1.99184	2.431085	2.86165	2.434743	0.221817	NA	0.00442	2	2519	0.166787	1.003003
AlphaTime[21]	1.54549	1.93211	2.33315	1.933267	0.202014	NA	0.004449	2.2	2062	0.201458	1.002221
AlphaTime[22]	1.82822	2.24236	2.67212	2.244982	0.21621	NA	0.004774	2.2	2051	0.184057	1.000607
AlphaTime[23]	0.630412	0.982329	1.32763	0.983669	0.177616	NA	0.004516	2.5	1547	0.277676	1.004002
AlphaTime[24]	-0.4644	-0.14621	0.171303	-0.14618	0.162139	NA	0.004589	2.8	1248	0.344188	1.003605
AlphaTime[25]	0.53735	0.886404	1.23691	0.886834	0.177838	NA	0.004686	2.6	1440	0.279384	1.002231
AlphaTime[26]	-0.72419	-0.41037	-0.08372	-0.41001	0.162905	NA	0.004602	2.8	1253	0.35061	1.003832
AlphaTime[27]	0.044833	0.386027	0.727473	0.387702	0.173151	NA	0.004797	2.8	1303	0.304881	1.003585
AlphaTime[28]	1.38862	1.8047	2.23312	1.80691	0.217296	NA	0.004645	2.1	2188	0.200567	1.002325
AlphaTime[29]	1.52179	1.99714	2.44998	1.999589	0.236656	NA	0.004657	2	2583	0.189156	1.002709
AlphaTime[30]	2.12758	2.98683	4.13645	3.071239	0.604354	NA	0.016791	2.8	1296	0.391326	1.002635
sigma	0.36657	0.554997	0.791966	0.567171	0.112379	NA	0.001715	1.5	4294	0.098478	1.000898
epsilon	1.30614	1.43022	1.56648	1.432521	0.066716	NA	0.001591	2.4	1758	0.312428	1.004114
gamma[1]	0.232794	0.259912	0.287983	0.260095	0.014098	NA	0.000121	0.9	13580	0.021506	1.010364

gamma[2]	0.011807	0.0212	0.032285	0.021643	0.005341	NA	4.21E-05	0.8	16071	0.003088	1.000461
gamma[3]	0.011124	0.020428	0.031387	0.020842	0.005306	NA	4.26E-05	0.8	15522	-0.00263	1.002575
gamma[4]	0.007128	0.014885	0.024418	0.015346	0.004533	NA	3.57E-05	0.8	16105	0.005964	1.00052
gamma[5]	0.012301	0.022143	0.033829	0.022622	0.005644	NA	4.42E-05	0.8	16312	-0.00086	1.0006
gamma[6]	0.007228	0.015423	0.025399	0.01586	0.004745	NA	3.88E-05	0.8	14932	4.60E-05	1.000349
gamma[7]	0.016057	0.027415	0.040173	0.027879	0.006296	NA	4.82E-05	0.8	17092	-0.00243	1.000494
gamma[8]	0.019041	0.031134	0.045337	0.031564	0.006778	NA	5.16E-05	0.8	17289	0.004194	1.000814
gamma[9]	0.001828	0.00725	0.014515	0.007762	0.003467	NA	2.97E-05	0.9	13656	0.001472	1.000331
gamma[10]	0.006668	0.015024	0.025296	0.015538	0.004893	NA	3.86E-05	0.8	16101	-0.002	1.000312
gamma[11]	0.003781	0.010584	0.019386	0.01108	0.004175	NA	3.36E-05	0.8	15442	0.001323	1.000093
gamma[12]	0.033269	0.048992	0.066451	0.049419	0.008594	NA	6.47E-05	0.8	17636	0.004394	1.000667
gamma[13]	0.02536	0.039579	0.05624	0.040093	0.008012	NA	6.20E-05	0.8	16709	0.006723	1.000991
gamma[14]	0.029538	0.044868	0.063199	0.04534	0.008586	NA	6.42E-05	0.7	17864	0.00813	1.001467
gamma[15]	0.017027	0.03036	0.04571	0.030921	0.007446	NA	5.79E-05	0.8	16514	0.007157	1.000498
gamma[16]	0.035747	0.053721	0.074332	0.054354	0.009904	NA	7.59E-05	0.8	17047	-0.00175	1.000208
gamma[17]	0.02935	0.046889	0.065933	0.047532	0.009513	NA	7.43E-05	0.8	16374	-0.00219	1.000934
gamma[18]	0.029668	0.046929	0.067138	0.047628	0.009679	NA	7.26E-05	0.7	17783	-0.011	1.001039
gamma[19]	0.036034	0.055688	0.077818	0.056442	0.010836	NA	8.25E-05	0.8	17266	0.008842	1.000304
gamma[20]	0.05559	0.079956	0.105926	0.080555	0.012979	NA	9.83E-05	0.8	17433	0.00563	1.002001
gamma[21]	0.039939	0.061924	0.086548	0.062577	0.012099	NA	9.08E-05	0.8	17773	0.010165	1.001559
gamma[22]	0.03175	0.052311	0.076733	0.053171	0.011671	NA	9.19E-05	0.8	16119	0.011563	1.002326
gamma[23]	0.006945	0.018906	0.034689	0.019794	0.007416	NA	5.98E-05	0.8	15400	-0.00473	1.001435
gamma[24]	0.030197	0.051472	0.076369	0.052319	0.011959	NA	9.77E-05	0.8	14970	0.003781	1.00637
gamma[25]	0.009231	0.023525	0.041606	0.024534	0.008517	NA	7.05E-05	0.8	14586	9.75E-05	1.002694
gamma[26]	0.024477	0.046581	0.07077	0.047561	0.012064	NA	0.000109	0.9	12197	0.020103	1.00605
gamma[27]	0.024109	0.04467	0.069758	0.045672	0.011917	NA	9.42E-05	0.8	16019	0.0118	1.006164
gamma[28]	0.008125	0.022625	0.041683	0.023764	0.00892	NA	7.60E-05	0.9	13786	-0.00452	1.002649
gamma[29]	4.78E-08	0.002407	0.01058	0.003496	0.003488	NA	4.75E-05	1.4	5387	0.045974	1.000609
gamma[30]	2.47E-07	0.002475	0.010749	0.003581	0.003578	NA	4.86E-05	1.4	5421	0.033122	1.000223
B[1]	259	262	268	262.7252	2.428737	262	0.300105	12.4	65	0.810223	1.737256
B[2]	15	15	16	15.22737	0.487865	15	0.006758	1.4	5212	0.047361	1.069801
B[3]	14	14	15	14.28697	0.557579	14	0.009023	1.6	3818	0.085964	1.095241
B[4]	10	10	11	10.089	0.303121	10	0.003808	1.3	6335	0.041951	1.059974
B[5]	15	15	16	15.09477	0.310036	15	0.004975	1.6	3884	0.099797	1.062683

B[6]	10	10	11	10.0641	0.257281	10	0.004011	1.6	4115	0.110932	1.056034
B[7]	18	18	19	18.12033	0.34889	18	0.00867	2.5	1619	0.247172	1.045544
B[8]	20	20	21	20.0976	0.315401	20	0.008459	2.7	1390	0.220105	1.02143
B[9]	4	4	4	4.0388	0.197558	4	0.00331	1.7	3561	0.094966	1.016039
B[10]	9	9	10	9.061833	0.255888	9	0.006151	2.4	1731	0.221706	1.024148
B[11]	6	6	6	6.029767	0.17209	6	0.003068	1.8	3147	0.096713	1.03001
B[12]	30	30	31	30.093	0.312016	30	0.009914	3.2	990	0.343171	1.066224
B[13]	23	23	24	23.0638	0.26204	23	0.006713	2.6	1523	0.229638	1.048377
B[14]	25	25	26	25.06857	0.271049	25	0.007173	2.6	1428	0.201387	1.069801
B[15]	16	16	17	16.05497	0.23526	16	0.005429	2.3	1878	0.1536	1.062275
B[16]	28	28	29	28.0768	0.285957	28	0.007427	2.6	1482	0.207828	1.079679
B[17]	23	23	24	23.07813	0.287688	23	0.007428	2.6	1500	0.263395	1.085047
B[18]	22	22	22	22.04113	0.203902	22	0.003094	1.5	4344	0.080318	1.036173
B[19]	25	25	26	25.0699	0.264732	25	0.005337	2	2461	0.158711	1.031544
B[20]	34	34	35	34.11183	0.339112	34	0.007437	2.2	2079	0.155675	1.055966
B[21]	24	24	25	24.14597	0.389014	24	0.009365	2.4	1725	0.195754	1.058213
B[22]	19	19	20	19.1499	0.39762	19	0.00698	1.8	3246	0.113127	1.071335
B[23]	6	6	7	6.1175	0.348852	6	0.005031	1.4	4809	0.060061	1.063405
B[24]	17	17	19	17.4657	0.717896	17	0.022801	3.2	991	0.251398	1.134326
B[25]	7	7	8	7.1964	0.460254	7	0.010032	2.2	2105	0.084002	1.082173
B[26]	14	14	16	14.59777	0.819876	14	0.032751	4	627	0.33029	1.14064
B[27]	13	13	15	13.3468	0.617367	13	0.016973	2.7	1323	0.197979	1.099254
B[28]	6	6	7	6.110333	0.339161	6	0.005531	1.6	3760	0.101758	1.057824
B[29]	0	0	0	0.015567	0.126721	0	0.001172	0.9	11700	0.019203	1.021036
B[30]	0	0	0	0.051267	0.236164	0	0.001722	0.7	18819	0.00488	1.000667
N[1]	259	262	268	262.7252	2.428737	262	0.300105	12.4	65	0.810223	1.737256
N[2]	265	270	274	270.0626	2.453844	269	0.073434	3	1117	0.24859	1.195357
N[3]	276	280	285	280.4742	2.374684	280	0.058779	2.5	1632	0.232452	1.157435
N[4]	273	276	280	276.1856	1.910627	276	0.03249	1.7	3458	0.124409	1.047006
N[5]	284	286	289	286.0665	1.463494	286	0.028252	1.9	2683	0.189103	1.049552
N[6]	290	292	294	291.8756	1.319185	291	0.026684	2	2444	0.20055	1.038583
N[7]	300	303	306	303.1888	1.648663	303	0.027734	1.7	3534	0.12659	1.019034
N[8]	311	313	316	313.3294	1.539274	313	0.026679	1.7	3329	0.14129	1.011862
N[9]	310	313	316	312.7395	1.590537	312	0.025381	1.6	3927	0.111296	1.007773

N[10]	309	311	314	311.5642	1.598007	311	0.022176	1.4	5193	0.085688	1.007722
N[11]	307	308	311	308.3698	1.174855	308	0.016382	1.4	5143	0.085448	1.006599
N[12]	331	332	334	331.9761	0.986591	331	0.015564	1.6	4018	0.131568	1.014687
N[13]	344	345	347	344.9119	0.96678	344	0.014707	1.5	4321	0.085536	1.012374
N[14]	358	359	361	359.3483	1.142496	359	0.015962	1.4	5123	0.086524	1.015491
N[15]	366	367	370	367.5352	1.169276	367	0.015741	1.3	5518	0.074645	1.011156
N[16]	390	391	393	391.3103	1.041919	391	0.016502	1.6	3987	0.105138	1.015084
N[17]	400	402	404	401.8492	1.294606	401	0.020929	1.6	3826	0.101022	1.007287
N[18]	411	412	414	411.8769	0.945728	411	0.023759	2.5	1584	0.24201	1.005895
N[19]	430	431	433	431.2831	1.058114	431	0.029028	2.7	1329	0.265775	1.004114
N[20]	459	460	462	460.197	1.09013	460	0.030953	2.8	1240	0.321068	1.011279
N[21]	472	476	478	475.6109	1.632992	475	0.041087	2.5	1580	0.244512	1.009288
N[22]	478	481	484	480.9014	1.675072	481	0.050445	3	1103	0.355418	1.018264
N[23]	466	472	476	472.0846	2.566639	472	0.065359	2.5	1542	0.279165	1.007016
N[24]	470	478	483	477.6003	3.40099	477	0.079084	2.3	1849	0.258975	1.019119
N[25]	467	474	480	473.7337	3.483328	473	0.079574	2.3	1916	0.277281	1.023405
N[26]	460	470	479	470.2718	4.947901	470	0.097605	2	2570	0.181483	1.017488
N[27]	445	453	461	453.3977	4.159941	452	0.083543	2	2479	0.178614	1.016718
N[28]	423	428	435	428.6224	3.351854	428	0.08382	2.5	1599	0.288276	1.01291
N[29]	380	386	392	385.8138	3.191047	385	0.092695	2.9	1185	0.437911	1.010158
N[30]	359	371	381	370.8973	5.806999	371	0.161867	2.8	1287	0.40402	1.004571
NM[1]	141	145	149	145.0906	2.149167	145	0.04301	2	2497	0.120415	1.089031
NM[2]	145	149	153	149.1017	2.228959	149	0.029105	1.3	5865	0.057703	1.023783
NM[3]	152	156	160	156.3729	2.232624	156	0.027923	1.3	6393	0.057944	1.016745
NM[4]	154	158	161	157.5662	2.063869	158	0.01889	0.9	11938	0.021693	1.003759
NM[5]	157	162	165	161.8889	2.058978	162	0.019904	1	10701	0.032598	1.001815
NM[6]	162	165	169	165.3412	1.986866	165	0.018486	0.9	11552	0.042726	1.00132
NM[7]	165	169	173	169.404	2.134807	170	0.020173	0.9	11199	0.036518	1.00145
NM[8]	172	177	180	176.5789	2.128362	177	0.018442	0.9	13319	0.029358	1.000855
NM[9]	174	179	182	178.8272	2.157994	179	0.018228	0.8	14016	0.02739	1.000602
NM[10]	176	180	184	180.238	2.146759	180	0.018035	0.8	14169	0.025905	1.000604
NM[11]	177	181	184	180.921	1.90175	181	0.015919	0.8	14271	0.026114	1.000373
NM[12]	188	192	196	192.4527	2.089124	192	0.018034	0.9	13419	0.029768	1.000226
NM[13]	194	199	202	198.8788	2.117859	199	0.01686	0.8	15780	0.021349	1.000313

NM[14]	206	211	214	210.8771	2.119034	211	0.01737	0.8	14882	0.023819	1.000443
NM[15]	213	218	221	217.8373	2.108938	218	0.018169	0.9	13472	0.016525	1.000307
NM[16]	224	229	233	229.3986	2.338071	230	0.020204	0.9	13391	0.035629	1.000298
NM[17]	235	240	244	240.3982	2.332215	240	0.020927	0.9	12420	0.025622	1.000228
NM[18]	246	251	254	250.5143	2.204365	251	0.020347	0.9	11737	0.033461	1.00024
NM[19]	256	262	265	261.5298	2.311628	262	0.02081	0.9	12339	0.035712	1.00036
NM[20]	269	273	277	273.0268	2.153448	273	0.02246	1	9193	0.046924	1.000618
NM[21]	275	280	284	280.2239	2.428123	280	0.027503	1.1	7794	0.0507	1.000949
NM[22]	277	282	286	281.85	2.418954	281	0.032537	1.3	5527	0.070041	1.002465
NM[23]	273	278	283	277.8952	2.757282	278	0.04063	1.5	4605	0.087303	1.002133
NM[24]	272	279	284	278.9061	3.14878	279	0.047438	1.5	4406	0.091533	1.006009
NM[25]	274	281	286	280.7647	3.17842	281	0.048776	1.5	4246	0.106836	1.008801
NM[26]	269	277	284	276.6985	4.062865	276	0.058164	1.4	4879	0.088642	1.007234
NM[27]	261	267	274	267.3331	3.526984	268	0.052508	1.5	4512	0.10043	1.006305
NM[28]	244	251	256	250.9051	3.116535	251	0.053073	1.7	3448	0.128182	1.004763
NM[29]	222	228	233	227.8661	3.010257	228	0.058035	1.9	2690	0.191754	1.003854
NM[30]	211	220	227	219.7008	4.16551	219	0.095737	2.3	1893	0.282197	1.003154
NF[1]	113	117	122	117.6346	2.450133	117	0.076895	3.1	1015	0.213985	1.210889
NF[2]	115	121	125	120.9609	2.544115	120	0.039321	1.5	4186	0.098215	1.061142
NF[3]	120	124	129	124.1013	2.4916	124	0.037278	1.5	4467	0.089349	1.051401
NF[4]	115	119	123	118.6194	2.274126	119	0.025496	1.1	7956	0.056351	1.01352
NF[5]	120	124	128	124.1776	2.124185	124	0.023551	1.1	8135	0.054923	1.00877
NF[6]	122	127	130	126.5344	2.10489	127	0.022193	1.1	8996	0.055827	1.005707
NF[7]	130	134	138	133.7848	2.268674	134	0.022662	1	10022	0.04289	1.00348
NF[8]	132	137	141	136.7505	2.429306	137	0.026872	1.1	8173	0.047431	1.00155
NF[9]	129	134	138	133.9122	2.429155	134	0.026093	1.1	8667	0.045445	1.001154
NF[10]	127	131	135	131.3262	2.256422	131	0.021989	1	10530	0.041247	1.001022
NF[11]	124	127	131	127.4487	1.992545	127	0.018089	0.9	12134	0.031389	1.000702
NF[12]	135	139	143	139.5234	2.108364	139	0.019705	0.9	11448	0.037248	1.001243
NF[13]	142	146	150	146.0331	2.160971	146	0.018576	0.9	13532	0.025056	1.000749
NF[14]	144	148	152	148.4712	2.233728	148	0.01991	0.9	12587	0.029273	1.001473
NF[15]	146	150	154	149.6979	2.254954	150	0.02006	0.9	12637	0.029639	1.001385
NF[16]	157	162	166	161.9117	2.393455	162	0.022847	1	10974	0.041964	1.001223
NF[17]	157	161	166	161.4509	2.475843	161	0.023247	0.9	11343	0.041258	1.000901

NF[18]	156	161	165	161.3626	2.334401	161	0.025602	1.1	8314	0.051841	1.000208
NF[19]	165	170	174	169.7534	2.381987	170	0.026829	1.1	7882	0.055492	1.000113
NF[20]	183	187	191	187.1703	2.22361	187	0.028812	1.3	5956	0.073481	1.000387
NF[21]	191	195	200	195.3869	2.46485	195	0.034126	1.4	5217	0.089969	1.000949
NF[22]	193	199	203	199.0513	2.536148	199	0.040166	1.6	3987	0.106537	1.001586
NF[23]	188	194	199	194.1894	2.888492	194	0.049038	1.7	3470	0.127915	1.000983
NF[24]	193	199	205	198.6942	3.244665	199	0.056947	1.8	3246	0.143775	1.004739
NF[25]	187	193	199	192.9691	3.333909	193	0.058868	1.8	3207	0.146952	1.004753
NF[26]	186	193	200	193.5732	3.669153	193	0.063957	1.7	3291	0.135952	1.006844
NF[27]	179	186	192	186.0646	3.399839	186	0.056312	1.7	3645	0.116238	1.005584
NF[28]	171	178	183	177.7173	3.152141	178	0.052803	1.7	3564	0.117305	1.002798
NF[29]	152	158	163	157.9477	2.911377	158	0.050314	1.7	3348	0.153252	1.001788
NF[30]	143	151	157	151.1965	3.617724	151	0.072794	2	2470	0.22238	1.001684

Table 2. Estimated parameters and their characteristics produced from the regime model.

	Lower95	Median	Upper95	Mean	SD	Mode	MCerr	MC%ofSD	SSeff	AC.30	psrf
phiaf[1]	0.950436	0.971388	0.987692	0.970053	0.009844	NA	0.000104	1.1	8919	0.045102	1.02635
phiaf[2]	0.96257	0.978682	0.991971	0.977876	0.007749	NA	5.65E-05	0.7	18786	0.005192	1.005379
phiaf[3]	0.929505	0.957667	0.979616	0.955933	0.013356	NA	0.000124	0.9	11627	0.012668	1.00949
phiaf[4]	0.957633	0.975484	0.989713	0.97449	0.008543	NA	5.82E-05	0.7	21568	0.007689	1.003724
phiaf[5]	0.961359	0.977554	0.990335	0.976741	0.007615	NA	5.07E-05	0.7	22571	0.001789	1.002382
phiaf[6]	0.954023	0.972739	0.987606	0.971779	0.008768	NA	5.62E-05	0.6	24304	0.009663	1.000804
phiaf[7]	0.946544	0.96778	0.98427	0.96651	0.009894	NA	6.82E-05	0.7	21016	-0.00571	1.001831
phiaf[8]	0.961997	0.977957	0.990395	0.977199	0.007439	NA	5.19E-05	0.7	20539	-0.00059	1.001063
phiaf[9]	0.945891	0.967148	0.983812	0.965909	0.010051	NA	6.68E-05	0.7	22659	0.001458	1.001783
phiaf[10]	0.948231	0.968681	0.983839	0.967632	0.009421	NA	6.01E-05	0.6	24595	0.009549	1.001764
phiaf[11]	0.956099	0.973742	0.987741	0.972766	0.008319	NA	5.22E-05	0.6	25391	0.004872	1.001324
phiaf[12]	0.949907	0.968802	0.983426	0.967832	0.008831	NA	5.59E-05	0.6	24991	0.00608	1.000815
phiaf[13]	0.950148	0.968602	0.983821	0.967649	0.008849	NA	5.53E-05	0.6	25564	0.008132	1.000461
phiaf[14]	0.959011	0.974418	0.987616	0.973728	0.007509	NA	4.72E-05	0.6	25339	-0.00082	1.000699
phiaf[15]	0.96685	0.980335	0.991801	0.979706	0.006534	NA	4.64E-05	0.7	19860	0.006035	1.00124
phiaf[16]	0.950463	0.968096	0.983208	0.96721	0.008616	NA	5.32E-05	0.6	26238	0.014982	1.001393
phiaf[17]	0.951751	0.9694	0.983069	0.968573	0.008163	NA	5.17E-05	0.6	24938	0.003896	1.001136
phiaf[18]	0.966567	0.979617	0.990581	0.979058	0.006279	NA	4.42E-05	0.7	20193	-0.00467	1.001089
phiaf[19]	0.968186	0.980827	0.991204	0.98024	0.006013	NA	4.29E-05	0.7	19670	0.005983	1.001567
phiaf[20]	0.963387	0.976921	0.988753	0.976349	0.006638	NA	4.63E-05	0.7	20566	0.022865	1.001287
phiaf[21]	0.953223	0.970174	0.98338	0.969334	0.007859	NA	5.14E-05	0.7	23383	0.007268	1.001122
phiaf[22]	0.938071	0.958969	0.977476	0.958232	0.010223	NA	7.86E-05	0.8	16927	0.004797	1.000788
phiaf[23]	0.939832	0.961885	0.980663	0.961154	0.010625	NA	9.02E-05	0.8	13886	0.014034	1.000699
phiaf[24]	0.942318	0.963662	0.98268	0.962825	0.0105	NA	8.77E-05	0.8	14323	0.008448	1.001054
phiaf[25]	0.922297	0.950003	0.97297	0.948988	0.013132	NA	9.96E-05	0.8	17401	-0.00382	1.00071
phiaf[26]	0.898204	0.929961	0.958286	0.928744	0.015646	NA	0.000124	0.8	15854	0.013918	1.000036
phiaf[27]	0.893827	0.925344	0.953701	0.924114	0.015615	NA	0.000117	0.7	17852	0.00901	1.000627
phiaf[28]	0.853886	0.893555	0.927567	0.892346	0.01906	NA	0.000153	0.8	15479	0.007514	1.000318
phiaf[29]	0.914127	0.945679	0.972743	0.944398	0.015167	NA	0.000155	1	9632	0.032765	1.000048
phiam[1]	0.968949	0.982327	0.992158	0.981481	0.006137	NA	6.35E-05	1	9333	0.037023	1.022074
phiam[2]	0.97656	0.986851	0.994894	0.986361	0.004803	NA	3.71E-05	0.8	16737	0.008217	1.003802

phiam[3]	0.955598	0.97375	0.98755	0.972571	0.008483	NA	8.21E-05	1	10682	0.012582	1.006819
phiam[4]	0.973794	0.984868	0.993817	0.984256	0.005297	NA	3.66E-05	0.7	20980	0.004929	1.002277
phiam[5]	0.97603	0.986153	0.994072	0.985657	0.004733	NA	3.22E-05	0.7	21564	-3.16E-05	1.001235
phiam[6]	0.971493	0.983195	0.992352	0.982551	0.005499	NA	3.76E-05	0.7	21418	0.01039	1.000264
phiam[7]	0.966469	0.979994	0.990228	0.979243	0.006245	NA	4.46E-05	0.7	19650	-0.00538	1.00085
phiam[8]	0.976924	0.986411	0.994618	0.985936	0.004636	NA	3.29E-05	0.7	19844	0.002524	1.000364
phiam[9]	0.966172	0.979705	0.990082	0.978868	0.006365	NA	4.35E-05	0.7	21428	-0.00081	1.000707
phiam[10]	0.967841	0.980691	0.990326	0.979951	0.005938	NA	3.86E-05	0.7	23663	0.005391	1.000709
phiam[11]	0.972632	0.983799	0.992258	0.98318	0.005169	NA	3.36E-05	0.7	23625	-0.00063	1.000457
phiam[12]	0.968817	0.980752	0.989988	0.980085	0.005544	NA	3.67E-05	0.7	22843	0.007082	1.000158
phiam[13]	0.968685	0.980586	0.989958	0.979964	0.005588	NA	3.70E-05	0.7	22827	0.008943	1.000102
phiam[14]	0.974669	0.984274	0.992511	0.983771	0.004703	NA	3.19E-05	0.7	21769	0.000147	1.000104
phiam[15]	0.979205	0.987925	0.994642	0.987501	0.004051	NA	2.98E-05	0.7	18431	0.005207	1.000452
phiam[16]	0.968759	0.980316	0.989226	0.979697	0.005415	NA	3.62E-05	0.7	22318	0.011443	1.000401
phiam[17]	0.970169	0.981102	0.989704	0.980549	0.005139	NA	3.58E-05	0.7	20631	0.00477	1.000371
phiam[18]	0.979298	0.987459	0.994152	0.987099	0.003886	NA	2.85E-05	0.7	18542	-0.00561	1.000382
phiam[19]	0.980398	0.988187	0.994556	0.987839	0.003703	NA	2.77E-05	0.7	17838	0.003717	1.000755
phiam[20]	0.976992	0.9858	0.992841	0.985414	0.004125	NA	3.18E-05	0.8	16844	0.019502	1.000432
phiam[21]	0.971259	0.98157	0.99	0.981032	0.00492	NA	3.53E-05	0.7	19473	0.011813	1.000252
phiam[22]	0.961215	0.974562	0.986009	0.974057	0.006401	NA	5.23E-05	0.8	14981	0.008426	1.000201
phiam[23]	0.962843	0.976381	0.988282	0.975905	0.006622	NA	5.78E-05	0.9	13118	0.013409	1.000448
phiam[24]	0.963867	0.977455	0.989229	0.976944	0.006567	NA	5.61E-05	0.9	13679	0.013752	1.000535
phiam[25]	0.951251	0.968811	0.983367	0.968191	0.008276	NA	6.57E-05	0.8	15866	-0.00196	1.000585
phiam[26]	0.934497	0.956011	0.973339	0.955173	0.010132	NA	8.71E-05	0.9	13538	0.020561	1.000196
phiam[27]	0.931621	0.953041	0.970673	0.952172	0.010182	NA	8.15E-05	0.8	15602	0.008304	1.000039
phiam[28]	0.905507	0.93218	0.954737	0.931286	0.012656	NA	0.000108	0.9	13642	0.011753	1.000229
phiam[29]	0.945785	0.966064	0.983612	0.965198	0.009823	NA	0.000104	1.1	8910	0.038016	1.000168
phi0[1]	0.912646	0.949483	0.978689	0.947206	0.017394	NA	0.000215	1.2	6543	0.050382	1.013315
phi0[2]	0.932567	0.962242	0.985601	0.960687	0.014085	NA	0.000138	1	10491	0.024271	1.001266
phi0[3]	0.875608	0.926059	0.964653	0.92309	0.023753	NA	0.000261	1.1	8272	0.03339	1.002545
phi0[4]	0.92284	0.956681	0.982504	0.954699	0.015868	NA	0.000156	1	10348	0.029662	1.000382
phi0[5]	0.929551	0.960237	0.983756	0.958584	0.014298	NA	0.000143	1	9945	0.031199	1.00005
phi0[6]	0.916635	0.951922	0.979438	0.9499	0.016673	NA	0.000178	1.1	8806	0.043454	1.000302
phi0[7]	0.903093	0.943343	0.973303	0.940805	0.018797	NA	0.000204	1.1	8491	0.037209	1.000231

phi0[8]	0.93121	0.960981	0.983997	0.9594	0.013951	NA	0.000141	1	9844	0.024776	1.00004
phi0[9]	0.900756	0.942292	0.973008	0.939757	0.019166	NA	0.000198	1	9379	0.029141	0.999966
phi0[10]	0.906374	0.944978	0.974504	0.942699	0.0181	NA	0.000195	1.1	8607	0.045367	0.999972
phi0[11]	0.920614	0.95362	0.980192	0.951607	0.015883	NA	0.000169	1.1	8809	0.043874	0.99999
phi0[12]	0.90954	0.94518	0.9731	0.9431	0.016883	NA	0.000187	1.1	8148	0.048232	1.000244
phi0[13]	0.909553	0.944834	0.973722	0.942782	0.016931	NA	0.00018	1.1	8815	0.035658	1.000812
phi0[14]	0.92508	0.954888	0.979318	0.953329	0.014282	NA	0.000152	1.1	8846	0.046152	1.000266
phi0[15]	0.939632	0.965123	0.985746	0.963819	0.012181	NA	0.00013	1.1	8808	0.030831	1.000011
phi0[16]	0.909988	0.943884	0.97153	0.942099	0.016248	NA	0.000178	1.1	8326	0.043829	1.000099
phi0[17]	0.912336	0.946102	0.971472	0.944429	0.01554	NA	0.000171	1.1	8237	0.044411	1.000472
phi0[18]	0.939023	0.963923	0.984149	0.962637	0.011923	NA	0.000129	1.1	8518	0.032029	1.000153
phi0[19]	0.942273	0.965954	0.98516	0.964738	0.011324	NA	0.000121	1.1	8709	0.033564	1.000243
phi0[20]	0.933036	0.959245	0.980424	0.95796	0.012435	NA	0.000135	1.1	8448	0.049262	1.000244
phi0[21]	0.915593	0.947331	0.972358	0.945751	0.014933	NA	0.000162	1.1	8457	0.036836	1.000261
phi0[22]	0.940465	0.965191	0.98383	0.963747	0.011565	NA	0.000162	1.4	5102	0.069726	1.000244
phi0[23]	0.943209	0.967734	0.986959	0.966262	0.011667	NA	0.000155	1.3	5702	0.070078	0.999986
phi0[24]	0.945941	0.969126	0.988052	0.967743	0.011301	NA	0.000146	1.3	5965	0.062103	1.00005
phi0[25]	0.926209	0.957496	0.982216	0.955573	0.014943	NA	0.000207	1.4	5211	0.071426	1.000068
phi0[26]	0.897591	0.94036	0.971202	0.937611	0.019955	NA	0.000303	1.5	4324	0.089228	1.000792
phi0[27]	0.893947	0.936535	0.969956	0.933591	0.020307	NA	0.000305	1.5	4424	0.083765	1.000346
phi0[28]	0.851734	0.909331	0.952573	0.90537	0.027187	NA	0.00043	1.6	4002	0.099346	1.000987
phi0[29]	0.918962	0.953854	0.980043	0.951726	0.016325	NA	0.000223	1.4	5380	0.067029	1.000442
phi1[1]	0.928962	0.958917	0.981601	0.95715	0.013781	NA	0.000157	1.1	7664	0.043245	1.015657
phi1[2]	0.945783	0.969304	0.987746	0.968191	0.011106	NA	9.84E-05	0.9	12740	0.015916	1.001724
phi1[3]	0.899302	0.939609	0.970367	0.937259	0.018899	NA	0.000192	1	9660	0.023127	1.003402
phi1[4]	0.93835	0.964843	0.985458	0.963316	0.012459	NA	0.00011	0.9	12938	0.01999	1.00066
phi1[5]	0.94423	0.967721	0.986811	0.966496	0.011194	NA	9.82E-05	0.9	12984	0.020082	1.000174
phi1[6]	0.93286	0.960882	0.982213	0.959399	0.013044	NA	0.000124	0.9	11087	0.032408	1.000207
phi1[7]	0.922482	0.95383	0.977767	0.951932	0.014723	NA	0.000143	1	10538	0.023921	1.00024
phi1[8]	0.945585	0.968333	0.987068	0.967157	0.010921	NA	9.73E-05	0.9	12592	0.014552	1.000002
phi1[9]	0.920845	0.953075	0.977607	0.951073	0.015016	NA	0.000138	0.9	11823	0.017453	0.999972
phi1[10]	0.925497	0.955288	0.978837	0.953496	0.014138	NA	0.000134	0.9	11105	0.03288	0.999978
phi1[11]	0.936549	0.962306	0.983126	0.960803	0.01238	NA	0.000117	0.9	11240	0.030702	0.999959
phi1[12]	0.927711	0.955353	0.977381	0.953823	0.013126	NA	0.000127	1	10689	0.034825	1.000097

phi1[13]	0.927582	0.955091	0.977774	0.95356	0.013173	NA	0.000122	0.9	11639	0.023704	1.00061
phi1[14]	0.940006	0.96332	0.982366	0.962203	0.011099	NA	0.000103	0.9	11717	0.031599	1.000126
phi1[15]	0.95164	0.971694	0.987912	0.970759	0.00952	NA	8.83E-05	0.9	11625	0.020453	0.999992
phi1[16]	0.927689	0.954319	0.975533	0.952992	0.01261	NA	0.00012	1	10954	0.030146	1.000003
phi1[17]	0.930542	0.95613	0.976557	0.954909	0.012035	NA	0.000115	1	10996	0.029723	1.000342
phi1[18]	0.951828	0.970729	0.987019	0.969804	0.009257	NA	9.00E-05	1	10572	0.018615	1.000085
phi1[19]	0.954074	0.972392	0.987442	0.971513	0.008793	NA	8.38E-05	1	11015	0.021641	1.000235
phi1[20]	0.946871	0.966916	0.983742	0.965981	0.009644	NA	9.24E-05	1	10885	0.037404	1.000165
phi1[21]	0.93318	0.957191	0.977335	0.955995	0.011538	NA	0.000109	0.9	11185	0.023589	1.00011
phi1[22]	0.910163	0.941586	0.967771	0.940352	0.015024	NA	0.000143	1	11027	0.014619	1.000539
phi1[23]	0.912817	0.94571	0.973896	0.944381	0.015879	NA	0.000163	1	9441	0.024656	1.000635
phi1[24]	0.916178	0.948163	0.975396	0.94678	0.015472	NA	0.000153	1	10289	0.021139	1.000645
phi1[25]	0.887968	0.928946	0.963274	0.927379	0.01949	NA	0.000198	1	9690	0.025528	1.001015
phi1[26]	0.853152	0.901353	0.94307	0.899447	0.023448	NA	0.000255	1.1	8487	0.040707	1.001501
phi1[27]	0.846676	0.895061	0.935907	0.893191	0.023236	NA	0.000245	1.1	8998	0.030362	1.000648
phi1[28]	0.79289	0.852461	0.90378	0.850549	0.028769	NA	0.000334	1.2	7432	0.041782	1.001729
phi1[29]	0.874431	0.922892	0.961394	0.92096	0.022594	NA	0.000263	1.2	7408	0.050808	1.001178
phi2[1]	0.942682	0.966659	0.984933	0.965252	0.011027	NA	0.000125	1.1	7766	0.037693	1.017908
phi2[2]	0.956607	0.975111	0.990135	0.974272	0.008837	NA	7.17E-05	0.8	15194	0.009418	1.002242
phi2[3]	0.918823	0.950851	0.975866	0.948918	0.015157	NA	0.000143	0.9	11273	0.014883	1.004347
phi2[4]	0.950529	0.971399	0.987861	0.970313	0.009865	NA	7.74E-05	0.8	16249	0.011748	1.001013
phi2[5]	0.955416	0.97383	0.9891	0.972909	0.008844	NA	6.92E-05	0.8	16326	0.0103	1.000366
phi2[6]	0.946018	0.96825	0.98509	0.967124	0.010292	NA	8.55E-05	0.8	14505	0.022399	1.000148
phi2[7]	0.937832	0.962464	0.981883	0.961015	0.011626	NA	9.96E-05	0.9	13635	0.011497	1.000307
phi2[8]	0.956245	0.974281	0.989212	0.973443	0.008631	NA	6.86E-05	0.8	15817	0.0062	1.000012
phi2[9]	0.93673	0.961857	0.981555	0.960314	0.011857	NA	9.57E-05	0.8	15338	0.007276	1.000048
phi2[10]	0.939903	0.963707	0.982152	0.962302	0.011133	NA	9.22E-05	0.8	14590	0.021172	1.000054
phi2[11]	0.948865	0.96938	0.985718	0.968276	0.009734	NA	7.93E-05	0.8	15053	0.018207	0.999986
phi2[12]	0.942028	0.963792	0.981067	0.962566	0.010307	NA	8.50E-05	0.8	14696	0.022264	0.999998
phi2[13]	0.941494	0.963518	0.981056	0.962349	0.010354	NA	8.20E-05	0.8	15936	0.013485	1.000414
phi2[14]	0.952241	0.970265	0.985513	0.969409	0.008722	NA	6.90E-05	0.8	15995	0.01794	1.000024
phi2[15]	0.96129	0.977063	0.99	0.976371	0.007519	NA	6.21E-05	0.8	14648	0.011667	1.000024
phi2[16]	0.942117	0.96286	0.979831	0.961878	0.009906	NA	7.81E-05	0.8	16083	0.01813	0.999975
phi2[17]	0.943907	0.964388	0.980134	0.963448	0.009435	NA	7.64E-05	0.8	15257	0.016314	1.000249

phi2[18]	0.961369	0.976255	0.989048	0.975601	0.007267	NA	6.16E-05	0.8	13928	0.006607	1.000068
phi2[19]	0.963386	0.977658	0.989716	0.976989	0.006907	NA	5.83E-05	0.8	14048	0.011321	1.000284
phi2[20]	0.957192	0.973185	0.986303	0.972483	0.007577	NA	6.35E-05	0.8	14232	0.027003	1.000137
phi2[21]	0.946031	0.965237	0.980669	0.964338	0.009029	NA	7.13E-05	0.8	16047	0.012475	1.000013
phi2[22]	0.928016	0.952405	0.973265	0.951509	0.011762	NA	9.97E-05	0.8	13921	0.00428	1.000374
phi2[23]	0.930122	0.955765	0.978143	0.954835	0.012455	NA	0.000117	0.9	11320	0.016041	1.000523
phi2[24]	0.932602	0.957806	0.979568	0.95679	0.012197	NA	0.000108	0.9	12704	0.013169	1.000544
phi2[25]	0.910488	0.941957	0.97007	0.940811	0.015348	NA	0.000139	0.9	12271	0.012278	1.000862
phi2[26]	0.880604	0.919042	0.951308	0.917564	0.018466	NA	0.000176	1	11015	0.028373	1.00115
phi2[27]	0.876448	0.9137	0.946618	0.912314	0.018283	NA	0.000165	0.9	12218	0.015166	1.000383
phi2[28]	0.83156	0.877729	0.919014	0.876228	0.022606	NA	0.000228	1	9835	0.024599	1.001361
phi2[29]	0.899143	0.936874	0.968575	0.93547	0.01799	NA	0.000196	1.1	8404	0.043699	1.000889
phi3[1]	0.953178	0.972999	0.987362	0.971832	0.008938	NA	9.44E-05	1.1	8957	0.03455	1.019846
phi3[2]	0.964852	0.979838	0.99193	0.979188	0.007115	NA	5.27E-05	0.7	18217	0.005672	1.002789
phi3[3]	0.933759	0.960046	0.980085	0.958461	0.012304	NA	0.000115	0.9	11495	0.00994	1.005297
phi3[4]	0.959979	0.976855	0.989917	0.975978	0.007904	NA	5.68E-05	0.7	19329	0.00601	1.001422
phi3[5]	0.963889	0.978804	0.990938	0.978094	0.007074	NA	5.00E-05	0.7	20038	0.003096	1.000619
phi3[6]	0.956739	0.974322	0.987999	0.973388	0.008221	NA	5.66E-05	0.7	21084	0.014721	1.000136
phi3[7]	0.949209	0.969611	0.984629	0.968402	0.009297	NA	6.86E-05	0.7	18385	0.001564	1.000437
phi3[8]	0.96505	0.979169	0.991537	0.978524	0.006909	NA	5.02E-05	0.7	18977	0.00094	1.000077
phi3[9]	0.948912	0.969024	0.984656	0.967832	0.009481	NA	6.59E-05	0.7	20716	0.000119	1.000203
phi3[10]	0.951252	0.97057	0.985078	0.969458	0.008879	NA	6.21E-05	0.7	20416	0.011798	1.000209
phi3[11]	0.958561	0.975201	0.98802	0.974331	0.007753	NA	5.47E-05	0.7	20058	0.007924	1.00008
phi3[12]	0.953265	0.970635	0.984444	0.96967	0.008219	NA	5.83E-05	0.7	19890	0.01243	0.999972
phi3[13]	0.952393	0.970419	0.983993	0.969491	0.008265	NA	5.60E-05	0.7	21755	0.006836	1.00025
phi3[14]	0.961295	0.975911	0.987879	0.975244	0.006963	NA	4.74E-05	0.7	21596	0.007129	0.999981
phi3[15]	0.968814	0.981463	0.991844	0.980902	0.006021	NA	4.48E-05	0.7	18039	0.005696	1.000116
phi3[16]	0.953578	0.969929	0.983696	0.969101	0.007922	NA	5.19E-05	0.7	23322	0.010051	1.000035
phi3[17]	0.955239	0.971147	0.984023	0.970384	0.007533	NA	5.14E-05	0.7	21481	0.006571	1.000216
phi3[18]	0.968462	0.980782	0.990588	0.980281	0.005792	NA	4.35E-05	0.8	17742	-0.00226	1.000112
phi3[19]	0.970402	0.981916	0.99148	0.981407	0.00551	NA	4.16E-05	0.8	17504	0.004202	1.000393
phi3[20]	0.96556	0.978253	0.988899	0.977741	0.00606	NA	4.57E-05	0.8	17564	0.019821	1.000173
phi3[21]	0.95692	0.971831	0.984536	0.97111	0.007203	NA	4.73E-05	0.7	23164	0.00591	0.999999
phi3[22]	0.941679	0.961272	0.977818	0.96062	0.009375	NA	7.26E-05	0.8	16660	-0.00113	1.000172

phi3[23]	0.943871	0.964051	0.982089	0.96336	0.009903	NA	8.64E-05	0.9	13151	0.010535	1.000449
phi3[24]	0.945717	0.965724	0.983432	0.964946	0.009746	NA	8.15E-05	0.8	14313	0.008655	1.000486
phi3[25]	0.927282	0.952695	0.974764	0.951839	0.01225	NA	9.64E-05	0.8	16138	0.002031	1.000732
phi3[26]	0.902557	0.933689	0.959291	0.932603	0.014759	NA	0.000126	0.9	13829	0.019446	1.000774
phi3[27]	0.899046	0.929432	0.95534	0.928225	0.014637	NA	0.000115	0.8	16218	0.004496	1.000162
phi3[28]	0.862306	0.899057	0.932288	0.897958	0.018046	NA	0.000158	0.9	13109	0.011001	1.000926
phi3[29]	0.918055	0.948543	0.974301	0.947419	0.014476	NA	0.000153	1.1	8986	0.038628	1.000604
phi4[1]	0.962314	0.978159	0.990279	0.977165	0.007351	NA	7.55E-05	1	9488	0.034329	1.021273
phi4[2]	0.971347	0.983708	0.99351	0.983157	0.005805	NA	4.26E-05	0.7	18555	0.005254	1.003322
phi4[3]	0.945512	0.967595	0.983685	0.966243	0.010137	NA	9.43E-05	0.9	11566	0.009153	1.006149
phi4[4]	0.967945	0.981285	0.992255	0.980558	0.006422	NA	4.36E-05	0.7	21728	0.003627	1.001856
phi4[5]	0.970577	0.982867	0.992501	0.98228	0.005741	NA	3.86E-05	0.7	22182	-0.0005	1.000917
phi4[6]	0.96488	0.979199	0.990233	0.978456	0.006668	NA	4.34E-05	0.7	23605	0.010525	1.000176
phi4[7]	0.959102	0.975313	0.988001	0.974393	0.007554	NA	5.31E-05	0.7	20218	-0.00435	1.000625
phi4[8]	0.971022	0.983154	0.992551	0.982627	0.005615	NA	3.88E-05	0.7	20908	-0.00035	1.000198
phi4[9]	0.958667	0.974903	0.987631	0.97393	0.007701	NA	5.18E-05	0.7	22129	-0.00275	1.00043
phi4[10]	0.960794	0.976153	0.988123	0.975258	0.007197	NA	4.61E-05	0.6	24335	0.006249	1.000434
phi4[11]	0.966678	0.979936	0.990586	0.979226	0.006276	NA	4.03E-05	0.6	24273	0.001344	1.000241
phi4[12]	0.961931	0.976196	0.987449	0.975427	0.006681	NA	4.16E-05	0.6	25815	0.007081	1.000028
phi4[13]	0.961822	0.976023	0.987434	0.97528	0.006727	NA	4.29E-05	0.6	24543	0.005205	1.00014
phi4[14]	0.968937	0.980533	0.990617	0.979962	0.005666	NA	3.67E-05	0.6	23786	0.000922	1.000009
phi4[15]	0.974569	0.98504	0.993289	0.984556	0.004898	NA	3.54E-05	0.7	19192	0.003453	1.000262
phi4[16]	0.962054	0.97567	0.986652	0.974957	0.006476	NA	4.05E-05	0.6	25572	0.007694	1.000184
phi4[17]	0.963851	0.976642	0.987334	0.976003	0.00615	NA	3.99E-05	0.6	23813	0.002515	1.000258
phi4[18]	0.974654	0.984477	0.99264	0.984056	0.0047	NA	3.34E-05	0.7	19784	-0.00652	1.00022
phi4[19]	0.975687	0.985373	0.992863	0.984969	0.004475	NA	3.22E-05	0.7	19272	0.001537	1.000556
phi4[20]	0.972025	0.982413	0.990992	0.981987	0.004948	NA	3.62E-05	0.7	18680	0.017216	1.000275
phi4[21]	0.964711	0.977182	0.987249	0.976596	0.005881	NA	3.78E-05	0.6	24209	0.005652	1.000082
phi4[22]	0.952347	0.968626	0.981923	0.968036	0.00765	NA	5.82E-05	0.8	17262	0.000239	1.000146
phi4[23]	0.954318	0.970844	0.985171	0.970287	0.008016	NA	6.81E-05	0.8	13875	0.009503	1.000423
phi4[24]	0.956148	0.972182	0.98685	0.971572	0.007924	NA	6.52E-05	0.8	14792	0.008771	1.000482
phi4[25]	0.940685	0.961533	0.97934	0.960851	0.009962	NA	7.61E-05	0.8	17128	-0.00308	1.000638
phi4[26]	0.920773	0.945907	0.967191	0.945002	0.012067	NA	9.60E-05	0.8	15809	0.016491	1.000436
phi4[27]	0.917393	0.942374	0.963526	0.941371	0.012029	NA	8.76E-05	0.7	18859	0.001845	1.000038

phi4[28]	0.886457	0.917128	0.944042	0.91616	0.014838	NA	0.00012	0.8	15300	0.005929	1.000514
phi4[29]	0.933734	0.958147	0.979388	0.957209	0.011823	NA	0.000123	1	9280	0.036587	1.000355
BetaAge	0.136526	0.217182	0.294162	0.216646	0.040273	NA	0.000705	1.7	3267	0.139507	1.001995
BetaSex[1]	2.63395	3.01149	3.39055	3.01541	0.194144	NA	0.003721	1.9	2722	0.172456	0.999959
BetaSex[2]	-0.75118	-0.4927	-0.2314	-0.49306	0.132597	NA	0.001249	0.9	11271	0.024137	1.00116
pcap1[1]	0.607954	0.673738	0.736369	0.672891	0.033011	NA	0.000622	1.9	2821	0.156562	1.013225
pcap1[2]	0.43015	0.517343	0.605549	0.517475	0.044695	NA	0.000457	1	9557	0.033637	1.003821
pcap1[3]	0.66276	0.737406	0.803278	0.735911	0.036042	NA	0.000355	1	10328	0.02658	1.003225
pcap1[4]	0.779617	0.834171	0.882341	0.832601	0.026577	NA	0.000258	1	10602	0.01912	1.001851
pcap1[5]	0.815612	0.863423	0.905324	0.861971	0.023114	NA	0.000225	1	10573	0.019465	1.001902
pcap1[6]	0.768791	0.824146	0.874685	0.822613	0.027244	NA	0.000267	1	10394	0.02317	1.001418
pcap1[7]	0.837401	0.880388	0.917307	0.879186	0.020681	NA	0.000203	1	10339	0.026781	1.00173
pcap1[8]	0.744976	0.805204	0.85744	0.803824	0.028852	NA	0.000301	1	9190	0.032464	1.00237
pcap1[9]	0.788591	0.839646	0.88682	0.838308	0.025317	NA	0.000257	1	9676	0.031607	1.002209
pcap1[10]	0.816041	0.862917	0.904723	0.86144	0.022975	NA	0.000233	1	9717	0.031688	1.001158
pcap1[11]	0.898393	0.927335	0.953249	0.926332	0.014231	NA	0.000137	1	10729	0.024538	1.001295
pcap1[12]	0.922471	0.946105	0.966015	0.945129	0.01134	NA	0.000108	1	11063	0.027677	1.000805
pcap1[13]	0.914484	0.940264	0.960827	0.939339	0.012068	NA	0.000114	0.9	11185	0.018564	1.000977
pcap1[14]	0.816966	0.86101	0.90244	0.85973	0.022017	NA	0.00022	1	10001	0.030745	1.001638
pcap1[15]	0.935286	0.955531	0.972654	0.954735	0.009659	NA	8.81E-05	0.9	12032	0.017881	1.000969
pcap1[16]	0.897147	0.925829	0.950479	0.924724	0.013809	NA	0.000132	1	10874	0.021839	1.001623
pcap1[17]	0.946041	0.963129	0.978213	0.96245	0.008397	NA	7.32E-05	0.9	13168	0.010204	1.000746
pcap1[18]	0.930159	0.951027	0.968965	0.950229	0.010142	NA	9.86E-05	1	10578	0.026069	1.001293
pcap1[19]	0.941095	0.95934	0.975077	0.958601	0.008803	NA	8.26E-05	0.9	11360	0.015973	1.001162
pcap1[20]	0.909012	0.934718	0.956192	0.933806	0.01219	NA	0.000125	1	9500	0.026397	1.000759
pcap1[21]	0.930088	0.951237	0.968576	0.950359	0.009973	NA	9.29E-05	0.9	11533	0.023124	1.000911
pcap1[22]	0.80219	0.847507	0.888076	0.846268	0.022113	NA	0.000232	1	9124	0.035934	1.000821
pcap1[23]	0.574414	0.642844	0.708583	0.642239	0.034439	NA	0.000391	1.1	7744	0.04628	1.001386
pcap1[24]	0.788952	0.836126	0.879956	0.834939	0.023324	NA	0.000255	1.1	8340	0.038804	1.000902
pcap1[25]	0.509469	0.582521	0.653834	0.582444	0.036816	NA	0.000403	1.1	8333	0.04448	1.001261
pcap1[26]	0.695311	0.755563	0.811106	0.754461	0.029766	NA	0.000322	1.1	8539	0.03224	1.001518
pcap1[27]	0.897656	0.927755	0.953276	0.926681	0.014395	NA	0.000137	1	11026	0.02744	1.000946
pcap1[28]	0.911659	0.939527	0.962711	0.938512	0.013262	NA	0.000131	1	10323	0.025741	1.000851
pcap1[29]	0.960933	0.980379	0.999975	0.979424	0.010289	NA	0.000147	1.4	4911	0.08234	1.000619

pcap2[1]	0.665392	0.722151	0.778771	0.721709	0.028937	NA	0.000788	2.7	1349	0.389991	1.006205
pcap2[2]	0.491621	0.575065	0.656436	0.574595	0.042365	NA	0.000493	1.2	7378	0.059938	1.000987
pcap2[3]	0.715646	0.779656	0.836506	0.778394	0.031001	NA	0.000358	1.2	7520	0.060699	1.000755
pcap2[4]	0.817301	0.863934	0.901926	0.862508	0.021964	NA	0.000243	1.1	8191	0.045017	1.00033
pcap2[5]	0.849773	0.888528	0.923247	0.887352	0.018895	NA	0.000213	1.1	7849	0.043981	1.000168
pcap2[6]	0.809068	0.855161	0.896166	0.853978	0.022625	NA	0.000264	1.2	7357	0.062143	1.000025
pcap2[7]	0.868395	0.902955	0.933488	0.901773	0.01682	NA	0.000183	1.1	8421	0.05065	1.000118
pcap2[8]	0.790583	0.839143	0.884178	0.83786	0.024032	NA	0.00027	1.1	7917	0.050716	1.00035
pcap2[9]	0.824746	0.86871	0.905668	0.867371	0.020789	NA	0.000235	1.1	7856	0.058901	1.000285
pcap2[10]	0.849812	0.88816	0.921835	0.886934	0.018586	NA	0.00021	1.1	7829	0.053135	0.999995
pcap2[11]	0.918134	0.941578	0.961632	0.940725	0.011295	NA	0.000114	1	9838	0.033662	1.000175
pcap2[12]	0.938885	0.956776	0.973263	0.956028	0.008979	NA	8.60E-05	1	10912	0.034172	0.999963
pcap2[13]	0.932616	0.952042	0.969296	0.951327	0.009548	NA	9.64E-05	1	9814	0.028746	1.000063
pcap2[14]	0.850253	0.88661	0.919382	0.885513	0.017708	NA	0.000195	1.1	8214	0.047267	1.000093
pcap2[15]	0.948213	0.964413	0.977437	0.9638	0.007627	NA	7.64E-05	1	9958	0.035623	1.000024
pcap2[16]	0.917595	0.940207	0.959749	0.939419	0.01091	NA	0.000114	1	9239	0.044364	1.000147
pcap2[17]	0.956743	0.970605	0.981991	0.970027	0.006599	NA	6.20E-05	0.9	11325	0.025139	0.999976
pcap2[18]	0.944126	0.960816	0.974473	0.960173	0.007939	NA	8.07E-05	1	9671	0.033072	1.000052
pcap2[19]	0.953253	0.967498	0.979713	0.966934	0.006868	NA	6.67E-05	1	10590	0.026615	1.000042
pcap2[20]	0.927502	0.94753	0.964652	0.946834	0.009596	NA	9.72E-05	1	9749	0.032957	1.000032
pcap2[21]	0.944782	0.960908	0.975188	0.960271	0.007819	NA	7.56E-05	1	10697	0.035517	1.000183
pcap2[22]	0.839018	0.875089	0.908124	0.874153	0.017836	NA	0.000199	1.1	8059	0.054355	1.000135
pcap2[23]	0.633924	0.694465	0.751274	0.693556	0.03016	NA	0.000361	1.2	6971	0.053425	0.999995
pcap2[24]	0.825846	0.865567	0.89989	0.86454	0.01893	NA	0.000216	1.1	7714	0.050287	0.999998
pcap2[25]	0.573026	0.638008	0.702755	0.637437	0.033313	NA	0.000412	1.2	6529	0.061519	1.000009
pcap2[26]	0.745383	0.796041	0.84339	0.794877	0.025028	NA	0.000293	1.2	7318	0.04865	0.999975
pcap2[27]	0.917992	0.941867	0.962006	0.94102	0.011393	NA	0.000115	1	9779	0.040183	1.000064
pcap2[28]	0.929847	0.951568	0.970314	0.95066	0.010505	NA	0.000104	1	10273	0.030639	1.000118
pcap2[29]	0.968936	0.984385	0.999983	0.983609	0.008204	NA	0.000119	1.4	4774	0.089399	1.000267
gmif	-1.20299	-0.75844	-0.34576	-0.75697	0.217273	NA	0.00347	1.6	3921	0.07745	1.001844
pie	0.43002	0.467563	0.505043	0.467582	0.019245	NA	0.000115	0.6	27966	0.004227	1.000532
AlphaSex[1]	0.675768	0.955157	1.24435	0.957606	0.144982	NA	0.003966	2.7	1336	0.391029	1.006019
AlphaSex[2]	-0.51974	-0.23234	0.048349	-0.23239	0.145258	NA	0.002797	1.9	2697	0.185849	1.00206
AlphaTime[1]	0	0	0	0	0	0	NA	NA	NA	NA	NA

AlphaTime[2]	0	0	0	0	0	0	NA	NA	NA	NA	NA
AlphaTime[3]	-1.01517	-0.65555	-0.30757	-0.65471	0.17973	NA	0.0024	1.3	5608	0.087858	1.001171
AlphaTime[4]	-0.05209	0.306794	0.670279	0.307767	0.185677	NA	0.002433	1.3	5823	0.080414	1.001295
AlphaTime[5]	0.508968	0.891286	1.26005	0.891085	0.19129	NA	0.002497	1.3	5868	0.07931	1.002398
AlphaTime[6]	0.756601	1.119195	1.51497	1.120188	0.194219	NA	0.002486	1.3	6105	0.072177	1.001877
AlphaTime[7]	0.44874	0.820999	1.18583	0.820213	0.187753	NA	0.002532	1.3	5499	0.09031	1.00275
AlphaTime[8]	0.896817	1.27356	1.6686	1.273903	0.195529	NA	0.002605	1.3	5634	0.089528	1.00208
AlphaTime[9]	0.347713	0.694296	1.07006	0.69537	0.184997	NA	0.002511	1.4	5428	0.094915	1.001808
AlphaTime[10]	0.55907	0.932589	1.29855	0.932306	0.188136	NA	0.002585	1.4	5296	0.097973	1.001886
AlphaTime[11]	0.739279	1.114905	1.48636	1.115462	0.191704	NA	0.002592	1.4	5471	0.091806	1.002944
AlphaTime[12]	1.41725	1.82309	2.23779	1.824903	0.209441	NA	0.002589	1.2	6543	0.070538	1.001969
AlphaTime[13]	1.70822	2.141645	2.56554	2.142292	0.220049	NA	0.002666	1.2	6813	0.067886	1.002426
AlphaTime[14]	1.60847	2.03208	2.44839	2.034332	0.213911	NA	0.002656	1.2	6489	0.070416	1.002457
AlphaTime[15]	0.730012	1.0987	1.45753	1.099833	0.18519	NA	0.002584	1.4	5136	0.098141	1.002749
AlphaTime[16]	1.89845	2.343455	2.78504	2.346242	0.225635	NA	0.002766	1.2	6653	0.074912	1.001941
AlphaTime[17]	1.41241	1.798555	2.19768	1.799767	0.201787	NA	0.002751	1.4	5381	0.095069	1.001966
AlphaTime[18]	2.09194	2.54086	3.00904	2.543462	0.234471	NA	0.002736	1.2	7343	0.057066	1.001985
AlphaTime[19]	1.81841	2.242185	2.66783	2.244701	0.217874	NA	0.002761	1.3	6226	0.075992	1.001748
AlphaTime[20]	2.00807	2.437645	2.88673	2.439508	0.224479	NA	0.00293	1.3	5869	0.075177	1.001776
AlphaTime[21]	1.54555	1.937975	2.33854	1.938294	0.203455	NA	0.002862	1.4	5054	0.094134	1.00333
AlphaTime[22]	1.81234	2.2448	2.66142	2.24679	0.216082	NA	0.002773	1.3	6071	0.083539	1.00298
AlphaTime[23]	0.644588	0.989675	1.33974	0.990422	0.177312	NA	0.002701	1.5	4310	0.1229	1.004805
AlphaTime[24]	-0.4531	-0.13505	0.180133	-0.1369	0.162705	NA	0.002764	1.7	3465	0.153499	1.004858
AlphaTime[25]	0.558257	0.905567	1.25061	0.90544	0.176934	NA	0.002797	1.6	4003	0.127693	1.004567
AlphaTime[26]	-0.71279	-0.39041	-0.0724	-0.39048	0.163932	NA	0.002781	1.7	3474	0.153058	1.005185
AlphaTime[27]	0.070109	0.404972	0.737527	0.403936	0.170944	NA	0.002791	1.6	3752	0.138157	1.003867
AlphaTime[28]	1.4065	1.828335	2.26007	1.830701	0.217052	NA	0.002834	1.3	5865	0.084797	1.002615
AlphaTime[29]	1.56529	2.021375	2.49072	2.023353	0.236678	NA	0.00312	1.3	5755	0.079614	1.00207
AlphaTime[30]	2.1609	3.19015	4.55693	3.319247	0.770478	NA	0.014241	1.8	2927	0.163756	1.000803
sigma	0.22255	0.405084	0.625744	0.414264	0.10448	NA	0.001327	1.3	6202	0.029803	1.001516
epsilon	1.30567	1.43035	1.56347	1.431534	0.065809	NA	0.000984	1.5	4469	0.077329	1.003066
gamma[1]	0.234187	0.261045	0.28865	0.261164	0.013922	NA	0.0001	0.7	19368	0.011666	1.00829
gamma[2]	0.01203	0.021298	0.03279	0.021732	0.005374	NA	3.19E-05	0.6	28327	0.003305	1.000689
gamma[3]	0.011071	0.020396	0.031476	0.02086	0.005301	NA	3.18E-05	0.6	27778	0.000583	1.001024

gamma[4]	0.007319	0.014949	0.024933	0.015439	0.004623	NA	2.76E-05	0.6	28123	-0.00079	1.000096
gamma[5]	0.012366	0.022198	0.033763	0.022641	0.005592	NA	3.31E-05	0.6	28590	0.008673	1.000473
gamma[6]	0.007101	0.01546	0.025184	0.015933	0.004751	NA	2.79E-05	0.6	28954	-0.00105	1.000227
gamma[7]	0.016466	0.027554	0.040751	0.028005	0.006283	NA	3.73E-05	0.6	28391	0.000904	1.000114
gamma[8]	0.019194	0.031274	0.045437	0.031701	0.006815	NA	4.08E-05	0.6	27963	-0.0066	1.00047
gamma[9]	0.001791	0.007313	0.014647	0.007808	0.003482	NA	2.19E-05	0.6	25241	-0.00876	1.000187
gamma[10]	0.007071	0.015176	0.025708	0.015644	0.004865	NA	2.95E-05	0.6	27283	0.001646	1.000122
gamma[11]	0.003816	0.010586	0.019314	0.011094	0.004157	NA	2.54E-05	0.6	26860	0.007175	0.999985
gamma[12]	0.033331	0.049098	0.067098	0.049578	0.008652	NA	5.11E-05	0.6	28670	-0.00011	1.000709
gamma[13]	0.025255	0.03972	0.056516	0.040214	0.008092	NA	4.87E-05	0.6	27615	0.004736	1.000606
gamma[14]	0.029099	0.044874	0.0624	0.045373	0.008606	NA	5.01E-05	0.6	29482	-0.00471	1.000233
gamma[15]	0.017094	0.03049	0.045486	0.031012	0.007385	NA	4.36E-05	0.6	28651	0.001664	1.000423
gamma[16]	0.035962	0.053985	0.074209	0.054481	0.00986	NA	5.80E-05	0.6	28851	0.000789	1.000294
gamma[17]	0.030029	0.047056	0.066419	0.047631	0.009426	NA	5.67E-05	0.6	27637	-0.00011	1.000259
gamma[18]	0.029352	0.047122	0.066959	0.047765	0.009761	NA	5.77E-05	0.6	28579	0.004273	1.000102
gamma[19]	0.03638	0.055889	0.078016	0.056562	0.010771	NA	6.33E-05	0.6	28969	-0.00514	1.000587
gamma[20]	0.054905	0.080052	0.105546	0.080609	0.013004	NA	7.67E-05	0.6	28777	0.009271	1.001412
gamma[21]	0.039956	0.061892	0.086841	0.062655	0.012111	NA	7.18E-05	0.6	28469	-0.01	1.000392
gamma[22]	0.0324	0.052452	0.077178	0.053261	0.011595	NA	6.86E-05	0.6	28581	-0.00369	1.00036
gamma[23]	0.006843	0.018889	0.03462	0.019808	0.00737	NA	4.49E-05	0.6	26932	0.00284	1.000062
gamma[24]	0.029694	0.051632	0.07598	0.052495	0.012017	NA	7.64E-05	0.6	24764	0.005445	1.000433
gamma[25]	0.009256	0.023542	0.041476	0.024566	0.008604	NA	5.47E-05	0.6	24753	0.015754	1.000485
gamma[26]	0.025689	0.046754	0.071836	0.047611	0.011918	NA	7.80E-05	0.7	23376	0.010659	1.00167
gamma[27]	0.024328	0.044808	0.069924	0.045817	0.011973	NA	7.44E-05	0.6	25920	0.012644	1.001034
gamma[28]	0.007797	0.022684	0.041111	0.023735	0.008887	NA	5.35E-05	0.6	27563	-0.00527	1.000282
gamma[29]	1.44E-07	0.002424	0.010499	0.003511	0.003527	NA	3.11E-05	0.9	12867	-0.00029	1.000356
gamma[30]	7.80E-08	0.002463	0.010533	0.003543	0.003523	NA	2.84E-05	0.8	15385	0.0056	1.000053
N[1]	260	263	269	263.661	2.490437	263	0.307289	12.3	66	0.791951	1.504843
N[2]	266	270	275	270.5926	2.493586	270	0.098928	4	635	0.226672	1.131097
N[3]	276	280	285	280.6362	2.402769	280	0.081634	3.4	866	0.183665	1.102636
N[4]	273	276	280	276.626	2.015966	276	0.033726	1.7	3573	0.0626	1.03128
N[5]	284	286	289	286.2823	1.530099	286	0.027408	1.8	3117	0.098945	1.028395
N[6]	290	292	294	291.9549	1.35586	292	0.02025	1.5	4483	0.090643	1.021761
N[7]	300	303	306	303.2677	1.653576	303	0.021362	1.3	5992	0.075542	1.013161

N[8]	311	313	316	313.5388	1.587842	313	0.01979	1.2	6438	0.062422	1.011782
N[9]	310	313	316	312.7168	1.58038	312	0.019621	1.2	6488	0.05562	1.007068
N[10]	309	311	314	311.6195	1.573871	311	0.017476	1.1	8111	0.052434	1.004012
N[11]	307	308	311	308.441	1.190168	308	0.014959	1.3	6330	0.061612	1.003055
N[12]	331	332	334	332.0202	1.013423	332	0.015388	1.5	4337	0.109633	1.003962
N[13]	344	345	347	344.9763	1.010267	344	0.016087	1.6	3944	0.094435	1.001665
N[14]	358	359	362	359.4391	1.16525	359	0.015495	1.3	5655	0.058715	1.000536
N[15]	366	368	370	367.6534	1.215504	367	0.016374	1.3	5511	0.063095	1.001099
N[16]	390	391	393	391.2931	1.040295	391	0.015347	1.5	4595	0.098585	1.002035
N[17]	400	402	404	401.9089	1.279876	402	0.017617	1.4	5278	0.086014	1.001097
N[18]	411	412	414	411.9859	0.968555	412	0.016459	1.7	3463	0.135898	1.001096
N[19]	430	431	433	431.3495	1.052329	431	0.018423	1.8	3263	0.141636	1.001145
N[20]	459	460	462	460.2184	1.081823	460	0.020903	1.9	2679	0.178738	1.001042
N[21]	472	476	478	475.6972	1.61348	475	0.024975	1.5	4174	0.112787	1.000504
N[22]	478	481	484	481.2538	1.724201	481	0.029462	1.7	3425	0.135606	1.001621
N[23]	468	472	477	472.1183	2.524759	472	0.034299	1.4	5418	0.081402	1.000828
N[24]	471	477	483	477.0387	3.229828	477	0.046714	1.4	4780	0.082629	1.000336
N[25]	466	472	478	472.4508	3.277214	472	0.0496	1.5	4366	0.092754	1.00038
N[26]	460	468	477	468.0092	4.576328	467	0.065421	1.4	4893	0.080128	1.000168
N[27]	444	452	459	452.2381	3.931082	452	0.054727	1.4	5160	0.081811	1.000302
N[28]	421	427	433	427.6566	3.198667	427	0.046581	1.5	4715	0.08845	1.00024
N[29]	378	385	390	385.0801	3.092341	385	0.051388	1.7	3621	0.122655	1.000194
N[30]	356	368	378	368.161	5.569425	369	0.095702	1.7	3387	0.126701	1.000074
NM[1]	141	145	149	145.3769	2.203058	145	0.04794	2.2	2112	0.104508	1.059859
NM[2]	145	149	153	149.23	2.258584	149	0.024441	1.1	8539	0.029099	1.016235
NM[3]	152	156	160	156.3412	2.257582	156	0.020631	0.9	11974	0.017426	1.012257
NM[4]	153	158	161	157.6774	2.094487	157	0.01521	0.7	18963	0.008251	1.002434
NM[5]	157	162	165	161.9099	2.07602	162	0.015164	0.7	18743	0.006691	1.001222
NM[6]	162	165	169	165.3122	1.990074	165	0.014427	0.7	19028	0.007304	1.000595
NM[7]	165	169	173	169.377	2.125862	169	0.014935	0.7	20262	0.005898	1.000447
NM[8]	172	177	180	176.5512	2.139469	176	0.015083	0.7	20121	-0.0011	1.000267
NM[9]	174	179	182	178.7499	2.154694	179	0.014927	0.7	20837	-0.00379	1.000081
NM[10]	176	180	184	180.1826	2.125807	180	0.013982	0.7	23117	0.001719	1.000033
NM[11]	177	181	184	180.8878	1.900269	181	0.012906	0.7	21679	-0.00014	1.000078

NM[12]	188	192	196	192.3982	2.081676	193	0.014604	0.7	20318	0.002959	1.000044
NM[13]	194	199	202	198.8554	2.139397	199	0.014849	0.7	20758	0.004934	1.000159
NM[14]	206	211	214	210.8579	2.13531	211	0.014789	0.7	20848	0.007881	1.000102
NM[15]	213	218	221	217.8293	2.125324	218	0.014735	0.7	20804	0.008225	1.000096
NM[16]	224	229	233	229.3149	2.312643	229	0.016573	0.7	19472	0.014639	1.000123
NM[17]	235	240	244	240.3447	2.32053	240	0.016682	0.7	19351	0.016525	1.00015
NM[18]	246	250	254	250.4746	2.196539	251	0.015868	0.7	19162	0.01517	1.000151
NM[19]	256	261	265	261.4831	2.308165	261	0.017094	0.7	18233	0.012117	1.000062
NM[20]	269	273	277	272.9627	2.148789	273	0.017015	0.8	15949	0.016568	1.000135
NM[21]	275	280	284	280.1496	2.434136	280	0.020154	0.8	14587	0.009981	1.000049
NM[22]	277	282	286	281.8983	2.438605	282	0.021413	0.9	12969	0.024142	1.000215
NM[23]	273	278	283	277.8172	2.749907	278	0.026188	1	11027	0.030239	1.000108
NM[24]	272	279	284	278.527	3.131868	279	0.030335	1	10659	0.026235	1.000093
NM[25]	274	280	286	280.052	3.180498	280	0.032266	1	9717	0.021671	1.000342
NM[26]	267	275	282	275.3654	3.915542	275	0.039242	1	9956	0.036122	1.000087
NM[27]	260	267	273	266.638	3.417769	267	0.032887	1	10800	0.029585	1.000035
NM[28]	245	250	256	250.3556	3.055124	250	0.03064	1	9942	0.023531	1.000051
NM[29]	222	227	233	227.4426	2.94771	227	0.03332	1.1	7826	0.037586	1.00014
NM[30]	210	218	225	218.1141	4.01424	217	0.055723	1.4	5190	0.072105	1.000096
NF[1]	114	118	123	118.2842	2.545604	118	0.096988	3.8	689	0.223501	1.153926
NF[2]	116	121	126	121.3626	2.607119	121	0.049435	1.9	2781	0.083203	1.045243
NF[3]	120	124	129	124.2951	2.53413	124	0.040971	1.6	3826	0.060896	1.035381
NF[4]	114	119	123	118.9486	2.338941	119	0.021215	0.9	12155	0.022205	1.010146
NF[5]	120	124	128	124.3724	2.169332	124	0.019523	0.9	12347	0.022915	1.006202
NF[6]	122	127	130	126.6427	2.120125	127	0.018599	0.9	12994	0.019937	1.004531
NF[7]	130	134	138	133.8907	2.272184	134	0.020293	0.9	12537	0.019513	1.00378
NF[8]	132	137	141	136.9876	2.445781	137	0.019598	0.8	15575	0.011931	1.003029
NF[9]	129	134	138	133.9669	2.422073	134	0.019715	0.8	15093	0.010714	1.002041
NF[10]	126	131	135	131.4369	2.263742	131	0.017061	0.8	17605	0.008945	1.001467
NF[11]	124	128	131	127.5532	1.999958	127	0.014873	0.7	18083	0.015446	1.000718
NF[12]	135	140	143	139.622	2.133852	139	0.0175	0.8	14869	0.015806	1.000774
NF[13]	142	146	150	146.1209	2.179484	146	0.016231	0.7	18031	0.00906	1.000376
NF[14]	145	149	153	148.5813	2.261482	149	0.015936	0.7	20138	0.012067	1.000133
NF[15]	146	150	154	149.8241	2.290963	150	0.016687	0.7	18848	0.008719	1.000289

NF[16]	157	162	166	161.9782	2.386925	162	0.018394	0.8	16839	0.016642	1.000511
NF[17]	157	162	166	161.5642	2.4787	162	0.01956	0.8	16058	0.019148	1.00055
NF[18]	156	161	165	161.5113	2.343186	161	0.019568	0.8	14339	0.026417	1.000546
NF[19]	165	170	174	169.8665	2.396141	170	0.021318	0.9	12634	0.026752	1.00043
NF[20]	183	187	191	187.2557	2.226619	187	0.021162	1	11070	0.036143	1.000364
NF[21]	191	196	200	195.5476	2.457926	195	0.022504	0.9	11930	0.027846	1.000201
NF[22]	195	199	204	199.3554	2.527063	199	0.026494	1	9098	0.03594	1.000303
NF[23]	188	194	199	194.3012	2.873559	194	0.027702	1	10760	0.031922	1.000319
NF[24]	192	198	204	198.5117	3.194694	198	0.034113	1.1	8770	0.037171	1.000224
NF[25]	186	192	198	192.3988	3.235063	193	0.035046	1.1	8521	0.039835	1.000143
NF[26]	186	193	199	192.6438	3.522906	192	0.037142	1.1	8996	0.043903	1.000298
NF[27]	180	185	192	185.6001	3.321958	185	0.034717	1	9156	0.046641	1.000474
NF[28]	172	177	183	177.3011	3.100131	177	0.031506	1	9682	0.029712	1.000105
NF[29]	152	158	163	157.6375	2.910954	157	0.0325	1.1	8022	0.042388	1.000014
NF[30]	143	150	156	150.0469	3.540516	150	0.04689	1.3	5701	0.070684	1.000016
B[1]	260	263	269	263.661	2.490437	263	0.307289	12.3	66	0.791951	1.504843
B[2]	15	15	16	15.27157	0.534317	15	0.007367	1.4	5261	0.035021	1.038638
B[3]	14	14	15	14.31817	0.577305	14	0.007856	1.4	5400	0.03952	1.04066
B[4]	10	10	11	10.10913	0.332807	10	0.002913	0.9	13055	0.022293	1.032851
B[5]	15	15	16	15.11923	0.349887	15	0.003728	1.1	8808	0.039633	1.031361
B[6]	10	10	11	10.08467	0.292063	10	0.003055	1	9142	0.047626	1.022997
B[7]	18	18	19	18.15633	0.395346	18	0.006364	1.6	3860	0.130971	1.027488
B[8]	20	20	21	20.1319	0.359963	20	0.005543	1.5	4217	0.105957	1.028614
B[9]	4	4	4	4.044667	0.212618	4	0.002232	1	9075	0.055051	1.013928
B[10]	9	9	10	9.070233	0.2674	9	0.003767	1.4	5040	0.075507	1.012954
B[11]	6	6	6	6.036267	0.190489	6	0.0022	1.2	7495	0.02202	1.009009
B[12]	30	30	31	30.11593	0.343167	30	0.007519	2.2	2083	0.163551	1.011498
B[13]	23	23	24	23.07047	0.263255	23	0.004566	1.7	3325	0.09124	1.008487
B[14]	25	25	26	25.07327	0.269508	25	0.004857	1.8	3079	0.104014	1.006475
B[15]	16	16	17	16.0673	0.261227	16	0.005234	2	2491	0.122222	1.007451
B[16]	28	28	29	28.07863	0.279975	28	0.004985	1.8	3155	0.137077	1.012339
B[17]	23	23	24	23.08	0.284024	23	0.005572	2	2599	0.142751	1.016617
B[18]	22	22	22	22.0472	0.215346	22	0.00256	1.2	7079	0.059356	1.005029
B[19]	25	25	26	25.06623	0.25622	25	0.00322	1.3	6331	0.05708	1.005077

B[20]	34	34	35	34.11577	0.341226	34	0.004858	1.4	4934	0.084929	1.003224
B[21]	24	24	25	24.15047	0.390681	24	0.005982	1.5	4266	0.090336	1.002537
B[22]	19	19	20	19.1567	0.39245	19	0.006265	1.6	3924	0.069142	1.00505
B[23]	6	6	7	6.1206	0.348893	6	0.004636	1.3	5664	0.032764	1.005606
B[24]	17	17	19	17.45517	0.677991	17	0.020933	3.1	1049	0.183233	1.004908
B[25]	7	7	8	7.1836	0.432856	7	0.007991	1.8	2934	0.065042	1.004457
B[26]	14	14	16	14.54703	0.74789	14	0.027269	3.6	752	0.252767	1.010262
B[27]	13	13	14	13.33323	0.585776	13	0.016247	2.8	1300	0.148605	1.006068
B[28]	6	6	7	6.100567	0.320816	6	0.004371	1.4	5386	0.049572	1.002882
B[29]	0	0	0	0.014033	0.119597	0	0.000759	0.6	24806	0.006795	1.004084
B[30]	0	0	0	0.042133	0.212351	0	0.001297	0.6	26823	-0.00413	1.001965

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