

## **ASSESSMENT OF THE PACIFIC SARDINE RESOURCE IN 2015 FOR U.S.A. MANAGEMENT IN 2015-16**

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## ACRONYMS AND DEFINITIONS

|            |                                                                                      |
|------------|--------------------------------------------------------------------------------------|
| ABC        | acceptable biological catch                                                          |
| ATM        | Acoustic-trawl method of biomass estimation                                          |
| BC         | British Columbia (Canada)                                                            |
| Bongo      | Obliquely-towed ichthyoplankton net (505 micron mesh)                                |
| CA         | California                                                                           |
| CalCOFI    | California Cooperative Oceanic Fisheries Investigations                              |
| CalVET     | California vertical egg tow (333 micron mesh)                                        |
| CCA        | Central California fishery                                                           |
| CDFW       | California Department of Fish and Wildlife                                           |
| CDFO       | Canada Department of Fisheries and Oceans                                            |
| CICIMAR    | Centro Interdisciplinario de Ciencias Marinas                                        |
| CONAPESCA  | National Commission of Aquaculture and Fishing (México)                              |
| CPS        | Coastal Pelagic Species                                                              |
| CPSAS      | Coastal Pelagic Species Advisory Subpanel                                            |
| CPSMT      | Coastal Pelagic Species Management Team                                              |
| CUFES      | Continuous Underway Fish Egg Sampler (fixed at 3 meters depth)                       |
| DEPM       | Daily egg production method                                                          |
| ENS        | Ensenada (México)                                                                    |
| FMP        | fishery management plan                                                              |
| HG         | harvest guideline                                                                    |
| INAPESCA   | National Fisheries Institute (México)                                                |
| Model Year | July 1 (year) to June 30 (year+1)                                                    |
| mt         | metric tons                                                                          |
| mmt        | million metric tons                                                                  |
| MexCal     | southern fleet based on ENS, SCA, and CCA fishery data                               |
| NMFS       | National Marine Fisheries Service                                                    |
| NSP        | Northern subpopulation of Pacific sardine, as defined by satellite oceanography data |
| NWSS       | Northwest Sardine Survey (aka ‘Aerial Survey’)                                       |
| NOAA       | National Oceanic and Atmospheric Administration                                      |
| ODFW       | Oregon Department of Fish and Wildlife                                               |
| OFL        | overfishing limit                                                                    |
| OR         | Oregon                                                                               |
| PacNW      | northern fleet based on OR, WA, and BC fishery data                                  |
| PairoVET   | Paired CalVET net (333 micron mesh)                                                  |
| PFMC       | Pacific Fishery Management Council                                                   |
| SAFE       | Stock Assessment and Fishery Evaluation                                              |
| SCA        | Southern California fishery                                                          |
| SCB        | Southern California Bight (Pt. Conception, CA to northern Baja California)           |
| SS         | Stock Synthesis model                                                                |
| SSB        | spawning stock biomass                                                               |
| SSC        | Scientific and Statistical Committee                                                 |
| SST        | sea surface temperature                                                              |
| STAR       | Stock Assessment Review                                                              |
| STAT       | Stock Assessment Team                                                                |
| SWFSC      | Southwest Fisheries Science Center                                                   |
| TEP        | Total egg production                                                                 |
| VPA        | Virtual Population Analysis                                                          |
| WA         | Washington                                                                           |
| WDFW       | Washington Department of Fish and Wildlife                                           |

## **PREFACE**

The Pacific sardine resource is assessed each year in support of the Pacific Fishery Management Council (PFMC) process of recommending annual harvest specifications for the U.S. fishery. The following assessment update for 2015-16 management is based on data and methods reviewed by a Stock Assessment Review (STAR) Panel during March 2014 (STAR 2014) and more fully described in Hill et al. (2014).

The stock assessment update was conducted using Stock Synthesis (SS), and includes one additional year of data from fishery-dependent and fishery-independent sources. A preliminary draft assessment was reviewed by members of the Scientific and Statistical Committee's CPS Subcommittee on March 6, 2015 in Vancouver, WA. The following final draft incorporates changes recommended during that review and is provided to the Pacific Fishery Management Council for their April 2015 briefing book.

## EXECUTIVE SUMMARY

The following Pacific sardine assessment update was conducted to inform U.S. fishery management for the fishing year that begins July 1, 2015 and ends June 30, 2016. Model ‘T’ represented the final base model from the most recent stock assessment review (STAR) conducted in March 2014 (Hill et al. 2014, STAR 2014). This update assessment appends Model T with one additional year of data from fishery-dependent and -independent sources and is based on similar parameterizations as included in the most recently reviewed Model T.

### Stock

This assessment focuses on the Pacific sardine northern subpopulation (NSP) that ranges from northern Baja California, México to British Columbia, Canada and extends up to 300 nm offshore. In all past assessments, the default approach has been to assume that all catches landed in ports from Ensenada (ENS) to British Columbia (BC) were from the northern subpopulation. There is now general scientific consensus that catches landed in ENS and SCA likely represent a mixture of the southern subpopulation (warm months) and northern subpopulation (cool months) (Felix-Uraga et al. 2004, 2005; Garcia-Morales 2012; Zwolinski et al. 2011; Demer and Zwolinski 2014). Although the ranges of the northern and southern subpopulations can overlap within the Southern California Bight, the adult spawning stocks likely move north and south in synchrony each year and do not occupy the same space simultaneously to any significant extent (Garcia-Morales 2012). Satellite oceanography data (Demer and Zwolinski 2014) were used to partition catch data from ENS and southern California (SCA) ports in order to exclude both landings and biological compositions attributed to the southern subpopulation.

### Catches

The assessment includes sardine landings (metric tons) from six major fishing regions: Ensenada (ENS), southern California (SCA), central California (CCA), Oregon (OR), Washington (WA), and British Columbia (BC). Landings for each port and for the NSP over the past ten years follow:

| Calendar<br>Yr-Sem | Model<br>Yr-Seas | ENS<br>Total | ENS<br>NSP | SCA<br>Total | SCA<br>NSP | CCA      | OR       | WA       | BC       |
|--------------------|------------------|--------------|------------|--------------|------------|----------|----------|----------|----------|
| 2005-1             | 2004-2           | 17,323.0     | 11,186.6   | 15,419.0     | 13,948.1   | 115.3    | 691.9    | 324.0    | 0.4      |
| 2005-2             | 2005-1           | 37,999.5     | 4,396.7    | 14,833.6     | 1,508.6    | 7,824.9  | 44,316.2 | 6,605.0  | 3,231.4  |
| 2006-1             | 2005-2           | 17,600.9     | 11,214.6   | 17,157.7     | 16,504.9   | 2,032.6  | 101.7    | 0.0      | 0.0      |
| 2006-2             | 2006-1           | 39,636.0     | 0.0        | 16,128.2     | 4,909.8    | 15,710.5 | 35,546.5 | 4,099.0  | 1,575.4  |
| 2007-1             | 2006-2           | 13,981.4     | 13,320.0   | 26,343.6     | 19,900.7   | 6,013.3  | 0.0      | 0.0      | 0.0      |
| 2007-2             | 2007-1           | 22,865.5     | 11,928.2   | 19,855.0     | 5,350.3    | 28,768.8 | 42,052.3 | 4,662.5  | 1,522.3  |
| 2008-1             | 2007-2           | 23,487.8     | 15,618.2   | 24,127.2     | 24,114.3   | 2,515.3  | 0.0      | 0.0      | 0.0      |
| 2008-2             | 2008-1           | 43,378.3     | 5,930.0    | 6,962.1      | 21.8       | 24,195.7 | 22,939.9 | 6,435.2  | 10,425.0 |
| 2009-1             | 2008-2           | 25,783.2     | 20,244.4   | 9,250.8      | 9,221.3    | 11,079.9 | 0.0      | 0.0      | 0.0      |
| 2009-2             | 2009-1           | 30,128.0     | 0.0        | 3,310.3      | 29.8       | 13,935.1 | 21,481.6 | 8,025.2  | 15,334.3 |
| 2010-1             | 2009-2           | 12,989.1     | 7,904.2    | 19,427.7     | 19,427.7   | 2,908.8  | 437.1    | 510.9    | 421.7    |
| 2010-2             | 2010-1           | 43,831.8     | 9,171.2    | 9,924.7      | 562.7      | 1,397.1  | 20,414.9 | 11,869.6 | 21,801.3 |
| 2011-1             | 2010-2           | 18,513.8     | 11,588.5   | 12,526.4     | 12,515.4   | 2,713.3  | 0.1      | 0.0      | 0.0      |
| 2011-2             | 2011-1           | 51,822.6     | 17,329.6   | 5,115.4      | 11.9       | 7,358.4  | 11,023.3 | 8,008.4  | 20,718.8 |
| 2012-1             | 2011-2           | 10,534.0     | 9,026.1    | 11,906.2     | 10,018.8   | 3,672.7  | 2,873.9  | 2,931.7  | 0.0      |
| 2012-2             | 2012-1           | 48,534.6     | 0.0        | 6,896.1      | 883.6      | 568.7    | 39,744.1 | 32,509.6 | 19,172.0 |
| 2013-1             | 2012-2           | 13,609.2     | 12,827.9   | 2,592.2      | 769.7      | 84.2     | 149.3    | 1,421.4  | 0.0      |
| 2013-2             | 2013-1           | 37,803.5     | 0.0        | 3,658.1      | 62.9       | 811.3    | 27,599.0 | 29,203.7 | 0.0      |
| 2014-1             | 2013-2           | 17,667.5     | 2,106.2    | 1,237.7      | 666.7      | 4,404.0  | 0.0      | 908.0    | 0.0      |
| 2014-2             | 2014-1           | 49,076.6     | 0.0        | 320.0        | 0.0        | 1,830.8  | 7,788.4  | 7,208.5  | 0.0      |

## Data and Assessment

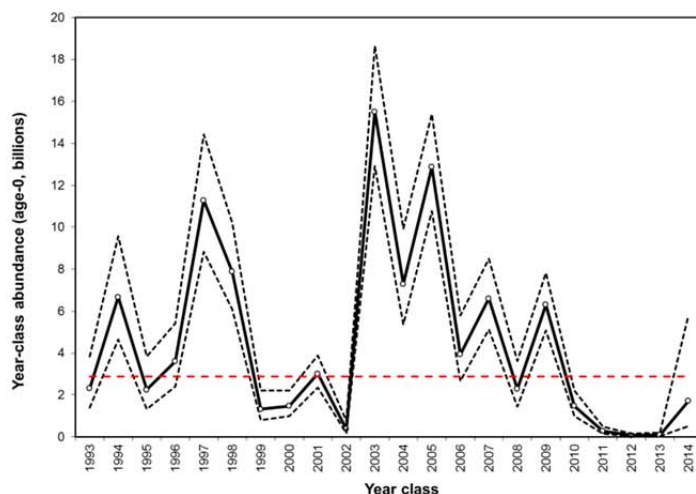
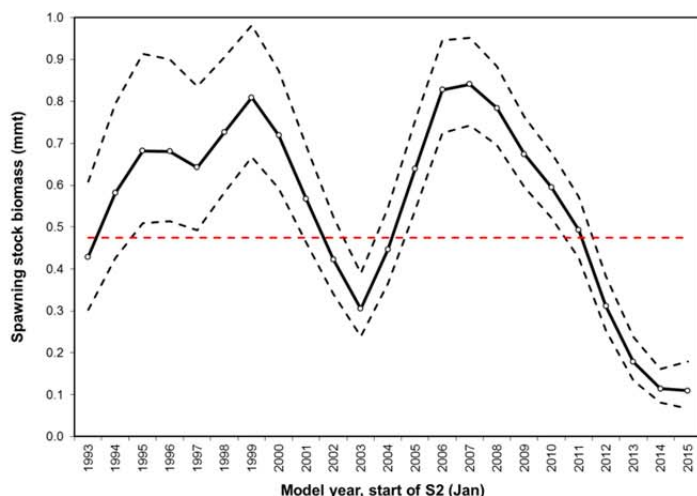
The assessment was conducted using Stock Synthesis (SS version 3.24s), and includes fishery and survey data collected from mid-1993 through 2014. The model is based on a July-June fishing year (aka ‘model year’), with two semester-based seasons per year (S1=Jul-Dec and S2=Jan-Jun). Catches and biological samples for the fisheries off ENS, SCA, and CCA were pooled into a single MexCal fleet (fishery), for which selectivity was modeled separately in each season (S1 and S2). Catches and biological samples from OR, WA, and BC were modeled as a single PacNW fleet (fishery). Three indices of abundance from ongoing surveys were included in the base model: daily and total egg production method (DEPM and TEPM) estimates of spawning stock biomass off CA (1994-2013) and acoustic-trawl method (ATM) estimates of biomass along the west coast (2006-2014). Catchability ( $q$ ) for the ATM surveys (spring and summer) was fixed (1.0) in the final base model T and  $q$ ’s for the egg production surveys were freely estimated. The spring and summer ATM time series were modeled with independent, asymptotic selectivities.

The following data were updated or appended to the update model:

- Landings for 2012 through 2014 were updated for all fishing regions (ENS to WA), including projected estimates for the first half of 2015 (model year 2014-2);
- Length compositions from SCA, CCA, OR, and WA fisheries were updated for model year 2013 and appended with the first semester of model year 2014 (Jul-Dec 2014 samples);
- Conditional age-at-length data from SCA, CCA, OR, and WA were updated through Dec 2013. Age data were not yet available for 2014;
- ATM estimates of biomass from the spring 2014 survey off California and the summer 2014 SaKe survey off the U.S. west coast (San Diego to Vancouver Island) were added to the model; and
- Due to very sparse data collected in the most recent CalCOFI survey conducted in the spring 2014 off California, it was not possible to produce an updated DEPM estimate of SSB for this index of abundance.

## Spawning Stock Biomass and Recruitment

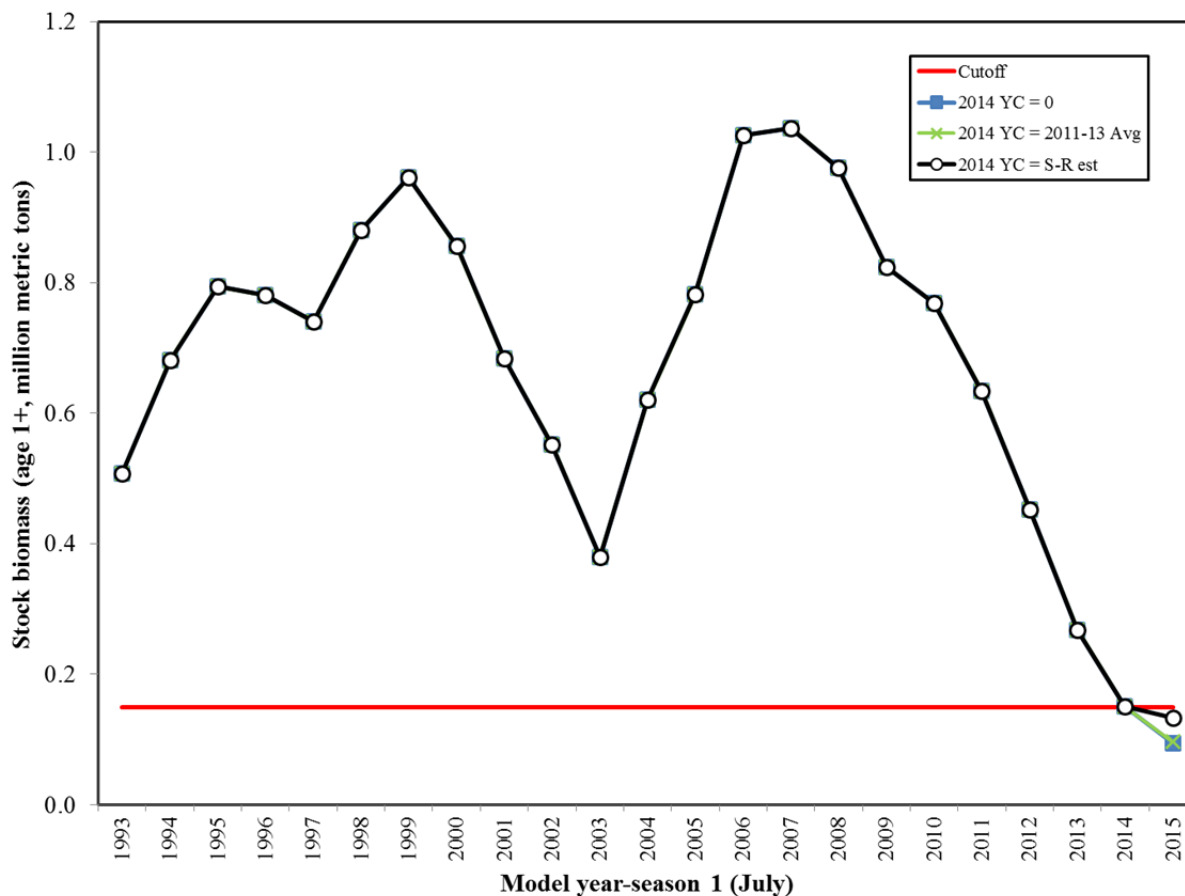
Recruitment was modeled using the Beverton-Holt (B-H) stock-recruitment relationship ( $\sigma_R=0.75$ ). Steepness estimates typically bounded at 1.0 for most model scenarios evaluated in sensitivity analysis, with steepness being fixed at 0.8 in the final base model, based on a reasonable range for clupeid stocks indicated from stock-recruitment meta-analysis research. Virgin recruitment ( $R_0$ ) for the final base model was estimated to be 2.884 billion age-0 fish. The virgin value of the spawning stock biomass (SSB) was estimated to be 0.475 million metric tons (mmt). The SSB increased throughout the 1990s, peaking at 0.809 mmt in 1999 and 0.841 mmt in 2007. Recruitment (age-0 abundance) peaked at 11.3 billion fish in 1997, 15.5 billion in 2003, and 12.9 billion in 2005. The 2010 to 2013 year classes were among the weakest in recent history. The 2014 year class, derived largely from the predicted stock-recruitment curve, was poorly estimated (CV=0.69) and unrealistically high, given the paucity of spawning activity during spring 2014.



| Calendar<br>Yr-Sem | Model<br>Yr-Seas | SSB (mt) | SSB<br>Std Dev | Year class<br>abundance<br>(billions) | Recruits<br>Std Dev |
|--------------------|------------------|----------|----------------|---------------------------------------|---------------------|
| 2004-1             | 2003-2           | 305,319  | 38,207         | ---                                   | ---                 |
| 2004-2             | 2004-1           | ---      | ---            | 7.294                                 | 1.155               |
| 2005-1             | 2004-2           | 445,992  | 45,653         | ---                                   | ---                 |
| 2005-2             | 2005-1           | ---      | ---            | 12.867                                | 1.182               |
| 2006-1             | 2005-2           | 639,018  | 54,433         | ---                                   | ---                 |
| 2006-2             | 2006-1           | ---      | ---            | 3.936                                 | 0.787               |
| 2007-1             | 2006-2           | 827,400  | 56,420         | ---                                   | ---                 |
| 2007-2             | 2007-1           | ---      | ---            | 6.597                                 | 0.853               |
| 2008-1             | 2007-2           | 840,513  | 53,143         | ---                                   | ---                 |
| 2008-2             | 2008-1           | ---      | ---            | 2.288                                 | 0.542               |
| 2009-1             | 2008-2           | 783,997  | 47,716         | ---                                   | ---                 |
| 2009-2             | 2009-1           | ---      | ---            | 6.302                                 | 0.701               |
| 2010-1             | 2009-2           | 673,537  | 42,702         | ---                                   | ---                 |
| 2010-2             | 2010-1           | ---      | ---            | 1.473                                 | 0.309               |
| 2011-1             | 2010-2           | 595,091  | 39,326         | ---                                   | ---                 |
| 2011-2             | 2011-1           | ---      | ---            | 0.275                                 | 0.080               |
| 2012-1             | 2011-2           | 492,999  | 37,406         | ---                                   | ---                 |
| 2012-2             | 2012-1           | ---      | ---            | 0.076                                 | 0.029               |
| 2013-1             | 2012-2           | 310,918  | 32,865         | ---                                   | ---                 |
| 2013-2             | 2013-1           | ---      | ---            | 0.087                                 | 0.037               |
| 2014-1             | 2013-2           | 178,656  | 26,352         | ---                                   | ---                 |
| 2014-2             | 2014-1           | ---      | ---            | 1.718                                 | 1.177               |
| 2015-1             | 2014-2           | 114,566  | 20,330         | ---                                   | ---                 |
| 2015-2             | 2015-1           | ---      | ---            | ---                                   | ---                 |
| 2016-1             | 2015-2           | 109,441  | 27,938         | ---                                   | ---                 |

## Stock Biomass

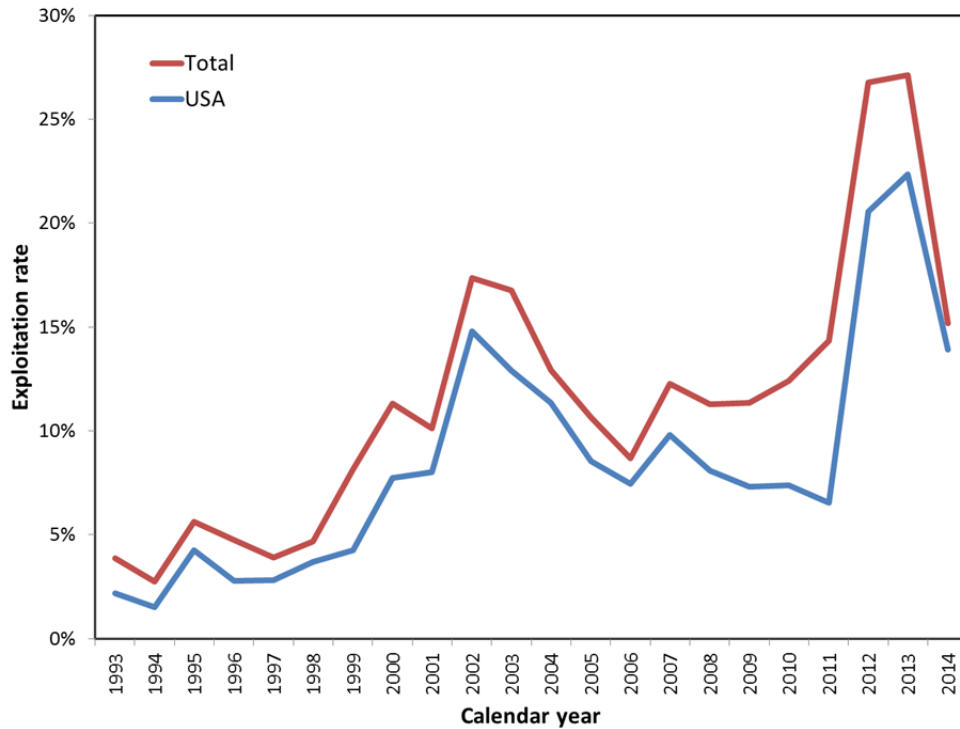
Stock biomass, used for calculating harvest specifications, is defined as the sum of the biomass for sardine ages one and older (age 1+). Stock biomass increased throughout the 1990s, peaking at 0.961 mmt in 1999 and 1.037 mmt in 2007. Stock biomass is projected to be less than 150,000 mt as of July 2015. When the 2014 year class is freely estimated, then stock biomass is projected to be 132,884 mt in July 2015. When the 2014 year class is based on an average of recruitments from 2011-2013, then stock biomass is projected to be 96,688 mt in July 2015. Given the lack of evidence for spawning in 2014, and the fact that recent recruitments have been over-estimated in the past several assessments, the latter is considered to represent the most likely scenario and is recommended for calculating harvest control rules (HCR) in 2015-2016.



### Exploitation Status

Exploitation rate is defined as the calendar year NSP catch divided by the total mid-year biomass (July-1, ages 0+). Based on update model estimates, exploitation rate for the U.S. fishery peaked at 22.4% in 2013. U.S. exploitation rate was 13.9% in 2014. U.S. exploitation rate has averaged about 11% since the onset of Council management in 2000. U.S. and total exploitation rates for the NSP, calculated from the update model, are:

| Calendar year | USA    | Total  |
|---------------|--------|--------|
| 2000          | 7.74%  | 11.31% |
| 2001          | 8.02%  | 10.11% |
| 2002          | 14.78% | 17.36% |
| 2003          | 12.90% | 16.77% |
| 2004          | 11.35% | 12.93% |
| 2005          | 8.52%  | 10.65% |
| 2006          | 7.47%  | 8.68%  |
| 2007          | 9.80%  | 12.26% |
| 2008          | 8.07%  | 11.29% |
| 2009          | 7.30%  | 11.37% |
| 2010          | 7.37%  | 12.41% |
| 2011          | 6.54%  | 14.33% |
| 2012          | 20.57% | 26.79% |
| 2013          | 22.36% | 27.13% |
| 2014          | 13.91% | 15.20% |



## Harvest Control Rules

### *Harvest guideline*

The annual HG is calculated as follows:

$$HG = (BIOMASS - CUTOFF) \cdot FRACTION \cdot DISTRIBUTION;$$

where HG is the total U.S. quota for the period July 2015 to June 2016, BIOMASS is the stock biomass (ages 1+) projected as of July 1, 2015, CUTOFF (150,000 mt) is the lowest level of biomass for which directed harvest is allowed, FRACTION (5-20%) is the percentage of biomass above the CUTOFF that can be harvested, and DISTRIBUTION (87%) is the average portion of BIOMASS assumed in U.S. waters. Based on results from the update model, and regardless of assumptions regarding strength of the 2014 year-class, stock biomass is projected to be below the 150,000 mt threshold. Therefore, HG for 2015-2016 is calculated to be 0 mt.

### *OFL and ABC*

On March 11, 2014, the PFMC adopted the use of CalCOFI SST data for specifying environmentally-dependent  $E_{MSY}$  each year, beginning July 2014. Based on this recent decision, the following tables of OFL and ABCs are based on an  $E_{MSY} = 0.157239$ , which corresponds to the three-year running average of CalCOFI SST for 2012-2014 (15.562 °C). OFL and ABC values for 2015-2016 will depend on assumptions regarding strength of the 2014 year-class used to project stock biomass to July 1, 2015. As noted above, when the 2014 year class is freely estimated (albeit primarily derived from the spawner-recruit relationship) then stock biomass is projected to be 132,884 mt in July 2015. When the 2014 year class is based on an average of recruitments from 2011-2013, then stock biomass is projected to be 96,688 mt in July 2015.

Given the lack of spawning activity observed during spring 2014, the latter scenario is considered more realistic. The OFLs and ABCs for these two recruitment scenarios and for a range of P-star values follow:

**a) HCRs when 2014 YC is derived from S-R Curve.**

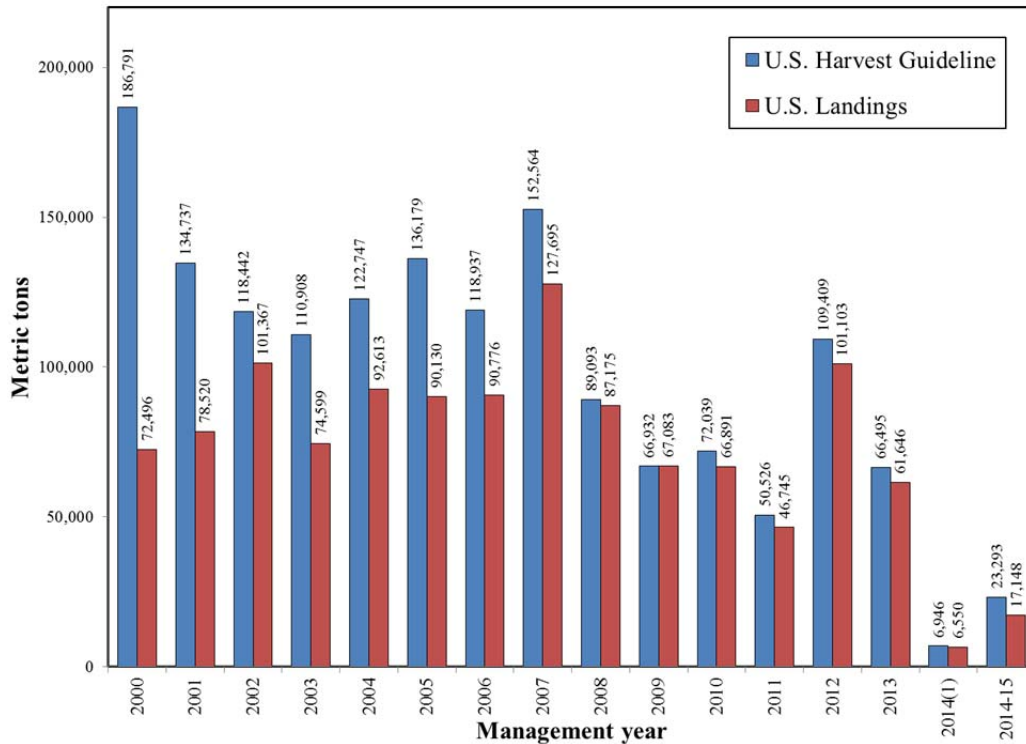
| Harvest Control Rule Formulas                                                                                                  |          |        |        |        |        |        |        |        |        |
|--------------------------------------------------------------------------------------------------------------------------------|----------|--------|--------|--------|--------|--------|--------|--------|--------|
| OFL = BIOMASS * $E_{MSY}$ * DISTRIBUTION; where $E_{MSY}$ is bounded 0.00 to 0.25                                              |          |        |        |        |        |        |        |        |        |
| ABC <sub>P-star</sub> = BIOMASS * BUFFER <sub>P-star</sub> * $E_{MSY}$ * DISTRIBUTION; where $E_{MSY}$ is bounded 0.00 to 0.25 |          |        |        |        |        |        |        |        |        |
| HG = (BIOMASS - CUT OFF) * FRACTION * DISTRIBUTION; where FRACTION is $E_{MSY}$ bounded 0.05 to 0.20                           |          |        |        |        |        |        |        |        |        |
| Harvest Formula Parameters                                                                                                     |          |        |        |        |        |        |        |        |        |
| BIOMASS (ages 1+, mt)                                                                                                          | 132,884  |        |        |        |        |        |        |        |        |
| P-star                                                                                                                         | 0.45     | 0.40   | 0.35   | 0.30   | 0.25   | 0.20   | 0.15   | 0.10   | 0.05   |
| ABC Buffer <sub>Tier 1</sub>                                                                                                   | 0.9558   | 0.9128 | 0.8705 | 0.8280 | 0.7844 | 0.7386 | 0.6886 | 0.6304 | 0.5531 |
| CalCOFI SST (2012-2014)                                                                                                        | 15.562   |        |        |        |        |        |        |        |        |
| $E_{MSY}$                                                                                                                      | 0.157239 |        |        |        |        |        |        |        |        |
| FRACTION                                                                                                                       | 0.157239 |        |        |        |        |        |        |        |        |
| CUT OFF (mt)                                                                                                                   | 150,000  |        |        |        |        |        |        |        |        |
| DISTRIBUTION (U.S.)                                                                                                            | 0.87     |        |        |        |        |        |        |        |        |
| Harvest Control Rule Values (MT)                                                                                               |          |        |        |        |        |        |        |        |        |
| OFL =                                                                                                                          | 18,178   |        |        |        |        |        |        |        |        |
| ABC <sub>Tier 1</sub> =                                                                                                        | 17,374   | 16,594 | 15,824 | 15,051 | 14,259 | 13,427 | 12,517 | 11,460 | 10,055 |
| HG =                                                                                                                           | 0        |        |        |        |        |        |        |        |        |

**b) HCRs when 2014 YC is based on the average of 2011-2013 YC sizes.**

| Harvest Control Rule Formulas                                                                                                  |          |         |         |         |         |         |         |         |         |
|--------------------------------------------------------------------------------------------------------------------------------|----------|---------|---------|---------|---------|---------|---------|---------|---------|
| OFL = BIOMASS * $E_{MSY}$ * DISTRIBUTION; where $E_{MSY}$ is bounded 0.00 to 0.25                                              |          |         |         |         |         |         |         |         |         |
| ABC <sub>P-star</sub> = BIOMASS * BUFFER <sub>P-star</sub> * $E_{MSY}$ * DISTRIBUTION; where $E_{MSY}$ is bounded 0.00 to 0.25 |          |         |         |         |         |         |         |         |         |
| HG = (BIOMASS - CUT OFF) * FRACTION * DISTRIBUTION; where FRACTION is $E_{MSY}$ bounded 0.05 to 0.20                           |          |         |         |         |         |         |         |         |         |
| Harvest Formula Parameters                                                                                                     |          |         |         |         |         |         |         |         |         |
| BIOMASS (ages 1+, mt)                                                                                                          | 96,688   |         |         |         |         |         |         |         |         |
| P-star                                                                                                                         | 0.45     | 0.40    | 0.35    | 0.30    | 0.25    | 0.20    | 0.15    | 0.10    | 0.05    |
| ABC Buffer <sub>Tier 1</sub>                                                                                                   | 0.95577  | 0.91283 | 0.87048 | 0.82797 | 0.78442 | 0.73861 | 0.68859 | 0.63043 | 0.55314 |
| CalCOFI SST (2012-2014)                                                                                                        | 15.562   |         |         |         |         |         |         |         |         |
| $E_{MSY}$                                                                                                                      | 0.157239 |         |         |         |         |         |         |         |         |
| FRACTION                                                                                                                       | 0.157239 |         |         |         |         |         |         |         |         |
| CUT OFF (mt)                                                                                                                   | 150,000  |         |         |         |         |         |         |         |         |
| DISTRIBUTION (U.S.)                                                                                                            | 0.87     |         |         |         |         |         |         |         |         |
| Harvest Control Rule Values (MT)                                                                                               |          |         |         |         |         |         |         |         |         |
| OFL =                                                                                                                          | 13,227   |         |         |         |         |         |         |         |         |
| ABC <sub>Tier 1</sub> =                                                                                                        | 12,642   | 12,074  | 11,514  | 10,951  | 10,375  | 9,769   | 9,108   | 8,338   | 7,316   |
| HG =                                                                                                                           | 0        |         |         |         |         |         |         |         |         |

## Management performance

U.S. HG values and catches since the onset of federal management follow:



### Unresolved Problems and Major Uncertainties

Population estimates from this update model scaled an average 26% lower than stock biomass estimated in the 2014 assessment (Model T). This change was attributed to a shift in the spring ATM length selectivity to small sizes as well as the updated fit to the ATM surveys that included the very low estimated biomass observed in 2014. This selectivity sensitivity was observed previously in the 2014 full assessment (see sections *Retrospective analyses* and *Likelihood profile for virgin recruitment*) and was part of the STAR 2014 panel deliberations (see STAR 2014), but was unable to be effectively resolved in 2014. During the SSC CPS Subcommittee's review of this update, it became apparent that the final 2014 assessment did not correspond to the best overall fit to the data. This was due to an uneven likelihood surface and the 2014 model converging to a local minimum. This problem was discovered by re-running the 2014 model from a lower initial  $R_0$  value and estimating this parameter in a later phase. The 2015 update model was subsequently run through a series of convergence tests to ensure the current model represents the optimal solution.

The 2014 year-class strength is highly uncertain and poorly informed by the available data. The model estimate of recruitment in 2014 is unrealistically high given the lack of spawning observed from the surveys during spring 2014. This is important, given the 2014 year-class is part of the calculation of the age 1+ stock biomass for July 2015. The STAT's proposed alternative approach would be to base the 2014 year-class estimate on average recruitment levels from 2011-13, account for natural and fishing mortality throughout 2014, and add the resulting age-1 biomass to the age 2+ biomass from the update model to determine the stock biomass for July 2015.

## INTRODUCTION

### **Distribution, Migration, Stock Structure, Management Units**

Information regarding Pacific sardine (*Sardinops sagax caerulea*) biology and population dynamics is available in Clark and Marr (1955), Ahlstrom (1960), Murphy (1966), MacCall (1979), Leet et al. (2001), as well as references cited below.

The Pacific sardine has at times been the most abundant fish species in the California Current Ecosystem (CCE). When the population is large, it is abundant from the tip of Baja California (23° N latitude) to southeastern Alaska (57° N latitude) and throughout the Gulf of California. Occurrence tends to be seasonal in the northern extent of its range. When sardine abundance is low, as during the 1960-70s and presently, sardines do not generally occur in high quantities commercially north of Baja California.

There is a longstanding, general consensus in the scientific community that sardines off the west coast of North America represent three subpopulations (see review by Smith 2005). A northern subpopulation (northern Baja California to Alaska; Figure 1), a southern subpopulation (outer coastal Baja California to southern California), and a Gulf of California subpopulation were distinguished on the basis of serological techniques (Vrooman 1964) and in studies of oceanography as pertaining to temperature-at-capture (Felix-Uraga et al., 2004, 2005; Garcia-Morales et al. 2012; Demer and Zwolinski 2014). An electrophoretic study (Hedgecock et al. 1989) showed, however, no genetic variation among sardines from central and southern California, the Pacific coast of Baja California, or the Gulf of California. Although the ranges of the northern and southern subpopulations can overlap within the Southern California Bight, the adult spawning stocks likely move north and south in synchrony and do not occupy the same space simultaneously to a significant extent (Garcia-Morales 2012). The northern subpopulation (NSP) is exploited by fisheries off Canada, the U.S., and northern Baja California (Figure 1), and represents the stock included in the CPS Fishery Management Plan (CPS-FMP; PFMC 1998). The 2014 assessment (Hill et al. 2014) addressed the above stock structure hypotheses in a more explicit manner, by partitioning southern (Ensenada and Southern California ports) fishery catches and composition data using an environment-based approach described by Demer and Zwolinski (2014) and in the following sections.

Pacific sardines probably migrated extensively during historical periods when abundance was high, moving as far north as British Columbia in the summer and returning to southern California and northern Baja California in the fall. Tagging studies have indicated that the older and larger fish moved farther north (Janssen 1938; Clark & Janssen 1945). Migratory patterns were probably complex, and the timing and extent of movement were affected by oceanographic conditions (Hart 1973) and stock biomass levels. During the 1950s to 1970s, a period of reduced stock size and unfavorably cold sea surface temperatures together likely caused the stock to abandon the northern portion of its range. In recent decades, the combination of increased stock size and warmer sea surface temperatures resulted in the stock re-occupying areas off Central California, Oregon, Washington, and British Columbia, as well as distant- offshore waters off California. During a cooperative U.S.-U.S.S.R. research cruise for jack mackerel in 1991, several tons of sardine were collected 300 nm west of the Southern California Bight (SCB) (Macewicz

and Abramenkoff 1993). Resumption of seasonal movement between the southern spawning habitat and the northern feeding habitat has been inferred by presence/absence of size classes in focused regional surveys (Lo et al. 2011a) and measured directly using the acoustic-trawl method (Demer et al. 2012).

### **Life History Features Affecting Management**

Pacific sardines may reach 41 cm in length, but are seldom longer than 30 cm in fishery catches and survey samples. They may live up to 15 years, but fish in California commercial catches are usually younger than five years. Sardine are typically larger and two to three years older in regions off the Pacific Northwest than observed further south in waters off California. There is evidence for regional variation in size-at-age, with size increasing from south to north and from inshore to offshore (Phillips 1948, Hill 1999). Size- and age-at-maturity may decline with a decrease in biomass, latitude, and temperature (Butler 1987). At relatively low biomass levels, sardines appear to be fully mature at age one, whereas at very high biomass levels, only some of the two-year-olds are mature (MacCall 1979).

Until 1953, sardines fully recruited to the fishery when they were ages three and older (MacCall 1979). Recent fishery data indicate that sardines begin to recruit at age zero and are fully recruited to the southern California fishery (SCA) by age two. Age-dependent availability to the fishery likely depends upon the location of the fishery, with young fish unlikely to be fully available to fisheries located in the north and older fish less likely to be fully available to fisheries south of Point Conception.

Age-specific mortality estimates are available for the entire suite of life history stages (Butler et al. 1993). Mortality is high at the egg and yolk sac larvae stages (instantaneous rates in excess of  $0.66 \text{ d}^{-1}$ ). The adult natural mortality rate has been estimated to be  $M=0.4 \text{ yr}^{-1}$  (Murphy 1966; MacCall 1979) and  $0.51 \text{ yr}^{-1}$  (Clark and Marr 1955). Zwolinski and Demer (2013b) studied natural mortality using trends in abundance from the acoustic-trawl method (ATM) surveys (2006-2011), accounting for fishery removals, and estimated  $M=0.52 \text{ yr}^{-1}$ . A natural mortality rate of  $M=0.4 \text{ yr}^{-1}$  means that 33% of the adult sardine stock would die each year of natural causes. Sensitivities to assumptions regarding  $M$  were addressed in last year's assessment (Hill et al. 2014).

Pacific sardines spawn in loosely aggregated schools in the upper 50 meters of the water column. The northern subpopulation spawning begins in January off northern Baja California and ends by August off the Pacific Northwest (Oregon, Washington, and Vancouver Island), typically peaking off California in April. Sardine eggs are most abundant at sea-surface temperatures of 13 to 15 °C, and larvae are most abundant at 13 to 16 °C. The spatial and seasonal distribution of spawning is influenced by temperature. During periods of warm water, the center of sardine spawning shifts northward and spawning extends over a longer period of time (Butler 1987; Ahlstrom 1960). Recent spawning has been concentrated in the region offshore and north of Point Conception (Lo et al. 1996, 2005). Sardines are oviparous, multiple-batch spawners, with annual fecundity that is indeterminate and age- or size-dependent (Macewicz et al. 1996).

## **Abundance, Recruitment, and Population Dynamics**

Extreme natural variability is characteristic of clupeid stocks, such as Pacific sardine (Cushing 1971). Estimates of sardine abundance from 300 AD through 1970 have been reconstructed from the deposition of fish scales in sediment cores from the Santa Barbara basin off SCA (Soutar and Issacs 1969, 1974; Baumgartner et al. 1992). Sardine populations existed throughout the period, with biomass levels varying widely on decadal time scales. Both sardine and anchovy populations tend to vary over periods of roughly 60 years, although sardines have varied more than anchovies. Estimates of sardine biomass inferred from scale-depositions in the 19th and 20th centuries suggest that abundance peaked at approximately 6 mmt in 1925 (Soutar and Isaacs 1969; Smith 1978). Declines in sardine populations have generally lasted an average of 36 years and recoveries an average of 30 years.

Sardine spawning biomass (ages 2+), estimated from virtual population analysis methods, averaged 3.5 mmt from 1932 through 1934, fluctuated from 1.2 to 2.8 mmt over the next ten years, then declined steeply from 1945 to 1965, with some short-term reversals following periods of strong recruitment success (Murphy 1966; MacCall 1979). During the 1960s and 1970s, spawning biomass levels were less than about five to ten thousand mt (Barnes et al. 1992). The sardine stock began to increase by an average rate of 27% per annum in the early 1980s (Barnes et al. 1992).

Pacific sardine recruitment is highly variable. Analyses of the sardine stock recruitment relationship have resulted in inconsistent findings, with some studies showing a strong density-dependent relationship (production of young sardines declines at high levels of spawning biomass) and others, concluding no relationship (Clark and Marr 1955; Murphy 1966; MacCall 1979). Jacobson and MacCall (1995) found both density-dependent and environmental factors to be important.

## **Relevant History of the Fishery**

The sardine fishery was first developed in response to demand for food during World War I. Landings increased from 1916 to 1936, peaking at over 700,000 mt. Pacific sardines supported the largest fishery in the western hemisphere during the 1930s and 1940s, with landings in Canada, WA, OR, CA, and Mexico. The population and fishery declined, beginning in the late 1940s and with some short-term reversals, to extremely low levels in the 1970s. There was a southward shift in catch as the fishery collapsed, with landings ceasing in the Pacific Northwest in 1947 through 1948 and in San Francisco, from 1951 through 1952. Sardines were primarily reduced to fish meal, oil, and canned food, with small quantities used for bait.

In the early 1980s, sardines were taken incidentally with Pacific and jack mackerel in the SCA mackerel fishery. As sardine continued to increase in abundance, a directed purse-seine fishery was re-established. The incidental fishery for sardines ended in 1991. Besides SCA and CCA, substantial quantities of Pacific sardine have been landed at OR, WA, BC, and ENS over the past decade. Total annual harvest by the Mexican fishery is not yet regulated by quotas, but there is a minimum legal size limit of 150 mm SL.

## Recent Management Performance

Management authority for the U.S. Pacific sardine fishery was transferred to the PFMC in January 2000. The Pacific sardine was one of five species included in the federal CPS-FMP (PFMC 1998). The CPS-FMP includes harvest control rules intended to prevent Pacific sardines from being overfished and to maintain relatively high and consistent, long-term catch levels. Harvest control rules for the sardine are provided at the end of this report. A thorough description of PFMC management actions for sardines, including HG values, may be found in the most recent CPS SAFE document (PFMC 2014). U.S. HG values and landings since 2000 are displayed in Table 1 and Figure 2. Harvests in major fishing regions from ENS to BC are provided in Table 2 and Figure 3a-b.

## ASSESSMENT DATA

### Biological Parameters

#### *Stock structure*

For this assessment, we modeled the northern subpopulation (NSP) that ranges from northern Baja California, México to British Columbia, Canada and extends up to 300 nm offshore (Macewicz and Abramenkoff 1993). In past assessments, the approach has been to assume that all catches landed at ports from ENS to BC were from the northern subpopulation. As mentioned above, there is general consensus that catches landed in ENS and SCA likely represent a mixture of southern subpopulation (during warm months) and northern subpopulation (cool months) (Felix-Uraga et al. 2004, 2005; Garcia-Morales 2012; Zwolinski et al. 2011; Demer and Zwolinski 2014) (Figure 1). For this assessment, we applied a more objective method to partition data from ENS and SCA ports in order to exclude catch and composition data attributed to the southern subpopulation.

Efforts to survey, assess, and manage Pacific sardine in the California Current may depend on accurate differentiation of the purported two migrating stocks (Smith, 2005). A decade ago, a practical method was proposed for differentiating landings from the two stocks using concomitant measurements of sea surface temperature (SST) (Felix-Uraga *et al.*, 2004, 2005). Demer and Zwolinski (2013) independently corroborated and refined the method using regional indices of optimal and good potential habitat for the northern stock (Zwolinski *et al.*, 2011), and SST-based indices associated with the probability of including 99.9 % of all the sardine egg sampled over a 12-year period. The alternative indices equal the proportions of each fishing region containing optimal or good potential habitat for the northern sardine stock habitat (Zwolinski et al. 2011) and SST <16.4°C, respectively. For months when either index is <0.5, (i.e., when the minority of a fishing region probably includes potential northern stock habitat), the commercial landings are attributed to the southern stock, and vice versa. Because sardine landings at Ensenada or San Pedro were often low when the local habitat was transitioning (Felix-Uraga *et al.* 2004, 2005), the efficacy of the method is largely insensitive to the choice of index. To potentially improve the assessment estimates of northern stock biomass, Demer and Zwolinski's SST-index was calculated for the Ensenada and San Pedro regions, monthly since

1980, enabling the exclusion of southern stock sardine landings and their respective length compositions from the SS model.

### *Growth*

The weight-at-length relationship for Pacific sardine (combined sexes) was modeled by the standard power function,

$$W = a (L^b);$$

where  $W$  is weight (kg) at length  $L$  (cm), and  $a$  and  $b$  are regression coefficients. The weight-at-length relationship was re-examined for this assessment using a least-squares method to fit to sample data from the modeled period, 1993-2013. Coefficients for the NSP (subscript '2' models) data set were,  $a = 7.5242\text{e-}06$ ,  $b = 3.2332$  ( $n = 104,326$ ; corrected  $R^2 = 0.936$ ) (Figure 4).

The largest recorded Pacific sardine reached a standard length ( $SL$ ) of 41 cm (Eschmeyer et al. 1983), but the largest Pacific sardine commercially captured since 1981 was  $SL = 29.7$  cm. The heaviest sardine weighed 0.323 kg. The oldest recorded Pacific sardine was 15 years old, but commercially-caught Pacific sardine are typically less than 7 years old.

Sardine ageing using otolith methods was first described by Walford and Mosher (1943) and extended by Yaremko (1996). Pacific sardines are routinely aged by fishery biologists in México, CA, and the PNW using annuli enumerated in whole sagittae. A birth date of July 1 is assumed when assigning year classes. Lab-specific ageing errors were calculated and applied as described in Hill et al. (2011).

Sardine growth was first estimated outside the SS model to provide initial parameter values and CV values for length-at-age<sub>min</sub> (0.5 yrs), length-at-age<sub>max</sub> (15 yrs), and growth coefficient  $K$  (Figure 5b). A re-analysis of size-at-age from fishery samples (1993-2013) did not indicate sexual dimorphism (Figure 5a) and thus, combined sexes are included in the present assessment model.

### *Maturity*

Maturity-at-length parameters were updated using sardines sampled from survey trawls conducted from 1994 to 2013. Their reproductive state was primarily established through histological examination, although some immature individuals were simply identified through gross visual inspection. Parameters for the logistic maturity function were estimated using,

$$\text{Maturity} = 1/(1+\exp(\text{slope} * L - L_{\text{inflexion}}));$$

where slope = -0.89252 and inflexion = 15.44 cm-SL. Maturity-at-length parameters were fixed in the assessment model. Fecundity was fixed at 1 egg/gram body weight. Maturity- and fecundity-at-length vectors are presented in Figure 6a. Maturity-at-age during the spawning season (beginning of S2), as derived from growth estimation in final base model T (2014) is presented in Figure 6b.

### *Natural mortality*

The instantaneous rate of adult natural mortality has been estimated to be  $M = 0.4 \text{ yr}^{-1}$  (Murphy 1966; MacCall 1979),  $0.51 \text{ yr}^{-1}$  (Clark and Marr 1955), and  $0.52 \text{ yr}^{-1}$  (Zwolinski and Demer 2013b). Consistent with all previous sardine assessments, our base models were parameterized with  $M = 0.4 \text{ yr}^{-1}$  for all ages and years (Murphy 1966, MacCall 1979, Deriso et al. 1996, Hill et al. 1999, Hill et al. 2014). A natural mortality rate of  $M = 0.4 \text{ yr}^{-1}$  means that roughly 33% of the stock die of natural causes each year.

The 2014 assessment (Hill et al. 2014) did examine sensitivity to alternative natural mortality assumptions based on: 1) new analyses by Zwolinski and Demer (2013b), where  $M = 0.52 \text{ yr}^{-1}$  for all ages; and 2) using the Lorenzen function based on the hypothesis that  $M$  is higher at younger ages (Butler et al. 1993). A general Lorenzen formulation was applied,

$$M_{\text{age}} = M_c (L_{\text{mat}}/L_{\text{age}}) \text{ for } a < a_{\text{mat}},$$

where  $M_c = 0.4$ ,  $L_{\text{mat}} = 15.44 \text{ cm-SL}$ , and  $L_{\text{age}} = 8 \text{ cm}$  for age 0,  $13.46 \text{ cm}$  for age 1, and  $a_{\text{mat}} = 2$  years. This resulted in an  $M_{\text{age}}$  vector of  $0.77 \text{ yr}^{-1}$  for age-0 fish,  $0.46 \text{ yr}^{-1}$  for age-1 fish, and  $0.4 \text{ yr}^{-1}$  for fish ages 2 and older. Neither the higher  $M$  nor Lorenzen function were included in the final 2014 model (STAR 2014).

## **Fishery Data**

### *Overview*

Available fishery data include commercial landings and biological samples from six regional fisheries: Ensenada (ENS), Southern California (SCA), Central California (CCA), Oregon (OR), Washington (WA), and British Columbia (BC). Standard biological samples include individual weight (kg), standard length (cm), sex, maturity, and otoliths for age determination (in most, but not all cases). A complete list of available landings and port sample data by fishing region, model year, and season is provided in Table 3.

The INAPESCA has collected sardine samples from the port of Ensenada since 1989. Sampling has been comparable to that of the U.S. with respect to randomness, frequency, and types of biological data. INAPESCA has collected roughly 10 random samples of 25 fish per month for size, sex, and reproductive condition, with a random subset being aged using otoliths (Table 3). We include length compositions (catch-weighted semester aggregates provided by INAPESCA) representing the full set of INAPESCA samples collected from mid-1988 through mid-2009. The INAPESCA also provided a full complement of conditional age-at-length compositions, however, those data have not been included in formal assessments to date, given unresolved methodological issues. No new composition data have been obtained since the 2011 full assessment (Hill et al. 2011).

The CDFW has collected sardine samples from SCA and CCA ports on a regular basis since 1981. The CDFW currently collects 12 random port samples (25 fish per sample) per month from each region. ODFW has collected port samples since 1999, and WDFW since 2000 (Table 3). Oregon and Washington fishery samples are collected at higher frequency due to the compressed fishing season, but each sample contains 25 fish.

The CDFO has sampled the BC sardine fishery since 1998. The CDFO collects 100 fish per sample and requires 50%-100% observer coverage, so many of the BC loads are sampled relative to other fisheries. The CDFO's protocol does include collection of otoliths, however, their ageing efforts have primarily focused on survey samples, with no fishery ages being available for this or past assessments.

All fishery catches and compositions were compiled based on the sardine's biological year ('model year') to match the July 1st birth date assumption used in age assignments. Each model year is labeled with the first of two calendar years spanned (e.g., model year '1993' includes data from July 1, 1993 through June 30, 1994). Further, each model year has two six-month seasons, where 'S1'=Jul-Dec and 'S2'=Jan-Jun. Major fishery regions were pooled to represent a southern 'MexCal' fleet (ENS+SCA+CCA) and a northern 'PacNW' fleet (OR+WA+BC), where the MexCal fleet was treated with semester-based selectivities ('MexCal\_S1' and 'MexCal\_S2'). Rationale for this design is provided in Hill et al. (2011).

### *Landings*

Ensenada monthly landings, 1993 to 2002, were compiled using the 'Boletín Anual' series previously produced by INAPESCA's Ensenada office (e.g., Garcia and Sánchez 2003). Monthly landings from 2003 to 2013 were taken from CONAPESCA's web archive of Mexican fishery yearbook statistics (CONAPESCA 2014). Ensenada landings for 2014 were based on an aggregate total for Jan-Oct (Concepción Enciso-Enciso, INAPESCA-Ensenada, pers. comm.) that was apportioned across months and projected through the end of 2014 using monthly data from 2013.

California (SCA and CCA) commercial landings were obtained from CDFW's 'Wetfish Tables' (1993 to 1999, and Aug-Dec 2014) and the PacFIN database (2000 to Jul 2014). Oregon (OR) and Washington (WA) landings (1999-2014) were obtained solely from PacFIN. British Columbia monthly landing statistics, 1999 to 2012, were provided by CDFO (Linnea Flostrand and Jordan Mah, pers. comm.). Sardine were not landed in Canada during 2013 or 2014.

As stated above, satellite oceanography data were used to characterize ocean climate (SST) within typical fishing zones off Ensenada and Southern California and attribute monthly catch for each fishery to either the southern or northern subpopulation (NSP). Landings by model year-season for each fishing region and stock scenario (port-based versus environment-based NSP) are presented in Table 2 and Figure 3. The current SS model aggregates regional fisheries into a southern 'MexCal' fleet and a northern 'PacNW' fleet (Figure 1). Landings aggregated by model year-season and fleet are presented in Table 4 and Figure 7.

### *Length compositions*

Length compositions for each fleet and season were the sums of catch-weighted length observations, with monthly landings within each port and season serving as the weighting unit. As indicated above, environmental criteria used to assign landings to subpopulations were also applied to monthly port samples to categorize NSP fish. New catch-based weighting vectors were also calculated for creating aggregate NSP length compositions.

Length compositions were comprised of 0.5-cm bins ranging from 9 to 28 cm standard length (39 bins total). The 9-cm bin reflects all fish  $\leq 9.49$  cm, the 28-cm bin reflects all fish  $\geq 28$  cm, and all other bins (9.5 to 27.5 cm) reflect the lower bound of the respective 0.5-cm interval (e.g., the 9.5-cm bin includes fish ranging 9.5 to 9.99 cm).

Total numbers of lengths observed in each fleet-semester stratum were divided by the typical number of fish collected per sampled load (25 fish per sample for most regions, 100 fish per sample in Canada) to calculate the sample sizes for compositions included in the assessment model. Compositions having fewer than two samples per semester were omitted from the model. Length compositions were input as proportions. While raw sample data were not available from the ENS and BC regional fisheries, catch-weighted length distributions, assembled per above, were made available by INAPESCA and CDFO. To combine ENS with SCA-CCA data ('MexCal') and to combine BC with OR-WA data ('PacNW'), the respective length distributions and sample sizes were weighted by catch from each region and summed at the season level. Length compositions and input sample sizes by fleet are displayed in Figures 8-10. Length compositions for the two stock structure assumptions (All vs. NSP) are presented side-by-side in these displays. For the current assessment, length compositions from SCA, CCA, OR, and WA fisheries were updated for model year 2013 and appended with the first semester of model year 2014 (Jul-Dec 2014 samples).

#### *Age compositions*

Age compositions were compiled based on the same fishery samples and weighting methods described above. Implied ('ghost') age-compositions were included as model inputs, but omitted from likelihood calculations, to facilitate comparison of model predictions of age composition with the inferred values through examination of model residual patterns. Aggregate age-composition data are presented in Figures 8-10.

Conditional age-at-length compositions, used to estimate growth in length-based models, were constructed from the same fishery samples and weighting methods described above. Age bins included 0, 1, 2, 3, 4, 5, 6, 7, 8-10, 11-15 (10 bins total). The age 11-15 bin served as an accumulator allowing growth to approach maximum length ( $L_{\infty}$ ). Age compositions were input as proportions of fish in 1-cm length bins. As was done for the length compositions, the number of individuals comprising each bin was divided by the number of fish per sample to set the initial, input sample size. In most cases, age data were available for every length observation. Conditional age-at-length compositions for each fishery are presented in Figures 11-13. For the current assessment, conditional age-at-length data from SCA, CCA, OR, and WA were updated through 2013. Age data were not yet available for 2014.

Oregon and Washington fishery ages from model season 2 (S2, Jan-Jun), which would have been included in the PacNW fleet, were omitted from all models due to inter-laboratory inconsistencies in the application of birth-date criteria during this semester. Total OR and WA landings and samples during S2 are typically small, so this omission did not represent a major loss of information to the model.

It is important to note that length data, but not age data, were available for the BC fishery. As a result, length-based models more accurately represent sizes-at-removal for the aggregate PacNW

fleet, but age-based models would only represent removals-at-age by the OR and WA fleets. The same problem applies to the southern MexCal fleet, where lengths, but not ages, were available from the ENS fishery.

#### *Ageing error*

Ageing-error vectors for fishery data were unchanged from Hill et al. (2011). Ageing error vectors (SD at true age) were linked to fishery-specific conditional age-at-length or aggregate age-composition data (Figure 14). For complete details regarding age-reading data sets, model development and assumptions, see Hill et al. (2011, Appendix 2), as well as Dorval et al. (2013).

### **Fishery-independent Data**

#### *Overview*

This assessment uses three time series obtained from fishery-independent surveys: 1) daily egg production method (DEPM) estimates of female spawning biomass; 2) total egg production (TEP) estimates of total spawning biomass; and 3) acoustic-trawl method (ATM) surveys of biomass, which are separated into spring and summer components. Each of these surveys and estimation methods have been vetted through PFMC-SSC Methodology Reviews (panels included representatives from the PFMC-SSC and the Center for Independent Experts). The DEPM/TEP and aerial survey methods were reviewed in May 2009, and the ATM survey was reviewed in February 2011 and included in the 2011 assessment. Survey data are presented in Tables 5-8, Figures 15-18, and Appendices A and B (Zwolinski et al. 2015a,b) of this report.

#### *Daily egg production method spawning biomass*

From 1994 to 2013, the times series of TEP and DEPM and estimates of SSB were based on SWFSC ship-based surveys conducted each April between San Diego and San Francisco. The DEPM index of female SSB is used when adult daily specific fecundity data are available from the survey. The total egg production (TEP) index of SSB is used when survey specific fecundity data are unavailable. The DEPM and TEP series have been used for sardine stock assessment since the 1990s, and the surveys and estimation method were reviewed by a STAR panel in May 2009. Both time series are treated as indices of relative SSB, with catchability coefficients ( $q$ ) being estimated (Figure 18).

In this assessment, it was not possible to calculate an unbiased estimate of egg density ( $P_0$ ) from the 2014 survey, because no eggs or larvae were collected in the CalVET net tows (Table 6). That is, strict adherence to adopted methodology would result in a  $P_0$  estimate of zero mt, however there is no approved method for calculating a variance on this quantity and there is no way to include such an estimate in the SS model. Given that eggs and larvae were collected using other sampling tools (CUFES and Bongo; Table 6), it is highly unlikely that population SSB is zero mt. Although other survey data and methods could theoretically be applied to derive a new time series of egg production, such time series would not be appropriate, based on the Terms of Reference for assessing CPS, for use in the 2015 assessment update. The CUFES intake samples the upper 3 m of the water column and CUFES egg densities can poorly correlated with CalVET densities. Bongo nets are able to retain sardine eggs, however the larger mesh size (505 microns) results in some egg extrusion, so density estimates from bongo hauls are not directly comparable to those provided by the CalVET (333 micron mesh). Finally, it is worth noting that very low

egg and larval counts encountered in 2014 were also observed during the historic period of low sardine abundance (mid-1960s to mid-1980s; Figure 16).

In 2014, the SWFSC conducted the sardine DEPM biomass survey aboard the chartered research vessel R/V *Ocean Starr* (April 23 – April 28) and the NOAA ship *Bell M. Shimada* (April 15 – May 8) within the standard DEPM area (CalCOFI line 60 to 95). The *Ocean Starr* covered the area from Del Mar, California up to the northern Channel Islands, California while the NOAA ship *Bell M. Shimada* covered the area north of Point Reyes, California (line 56.7) to Point Conception, California (Figure 15b). The *Ocean Starr* also conducted the standard spring CalCOFI survey from March 28 to April 22 (Figure 15a). Because no trawls were taken during the CalCOFI survey, only the data from the DEPM portion of *Ocean Starr* are reported in this assessment (i.e., data from April 23 to April 28). The DEPM survey from both research vessels employed all the usual methods for collecting data for estimating sardine SSB (Lo et al. 2010). The survey included a complete sampling of the ‘standard’ area for the assessment models’ DEPM time series, i.e. San Francisco to San Diego (Figure 15).

The 2014 DEPM index area off California (CalCOFI lines 56.7 to 93.8, about 38.49° – 31.85°N) was 160,305 km<sup>2</sup> (Figure 15). During the survey 69 CalVET tows were performed from the two vessels, but no eggs or larvae were observed in these tows. Similarly, no larvae were captured in 40 bongo tows cast over the period of the survey. Because no eggs and no larvae were collected in the CalVET or in the bongo tows, the mortality rate of eggs-at-age couldn’t be derived. Therefore, both the egg production ( $P_0$ ) and the female spawning biomass for 2014 could not be estimated based on established methods (see Dorval et al. 2014, Table 7).

Adult reproductive parameters for the survey are presented in Table 8. The estimated daily-specific fecundity was 23.70 (number of eggs/population weight (g)/day) using the following estimates of reproductive parameters from 7 mature females collected from 3 positive trawls: mean batch fecundity ( $F$ ) was 46,124 eggs/batch (CV = 0.08), spawning fraction ( $S$ ) was 0.143 females spawning per day (CV = 0.49), mean female fish weight ( $W_f$ ) was 155.82 g (CV = 0.03), and sex ratio of females by weight ( $R$ ) was 0.560 (CV = 0.26). Since 2005, trawling has been conducted randomly, at CalCOFI stations, or near daytime positive acoustic CPS locations, which resulted in sampling adult sardines in both high and low sardine egg-density areas. During the 2014 survey there was no post stratification of the DEPM area, which was only consisted of low egg-density areas (< 1 egg/min in CUFES). Sardines were captured in 7 of the 53 trawl tows conducted and a total of 18 male and female sardines were caught (Dorval et al. 2015).

In SS, the DEPM series was taken to represent female SSB in the middle of S2 (April). Since 2009, the time series of spawning biomass was replaced by female spawning biomass for years when sufficient trawl samples were available and the total egg production for other years as inputs to the stock assessment of Pacific sardines. In 2014, it was not possible to compute the TEP or the DEPM estimate based on previous methods used from 1994 to 2013 (Tables 5-8, Figure 18).

#### *Total egg production spawning biomass*

Adult sardine samples are needed to calculate the daily-specific fecundity for true DEPM estimates. Trawls were not always conducted during the egg production surveys. In the 2007

assessment, we chose to include these data as a Total Egg Production (TEP) series, which is simply the product of egg density ( $P_0$ ) and spawning area ( $\text{km}^2$ ). Calculated TEP values are provided in Tables 5 and 7 and displayed in Figure 18. TEP was also taken to represent relative SSB in the model ( $q$  estimated), but in this case the female fraction was unknown (Tables 5 and 7, Figure 18).

#### *Acoustic-trawl method survey*

The ATM time series is based on SWFSC surveys conducted along the Pacific coast since 2006 (Cutter and Demer 2008; Zwolinski et al. 2011, 2012, 2014, Demer et al. 2012, and Zwolinski et al. 2015; see Appendices A and B of this report). The ATM survey and estimation methods were reviewed by a panel in February 2011 and the results from these surveys have been included in the assessment since 2011 (Hill et al. 2011, 2012, 2014).

Two new ATM-based biomass estimates were included in this assessment; one from the spring 2014 survey off CA and the other from the summer 2014 survey spanning San Diego to northern Vancouver Island, Canada. Biomass estimates and associated size distributions from the 2014 surveys are described in detail in Appendices A and B of this report (Zwolinski et al. 2015a,b). Biomass estimates from the spring and summer 2014 surveys, 35,339 (CV=0.396) mt and 26,280 (CV=0.704) mt respectively, were considerably lower than estimates from the previous year (Table 5, Figure 18). These low ATM estimates were qualitatively consistent with the lack of spawning observed during spring 2014.

The time series of ATM biomass estimates is presented in Table 5 and Figure 18, and associated biomass-weighted length compositions are displayed in Figure 17. ATM survey biomass estimates (2006-2014) were partitioned into two (spring and summer) surveys, with  $q=1$  for each survey. Length compositions were fit using asymptotic length-selectivity, where spring and summer surveys were estimated independently.

## ASSESSMENT MODEL

### History of Modeling Approaches

The Pacific sardine population's dynamics and status prior to the collapse in the mid-1900s was first modeled by Murphy (1966). MacCall (1979) refined Murphy's virtual population analysis (VPA) model using additional data and prorated portions of Mexican landings to exclude the southern subpopulation. Deriso et al. (1996) modeled the recovering population (1982 forward) using CANSAR, a modification of Deriso's (1985) CAGEAN model. The CANSAR was subsequently modified by Jacobson (Hill et al. 1999) into a *quasi*, two-area model CANSAR-TAM to account for net losses from the core model area. The CANSAR and CANSAR-TAM models were used for annual stock assessments and management advice from 1996 through 2004 (e.g., Hill et al. 1999; Conser et al. 2003). In 2004, a STAR panel endorsed the use of an Age Structured Assessment Program (ASAP) model for routine assessments. The ASAP model was used for sardine assessment and management advice from 2005 to 2007 (Conser et al. 2003, 2004; Hill et al. 2006a,b). In 2007, a STAR panel reviewed and endorsed an assessment using Stock Synthesis 2 (Methot 2005, 2007), and the results were adopted for management in 2008

(Hill et al. 2007), as well as an update for 2009 management (Hill et al. 2008). The sardine model was transitioned to Stock Synthesis version 3.03a in 2009 (Methot 2009) and was again used for an updated assessment in 2010 (Hill et al. 2009 & 2010). Stock Synthesis version 3.21d was used for the 2011 full assessment (Hill et al. 2011), the 2012 update assessment (Hill et al. 2012), and the 2013 catch-only projection (Hill 2013). The 2014 sardine assessment (Hill et al. 2014), and this 2015 update assessment, were based on SS version 3.24s.

## Update Model Configuration

Readers should consult both the final 2014 assessment report (Hill et al. 2014) and final review report (STAR 2014) for background information regarding various model scenarios investigated in the initial sensitivity analysis and bases for final choices, assumptions, and parameterizations associated with base model T, generally described below.

The update model incorporated specifications. Changes from 2014 model are highlighted in bold:

- catches for the MexCal fleet computed using the environmentally-based method;
- two seasons (Jul-Dec and Jan-Jun) for each assessment year from 1993 to **2014**;
- sexes are combined;
- two fishery fleets (MexCal, PacNW), with an annual selectivity pattern for the PacNW fleet, and seasonal selectivity patterns (S1 and S2) for the MexCal fleet;
  - o MexCal fleet:
    - dome-shaped length-based selectivity with two time blocks (1993-1998, 1999-**2014**);
  - o PacNW fleet:
    - asymptotic length-based selectivity for a single time block;
  - o length compositions with effective sample size set to 1 per haul and lambda weighting =1;
  - o conditional age-at-length with effective sample size set to 1 per haul and lambda weighting = 0.2;
- Beverton-Holt stock-recruitment relationship steepness set to 0.8 (fixed value);
- $M = 0.4 \text{ yr}^{-1}$ ;  $\sigma_R = 0.75$  (fixed value);
- recruitment deviations estimated for SSB years 1987-**2013**;
- virgin ( $R_0$ ) and initial recruitment offset ( $R_1$ ) were estimated;
- initial  $F$ s set to 0 for all fleets (non-equilibrium model);
- DEPM (1993-2012) and TEP(1995-2005) indices of spawning biomass with  $q$  estimated for both surveys;
- ATM survey biomass 2006-**2014**, partitioned into two (spring and summer) surveys, with  $q=1$  for each survey;
  - o length compositions with effective sample sizes set by dividing the number of fish sampled by 25 and lambda weighting =1; and
  - o asymptotic length-based selectivity for spring and summer surveys, estimated independently.

## Model Description

### *Assessment program with last revision date*

In 2014, the STAT transitioned from Stock Synthesis (SS) version 3.21d to version 3.24s (compiled 12/16/2013; Methot 2013, Methot and Wetzel 2013) for conducting the stock assessment. The SS model is founded on the AD Model Builder software environment, which serves as a suite of C++ libraries of automatic differentiation code for nonlinear statistical optimization (Otter Research 2001). The modeling framework allows for the full integration of both population size and age structure, with explicit parameterization both spatially and temporally. The model incorporates all relevant sources of variability and estimates goodness of fit in terms of the original data, allowing for final estimates of precision that accurately reflect uncertainty associated with the sources of data used as input in the overall modeling effort.

The SS model comprises three sub-models: (1) a population dynamics sub-model, where abundance, mortality, and growth patterns are incorporated to create a synthetic representation of the true population; (2) an observation sub-model that defines various processes and filters to derive expected values for different types of data; and (3) a statistical sub-model that quantifies the difference between observed data and their expected values and implements algorithms to search for the set of parameters that maximizes goodness of fit (Methot 2013; Methot and Wetzel 2013). This modeling platform is also very flexible in terms of estimation of management quantities typically involved in forecast analysis. Finally, from an international context, the SS model is rapidly gaining popularity, with SS-based stock assessments being conducted on numerous marine species throughout the world.

### *Definitions of fleets and areas*

Data from major fishing regions are aggregated to represent southern and northern fleets (fisheries). The southern ‘MexCal’ fleet includes data from three major fishing areas at the southern end of the stock’s distribution: northern Baja California (Ensenada, Mexico), southern California (Los Angeles to Santa Barbara), and central California (Monterey Bay). Fishing can occur throughout the year in the southern region. However, availability-at-size/age changes due to migration. Selectivity for the southern ‘MexCal’ fleet was therefore modeled separately for seasons 1 and 2 (semesters, S1 and S2).

The ‘PacNW’ fleet (fishery) includes data from the northern range of the stock’s distribution, where sardine are typically abundant between late spring and early fall. The PacNW fleet includes aggregate data from Oregon, Washington, and Vancouver Island (British Columbia, Canada). The majority of fishing in the northern region typically occurs between July and October (S1).

### *Likelihood components and model parameters*

A complete list of model parameters for base model T is provided in Tables 10 and 11. The total objective function for the update model included likelihood component contributions from: 1) fits to catch time series; 2) fits to the DEPM, TEP, and ATM survey abundance indices; 3) fits to length compositions from the three fleets and ATM surveys; 4) fits to conditional age-at-length data from the three fleets; 5) deviations about the spawner-recruit relationship; and 6) minor

contributions from soft-bound penalties associated with particular estimated parameters (Tables 9 and 11).

#### *Selectivity assumptions*

Length data from the MexCal and PacNW fisheries were fit using length-based selectivity. The MexCal compositions were based on domed-shaped selectivity, given the assumption that not all larger sardines were available to the Baja California and California fisheries from 1993 onward. At that stage in the population's recovery, large spawning events were observed off central California (Lo et al. 1996), and sardines were captured in trawls 300 nm off the California coast (Macewicz and Abramenkoff 1993). Selectivity for the MexCal fleet was estimated by season and in two time blocks (1993-1998, 1999-2014) to better account for both seasonal- and decadal-scale shifts in sardine availability to the southern region. The PacNW fishery length compositions were fit using asymptotic selectivity. Large sardines are typically found in the northern region, and it is assumed the largest sardines typically migrate to northern feeding habitats in the summer.

#### *Stock-recruitment constraints and components*

Pacific sardines are believed to have a broad spawning season, beginning in January off northern Baja California and ending by July off the Pacific Northwest. The SWFSC's annual egg production surveys are timed to capture (as efficiently as possible) the peak of spawning activity off the central and southern California coast during April. In our semester-based model, we calculated SSB at the beginning of S2. Recruitment was specified to occur in S1 of the following model year (consistent with the July-1 birth date assumption). In past assessments, a Ricker stock-recruitment (S-R) relationship had been assumed following Jacobson and MacCall (1995), however, following recommendations from past reviews, a Beverton-Holt S-R was investigated and ultimately adopted in the 2014 assessment (Hill et al. 2014).

Virgin recruitment ( $R_0$ ) and initial recruitment offset ( $R_1$ ) were estimated and steepness was fixed (0.8). Recruitment variability ( $\sigma_R$ ) to apply in S-R estimation was set to 0.75. Recruitment deviations were estimated as separate vectors for the early and main data periods in the overall model. Early recruitment deviations for the initial population were estimated from 1987 (6 years before the start of the model). A recruitment bias adjustment ramp (Methot and Taylor 2011) was applied to the early period (Figure 34d). Main period recruitment deviations were estimated from 1993-2013, which means that the 2014 year class was freely estimated (albeit poorly) from the data and not justified from the surveys conducted in the spring 2014.

It is important to note that there exists little to no data in the assessment to directly evaluate recent recruitment strength (e.g., absolute numbers of age-0, 6-9 cm fish), with the exception of length data from the southern fisheries (MexCal), which in past years, have caught these juveniles in low volume during their first semester of life (S1), but in greater volume during their second semester (S2). Age-0 fish are not encountered by the ATM survey, with reliable identification of age-1 fish typically only during strong recruitment years. Implied age-selectivities (product of length selectivity and the age-length key) from the fisheries and surveys are displayed in Figures 23b and 27b, respectively. In the ATM spring survey, fish are 55% selected by age 1. Fish caught in the MexCal\_S2 fishery (1999-2013 block) are ~60% selected

by age 0 (approaching their first birthday) and fully selected by age 1 (approaching their second birthday). In the MexCal\_S1 fishery (same time block), fish are fully selected by age 2.

#### *Selection of first modeled year and treatment of initial population*

The initial population was calculated by estimating early recruitment deviations from 1987-1992, six years prior to the model start year. Initial  $F$  values were fixed to zero, following recommendations from past assessments/reviews (see STAR 2011). The ‘early years’ recruitment deviations are applied to the initial equilibrium age frequency to adjust this composition before the time series start, whereby the model applies the initial  $F$  level to an equilibrium age composition to get a preliminary numbers-at-age time series, then applies the recruitment deviations for the specified number of younger ages in this initial vector. If the number of estimated ages in the initial age composition is less than the total number of age groups assumed in the model (as is the case with Pacific sardine assessment), then the older ages will retain their equilibrium levels. Because the older ages in the initial age composition will have progressively less information from which to estimate their true deviation, the start of the bias adjustment was set accordingly (see Methot 2013; Methot and Wetzel 2013).

#### *Convergence criteria*

The iterative process for determining numerical solutions in the model was continued until the difference between successive likelihood estimates was  $<0.0001$ . Final gradient for the base model was  $6.51e-6$ .

### **Update Model Results**

#### *Parameter estimates and errors*

Parameter estimates and standard errors (SE) for the update model, along with estimates from the 2014 assessment (model T; Hill et al. 2014), are presented in Table 10. The only parameter estimates to change noticeably in this update were the two length-selectivity parameters (peak, ascending slope) associated with the spring ATM survey (see following sections).

#### *Growth and fits to conditional age-at-length data*

Modeled length-at-age is displayed in Figure 19. Length-at-age 0.5 was estimated to be 11.4 cm SL,  $L_{\infty}$  was 23.4 cm, and the growth coefficient  $K$  was 0.424. Standard deviations for growth parameters are provided in Table 10. Fits to fishery conditional age-at-length data are shown in Figures 20-22. Most conditional age-at-length compositions fit reasonably well, with the exceptions of MexCal\_S1 in 2001-2003 (Figure 20) and PacNW in 2008-2010 (Figure 22).

#### *Selectivity estimates and fits to fishery length-composition data*

Length selectivity estimates for each fleet and time block are displayed in Figure 23a. Implied age selectivities (product of length selectivity and the age-length key) for each fleet and period are shown in Figure 23b. The MexCal fleets (S1 and S2) captured progressively smaller fish between the early and latter time blocks (Figure 23a).

Model fits to fleet length frequencies, implied age-frequencies, Pearson residuals, and observed and effective samples sizes are displayed in Figures 24a-26a. Results are grouped by fleet to aid examination of fits to length compositions, bubble plots of Pearson residuals, and corresponding

fits to implied age compositions on opposing pages. Results indicate random residual patterns for most data and fleets. The MexCal\_S1 and S2 fleet length data were poorly fit during the last couple of years, when larger sardine were taken by the fishery (Figures 24a-25a). The PacNW fleet displayed notable residuals patterns for strong year classes (1997, 1998, and 2003) moving through the fishery (Figure 26).

#### *Selectivity estimates and fits to survey length-composition data*

Length selectivity estimates for surveys are displayed in Figure 27a and implied age selectivities for each survey are shown in Figure 27b. Selectivities for the ATM spring and summer surveys are notably different, with the spring survey selecting for smaller, younger sardine than in summer (Figure 27a,b). Presumably, this difference is due to spatial differentiation of the migrating stock during the spring (off California) vs. summer (primarily PacNW) seasons.

Model fits to ATM survey length compositions, Pearson residuals, and observed and effective samples sizes are displayed in Figures 28-29. Poor fits to the ATM survey length data are indicated in most years (Figure 28). As noted above (*Parameter estimates and errors*), the selectivity pattern for the spring ATM survey underwent a marked shift toward smaller, younger sardine in this update assessment (Table 10, Figure 39). This inconsistency in knife-edged selectivity is not a new observation, as it was noted during various sensitivity runs conducted prior to and during the 2014 STAR. Given that the ATM series are fit with  $q$  fixed at 1.0, the shift to selecting smaller sardine had a noticeable effect on abundance scaling in the update model. This area of sensitivity is further discussed under **Uncertainty and Sensitivity Analysis** below.

#### *Fits to survey indices of abundance*

Model fits to the DEPM, TEP, and ATM spring and summer survey time series are displayed in both arithmetic and log scale in Figures 30-33. Model fits to the ATM surveys were reasonable (near mean estimates and within error bounds, Figures 30-31), with the exceptions of the estimate for the initial survey year 2005 (spring 2006 survey), which was notably under-estimated and the recent 2014 survey (spring and summer), which was over-estimated by the model. Fits to the summer ATM survey also indicated a trend in the residuals (under-fitting in 2009-2013) that was not evident in last year's assessment (Hill et al. 2014) (Figure 31). The trend in under-fitting was likely driven by the low estimate from the 2014 surveys coupled with the selectivity shift in the spring ATM series.

Fits to the DEPM and TEP surveys are displayed in Figures 32-33. Both time series are poorly fit compared to the ATM time series, however, the fit to the DEPM survey is slightly better than the fitted TEP time series. Catchability coefficient ( $q$ ) for the DEPM series of female SSB was estimated to be 0.215 and the TEP series  $q=0.71$ .

#### *Population numbers- and biomass-at-age*

Update model estimates of numbers-at-age are provided in Table 12a. Corresponding estimates of population biomass-at-age, total biomass (age 0+), and stock biomass (age 1+) are shown in Table 12b.

### *Stock-recruitment relationship*

Recruitment was modeled using the Beverton-Holt stock-recruitment relationship ( $\sigma_R=0.75$ , fixed value). Steepness ( $h$ ) estimates for 2014 preliminary model runs typically bounded at  $h=1$ , so steepness was fixed at 0.8 – a value considered reasonable for clupeid stocks (Myers et al. 1999). The Beverton-Holt stock-recruitment relationship for base model T (2014) is displayed in Figure 34a. Recruitment deviations for the main era were estimated for years 1993 to 2012 (2013 year-class) (Figure 34b). Asymptotic standard errors for recruitment deviations are displayed in Figure 34c and the S-R bias adjustment ramp (Methot and Taylor 2011) is shown in Figure 34d.

### *Spawning stock biomass*

Base model estimates (with 95% confidence intervals) of total SSB are provided in Table 13 and Figure 35a. The estimate of virgin SSB was 0.475 mmt. SSB increased throughout the 1990s, peaking at 0.809 million metric tons (mmt) in 1999 and 0.841 mmt in 2007 (Table 13, Figure 35a).

### *Recruitment*

Estimated time series of recruit (age-0) abundance is provided in Table 13 and Figure 35b. Virgin recruitment ( $R_0$ ) for base model T was estimated to be 2.884 billion age-0 fish. Recruitment (year-class abundance) peaked at 11.3 billion fish in 1997, 15.5 billion in 2003, and 12.9 billion in 2005. The 2010 to 2013 year classes were among the weakest in recent history. The 2014 year class, derived largely from the predicted stock-recruitment curve, was poorly estimated ( $CV=0.69$ ) and unrealistically high, given the paucity of spawning activity observed in the surveys during spring 2014 (Table 13, Figures 15 and 35b).

### *Stock biomass for PFM management*

Stock biomass, used for setting management specifications, is defined as the sum of the biomass for ages one and older (age 1+). Model estimates of stock biomass are provided in Table 12b and displayed in Figure 43. Stock biomass increased throughout the 1990s, peaking at 0.961 mmt in 1999 and 1.037 mmt in 2007. Stock biomass is projected to be less than 150,000 mt as of July 2015. When the 2014 year class is drawn from the S-R relationship, stock biomass is projected to be 132,884 mt in July 2015. As noted previously, the S-R derived estimate 2014 year-class strength is biased high, given the lack of evidence for spawning during spring 2014 (Figure 15), as well as the recent trend in poor recruitment (Figure 35b). Alternatively, when the 2014 year class is based on an average recruitment from 2011-2013, and accounting for natural and fishing mortality during 2014, then stock biomass is projected to be 96,688 mt in July 2015 (Figure 43). Given that recent recruitment has been consistently over-estimated in the past several assessments (Figure 41), the low-recruitment scenario is considered more plausible and is recommended for calculating HCRs for 2015-16.

### *Harvest and exploitation rates*

Harvest rates (catch per selected biomass, continuous- $F$ ) by fleet are displayed in Figure 36a. Instantaneous  $F$  estimates were all within a plausible range of values and less than 0.5 in most years/seasons.

Exploitation rate is defined as the calendar year NSP catch divided by the total mid-year biomass (July-1, ages 0+). The U.S. and total exploitation rates for the NSP are shown in Figure 36b. Based on update model estimates, exploitation rate for the U.S. fishery peaked at 22.4% in 2013. The U.S. exploitation rate was 13.9% in 2014. U.S. exploitation rate has averaged about 11% since the onset of Council management in 2000.

## Uncertainty and Sensitivity Analysis

### *Sensitivity to addition of new data*

Sensitivity of the update model to new data was examined through stepwise addition of updated sources of information. Likelihoods and derived quantities of interest are presented in Table 9. The update model gradually scaled lower with the addition of each updated data component. The downward scaling of population estimates between the 2014 full and this update assessment has been attributed to a shift in spring ATM selectivity to smaller fish (Figure 39), as well as the updated fit to the ATM surveys that included the very low estimated biomass observed in 2014. The stock biomass time-series scaled 26% lower in the update model relative to the 2014 ‘final’ model (Figure 39). It is important to note that a downward scaling of population estimates was also observed during the course of the 2014 STAR panel and thus, was not entirely unexpected (STAR 2014). This shift was typically associated with changes in selectivity for the spring ATM survey (larger to smaller sardine). This model instability was carried forward in the final 2014 model, evidenced by the retrospective analysis by Hill et al. (2014) (see Figure 38 lower panel). Figure 39 compares spring ATM selectivity and biomass estimates from the update model to estimates from the final 2014 model, as well as the 2014 model minus one year of data. The 2015 update model and 2014 retrospective (y-1) models displayed similar selectivity patterns and biomass estimates in the last eight years relative to the final 2014 model (Figure 39).

During the SSC CPS Subcommittee’s review of this update (March 6, 2015), it became further apparent that the final 2014 assessment did not correspond to the best overall fit to the data. This was due to an uneven likelihood surface and the 2014 model converging to a local rather than a global minimum (see following subsection and Figure 37). This problem was uncovered by re-running the 2014 model from a lower initial  $R_0$  value and estimating this parameter in a later phase. Likelihoods and derived quantities for the ‘revised’ 2014 model are included in Table 9. Biomass trajectories and spring 2014 selectivity estimates for all stepwise models are presented in Figure 40. The revised 2014 model stock biomass estimate is now much closer to that of the 2015 update model (Figure 40).

### *Likelihood profile for virgin recruitment*

Likelihood profiles for virgin recruitment ( $R_0$ ) can provide insight as to which data components influence scale in a stock assessment model. The 2015 update model was profiled for  $\ln(R_0)$  values ranging from 14.4 to 16.0 for comparison to the final 2014 model, which ranged from 14.8 to 16.4 (Figure 37). Both the 2014 and 2015 models displayed non-smooth total likelihood surfaces. Likelihood profiles for the individual model components are likewise inconsistent and in some cases, conflicting with regard to scale (Figure 37). Profile surfaces for the total and component likelihoods were generally similar in form between the 2014 and 2015 assessments, however, the 2015 update model had a lower  $R_0$  and displayed a steeper gradient for some model components (e.g., spring ATM length, MexCal\_S2 length, and PacNW conditional age-at-

length compositions). As noted in Hill et al. (2014), while assuming a fixed  $q=1$  for the ATM series theoretically provides more stability in scaling, the model may yet change unpredictably when additional data are included due to this inherent tension in the model. This possibility was also highlighted in the STAR report (STAR 2104).

#### *Retrospective analysis*

Retrospective analysis can provide another means of examining model properties and characterizing uncertainty. A retrospective analysis was performed on the update model, where data were incrementally removed from the end year back to 2009. Update model results were compared to the retrospective analysis conducted for the final 2014 model T (Hill et al. 2014). Stock biomass estimates for these analyses are displayed in Figure 38. The 2014 model displayed a systematic retrospective pattern for recent years, with the greatest change in scale occurring for the model fitting data through end year -1 (Figure 38 lower panel; also see discussion in STAR 2014). The retrospective pattern observed in the 2014 final model was not exhibited in the update model (Figure 38 upper panel).

#### *Convergence tests*

Convergence properties of the 2015 update model were tested to ensure the model represents an optimal solution. The update model was run with a wide range of initial  $R_0$  values (14.1 to 16.0). For each run, phase order for estimating parameter components ( $R_0$ ,  $R_1$ , growth, selectivity, and survey  $Q$ ) was randomized from 1 to 5 (Table 14), and all parameters were jittered by 10%. All models solved to one of two very similar total negative log likelihoods (1164.64 or 1164.61) and had similar final estimates of  $R_0$  (14.8748 or 14.8782) (Table 14). The update model appears to have converged to a global minimum.

#### *Historical analysis*

Update model estimates of stock biomass and recruitment are compared to recent assessments in Figure 41. Full and updated SS models since 2009 (Hill et al. 2009-2014), including the ‘revised’ 2014 model, were included in the comparison. Biomass and recruitment are similar in trend across models, with some differences in scale for peak and low periods. Note that terminal-year recruitment strength has consistently been over-estimated for the past several years (Figure 41).

#### *Uncertainty regarding strength of the 2014 year class*

In this assessment, there exists considerable uncertainty surrounding absolute levels of recruitment (age-0 abundance) in the terminal year of the estimated time series of numbers-at-age, which can in some years, comprise a substantial portion of the total biomass of short-lived, small pelagic species, such as Pacific sardine (Figure 42a,b). It is important to note that recent samples from both fisheries and surveys indicate recruitment remains at depressed levels, indicating an extended period of weak compensation exhibited by the population, which is likely to translate to continued, decreased stock biomass in the immediate future.

As noted above (*Recruitment and Stock biomass for PFMC management*), estimated abundance of the 2014 year-class is poorly informed by the existing data and not supported by the spring 2014 surveys. The STAT considers the S-R estimate to be unrealistically high, given: 1) the lack of spawning observed during spring 2014 (Figure 15); and 2) consistent over-estimation of terminal year recruitment in the past several assessments (Figure 41, lower panel). The STAT

proposes addressing this uncertainty by basing the 2014 year-class estimate on recent average recruitment (see *Stock biomass for PFMC management*) for purposes of calculating an OFL and ABCs (Table 15b), e.g., as recommended in recent Pacific mackerel (projection) assessments reviewed by CPS-SSC panels.

## **HARVEST CONTROL RULES FOR THE 2015-16 MANAGEMENT CYCLE**

### *Harvest guideline*

The annual HG is calculated as follows:

$$\text{HG} = (\text{BIOMASS} - \text{CUTOFF}) \cdot \text{FRACTION} \cdot \text{DISTRIBUTION};$$

where HG is the total U.S. quota for the period July 2015 to June 2016, BIOMASS is the stock biomass (ages 1+) projected as of July 1, 2015, CUTOFF (150,000 mt) is the lowest level of biomass for which directed harvest is allowed, FRACTION (5-20%) is the percentage of biomass above the CUTOFF that can be harvested, and DISTRIBUTION (87%) is the average portion of BIOMASS assumed in U.S. waters. Based on results from the update model, and regardless of assumptions regarding strength of the 2014 year-class (i.e. S-R derived versus recent average), stock biomass is projected to be below the 150,000 threshold. Therefore, HG for 2015-16 is calculated to be 0 mt (Table 15a,b). The U.S. harvest guidelines and landings since the onset of federal management are displayed in Figure 2. The 2015-16 fishing season will be the first where harvest guideline will be 0 mt.

### *OFL and ABC*

On March 11, 2014, the PFMC adopted the use of CalCOFI SST data for specifying environmentally-dependent  $E_{\text{MSY}}$  each year, beginning July 2014. Based on this recent decision, the following table of OFL and ABCs is based on an  $E_{\text{MSY}} = 0.157239$ , which corresponds to the three-year running average of CalCOFI SST for 2012-14 (15.562 °C). OFL and ABC values for 2015-16 will depend on assumptions regarding strength of the 2014 year-class used to project stock biomass to July 1, 2015. As noted above, when the 2014 year class is freely estimated (albeit primarily derived from the spawner-recruit relationship), then stock biomass is projected to be 132,884 mt in July 2015. When the 2014 year class is based on an average of recruitments from 2011-2013, then stock biomass is projected to be 96,688 mt in July 2015. Given the lack of spawning activity observed during spring 2014, the latter scenario is considered more plausible. OFLs and ABCs for these two recruitment scenarios and for a range of Pstar values are provided in Table 15a,b.

## **RESEARCH AND DATA NEEDS**

See the 2014 assessment (Hill et al. 2014) and STAR (STAR 2014) reports for extensive lists of Research and Data Needs for Pacific sardine.

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## LITERATURE CITED

- Ahlstrom, E. H. 1960. Synopsis on the biology of the Pacific sardine (*Sardinops caerulea*). Proc. World Sci. Meet. Biol. Sardines and Related Species, FAO, Rome, 2: 415-451
- Barnes, J. T., L. D. Jacobson, A. D. MacCall, and P. Wolf. 1992. Recent population trends and abundance estimates of the Pacific sardine (*Sardinops sagax*). CalCOFI Rep. 33: 60-75.
- Baumgartner, T., A. Soutar, and V. Ferriera-Bartrina. 1992. Reconstruction of the history of Pacific sardine and northern anchovy populations over the past two millennia from sediments of the Santa Barbara Basin, California. CalCOFI Rep. 33: 24-40.
- Butler, J. L. 1987. Comparisons of the larval and juvenile growth and larval mortality rates of Pacific sardine and northern anchovy and implications for species interactions. Ph. D. Thesis, Univ. Calif., San Diego, 240 pp.
- Butler, J.L., P.E. Smith, and N.C.H. Lo. 1993. The effect of natural variability of life-history parameters on anchovy and sardine population growth. CalCOFI Rep. 34: 104-111.
- Clark, F. N., and J. F. Janssen. Jr. 1945. Movements and abundance of the sardine as measured by tag returns. Calif. Div. Fish Game Fish. Bull. 61: 7-42.
- Clark, F. N., and J. C. Marr. 1955. Population dynamics of the Pacific sardine. CalCOFI Prog. Rep. 1 July 1953-31 March 1955: 11-48.
- CONAPESCA. 2011. Anuario Estadístico de Acuicultura y Pesca. ([http://www.conapesca.sagarpa.gob.mx/wb/cona/cona\\_anuario\\_estadistico\\_de\\_pesca](http://www.conapesca.sagarpa.gob.mx/wb/cona/cona_anuario_estadistico_de_pesca))
- Conser, R. J., K. T. Hill, P. R. Crone, N. C. H. Lo, and D. Bergen. 2003. Stock assessment of Pacific sardine with management recommendations for 2004: Executive Summary. Pacific Fishery Management Council, November 2003. 15 p.
- Conser, R., K. Hill, P. Crone, N. Lo, and R. Felix-Uraga. 2004. Assessment of the Pacific sardine stock for U.S. management in 2005: Pacific Fishery Management Council, November 2004. 135 p.
- CPSMT. 2014. Coastal pelagic species management team report on sardine harvest parameters changes. Pacific Fishery Management Council, Pacific Fishery Management Council, 7700 NE Ambassador Place, Suite 101, Portland, Oregon 97220, USA. 14 p.
- Cushing, D. H. 1971. The dependence of recruitment of parent stock on different groups of fishes. J. Cons. Int. Explor. Mer. 33: 340-362.
- Cutter, G. R. and D. A. Demer. 2008. California current ecosystem survey 2006: Acoustic cruise reports for NOAA FSV *Oscar Dyson* and NOAA FRV *David Starr Jordan*. NOAA Tech. Memo. NOAA-TM-NMFS-SWFSC-415. 103 p.
- Demer, D. A., J. P. Zwolinski, K. A. Byers, G. R. Cutter Jr., T. S. Sessions, and B. J. Macewicz. 2011. Pacific sardine (*Sardinops sagax*) abundances estimated using an acoustic trawl survey method. PFMC, Nov 2011 Briefing Book, Agenda Item F.2.b., Attachment 4. 9 p.
- Demer, D. A., J. P. Zwolinski, K. A. Byers, G. R. Cutter, J. S. Renfree, T. S. Sessions, B. J. Macewicz. 2012. Prediction and confirmation of seasonal migration of Pacific sardine (*Sardinops sagax*) in the California Current Ecosystem. Fish. Bull. 110:52-70.
- Demer, D.A., Zwolinski, J.P. 2014. Corroboration and refinement of a method for differentiating landings from two stocks of Pacific sardine (*Sardinops sagax*) in the California Current. ICES Journal of Marine Science 71(2): 328-335.
- Deriso, R., T. J. Quinn and P. R. Neal. 1985. Catch-age analysis with auxiliary information. Can. J. Fish. Aquat. Sci. 42:4.

- Deriso, R. B., J. T. Barnes, L. D. Jacobson, and P. J. Arenas. 1996. Catch-at-age analysis for Pacific sardine (*Sardinops sagax*), 1983-1995. CalCOFI Rep. 37:175-187.
- Dorval, E., McDaniel, J.D., Porzio, D.L., Hodes, V., Felix-Uraga, R., Rosenfield, S. 2013. Computing and selecting ageing errors to include in stock assessment models of Pacific sardine (*Sardinops sagax*). CalCOFI Rep. 54: 1-13.
- Eschmeyer, W. N., E. S. Herald, and H. Hammann. 1983. A Field Guide to Pacific Coast Fishes of North America. Houghton Mifflin Company, Boston, MA. 336 p.
- Félix-Uraga, R., V. M. Gómez-Muñoz, C. Quiñónez-Velázquez, F. Neri Melo-Barrera, and W. García-Franco. 2004. On the existence of Pacific sardine groups off the west coast of Baja California and Southern California. CalCOFI Rep. 45: 146-151.
- Felix-Uraga, R., V. M. Gómez-Muñoz, C. Quiñónez-Velázquez, F. Neri Melo-Barrera, K. T. Hill and W. García-Franco. 2005. Pacific sardine stock discrimination off the west coast of Baja California and southern California using otolith morphometry. CalCOFI Rep. 46: 113-121.
- Francis, R.I.C.C. 2011. Data weighting in statistical fisheries stock assessment models. Canadian Journal of Fisheries and Aquatic Sciences 68:1,124-1,138.
- García F. W. and Sánchez R. F. J. 2003. Análisis de la pesquería de pelágicos menores de la costa occidental de Baja California durante la temporada del 2002. Boletín Anual 2003. Secretaria de Agricultura, Ganadería, Desarrollo Rural, Pesca y Alimentación. Instituto Nacional de la Pesca. Centro Regional de Investigación Pesquera de Ensenada, Cámara Nacional de la Industria Pesquera y Acuícola, Delegación Baja California. 15 p.
- Garcia-Morales, R. Shirasago-German, B. Felix-Uraga, R. and Perez-Lezama, E.L. 2012. Conceptual models of Pacific sardine distribution in the California Current system. Current Develop. Oceangr. 5(1): 23-47.
- Hart, J. L. 1973. Pacific fishes of Canada. Fish. Res. Board Can., Bull. 180. 740 p.
- Hedgecock, D., E. S. Hutchinson, G. Li, F. L. Sly, and K. Nelson. 1989. Genetic and morphometric variation in the Pacific sardine, *Sardinops sagax caerulea*: comparisons and contrasts with historical data and with variability in the northern anchovy, *Engraulis mordax*. Fish. Bull. 87: 653-671.
- Hill, K. T. 1999. Determining age composition of coastal pelagic species in northern California, Oregon, and Washington coastal waters. Pacific States Marine Fisheries Commission. Gladstone, Oregon. Project #1-IJ-9 Final Report. 47 p.
- Hill, K.T. 2013. Pacific sardine biomass projection in 2013 for U.S. management during the first half of 2014 (Executive Summary). Pacific Fishery Management Council, 7700 NE Ambassador Place, Suite 101, Portland, Oregon 97220. 8 p.
- Hill, K.T., L.D. Jacobson, N.C.H. Lo, M. Yaremko, and M. Dege. 1999. Stock assessment of Pacific sardine for 1998 with management recommendations for 1999. Calif. Dept. Fish. Game. Marine Region Admin. Rep. 99-4. 92 pp.
- Hill, K. T., N. C. H. Lo, B. J. Macewicz, and R. Felix-Uraga. 2006a. Assessment of the Pacific sardine (*Sardinops sagax caerulea*) population for U.S. management in 2006. NOAA Tech. Memo. NOAA-TM-NMFS-SWFSC-386. 75 p.
- Hill, K. T., N. C. H. Lo, B. J. Macewicz, and R. Felix-Uraga. 2006b. Assessment of the Pacific sardine (*Sardinops sagax caerulea*) population for U.S. management in 2007. NOAA Tech. Memo. NOAA-TM-NMFS-SWFSC-396. 99 p.
- Hill, K. T., E. Dorval, N. C. H. Lo, B. J. Macewicz, C. Show, and R. Felix-Uraga. 2007. Assessment of the Pacific sardine resource in 2007 for U.S. management in 2008. NOAA Tech. Memo. NOAA-TM-NMFS-SWFSC-413. 178 p.

- Hill, K. T., E. Dorval, N. C. H. Lo, B. J. Macewicz, C. Show, and R. Felix-Uraga. 2008. Assessment of the Pacific sardine resource in 2008 for U.S. management in 2009. PFMC, Nov 2008, Agenda Item G.2.b, 236 p.
- Hill, K. T., N. C. H. Lo, P. R. Crone, B. J. Macewicz, and R. Felix-Uraga. 2009. Assessment of the Pacific sardine resource in 2009 for USA management in 2010. U.S. Dep. Commer., NOAA Tech. Memo. NMFS-SWFSC-452. 182 p.
- Hill, K. T., N. C. H. Lo, B. J. Macewicz, P. R. Crone, and R. Felix-Uraga. 2010. Assessment of the Pacific sardine resource in 2010 for U.S. management in 2011. U.S. Dep. Commer., NOAA Tech. Memo. NMFS-SWFSC-469. 137 p.
- Hill, K. T., P. R. Crone, N. C. H. Lo, B. J. Macewicz, E. Dorval, J. D. McDaniel, and Y. Gu. 2011. Assessment of the Pacific sardine resource in 2011 for U.S. management in 2012. U.S. Dep. Commer., NOAA Tech. Memo. NMFS-SWFSC-487. 260 p.
- Hill, K.T., Crone, P.R., Lo, N. C. H., Demer, D.A., Zwolinski, J.P., Macewicz, B.J. 2012. Assessment of the Pacific sardine resource in 2012 for U.S. management in 2013. NOAA Technical Memorandum NMFS-SWFSC-501.
- Hill K. T., P. R. Crone, D. A. Demer, J. P. Zwolinski, E. Dorval, and B. J. Macewicz. 2014. Assessment of the Pacific sardine resource in 2014 for U.S.A. management in 2014-15. US Department of Commerce. NOAA Tech. Memo. NMFS-SWFSC-531, 305 p.
- Hurtado-Ferro, F., Punt, A.E. 2014. Revised analyses related to Pacific sardine harvest parameters. School of Aquatic and Fishery Sciences, University of Washington, Seattle, WA. PFMC March 2014 Briefing Book. Agenda Item I.1.b. 40 p.
- Hurtado-Ferro, J., Punt, A.E., Hill, K.T. 2013. Use of multiple selectivity patterns as a proxy for spatial structure. Fisheries Research. In Press.
- Jacobson, L. J. and A. D. MacCall. 1995. Stock-recruitment models for Pacific sardine (*Sardinops sagax*). Can. J. Fish. Aquat. Sci. 52:566-577.
- Jagiello, T., D. Hanan, and R. Howe. 2009. West coast aerial sardine survey: sampling results in 2009. PFMC, November 2009 Briefing Book, Agenda Item I.1.b., Attachment 1. 319 p.
- Jagiello, T., D. Hanan, R. Howe, and M. Mikesell. 2010. West coast aerial sardine survey: sampling results in 2010. PFMC, November 2010 Briefing Book, Agenda Item I.2.b.
- Jagiello, T., R. Howe, and M. Mikesell. 2011. Northwest aerial sardine survey sampling results in 2011. PFMC, Nov 2011 Briefing Book, Agenda Item F.2.b., Attachment 3. 91 p.
- Jagiello, T., R. Howe, and M. Mikesell. 2012. Northwest aerial sardine survey sampling results in 2012. PFMC, Nov 2012 Briefing Book, Agenda Item G.3.a., Attachment 6. 82 p.
- Janssen, J. F. 1938. Second report of sardine tagging in California. Calif. Fish Game 24(4): 376-389.
- Javor, B.J. 2013. Do shifts in otolith morphology of young Pacific sardine (*Sardinops sagax*) reflect changing recruitment contributions from northern and southern stocks? CalCOFI Rep. 54: 1-12.
- Leet, W. S., C. M. Dewees, R. Klingbeil, and E. J. Larson (Eds.). 2001. California's Living Marine Resources: A Status Report. Calif. Dep. Fish and Game. ANR Publication #SG01-11.
- Lo, N. C. H., Y. A. Green Ruiz, Mercedes J. Cervantes, H. G. Moser, R. J. Lynn. 1996. Egg production and spawning biomass of Pacific sardine (*Sardinops sagax*) in 1994, determined by the daily egg production method. CalCOFI Rep. 37:160-174.
- Lo, N. C. H., B. J. Macewicz, and D. A. Griffith. 2005. Spawning biomass of Pacific sardine (*Sardinops sagax*) from 1994-2004 off California. CalCOFI Rep. 46: 93-112.

- Lo, N. C.H., B. J. Macewicz, and D. A. Griffith. 2011a. Migration of Pacific sardine (*Sardinops sagax*) off the west coast of United States in 2003-2005. Bull. Mar. Sci. 87(3): 395-412.
- Lo, N. C. H., B. J. Macewicz, and D. A. Griffith. 2011b. Spawning biomass of Pacific sardine (*Sardinops sagax*) off U.S. in 2011. PFMF, Nov 2011 Briefing Book, Agenda Item F.2.b., Attachment 2. 38 p.
- MacCall, A. D. 1979. Population estimates for the waning years of the Pacific sardine fishery. CalCOFI Rep. 20: 72-82.
- Macewicz, B. J. and D. N. Abramenkoff. 1993. Collection of jack mackerel, *Trachurus symmetricus*, off southern California during 1991 cooperative U.S.-U.S.S.R. cruise. Southwest Fisheries Science Center, National Marine Fisheries Service, Admin. Rep. LJ-93-07. 13 pp.
- Macewicz B. J., J. J. Castro-Gonzalez, C. E. Coto Altamirano, and J. R. Hunter. 1996. Adult reproductive parameters of Pacific Sardine (*Sardinops sagax*) during 1994 CalCOFI Rep 37:140-151.
- Methot, R. 2005. Technical description of the stock synthesis II assessment program. Version 1.17-March 2005. NOAA Fisheries, Seattle, WA.
- Methot, R. 2007. User manual for the Integrated analysis program stock synthesis 2 (SS2). Model version 2.00c. March 2007. NOAA Fisheries, Seattle, WA.
- Methot, R. 2009. User manual for Stock Synthesis. Model version 3.03a. May 11, 2009. NOAA Fisheries, Seattle, WA. 143 p.
- Methot, R. 2011. User manual for Stock Synthesis. Model version 3.21d. May 8, 2011. NOAA Fisheries, Seattle, WA. 165 p.
- Methot, R., 2013. User manual for stock synthesis, Model Version 3.24s. NOAA Fisheries, Seattle, WA.
- Methot, R.D. and I.G. Taylor. 2011. Adjusting for bias due to variability of estimated recruitments in fishery assessment models. Can. J. Fish. Aquat. Sci., 68:1744-1760.
- Methot, R.D., Wetzel, C.R. 2013. Stock Synthesis: A biological and statistical framework for fish stock assessment and fishery management. Fisheries Research 142, 86-99.
- Moser, H. G., R. L. Charter, P. E. Smith, D. A. Ambrose, W. Watson, S. R. Charter, and E. M. Sandknop. 2001. Distributional atlas of fish larvae and eggs in the Southern California Bight region: 1951-1998. CalCOFI Atlas No. 34. 208 pp.
- Murphy, G. I. 1966. Population biology of the Pacific sardine (*Sardinops caerulea*). Proc. Calif. Acad. Sci. Vol. 34 (1): 1-84.
- Myers, R.A., Bowen, K.G., Barrowman, N.J. 1999. Maximum reproductive rate of fish at low population sizes. Canadian Journal of Fisheries and Aquatic Sciences 56:2,404-2419.
- Otter Research Ltd. 2001. An introduction to AD Model Builder (Version 6.0.2) for use in nonlinear modeling and statistics. Otter Research Ltd., Sidney, B.C., Canada. 202 p.
- PFMC (Pacific Fishery Management Council). 1998. Amendment 8 (to the northern anchovy fishery management plan) incorporating a name change to: the coastal pelagic species fishery management plan. Pacific Fishery Management Council, Portland, OR.
- PFMC (Pacific Fishery Management Council). 2014. Status of the Pacific Coast Coastal Pelagic Species Fishery and Recommended Acceptable Biological Catches. Stock Assessment and Fishery Evaluation for 2014.
- Phillips, J. B. 1948. Growth of the sardine, *Sardinops caerulea*, 1941-42 through 1946-47. Calif. Div. Fish Game Fish Bull. 71: 33 p.

- Smith, P. E. 1978. Biological effects of ocean variability: time inferred from fish scales in anaerobic sediments off California. CalCOFI Rep. 13: 63-70.
- Smith, P.E. 2005. A history of proposals for subpopulation structure in the Pacific sardine (*Sardinops sagax*) population off western North America. CalCOFI Rep. 46: 75-82.
- Soutar, A. and J. D. Isaacs. 1969. History of fish populations inferred from fish scales in anaerobic sediments off California. CalCOFI Rep. 13: 63-70.
- Soutar, A., and J. D. Isaacs. 1974. Abundance of pelagic fish during the 19<sup>th</sup> and 20<sup>th</sup> centuries as recorded in anaerobic sediment off the Californias. Fish. Bull. 72: 257-273.
- SSC (Scientific and Statistical Committee). 2012a. Update assessment meeting report. CPS-subcommittee, O. Hamel (chair) and R. Conser. NOAA Fisheries, Southwest Fisheries Science Center, La Jolla CA, 92037, October 2-3, 2012. 7 p. See Appendix C in Hill et al. (2012).
- SSC (Scientific and Statistical Committee). 2012b. SSC report on the Pacific sardine stock assessment and management for 2013, including preliminary EFP proposals and tribal set-aside. November 2012. 2 p. See Appendix C in Hill et al. (2012).
- STAR (Stock Assessment Review). 2011. Pacific sardine STAR panel meeting report. CPS-subcommittee, A. Punt (chair), R. Conser, L. Jacobson, and C. Francis. NOAA Fisheries, Southwest Fisheries Science Center, La Jolla CA, 92037, October 4-7, 2011. 21 p. See Appendix 6 in Hill et al. (2011).
- STAR (Stock Assessment Review). 2014. Pacific sardine STAR panel meeting report. A. Punt (chair), M. Key, J. De Oliveira, J. Simmonds. Review: NOAA Fisheries, Southwest Fisheries Science Center, La Jolla CA, 92037, March 3-5, 2014. Report: Pacific Fishery Management, Portland, OR, 97220, USA.
- Vrooman, A. M. 1964. Serologically differentiated subpopulations of the Pacific sardine, *Sardinops caerulea*. J. Fish. Res. Bd. Canada, 21: 691-701.
- Walford, L. A. and K. H. Mosher. 1943. Studies on the Pacific pilchard or sardine (*Sardinops caerulea*). U.S. Dep. Of Interior, Fish and Wildlife Service, Special Sci. Rep. No. 20. 33 p.
- Yaremko, M. L. 1996. Age determination in Pacific sardine, *Sardinops sagax*. NOAA Tech. Mem. NOAA-TM-NMFS-SWFSC-223. 33 p.
- Zwolinski, J. P., K. A. Byers, G. R. Cutter Jr., T. S. Sessions, B. J. Macewicz, and D. A. Demer. 2011. Acoustic-trawl survey conducted during the Spring 2011 California Current Ecosystem Survey from FV *Frosti* and FSV *Bell M. Shimada*.
- Zwolinski, J. P., Emmett, R. L., and Demer, D. A. 2011. Predicting habitat to optimize sampling of Pacific sardine (*Sardinops sagax*). ICES Journal of Marine Science, 68: 867-879.
- Zwolinski, J.P., Demer, D.A. 2013a. Environmental and parental control of Pacific sardine (*Sardinops sagax*) recruitment. ICES Journal of Marine Science, doi:10.1093/icesjms/fst173.
- Zwolinski, J.P., Demer, D.A. 2013b. Measurements of natural mortality for Pacific sardine (*Sardinops sagax*). ICES Journal of Marine Science 70:1,408-1,415.
- Zwolinski, J. P., D. A. Demer, K. A. Byers, G. R. Cutter, J. S. Renfree, T. S. Sessions, and B. J. Macewicz. 2012a. Distributions and abundances of Pacific sardine (*Sardinops sagax*) and other pelagic fishes in the California Current Ecosystem during spring 2006, 2008, and 2010, estimated from acoustic—trawl surveys. Fish. Bull. 110: 110-122.
- Zwolinski, J., D. A. Demer, B. J. Macewicz, G. R. Cutter Jr., K. A. Byers, J. S. Renfree, and T. S. Sessions. 2012b. Acoustic-trawl estimates of sardine biomass off California during spring 2012. (Appendix A of Hill et al. 2014)

- Zwolinski, J., D. A. Demer, B. J. Macewicz, G. R. Cutter Jr., K. A. Byers, J. S. Renfree, and T. S. Sessions. 2012c. Acoustic-trawl estimates of sardine biomass off the west coasts of the United States of America and Canada during summer 2012. (Appendix B of Hill et al. 2014).
- Zwolinski, J. P., D. A. Demer, B. J. Macewicz, G. R. Cutter Jr., B. E. Elliot, S. A. Mau, D. W. Murfin, J. S. Renfree, T. S. Sessions, and K. L. Stierhoff. 2015a. Acoustic-trawl estimates of sardine biomass off California during spring 2014 (Appendix A of this report).
- Zwolinski, J. P., D. A. Demer, B. J. Macewicz, G. R. Cutter Jr., B. E. Elliot, S. A. Mau, D. W. Murfin, J. S. Renfree, T. S. Sessions, and K. L. Stierhoff. 2015b. Acoustic-trawl estimates of sardine biomass off USA and Canada during summer 2014 (Appendix B of this report).

## TABLES

**Table 1.** U.S. Pacific sardine harvest guidelines (HG) and landings (metric tons) since the onset of federal management.

| Mgmt<br>Year | Harvest<br>Guideline | Landings |
|--------------|----------------------|----------|
| 2000         | 186,791              | 72,496   |
| 2001         | 134,737              | 78,520   |
| 2002         | 118,442              | 101,367  |
| 2003         | 110,908              | 74,599   |
| 2004         | 122,747              | 92,613   |
| 2005         | 136,179              | 90,130   |
| 2006         | 118,937              | 90,776   |
| 2007         | 152,564              | 127,695  |
| 2008         | 89,093               | 87,175   |
| 2009         | 66,932               | 67,083   |
| 2010         | 72,039               | 66,891   |
| 2011         | 50,526               | 46,745   |
| 2012         | 109,409              | 101,103  |
| 2013         | 66,495               | 61,646   |
| 2014(1)      | 6,946                | 6,550    |
| 2014-15      | 23,293               | 17,148   |

**Table 2.** Pacific sardine landings (mt) for major fishing regions off northern Baja California (Ensenada, Mexico), the United States, and British Columbia (Canada). ENS and SCA landings are presented as totals and northern subpopulation (NSP) portions.

| Calendar<br>Yr-Sem | Model<br>Yr-Seas | ENS<br>Total | ENS<br>NSP | SCA<br>Total | SCA<br>NSP | CCA      | OR       | WA       | BC       |
|--------------------|------------------|--------------|------------|--------------|------------|----------|----------|----------|----------|
| 1993-2             | 1993-1           | 13,396.8     | 0.0        | 3,728.8      | 487.6      | 335.2    | 0.0      | 0.0      | 0.0      |
| 1994-1             | 1993-2           | 5,711.6      | 2,994.5    | 7,738.5      | 7,722.5    | 628.8    | 0.0      | 0.0      | 0.0      |
| 1994-2             | 1994-1           | 15,165.4     | 6,079.3    | 2,607.4      | 1,029.2    | 1,730.2  | 0.0      | 0.0      | 0.0      |
| 1995-1             | 1994-2           | 18,227.3     | 11,183.6   | 28,122.2     | 28,122.2   | 442.7    | 0.0      | 0.0      | 0.0      |
| 1995-2             | 1995-1           | 17,168.9     | 0.0        | 8,439.2      | 1,508.1    | 4,485.2  | 0.0      | 0.0      | 22.7     |
| 1996-1             | 1995-2           | 15,665.9     | 11,643.9   | 14,409.4     | 12,435.9   | 2,485.9  | 0.0      | 0.0      | 0.0      |
| 1996-2             | 1996-1           | 23,398.8     | 4,394.2    | 10,761.5     | 1,123.9    | 6,399.2  | 0.0      | 0.0      | 0.0      |
| 1997-1             | 1996-2           | 13,498.4     | 8,911.1    | 11,523.5     | 9,905.0    | 342.6    | 0.0      | 0.0      | 43.5     |
| 1997-2             | 1997-1           | 54,940.6     | 0.0        | 21,313.3     | 0.0        | 13,018.2 | 0.0      | 0.0      | 27.2     |
| 1998-1             | 1997-2           | 20,238.8     | 4,980.8    | 19,094.1     | 16,800.1   | 2,746.7  | 0.8      | 0.0      | 0.0      |
| 1998-2             | 1998-1           | 27,573.4     | 3,792.0    | 12,880.5     | 8,799.1    | 6,334.0  | 0.2      | 0.0      | 488.1    |
| 1999-1             | 1998-2           | 34,759.8     | 31,656.8   | 24,049.9     | 23,880.8   | 7,740.8  | 50.1     | 0.0      | 24.3     |
| 1999-2             | 1999-1           | 23,809.6     | 6,203.7    | 18,813.1     | 2,649.3    | 6,143.2  | 725.0    | 0.0      | 0.2      |
| 2000-1             | 1999-2           | 33,933.4     | 23,716.6   | 34,119.2     | 33,339.8   | 1,285.0  | 205.0    | 62.2     | 162.4    |
| 2000-2             | 2000-1           | 33,911.9     | 5,526.6    | 12,715.5     | 8,084.4    | 10,082.4 | 9,324.0  | 4,703.2  | 1,559.0  |
| 2001-1             | 2000-2           | 16,544.9     | 9,937.5    | 29,343.4     | 24,467.3   | 774.4    | 2,288.0  | 48.5     | 0.4      |
| 2001-2             | 2001-1           | 29,526.4     | 3,609.5    | 18,318.3     | 1,474.0    | 6,467.0  | 10,492.0 | 10,788.5 | 1,265.5  |
| 2002-1             | 2001-2           | 17,421.7     | 13,552.0   | 26,620.6     | 25,991.6   | 1,574.8  | 2,724.0  | 412.3    | 0.5      |
| 2002-2             | 2002-1           | 29,423.6     | 0.0        | 22,745.3     | 4,059.7    | 12,503.0 | 19,987.0 | 14,799.8 | 738.9    |
| 2003-1             | 2002-2           | 15,514.3     | 12,405.4   | 20,379.6     | 18,639.6   | 5,085.7  | 503.0    | 93.9     | 0.4      |
| 2003-2             | 2003-1           | 25,827.5     | 6,081.9    | 9,909.5      | 1,896.1    | 2,362.6  | 24,755.0 | 11,510.0 | 977.3    |
| 2004-1             | 2003-2           | 11,212.9     | 3,922.9    | 15,232.0     | 15,232.0   | 2,145.7  | 2,203.5  | 235.3    | 179.6    |
| 2004-2             | 2004-1           | 30,684.0     | 2,373.9    | 17,161.5     | 1,512.5    | 13,162.6 | 33,908.3 | 8,564.1  | 4,258.4  |
| 2005-1             | 2004-2           | 17,323.0     | 11,186.6   | 15,419.0     | 13,948.1   | 115.3    | 691.9    | 324.0    | 0.4      |
| 2005-2             | 2005-1           | 37,999.5     | 4,396.7    | 14,833.6     | 1,508.6    | 7,824.9  | 44,316.2 | 6,605.0  | 3,231.4  |
| 2006-1             | 2005-2           | 17,600.9     | 11,214.6   | 17,157.7     | 16,504.9   | 2,032.6  | 101.7    | 0.0      | 0.0      |
| 2006-2             | 2006-1           | 39,636.0     | 0.0        | 16,128.2     | 4,909.8    | 15,710.5 | 35,546.5 | 4,099.0  | 1,575.4  |
| 2007-1             | 2006-2           | 13,981.4     | 13,320.0   | 26,343.6     | 19,900.7   | 6,013.3  | 0.0      | 0.0      | 0.0      |
| 2007-2             | 2007-1           | 22,865.5     | 11,928.2   | 19,855.0     | 5,350.3    | 28,768.8 | 42,052.3 | 4,662.5  | 1,522.3  |
| 2008-1             | 2007-2           | 23,487.8     | 15,618.2   | 24,127.2     | 24,114.3   | 2,515.3  | 0.0      | 0.0      | 0.0      |
| 2008-2             | 2008-1           | 43,378.3     | 5,930.0    | 6,962.1      | 21.8       | 24,195.7 | 22,939.9 | 6,435.2  | 10,425.0 |
| 2009-1             | 2008-2           | 25,783.2     | 20,244.4   | 9,250.8      | 9,221.3    | 11,079.9 | 0.0      | 0.0      | 0.0      |
| 2009-2             | 2009-1           | 30,128.0     | 0.0        | 3,310.3      | 29.8       | 13,935.1 | 21,481.6 | 8,025.2  | 15,334.3 |
| 2010-1             | 2009-2           | 12,989.1     | 7,904.2    | 19,427.7     | 19,427.7   | 2,908.8  | 437.1    | 510.9    | 421.7    |
| 2010-2             | 2010-1           | 43,831.8     | 9,171.2    | 9,924.7      | 562.7      | 1,397.1  | 20,414.9 | 11,869.6 | 21,801.3 |
| 2011-1             | 2010-2           | 18,513.8     | 11,588.5   | 12,526.4     | 12,515.4   | 2,713.3  | 0.1      | 0.0      | 0.0      |
| 2011-2             | 2011-1           | 51,822.6     | 17,329.6   | 5,115.4      | 11.9       | 7,358.4  | 11,023.3 | 8,008.4  | 20,718.8 |
| 2012-1             | 2011-2           | 10,534.0     | 9,026.1    | 11,906.2     | 10,018.8   | 3,672.7  | 2,873.9  | 2,931.7  | 0.0      |
| 2012-2             | 2012-1           | 48,534.6     | 0.0        | 6,896.1      | 883.6      | 568.7    | 39,744.1 | 32,509.6 | 19,172.0 |
| 2013-1             | 2012-2           | 13,609.2     | 12,827.9   | 2,592.2      | 769.7      | 84.2     | 149.3    | 1,421.4  | 0.0      |
| 2013-2             | 2013-1           | 37,803.5     | 0.0        | 3,658.1      | 62.9       | 811.3    | 27,599.0 | 29,203.7 | 0.0      |
| 2014-1             | 2013-2           | 17,667.5     | 2,106.2    | 1,237.7      | 666.7      | 4,404.0  | 0.0      | 908.0    | 0.0      |
| 2014-2             | 2014-1           | 49,076.6     | 0.0        | 320.0        | 0.0        | 1,830.8  | 7,788.4  | 7,208.5  | 0.0      |

**Table 3.** Pacific sardine length and age samples available for major fishing regions off northern Baja California (Mexico), the United States, and Canada.

| Calendar<br>Yr-Sem | Model<br>Yr-Seas | ENS<br>Length | ENS<br>Age | SCA<br>Length | SCA<br>Age | CCA<br>Length | CCA<br>Age | OR<br>Length | OR<br>Age | WA<br>Length | WA<br>Age | BC<br>Length | BC<br>Age |
|--------------------|------------------|---------------|------------|---------------|------------|---------------|------------|--------------|-----------|--------------|-----------|--------------|-----------|
| 1993-2             | 1993-1           | 83            | 0          | 22            | 15         | 0             | 0          | 0            | 0         | 0            | 0         | 0            | 0         |
| 1994-1             | 1993-2           | 33            | 0          | 105           | 31         | 0             | 0          | 0            | 0         | 0            | 0         | 0            | 0         |
| 1994-2             | 1994-1           | 37            | 0          | 26            | 26         | 0             | 0          | 0            | 0         | 0            | 0         | 0            | 0         |
| 1995-1             | 1994-2           | 38            | 0          | 278           | 121        | 0             | 0          | 0            | 0         | 0            | 0         | 0            | 0         |
| 1995-2             | 1995-1           | 51            | 0          | 59            | 35         | 0             | 0          | 0            | 0         | 0            | 0         | 0            | 0         |
| 1996-1             | 1995-2           | 27            | 0          | 61            | 60         | 11            | 11         | 0            | 0         | 0            | 0         | 0            | 0         |
| 1996-2             | 1996-1           | 43            | 0          | 34            | 33         | 88            | 87         | 0            | 0         | 0            | 0         | 0            | 0         |
| 1997-1             | 1996-2           | 21            | 0          | 59            | 58         | 2             | 2          | 0            | 0         | 0            | 0         | 0            | 0         |
| 1997-2             | 1997-1           | 50            | 0          | 54            | 53         | 55            | 55         | 0            | 0         | 0            | 0         | 0            | 0         |
| 1998-1             | 1997-2           | 18            | 0          | 60            | 59         | 5             | 5          | 0            | 0         | 0            | 0         | 0            | 0         |
| 1998-2             | 1998-1           | 41            | 0          | 54            | 53         | 52            | 51         | 0            | 0         | 0            | 0         | 0            | 0         |
| 1999-1             | 1998-2           | 58            | 0          | 61            | 61         | 14            | 14         | 1            | 1         | 0            | 0         | 0            | 0         |
| 1999-2             | 1999-1           | 41            | 0          | 49            | 49         | 0             | 0          | 3            | 3         | 0            | 0         | 3            | 0         |
| 2000-1             | 1999-2           | 46            | 0          | 58            | 58         | 0             | 0          | 4            | 4         | 0            | 0         | 0            | 0         |
| 2000-2             | 2000-1           | 51            | 0          | 56            | 56         | 0             | 0          | 32           | 31        | 36           | 35        | 29           | 0         |
| 2001-1             | 2000-2           | 46            | 0          | 68            | 68         | 4             | 4          | 7            | 7         | 4            | 4         | 6            | 0         |
| 2001-2             | 2001-1           | 29            | 0          | 67            | 67         | 28            | 28         | 28           | 28        | 54           | 54        | 12           | 0         |
| 2002-1             | 2001-2           | 37            | 0          | 65            | 65         | 13            | 12         | 10           | 10        | 17           | 9         | 3            | 0         |
| 2002-2             | 2002-1           | 36            | 0          | 70            | 10         | 35            | 30         | 50           | 47        | 125          | 64        | 93           | 0         |
| 2003-1             | 2002-2           | 18            | 0          | 70            | 70         | 19            | 19         | 1            | 1         | 7            | 4         | 3            | 0         |
| 2003-2             | 2003-1           | 41            | 0          | 61            | 60         | 8             | 8          | 38           | 37        | 109          | 56        | 92           | 0         |
| 2004-1             | 2003-2           | 201           | 0          | 67            | 67         | 8             | 8          | 5            | 5         | 12           | 6         | 0            | 0         |
| 2004-2             | 2004-1           | 205           | 0          | 69            | 69         | 24            | 23         | 35           | 35        | 61           | 32        | 67           | 0         |
| 2005-1             | 2004-2           | 168           | 0          | 71            | 70         | 1             | 1          | 2            | 2         | 6            | 3         | 0            | 0         |
| 2005-2             | 2005-1           | 115           | 0          | 73            | 72         | 24            | 23         | 14           | 14        | 54           | 27        | 65           | 0         |
| 2006-1             | 2005-2           | 53            | 0          | 67            | 66         | 32            | 31         | 0            | 0         | 0            | 0         | 0            | 0         |
| 2006-2             | 2006-1           | 46            | 0          | 61            | 61         | 58            | 58         | 12           | 12        | 15           | 15        | 0            | 0         |
| 2007-1             | 2006-2           | 22            | 0          | 74            | 72         | 47            | 46         | 3            | 3         | 0            | 0         | 0            | 0         |
| 2007-2             | 2007-1           | 46            | 0          | 72            | 72         | 68            | 68         | 80           | 80        | 10           | 10        | 23           | 0         |
| 2008-1             | 2007-2           | 43            | 0          | 53            | 53         | 15            | 15         | 0            | 0         | 0            | 0         | 0            | 0         |
| 2008-2             | 2008-1           | 83            | 0          | 25            | 25         | 30            | 30         | 80           | 80        | 14           | 14        | 229          | 0         |
| 2009-1             | 2008-2           | 50            | 0          | 20            | 20         | 20            | 20         | 0            | 0         | 0            | 0         | 0            | 0         |
| 2009-2             | 2009-1           | 0             | 0          | 13            | 12         | 23            | 23         | 82           | 81        | 12           | 12        | 285          | 0         |
| 2010-1             | 2009-2           | 0             | 0          | 62            | 62         | 37            | 36         | 3            | 1         | 2            | 2         | 2            | 0         |
| 2010-2             | 2010-1           | 0             | 0          | 25            | 25         | 13            | 13         | 64           | 26        | 8            | 8         | 287          | 0         |
| 2011-1             | 2010-2           | 0             | 0          | 22            | 21         | 11            | 11         | 0            | 0         | 0            | 0         | 0            | 0         |
| 2011-2             | 2011-1           | 0             | 0          | 22            | 22         | 22            | 22         | 34           | 33        | 10           | 10        | 362          | 0         |
| 2012-1             | 2011-2           | 0             | 0          | 48            | 47         | 16            | 16         | 8            | 8         | 7            | 7         | 0            | 0         |
| 2012-2             | 2012-1           | 0             | 0          | 44            | 41         | 18            | 17         | 83           | 82        | 37           | 37        | 106          | 0         |
| 2013-1             | 2012-2           | 0             | 0          | 16            | 16         | 2             | 2          | 0            | 0         | 3            | 3         | 0            | 0         |
| 2013-2             | 2013-1           | 0             | 0          | 40            | 40         | 5             | 5          | 75           | 74        | 66           | 62        | 0            | 0         |
| 2014-1             | 2013-2           | 0             | 0          | 27            | 0          | 14            | 0          | 0            | 0         | 1            | 0         | 0            | 0         |
| 2014-2             | 2014-1           | 0             | 0          | 8             | 0          | 6             | 0          | 27           | 0         | 24           | 0         | 0            | 0         |

**Table 4.** Pacific sardine landings (mt) by model year-season and SS fleet for NSP (update model) and total catch (not used).

| Calendar<br>Yr-Sem | Model<br>Yr-Seas | NSP Catch (update model) |           |          | Total Catch (not used) |           |          |
|--------------------|------------------|--------------------------|-----------|----------|------------------------|-----------|----------|
|                    |                  | MexCal S1                | MexCal S2 | PacNW    | MexCal S1              | MexCal S2 | PacNW    |
| 1993-2             | 1993-1           | 822.80                   | 0.00      | 0.00     | 17460.78               | 0.00      | 0.00     |
| 1994-1             | 1993-2           | 0.00                     | 11345.83  | 0.00     | 0.00                   | 14078.85  | 0.00     |
| 1994-2             | 1994-1           | 8838.65                  | 0.00      | 0.00     | 19503.00               | 0.00      | 0.00     |
| 1995-1             | 1994-2           | 0.00                     | 39748.42  | 0.00     | 0.00                   | 46792.12  | 0.00     |
| 1995-2             | 1995-1           | 5993.28                  | 0.00      | 22.68    | 30093.29               | 0.00      | 22.68    |
| 1996-1             | 1995-2           | 0.00                     | 26565.72  | 0.00     | 0.00                   | 32561.24  | 0.00     |
| 1996-2             | 1996-1           | 11917.29                 | 0.00      | 0.00     | 40559.48               | 0.00      | 0.00     |
| 1997-1             | 1996-2           | 0.00                     | 19158.65  | 43.54    | 0.00                   | 25364.55  | 43.54    |
| 1997-2             | 1997-1           | 13018.20                 | 0.00      | 27.22    | 89272.03               | 0.00      | 27.22    |
| 1998-1             | 1997-2           | 0.00                     | 24527.60  | 0.82     | 0.00                   | 42079.67  | 0.82     |
| 1998-2             | 1998-1           | 18925.15                 | 0.00      | 488.25   | 46787.92               | 0.00      | 488.25   |
| 1999-1             | 1998-2           | 0.00                     | 63278.38  | 74.39    | 0.00                   | 66550.51  | 74.39    |
| 1999-2             | 1999-1           | 14996.21                 | 0.00      | 725.20   | 48765.83               | 0.00      | 725.20   |
| 2000-1             | 1999-2           | 0.00                     | 58341.39  | 429.59   | 0.00                   | 69337.59  | 429.59   |
| 2000-2             | 2000-1           | 23693.38                 | 0.00      | 15586.16 | 56709.77               | 0.00      | 15586.16 |
| 2001-1             | 2000-2           | 0.00                     | 35179.21  | 2336.90  | 0.00                   | 46662.67  | 2336.90  |
| 2001-2             | 2001-1           | 11550.53                 | 0.00      | 22545.99 | 54311.70               | 0.00      | 22545.99 |
| 2002-1             | 2001-2           | 0.00                     | 41118.36  | 3136.84  | 0.00                   | 45617.11  | 3136.84  |
| 2002-2             | 2002-1           | 16562.71                 | 0.00      | 35525.69 | 64671.88               | 0.00      | 35525.69 |
| 2003-1             | 2002-2           | 0.00                     | 36130.69  | 597.29   | 0.00                   | 40979.60  | 597.29   |
| 2003-2             | 2003-1           | 10340.64                 | 0.00      | 37242.26 | 38099.55               | 0.00      | 37242.26 |
| 2004-1             | 2003-2           | 0.00                     | 21300.55  | 2618.43  | 0.00                   | 28590.55  | 2618.43  |
| 2004-2             | 2004-1           | 17048.96                 | 0.00      | 46730.80 | 61008.15               | 0.00      | 46730.80 |
| 2005-1             | 2004-2           | 0.00                     | 25249.92  | 1016.32  | 0.00                   | 32857.28  | 1016.32  |
| 2005-2             | 2005-1           | 13730.19                 | 0.00      | 54152.62 | 60658.00               | 0.00      | 54152.62 |
| 2006-1             | 2005-2           | 0.00                     | 29752.00  | 101.70   | 0.00                   | 36791.15  | 101.70   |
| 2006-2             | 2006-1           | 20620.28                 | 0.00      | 41220.90 | 71474.68               | 0.00      | 41220.90 |
| 2007-1             | 2006-2           | 0.00                     | 39234.00  | 0.00     | 0.00                   | 46338.25  | 0.00     |
| 2007-2             | 2007-1           | 46047.30                 | 0.00      | 48237.10 | 71489.22               | 0.00      | 48237.10 |
| 2008-1             | 2007-2           | 0.00                     | 42247.81  | 0.00     | 0.00                   | 50130.29  | 0.00     |
| 2008-2             | 2008-1           | 30147.46                 | 0.00      | 39800.10 | 74536.03               | 0.00      | 39800.10 |
| 2009-1             | 2008-2           | 0.00                     | 40545.56  | 0.00     | 0.00                   | 46113.91  | 0.00     |
| 2009-2             | 2009-1           | 13964.90                 | 0.00      | 44841.15 | 47373.39               | 0.00      | 44841.15 |
| 2010-1             | 2009-2           | 0.00                     | 30240.66  | 1369.73  | 0.00                   | 35325.50  | 1369.73  |
| 2010-2             | 2010-1           | 11130.97                 | 0.00      | 54085.91 | 55153.61               | 0.00      | 54085.91 |
| 2011-1             | 2010-2           | 0.00                     | 26817.27  | 0.09     | 0.00                   | 33753.60  | 0.09     |
| 2011-2             | 2011-1           | 24700.00                 | 0.00      | 39750.49 | 64296.47               | 0.00      | 39750.49 |
| 2012-1             | 2011-2           | 0.00                     | 22717.65  | 5805.63  | 0.00                   | 26113.00  | 5805.63  |
| 2012-2             | 2012-1           | 1452.24                  | 0.00      | 91425.63 | 55999.36               | 0.00      | 91425.63 |
| 2013-1             | 2012-2           | 0.00                     | 13681.80  | 1570.78  | 0.00                   | 16285.63  | 1570.78  |
| 2013-2             | 2013-1           | 874.21                   | 0.00      | 56802.71 | 42272.96               | 0.00      | 56802.71 |
| 2014-1             | 2013-2           | 0.00                     | 7176.11   | 908.01   | 0.00                   | 23309.15  | 908.01   |
| 2014-2             | 2014-1           | 1824.56                  | 0.00      | 14996.92 | 51227.40               | 0.00      | 14996.92 |
| 2015-1             | 2014-2           | 0.00                     | 6346.70   | 759.46   | 0.00                   | 6346.70   | 759.46   |
| 2015-2             | 2015-1           | 1000.00                  | 0.00      | 1000.00  | n/a                    | n/a       | n/a      |
| 2016-1             | 2015-2           | 0.00                     | 1000.00   | 1000.00  | n/a                    | n/a       | n/a      |

**Table 5.** Fishery-independent indices of Pacific sardine relative abundance. Complete details regarding calculation of DEPM and TEP estimates are provided in Tables 7 and 8. In the SS model, indices had a lognormal error structure with units of standard error of  $\log_e(\text{index})$ . Variances of the observations were available as a CVs, so the S.E.s were approximated as  $\sqrt{\log_e(1+CV^2)}$ .

| Model<br>yr-seas | DEPM    | S.E.<br>$\ln(\text{index})$ | TEP       | S.E.<br>$\ln(\text{index})$ | Acoustic  | S.E.<br>$\ln(\text{index})$ |
|------------------|---------|-----------------------------|-----------|-----------------------------|-----------|-----------------------------|
| 1993-2           | 69,065  | 0.29                        | ---       | ---                         | ---       | ---                         |
| 1995-2           | ---     | ---                         | 97,923    | 0.40                        | ---       | ---                         |
| 1996-2           | ---     | ---                         | 482,246   | 0.21                        | ---       | ---                         |
| 1997-2           | ---     | ---                         | 369,775   | 0.33                        | ---       | ---                         |
| 1998-2           | ---     | ---                         | 332,177   | 0.34                        | ---       | ---                         |
| 1999-2           | ---     | ---                         | 1,252,539 | 0.39                        | ---       | ---                         |
| 2000-2           | ---     | ---                         | 931,377   | 0.38                        | ---       | ---                         |
| 2001-2           | ---     | ---                         | 236,660   | 0.17                        | ---       | ---                         |
| 2002-2           | ---     | ---                         | 556,177   | 0.18                        | ---       | ---                         |
| 2003-2           | 145,274 | 0.23                        | ---       | ---                         | ---       | ---                         |
| 2004-2           | 459,943 | 0.55                        | ---       | ---                         | ---       | ---                         |
| 2005-2           | ---     | ---                         | 651,994   | 0.25                        | 1,947,063 | 0.30                        |
| 2006-2           | 198,404 | 0.30                        | ---       | ---                         | ---       | ---                         |
| 2007-2           | 66,395  | 0.27                        | ---       | ---                         | 751,075   | 0.09                        |
| 2008-1           | ---     | ---                         | ---       | ---                         | 801,000   | 0.30                        |
| 2008-2           | 99,162  | 0.24                        | ---       | ---                         | ---       | ---                         |
| 2009-1           | ---     | ---                         | ---       | ---                         | ---       | ---                         |
| 2009-2           | 58,447  | 0.40                        | ---       | ---                         | 357,006   | 0.41                        |
| 2010-1           | ---     | ---                         | ---       | ---                         | ---       | ---                         |
| 2010-2           | 219,386 | 0.27                        | ---       | ---                         | 493,672   | 0.30                        |
| 2011-1           | ---     | ---                         | ---       | ---                         | ---       | ---                         |
| 2011-2           | 113,178 | 0.27                        | ---       | ---                         | 469,480   | 0.28                        |
| 2012-1           | ---     | ---                         | ---       | ---                         | 340,831   | 0.33                        |
| 2012-2           | 82,182  | 0.29                        | ---       | ---                         | 305,146   | 0.24                        |
| 2013-1           | ---     | ---                         | ---       | ---                         | 313,746   | 0.27                        |
| 2013-2           | ---     | ---                         | ---       | ---                         | 35,339    | 0.38                        |
| 2014-1           | ---     | ---                         | ---       | ---                         | 26,280    | 0.63                        |

**Table 6.** Pacific sardine ichthyoplankton and adult collections made during the spring 2014 CalCOFI and DEPM cruises off California.

| CALCOFI                   |                      |     | DEPM                   |             |         |       |
|---------------------------|----------------------|-----|------------------------|-------------|---------|-------|
| March 28 - April 15, 2014 |                      |     | April 15 - May 8, 2014 |             |         |       |
| OCEAN STARR               |                      |     |                        | OCEAN STARR | SHIMADA | TOTAL |
| CALVET<br>(Pairovet)      | Total tows           | 53  | Total tows             | 9           | 60      | 69    |
|                           | Positive tows        | 0   | Positive tows          | 0           | 0       | 0     |
|                           | EGGS                 | 0   | EGGS                   | 0           | 0       | 0     |
|                           | Larvae               | 0   | Larvae                 | 0           | 0       | 0     |
| BONGO                     | Total tows           | 64  | Total tows             | 9           | 60      | 69    |
|                           | Total positive tows  | 7   | Total positive tows    | 0           | 0       | 0     |
|                           | Positive egg tows    | 6   | Positive egg tows      | 0           | 0       | 0     |
|                           | EGGS                 | 90  | EGGS                   | 0           | 0       | 0     |
|                           | Positive larvae tows | 4   | Positive larvae tows   | 0           | 0       | 0     |
|                           | Larvae               | 73  | Larvae                 | 0           | 0       | 0     |
| CUFES                     | Total samples        | 316 | Total samples          | 72          | 379     | 451   |
|                           | Positive samples     | 11  | Positive samples       | 2           | 1       | 3     |
|                           | EGGS                 | 98  | EGGS                   | 2           | 1       | 3     |
| Trawl                     | n/a                  | n/a | Total tows             | 14          | 39      | 53    |
|                           |                      |     | Total positive tows    | 0           | 7       | 7     |
|                           |                      |     | Total sardine          | 0           | 18      | 18    |
|                           |                      |     | Female sardine         | 0           | 7       | 7     |

**Table 7.** The spawning biomass related parameters: daily egg production/0.05m<sup>2</sup> ( $P_0$ ), daily mortality rate ( $z$ ), survey area (km<sup>2</sup>), two daily specific fecundities: (RSF/W), and (SF/W); s. biomass, female spawning biomass, total egg production (TEP) and sea surface temperature for 1986, 1987, 1994, 2004, 2005 and 2007-2013.

| Calendar year | Season | Region         | <sup>1</sup> $P_0/0.05m^2$ (cv) | Z (CV)     | <sup>2</sup> RSF/W based on $S_1$ | <sup>3</sup> RSF/W based on $S_{12}$ | <sup>3</sup> FS/W based on $S_{12}$ | <sup>4</sup> Area (km <sup>2</sup> ) | <sup>5</sup> S. biomass (cv) | S. biomass females (cv) | S. biomass females (Sum of R1 and R2) (cv) | Total egg production (TEP) | Mean temperature (°C) for positive eggs | Mean temperature (°C) from Calvet |
|---------------|--------|----------------|---------------------------------|------------|-----------------------------------|--------------------------------------|-------------------------------------|--------------------------------------|------------------------------|-------------------------|--------------------------------------------|----------------------------|-----------------------------------------|-----------------------------------|
| 1986 (Aug)    | 1986   | <sup>6</sup> S | 1.48(1)                         | 1.59(0.5)  | 38.31                             | 43.96                                | 72.84                               | 6478                                 | 4362 (1.00)                  | 2632 (1)                |                                            | 9587.44                    |                                         |                                   |
|               |        | N              | 0.32(0.25)                      |            | 8.9                               | 13.34                                | 23.89                               | 5333                                 | 2558 (0.33)                  | 1429 (0.28)             |                                            | 1706.56                    |                                         |                                   |
|               |        | whole          | 0.95(0.84)                      |            | 23.61                             | 29.89                                | 49.97                               | 11811                                | 7767 (0.87)                  | 4491 (0.86)             | 4061 (0.66)                                | 11220.45                   | 18.7                                    | 18.5                              |
| 1987 (Jul)    | 1987   | 1              | 1.11(0.51)                      | 0.66(0.4)  | 38.79                             | 37.86                                | 57.05                               | 22259                                | 13050 (0.58)                 | 8661 (0.56)             |                                            | 24707.49                   |                                         |                                   |
|               |        | 2              | 0                               |            |                                   |                                      |                                     | 15443                                | 0                            | 0                       |                                            | 0                          |                                         |                                   |
|               |        | whole          | 0.66(0.51)                      |            | 38.79                             | 37.86                                | 57.05                               | 37702                                | 13143 (0.58)                 | 8723 (0.56)             | 8661 (0.56)                                | 25637.36                   | 18.9                                    | 18.1                              |
| 1994          | 1993   | 1              | 0.42(0.21)                      | 0.12(0.91) | 11.57                             | 11.42                                | 21.27                               | 174880                               | 128664 (0.30)                | 69065 (0.30)            |                                            | 73449.6                    |                                         |                                   |
|               |        | 2              | 0(0)                            | -          |                                   |                                      |                                     | 205295                               | 0                            | 0                       |                                            | 0                          |                                         |                                   |
|               |        | whole          | 0.193(0.21)                     |            | 11.57                             | 11.42                                | 21.27                               | 380175                               | 128531 (0.31)                | 68994 (0.30)            | 69065 (0.30)                               | 73373.775                  | 14.3                                    | 14.7                              |
| 2004          | 2003   | 1              | 3.92(0.23)                      | 0.25(0.04) | 27.03                             | 26.2                                 | 42.37                               | 68204                                | 204118 (0.27)                | 126209 (0.26)           |                                            | 267359.68                  |                                         |                                   |
|               |        | 2              | 0.16(0.43)                      |            | -                                 | -                                    | -                                   | 252416                               | 30833 (0.45)                 | 19065 (0.44)            |                                            | 40386.56                   |                                         |                                   |
|               |        | whole          | 0.96(0.24)                      |            | 27.03                             | 26.2                                 | 42.37                               | 320620                               | 234958 (0.28)                | 145297 (0.27)           | 145274 (0.23)                              | 307795.2                   | 13.4                                    | 13.7                              |
| 2005          | 2004   | 1              | 8.14(0.4)                       | 0.58(0.2)  | 31.49                             | 25.6                                 | 46.52                               | 46203                                | 293863 (0.45)                | 161685 (0.42)           |                                            | 376092.42                  |                                         |                                   |
|               |        | 2              | 0.53(0.69)                      |            | 3.76                              | 3.2                                  | 7.37                                | 207417                               | 686168 (0.86)                | 298258 (0.89)           |                                            | 109931.01                  |                                         |                                   |
|               |        | whole          | 1.92(0.42)                      |            | 15.67                             | 12.89                                | 27.11                               | 253620                               | 755657 (0.52)                | 359209 (0.50)           | 459943 (0.60)                              | 486950.4                   | 14.21                                   | 14.1                              |
| 2007          | 2006   | 1              | 1.32(0.2)                       | 0.13(0.36) | 12.06                             | 13.37                                | 27.54                               | 142403                               | 281128 (0.42)                | 136485 (0.36)           |                                            | 187971.96                  |                                         |                                   |
|               |        | 2              | 0.56(0.46)                      |            | 24.48                             | 23.41                                | 38.94                               | 213756                               | 102998 (0.67)                | 61919 (0.62)            |                                            | 119703.36                  |                                         |                                   |
|               |        | whole          | 0.86(0.26)                      |            | 15.68                             | 16.17                                | 31.52                               | 356159                               | 380601 (0.39)                | 195279 (0.36)           | 198404 (0.31)                              | 306296.74                  | 13.7                                    | 13.6                              |
| 2008          | 2007   | 1              | 1.45(0.18)                      | 0.13(0.29) | 57.4                              | 53.89                                | 68.54                               | 53514                                | 29798 (0.20)                 | 22642 (0.19)            |                                            | 77595.3                    |                                         |                                   |
|               |        | 2              | 0.202(0.32)                     |            | 13.84                             | 12.6                                 | 22.57                               | 244435                               | 78359 (0.45)                 | 43753 (0.42)            |                                            | 49375.87                   |                                         |                                   |
|               |        | whole          | 0.43(0.21)                      |            | 21.82                             | 20.31                                | 32.2                                | 297949                               | 126148 (0.40)                | 79576 (0.35)            | 66395 (0.28)                               | 128118.07                  | 13.1                                    | 13.1                              |
| 2009          | 2008   | 1              | 1.76(0.22)                      | 0.25(0.19) | 19.50                             | 20.37                                | 36.12                               | 74966                                | 129520 (0.31)                | 73048 (0.29)            |                                            | 131940.16                  |                                         |                                   |
|               |        | 2              | 0.15(0.27)                      |            | 14.25                             | 14.34                                | 22.97                               | 199929                               | 41816 (0.38)                 | 26114 (0.38)            |                                            | 29989.35                   |                                         |                                   |
|               |        | whole          | 0.59(0.22)                      |            | 17.01                             | 17.53                                | 29.11                               | 274895                               | 185084 (0.28)                | 111444 (0.27)           | 99162 (0.24)                               | 162188.05                  | 13.6                                    | 13.5                              |

Table 7 (cont'd).

| Calendar year | Season | Region | P0/0.05m2 (cv) | Z (CV)     | RSF/W based on S <sub>1</sub> | RSF/W based on S <sub>12</sub> | FS/W based on S <sub>12</sub> | Area (km <sup>2</sup> ) | S. biomass (cv) | S. biomass females (cv) | S. biomass females (Sum of R1 and R2) (cv) | Total egg production (TEP) | Mean temperature (°C) for positive eggs | Mean temperature (°C) from Calvet |
|---------------|--------|--------|----------------|------------|-------------------------------|--------------------------------|-------------------------------|-------------------------|-----------------|-------------------------|--------------------------------------------|----------------------------|-----------------------------------------|-----------------------------------|
| 2010          | 2009   | 1      | 1.70(0.22)     | 0.33(0.23) | 21.08                         | 24.02                          | 51.56                         | 27462                   | 38875 (0.44)    | 18111 (0.39)            |                                            | 46685.4                    |                                         |                                   |
|               |        | 2      | 0.22(0.42)     |            | 14.55                         | 16.20                          | 26.65                         | 244311                  | 66345 (0.58)    | 40336 (0.58)            |                                            | 53748.42                   |                                         |                                   |
|               |        | whole  | 0.36(0.29)     |            | 16.08                         | 18.07                          | 31.49                         | 271773                  | 108280 (0.46)   | 62131 (0.46)            | 58447 (0.42)                               | 97838.28                   | 13.7                                    | 13.9                              |
| 2011          | 2010   | 1      | 5.57(0.24)     | 0.51(0.14) | 19.03                         | 24.26                          | 41.16                         | 41878                   | 192332 (0.31)   | 113340 (0.30)           |                                            | 233260.5                   |                                         |                                   |
|               |        | 2      | 0.487(0.33)    |            | 11.40                         | 14.67                          | 25.04                         | 272603                  | 181016 (0.48)   | 106046 (0.49)           |                                            | 132757.7                   |                                         |                                   |
|               |        | whole  | 1.16(0.26)     |            | 14.85                         | 19.04                          | 32.40                         | 314481                  | 383286 (0.32)   | 225155 (0.32)           | 219386 (0.28)                              | 364798.0                   | 13.5                                    | 13.6                              |
| 2012          | 2011   | 1      | 5.28 (0.27)    | 0.66(0.11) | 17.76                         | 19.25                          | 42.17                         | 32322                   | 177289 (0.37)   | 80930 (0.33)            |                                            | 170660.16                  |                                         |                                   |
|               |        | 2      | 0.24 (0.27)    |            | 15.34                         | 14.67                          | 35.52                         | 238669                  | 78102 (0.60)    | 32248 (0.46)            |                                            | 57280.56                   |                                         |                                   |
|               |        | whole  | 0.84 (0.27)    |            | 16.14                         | 16.14                          | 37.65                         | 270991                  | 282110 (0.43)   | 120902 (0.36)           | 113178 (0.27)                              | 227632.44                  | 13.57                                   | 13.3                              |
| 2013          | 2012   | 1      | 5.47 (0.29)    | 0.64(0.16) | 32.35                         | 27.41                          | 47.91                         | 29176                   | 116455 (0.40)   | 66633 (0.36)            |                                            | 159592.72                  |                                         |                                   |
|               |        | 2      | 0.27 (0.44)    |            | 13.20                         | 24.71                          | 39.00                         | 112221                  | 24547 (0.48)    | 15549 (0.49)            |                                            | 30299.67                   |                                         |                                   |
|               |        | whole  | 1.34 (0.299)   |            | 26.22                         | 26.22                          | 44.70                         | 141397                  | 144880 (0.36)   | 84972 (0.33)            | 82182 (0.30)                               | 198471.98                  | 13.51                                   | 13.47                             |
| 2014          | 2014   | 1      | --             | --         |                               |                                |                               |                         |                 |                         |                                            |                            |                                         |                                   |
|               |        | 2      | --             |            | 0                             | 23.70                          | 42.28                         |                         | --              | --                      |                                            | --                         |                                         |                                   |
|               |        | whole  | --             |            | 0                             | 23.70                          | 42.28                         | 160305                  | --              | --                      | --                                         | --                         | --                                      | 14.51                             |

1:  $P_0$  for the whole is the weighted average with area as the weight.

2. The estimates of adult parameters for the whole area were unstratified and RSF/W was based on original S<sub>1</sub> data of day-1 spawning females. For 2004, 27.03 was based on sex ratio = 0.618 while past biomass used RSF/W of 21.86 based on sex ratio = 0.5. (Lo et al. 2008)

3. The estimates of adult parameters for the whole area were unstratified. Batch fecundity was estimated with error term. For 1987 and 1994, estimates were based on S<sub>1</sub> using data of day-1 spawning females. For 2004, all trawls were in region 1 and value was applied to region 2,

4. Region 1, since 1997, is the area where the eggs/min from CUFES  $\geq 1$  and prior to 1997, is the area where the eggs/0.05m<sup>2</sup> >0 from CalVET tows

5: For the spawning biomasses, the estimates for the whole area uses unstratified adult parameters

6. Within southern and northern area, the survey area was stratified as Region 1 (eggs/0.05m<sup>2</sup> >0 with embedded zero) and Region 2 (zero eggs)

**Table 8.** Pacific sardine female adult parameters for surveys conducted in the standard daily egg production method (DEPM) sampling area off California (1994 includes females from off Mexico).

|                                                                |                                   | 1994        | 1997        | 2001        | 2002        | 2004        | 2005        | 2006        | 2007        | 2008        | 2009        | 2010        | 2011        | 2012        | 2013        | 2014        |
|----------------------------------------------------------------|-----------------------------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|
| Midpoint date of trawl survey                                  |                                   | 22-Apr      | 25-Mar      | 1-May       | 21-Apr      | 25-Apr      | 13-Apr      | 2-May       | 24-Apr      | 16-Apr      | 27-Apr      | 20-Apr      | 8-Apr       | 19-Apr      | 25-Apr      | 26-Apr      |
| Beginning and ending dates of positive collections             |                                   | 04/15-05/07 | 03/12-04/06 | 05/01-05/02 | 04/18-04/23 | 04/22-04/27 | 03/31-04/24 | 05/01-05/07 | 04/19-04/30 | 04/13-04/27 | 04/17-05/06 | 04/12-04/27 | 03/23-04/25 | 04/08-04/28 | 04/18-05/03 | 04/25-05/03 |
| N collections with mature females                              |                                   | 37          | 4           | 2           | 6           | 16          | 14          | 7           | 14          | 12          | 29          | 17          | 30          | 16          | 15          | 3           |
| N collection within Region 1                                   |                                   | 19          | 4           | 2           | 6           | 16          | 6           | 2           | 8           | 4           | 15          | 3           | 14          | 8           | 8           | 3           |
| Average surface temperature (°C) at collection locations       |                                   | 14.36       | 14.28       | 12.95       | 12.75       | 13.59       | 14.18       | 14.43       | 13.6        | 12.4        | 12.93       | 13.62       | 13.12       | 13.18       | 13.65       | 12.96       |
| Female fraction by weight                                      | <b>R</b>                          | 0.538       | 0.592       | 0.677       | 0.385       | 0.618       | 0.469       | 0.451       | 0.515       | 0.631       | 0.602       | 0.574       | 0.587       | 0.429       | 0.586       | 0.560       |
| Average mature female weight (grams):                          |                                   |             |             |             |             |             |             |             |             |             |             |             |             |             |             |             |
| with ovary                                                     | <b>W<sub>f</sub></b>              | 82.53       | 127.76      | 79.08       | 159.25      | 166.99      | 65.34       | 67.41       | 81.62       | 102.21      | 112.40      | 129.51      | 127.59      | 141.36      | 138.17      | 155.82      |
| without ovary                                                  | <b>W<sub>of</sub></b>             | 79.33       | 119.64      | 75.17       | 147.86      | 156.29      | 63.11       | 64.32       | 77.93       | 97.67       | 106.93      | 121.34      | 119.38      | 131.58      | 129.76      | 146.35      |
| Average batch fecundity <sup>a</sup> (mature females, oocytes) | <b>F</b>                          | 24283       | 42002       | 22456       | 54403       | 55711       | 17662       | 18474       | 21760       | 29802       | 29790       | 39304       | 38369       | 38681       | 41339       | 46124       |
| Relative batch fecundity (oocytes/g)                           |                                   | 294         | 329         | 284         | 342         | 334         | 270         | 274         | 267         | 292         | 265         | 303         | 301         | 274         | 299         | 296         |
| N mature females analyzed                                      |                                   | 583         | 77          | 9           | 23          | 290         | 175         | 86          | 203         | 187         | 467         | 313         | 244         | 126         | 121         | 7           |
| N active mature females                                        |                                   | 327         | 77          | 9           | 23          | 290         | 148         | 72          | 187         | 177         | 463         | 310         | 244         | 125         | 119         | 7           |
| Spawning fraction of mature females <sup>b</sup>               | <b>S</b>                          | 0.074       | 0.133       | 0.111       | 0.174       | 0.131       | 0.124       | 0.0698      | 0.114       | 0.1186      | 0.1098      | 0.1038      | 0.1078      | 0.1376      | 0.149       | 0.143       |
| Spawning fraction of active females <sup>c</sup>               | <b>S<sub>a</sub></b>              | 0.131       | 0.133       | 0.111       | 0.174       | 0.131       | 0.155       | 0.083       | 0.134       | 0.1187      | 0.1108      | 0.1048      | 0.1078      | 0.1388      | 0.153       | 0.143       |
| Daily specific fecundity                                       | <b><math>\frac{RSF}{W}</math></b> | 11.7        | 25.94       | 21.3        | 22.91       | 27.04       | 15.67       | 8.62        | 15.68       | 21.82       | 17.53       | 18.07       | 19.04       | 16.14       | 26.22       | 23.70       |

<sup>a</sup> 1994-2001 estimates were calculated using  $F_b = -10858 + 439.53 W_{of}$  (Macewicz et al. 1996), 2004 used  $F_b = 356.46 W_{of}$  (Lo and Macewicz 2004), 2005 used  $F_b = -6085 + 376.28 W_{of}$  (Lo and Macewicz 2006), 2006 used  $F_b = -396 + 293.39 W_{of}$  (Lo et al. 2007a), 2007 used  $F_b = 279.23 W_{of}$  (Lo et al. 2007b), 2008 used  $F_b = 305.14 W_{of}$  (Lo et al. 2008), 2009 used  $F_b = -4598 + 326.78 W_{of} + e$  (Lo et al. 2009), 2010 used  $F_b = 5136 + 287.37 W_{of} + e$  (Lo et al. 2010), 2011 used  $F_b = -2252 + 347.6 W_{of} + e$  (Lo et al. 2011), 2012 used  $F_b = -12724 + 402.3 W_{of} + e$  (Lo et al. 2013), 2013 used  $F_b = -9759 + 404.24 W_{of} + e$  (Dorval et al. 2014), and 2014 used equation from 2013.

<sup>b</sup> Mature females include females that are active and those that are postbreeding (incapable of further spawning this season).  $S_1$  was used for years prior to 2009 and  $S_{12}$  was used starting 2009.

<sup>c</sup> Active mature females are capable of spawning and have ovaries containing oocytes with yolk or postovulatory follicles less than 60 hours old.

**Table 9.** Likelihood components and derived quantities of interest for stepwise addition of new data to the update model. Biomass trajectories and spring ATM selectivities for each model are provided in Figure 40.

| NEW DATA / PROCESS:                               | T-2014 Final    | T-2014 Revised  | +Catch          | +MexCal_S1_len  | +MexCal_S2_len  | +PacNW_len      | +All Fshy Lengths | +All Fshy CondAL | +ATM (2015 Update) |
|---------------------------------------------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|-------------------|------------------|--------------------|
| Revised & New Catch                               |                 |                 |                 |                 |                 |                 |                   |                  |                    |
| MexCal_S1 Length Comp                             |                 |                 |                 |                 |                 |                 |                   |                  |                    |
| MexCal_S2 Length Comp                             |                 |                 |                 |                 |                 |                 |                   |                  |                    |
| PacNW Length Comp                                 |                 |                 |                 |                 |                 |                 |                   |                  |                    |
| New Fishery CondAL Comps                          |                 |                 |                 |                 |                 |                 |                   |                  |                    |
| ATM 2014 Estimates & Comps                        |                 |                 |                 |                 |                 |                 |                   |                  |                    |
| LIKELIHOOD COMPONENT:                             | T-2014 Final    | T-2014 Revised  | +Catch          | +MexCal_S1_len  | +MexCal_S2_len  | +PacNW_len      | +All Fshy Lengths | +All Fshy CondAL | +ATM (2015 Update) |
| DEPM Survey                                       | 11.9121         | 12.1741         | 12.1747         | 12.2843         | 12.3693         | 12.2739         | 12.5203           | 12.6746          | 12.7408            |
| TEP Survey                                        | 12.8943         | 12.9910         | 13.0133         | 12.8476         | 12.4988         | 13.1204         | 12.6171           | 12.5074          | 12.6253            |
| ATM Spring                                        | 2.4185          | 0.4765          | 0.5338          | 0.8277          | 1.1836          | 0.6406          | 1.3040            | 1.2758           | 6.7948             |
| ATM Summer                                        | -3.1019         | -2.3961         | -2.3297         | -2.3982         | -2.4801         | -2.3628         | -2.5075           | -2.5346          | 1.5017             |
| <b>Survey Subtotal</b>                            | <b>24.1231</b>  | <b>23.2455</b>  | <b>23.3922</b>  | <b>23.5614</b>  | <b>23.5716</b>  | <b>23.6721</b>  | <b>23.9339</b>    | <b>23.9232</b>   | <b>33.6625</b>     |
| MexCal_S1 Lengths                                 | 167.0000        | 167.1250        | 176.8860        | 186.9600        | 171.7850        | 174.4460        | 177.1140          | 180.8430         | 180.3010           |
| MexCal_S2 Lengths                                 | 170.5580        | 171.3570        | 170.7970        | 170.8710        | 199.2760        | 171.1080        | 197.4150          | 197.3290         | 197.9900           |
| PacNW Lengths                                     | 367.6850        | 365.8020        | 373.7440        | 373.1340        | 373.4570        | 393.6150        | 391.1980          | 393.0610         | 394.3950           |
| ATM Spring Lengths                                | 41.0370         | 41.0895         | 41.0407         | 41.1474         | 40.9247         | 40.9435         | 40.6351           | 41.1632          | 44.8175            |
| ATM Summer Lengths                                | 31.5671         | 31.8504         | 31.7132         | 31.6322         | 31.5272         | 31.6547         | 31.4176           | 32.0022          | 40.5409            |
| <b>Lengths Subtotal</b>                           | <b>777.8471</b> | <b>777.2239</b> | <b>794.1809</b> | <b>803.7446</b> | <b>816.9699</b> | <b>811.7672</b> | <b>837.7797</b>   | <b>844.3984</b>  | <b>858.0444</b>    |
| MexCal_S1 CondAL                                  | 247.8570        | 244.5480        | 244.9150        | 244.5590        | 243.5550        | 244.6820        | 242.8730          | 252.0110         | 252.6580           |
| MexCal_S2 CondAL                                  | 316.3550        | 311.6180        | 314.8770        | 314.7130        | 316.6730        | 315.4480        | 316.1400          | 309.4960         | 309.1470           |
| PacNW CondAL                                      | 508.5030        | 520.8010        | 524.8190        | 529.1810        | 537.8290        | 534.0360        | 551.2280          | 615.6430         | 613.0840           |
| <b>CondAL Subtotal (<math>\lambda=0.2</math>)</b> | <b>214.5430</b> | <b>215.3934</b> | <b>216.9222</b> | <b>217.6906</b> | <b>219.6114</b> | <b>218.8332</b> | <b>222.0482</b>   | <b>235.4300</b>  | <b>234.9778</b>    |
| Catch                                             | 1.08E-14        | 1.66E-14        | 2.09E-14        | 3.07E-14        | 3.87E-14        | 2.60E-14        | 4.45E-14          | 4.14E-14         | 8.31E-14           |
| Recruitment                                       | 17.2696         | 17.5958         | 19.4677         | 22.4845         | 32.5387         | 21.2052         | 35.5523           | 33.8802          | 37.9503            |
| Parm_softbounds                                   | 0.0041          | 0.0047          | 0.0049          | 0.0050          | 0.0048          | 0.0049          | 0.0050            | 0.0050           | 0.0068             |
| <b>TOTAL</b>                                      | <b>1033.79</b>  | <b>1033.46</b>  | <b>1053.97</b>  | <b>1067.49</b>  | <b>1092.70</b>  | <b>1075.48</b>  | <b>1119.32</b>    | <b>1137.64</b>   | <b>1164.64</b>     |
| DERIVED QUANTITIES:                               | T-2014 Final    | T-2014 Revised  | +Catch          | +MexCal_S1_len  | +MexCal_S2_len  | +PacNW_len      | +All Fshy Lengths | +All Fshy CondAL | +ATM (2015 Update) |
| Ln(R0)                                            | 15.3899         | 15.2604         | 15.2175         | 15.1288         | 15.0054         | 15.1742         | 14.9595           | 14.9784          | 14.8748            |
| SSB-Virgin                                        | 776,158         | 684,268         | 656,023         | 600,446         | 533,030         | 628,891         | 510,287           | 525,270          | 475,035            |
| Stock Biomass -2007 peak                          | 1,360,980       | 1,123,750       | 1,118,340       | 1,118,560       | 1,116,890       | 1,114,680       | 1,110,610         | 1,093,550        | 1,037,180          |
| Stock Biomass - 2014                              | 369,506         | 275,705         | 255,916         | 217,106         | 210,069         | 232,681         | 208,995           | 215,770          | 150,335            |
| Stock Biomass - 2015                              | ---             | ---             | 277,520         | 209,182         | 202,218         | 244,905         | 183,410           | 190,028          | 132,884            |

**Table 10.** Parameters and asymptotic standard deviations for base model T.

| Parameter                        | Phase | Min  | Max  | Initial Value | 2014 final  |         | 2015 update |         |
|----------------------------------|-------|------|------|---------------|-------------|---------|-------------|---------|
|                                  |       |      |      |               | Final Value | Std Dev | Final Value | Std Dev |
| NatM_p_1_Fem_GP_1                | -3    | 0.3  | 0.7  | 0.4000        | 0.4000      | —       | 0.4000      | —       |
| L_at_Amin_Fem_GP_1               | 3     | 3    | 15   | 10.0000       | 11.7754     | 0.2718  | 11.3881     | 0.2819  |
| L_at_Amax_Fem_GP_1               | 3     | 20   | 30   | 25.0000       | 23.4636     | 0.1806  | 23.3801     | 0.1506  |
| VonBert_K_Fem_GP_1               | 3     | 0.05 | 0.99 | 0.4000        | 0.3855      | 0.0232  | 0.4238      | 0.0234  |
| CV_young_Fem_GP_1                | 3     | 0.05 | 0.3  | 0.1400        | 0.1274      | 0.0071  | 0.1347      | 0.0076  |
| CV_old_Fem_GP_1                  | 3     | 0.01 | 0.1  | 0.0500        | 0.0491      | 0.0030  | 0.0474      | 0.0025  |
| Wtlen_1_Fem                      | -3    | -3   | 3    | 0.0000        | 0.0000      | —       | 0.0000      | —       |
| Wtlen_2_Fem                      | -3    | -3   | 5    | 3.2332        | 3.2332      | —       | 3.2332      | —       |
| Mat50%_Fem                       | -3    | 9    | 19   | 15.4400       | 15.4400     | —       | 15.4400     | —       |
| Mat_slope_Fem                    | -3    | -20  | 3    | -0.8925       | -0.8925     | —       | -0.8925     | —       |
| Eggs/kg_inter_Fem                | -3    | 0    | 10   | 1.0000        | 1.0000      | —       | 1.0000      | —       |
| Eggs/kg_slope_wt_Fem             | -3    | -1   | 5    | 0.0000        | 0.0000      | —       | 0.0000      | —       |
| SR_LN(R0)                        | 1     | 3    | 25   | 16.0000       | 15.3899     | 0.1018  | 14.8748     | 0.0734  |
| SR_BH_steep                      | -6    | 0.2  | 1    | 0.8000        | 0.8000      | —       | 0.8000      | —       |
| SR_sigmaR                        | -3    | 0    | 2    | 0.7500        | 0.7500      | —       | 0.7500      | —       |
| SR_R1_offset                     | 2     | -15  | 15   | 0.0000        | -0.3356     | 0.2587  | -0.2225     | 0.2595  |
| Early_InitAge_6                  | —     | —    | —    | —             | -0.3790     | 0.6395  | -0.3454     | 0.6468  |
| Early_InitAge_5                  | —     | —    | —    | —             | -0.4169     | 0.6278  | -0.3811     | 0.6348  |
| Early_InitAge_4                  | —     | —    | —    | —             | -0.3988     | 0.6224  | -0.3730     | 0.6281  |
| Early_InitAge_3                  | —     | —    | —    | —             | -0.0771     | 0.6092  | -0.0702     | 0.6145  |
| Early_InitAge_2                  | —     | —    | —    | —             | 0.3516      | 0.4843  | 0.3810      | 0.4879  |
| Early_InitAge_1                  | —     | —    | —    | —             | 1.2824      | 0.2787  | 1.3938      | 0.2813  |
| Main_RecrDev_1993                | —     | —    | —    | —             | 0.8290      | 0.1904  | 1.1060      | 0.1858  |
| Main_RecrDev_1994                | —     | —    | —    | —             | -0.2509     | 0.2708  | 0.0001      | 0.2686  |
| Main_RecrDev_1995                | —     | —    | —    | —             | 0.2351      | 0.2073  | 0.4631      | 0.2083  |
| Main_RecrDev_1996                | —     | —    | —    | —             | 1.2799      | 0.1377  | 1.6068      | 0.1344  |
| Main_RecrDev_1997                | —     | —    | —    | —             | 0.8195      | 0.1550  | 1.2496      | 0.1469  |
| Main_RecrDev_1998                | —     | —    | —    | —             | -0.8884     | 0.2622  | -0.5398     | 0.2638  |
| Main_RecrDev_1999                | —     | —    | —    | —             | -0.7929     | 0.2092  | -0.4386     | 0.2073  |
| Main_RecrDev_2000                | —     | —    | —    | —             | -0.0824     | 0.1419  | 0.2844      | 0.1361  |
| Main_RecrDev_2001                | —     | —    | —    | —             | -2.0683     | 0.3507  | -1.7772     | 0.3554  |
| Main_RecrDev_2002                | —     | —    | —    | —             | 1.7539      | 0.1109  | 1.9517      | 0.1069  |
| Main_RecrDev_2003                | —     | —    | —    | —             | 0.9213      | 0.1747  | 1.2235      | 0.1666  |
| Main_RecrDev_2004                | —     | —    | —    | —             | 1.4853      | 0.1163  | 1.7610      | 0.1109  |
| Main_RecrDev_2005                | —     | —    | —    | —             | 0.2177      | 0.2075  | 0.5562      | 0.2005  |
| Main_RecrDev_2006                | —     | —    | —    | —             | 0.6903      | 0.1530  | 1.0619      | 0.1413  |
| Main_RecrDev_2007                | —     | —    | —    | —             | -0.2729     | 0.2417  | 0.0026      | 0.2313  |
| Main_RecrDev_2008                | —     | —    | —    | —             | 0.7689      | 0.1334  | 1.0182      | 0.1187  |
| Main_RecrDev_2009                | —     | —    | —    | —             | -0.8222     | 0.2546  | -0.4290     | 0.2034  |
| Main_RecrDev_2010                | —     | —    | —    | —             | -1.5699     | 0.2761  | -2.1023     | 0.2733  |
| Main_RecrDev_2011                | —     | —    | —    | —             | -2.0573     | 0.4508  | -3.3736     | 0.3562  |
| Main_RecrDev_2012                | —     | —    | —    | —             | -0.1959     | 0.6890  | -3.2928     | 0.3912  |
| Main_RecrDev_2013                | —     | —    | —    | —             | —           | —       | -0.3321     | 0.6504  |
| LnQ_base_4_DEPM                  | 5     | -3   | 3    | -1.3900       | -1.8502     | 0.1561  | -1.5362     | 0.1122  |
| LnQ_base_5_TEP                   | 5     | -3   | 3    | -0.6900       | -0.5997     | 0.1631  | -0.3423     | 0.1318  |
| LnQ_base_8_ATM_Spring (& Summer) | -5    | -3   | 3    | 0.0000        | 0.0000      | —       | 0.0000      | —       |

**Table 10 (cont.).** Parameters and asymptotic standard deviations for base model T.

| Parameter                          | Phase | Min | Max | Initial Value | 2014 final  | 2015 update | Final Value | Std Dev |
|------------------------------------|-------|-----|-----|---------------|-------------|-------------|-------------|---------|
|                                    |       |     |     |               | Final Value | Std Dev     |             |         |
| SizeSel_1P_1_MexCal_S1_NSP_1993-98 | 4     | 10  | 28  | 18.0000       | 18.5134     | 0.3667      | 18.5165     | 0.3536  |
| SizeSel_1P_2_MexCal_S1_NSP_1993-98 | -4    | -5  | 3   | -4.9850       | -4.9850     | —           | -4.9850     | —       |
| SizeSel_1P_3_MexCal_S1_NSP_1993-98 | 4     | -1  | 9   | 2.5000        | 2.9077      | 0.1959      | 2.8690      | 0.1888  |
| SizeSel_1P_4_MexCal_S1_NSP_1993-98 | 4     | -1  | 9   | 4.0000        | 0.5753      | 0.5684      | 0.5432      | 0.5500  |
| SizeSel_1P_5_MexCal_S1_NSP_1993-98 | -4    | -10 | 10  | -10.0000      | -10.0000    | —           | -10.0000    | —       |
| SizeSel_1P_6_MexCal_S1_NSP_1993-98 | 4     | -10 | 10  | -10.0000      | -3.4271     | 1.0621      | -3.5107     | 1.0472  |
| SizeSel_1P_1_MexCal_S1_NSP_1999-14 | 4     | 10  | 28  | 18.0000       | 17.0451     | 0.1980      | 17.0810     | 0.1980  |
| SizeSel_1P_2_MexCal_S1_NSP_1999-14 | -4    | -5  | 3   | -4.9980       | -4.9980     | —           | -4.9980     | —       |
| SizeSel_1P_3_MexCal_S1_NSP_1999-14 | 4     | -1  | 9   | 2.5000        | 2.1075      | 0.1372      | 2.1050      | 0.1369  |
| SizeSel_1P_4_MexCal_S1_NSP_1999-14 | 4     | -1  | 9   | 4.0000        | -0.0949     | 0.4573      | -0.2977     | 0.4810  |
| SizeSel_1P_5_MexCal_S1_NSP_1999-14 | -4    | -10 | 10  | -10.0000      | -10.0000    | —           | -10.0000    | —       |
| SizeSel_1P_6_MexCal_S1_NSP_1999-14 | 4     | -10 | 10  | -10.0000      | -2.4192     | 0.2287      | -2.2423     | 0.1996  |
| SizeSel_1P_1_MexCal_S2_NSP_1993-98 | 4     | 10  | 28  | 18.0000       | 16.4577     | 0.2923      | 16.3601     | 0.2808  |
| SizeSel_1P_2_MexCal_S2_NSP_1993-98 | -4    | -5  | 3   | -4.9930       | -4.9930     | —           | -4.9930     | —       |
| SizeSel_1P_3_MexCal_S2_NSP_1993-98 | 4     | -1  | 9   | 2.5000        | 1.8849      | 0.1993      | 1.7947      | 0.1918  |
| SizeSel_1P_4_MexCal_S2_NSP_1993-98 | 4     | -1  | 9   | 4.0000        | 1.8145      | 0.3861      | 1.8461      | 0.3597  |
| SizeSel_1P_5_MexCal_S2_NSP_1993-98 | -4    | -10 | 10  | -10.0000      | -10.0000    | —           | -10.0000    | —       |
| SizeSel_1P_6_MexCal_S2_NSP_1993-98 | 4     | -10 | 10  | -10.0000      | -2.2433     | 0.5862      | -2.3386     | 0.5800  |
| SizeSel_1P_1_MexCal_S2_NSP_1999-14 | 4     | 10  | 28  | 18.0000       | 14.6115     | 0.2116      | 14.6774     | 0.2001  |
| SizeSel_1P_2_MexCal_S2_NSP_1999-14 | -4    | -5  | 3   | -4.9970       | -4.9970     | —           | -4.9970     | —       |
| SizeSel_1P_3_MexCal_S2_NSP_1999-14 | 4     | -1  | 9   | 2.5000        | 1.6284      | 0.2177      | 1.5394      | 0.1968  |
| SizeSel_1P_4_MexCal_S2_NSP_1999-14 | 4     | -1  | 9   | 4.0000        | 2.2416      | 0.1742      | 1.9650      | 0.1721  |
| SizeSel_1P_5_MexCal_S2_NSP_1999-14 | -4    | -10 | 10  | -10.0000      | -10.0000    | —           | -10.0000    | —       |
| SizeSel_1P_6_MexCal_S2_NSP_1999-14 | 4     | -10 | 10  | -10.0000      | -3.0857     | 0.3432      | -2.5563     | 0.2201  |
| SizeSel_3P_1_PacNW                 | 4     | 10  | 28  | 19.0000       | 20.9834     | 0.2330      | 20.9337     | 0.2285  |
| SizeSel_3P_2_PacNW                 | -4    | -5  | 10  | 2.5000        | 2.5000      | —           | 2.5000      | —       |
| SizeSel_3P_3_PacNW                 | 4     | -5  | 10  | 5.0000        | 1.8487      | 0.1242      | 1.8489      | 0.1241  |
| SizeSel_3P_4_PacNW                 | -4    | -5  | 10  | 5.0000        | 5.0000      | —           | 5.0000      | —       |
| SizeSel_3P_5_PacNW                 | -4    | -10 | 10  | -10.0000      | -10.0000    | —           | -10.0000    | —       |
| SizeSel_3P_6_PacNW                 | -4    | -10 | 10  | 10.0000       | 10.0000     | —           | 10.0000     | —       |
| SizeSel_8P_1_ATM_Spring            | 4     | 10  | 28  | 18.0000       | 23.2458     | 1.7109      | 16.7009     | 0.5535  |
| SizeSel_8P_2_ATM_Spring            | -4    | -5  | 3   | 3.0000        | 3.0000      | —           | 3.0000      | —       |
| SizeSel_8P_3_ATM_Spring            | 4     | -1  | 9   | 2.5000        | 3.4423      | 0.5041      | -0.8025     | 1.5009  |
| SizeSel_8P_4_ATM_Spring            | -4    | -1  | 9   | 4.0000        | 4.0000      | —           | 4.0000      | —       |
| SizeSel_8P_5_ATM_Spring            | -4    | -10 | 10  | -10.0000      | -10.0000    | —           | -10.0000    | —       |
| SizeSel_8P_6_ATM_Spring            | -4    | -10 | 10  | 10.0000       | 10.0000     | —           | 10.0000     | —       |
| SizeSel_9P_1_ATM_Summer            | 4     | 10  | 28  | 18.0000       | 22.8332     | 0.9872      | 22.6552     | 1.0042  |
| SizeSel_9P_2_ATM_Summer            | -4    | -5  | 3   | 3.0000        | 3.0000      | —           | 3.0000      | —       |
| SizeSel_9P_3_ATM_Summer            | 4     | -1  | 9   | 2.5000        | 2.2279      | 0.5083      | 2.2610      | 0.5414  |
| SizeSel_9P_4_ATM_Summer            | -4    | -1  | 9   | 4.0000        | 4.0000      | —           | 4.0000      | —       |
| SizeSel_9P_5_ATM_Summer            | -4    | -10 | 10  | -10.0000      | -10.0000    | —           | -10.0000    | —       |
| SizeSel_9P_6_ATM_Summer            | -4    | -10 | 10  | 10.0000       | 10.0000     | —           | 10.0000     | —       |

**Table 11.** Likelihood components and data weightings for base model T.

| <b>COMPONENT</b> | <b>-log(L)</b> | <b>MexCal S1</b> | <b>MexCal S2</b> | <b>PacNW</b> | <b>DEPM</b> | <b>TEP</b> | <b>ATM Spring</b> | <b>ATM Summer</b> |
|------------------|----------------|------------------|------------------|--------------|-------------|------------|-------------------|-------------------|
| Catch            | 8.31217E-14    | 4.01568E-14      | 3.96337E-14      | 3.33114E-15  | ---         | ---        | ---               | ---               |
| Survey           | 33.663         | ---              | ---              | ---          | 12.741      | 12.625     | 6.795             | 1.502             |
| Length comp      | 858.044        | 180.301          | 197.990          | 394.395      | ---         | ---        | 44.818            | 40.541            |
| Age comp         | 234.978        | 252.658          | 309.147          | 613.084      | ---         | ---        | 69.438            | 44.681            |
| Recruitment      | 37.9503        |                  |                  |              |             |            |                   |                   |
| Parm softbounds  | 0.00677722     |                  |                  |              |             |            |                   |                   |
| <b>TOTAL</b>     | <b>1164.64</b> |                  |                  |              |             |            |                   |                   |

| <b>VARIANCE<br/>ADJUSTMENTS</b> | <b>MexCal S1</b> | <b>MexCal S2</b> | <b>PacNW</b> | <b>DEPM</b> | <b>TEP</b> | <b>ATM Spring</b> | <b>ATM Summer</b> |
|---------------------------------|------------------|------------------|--------------|-------------|------------|-------------------|-------------------|
| Index_extra_CV                  | ---              | ---              | ---          | 0.0         | 0.0        | 0.0               | 0.0               |
| effN_mult_Lencomp               | 1.0              | 1.0              | 1.0          | ---         | ---        | 1.0               | 1.0               |
| effN_mult_Agecomp               | 1.0              | 1.0              | 1.0          |             |            | 1.0               | 1.0               |

| <b>LAMBDA WEIGHTINGS</b> | <b>MexCal S1</b> | <b>MexCal S2</b> | <b>PacNW</b> | <b>DEPM</b> | <b>TEP</b> | <b>ATM Spring</b> | <b>ATM Summer</b> |
|--------------------------|------------------|------------------|--------------|-------------|------------|-------------------|-------------------|
| Survey                   | ---              | ---              | ---          | 1.0         | 1.0        | 1.0               | 1.0               |
| Length comp              | 1.0              | 1.0              | 1.0          | ---         | ---        | 1.0               | 1.0               |
| Age comp                 | 0.2              | 0.2              | 0.2          | ---         | ---        | 0.0               | 0.0               |

**Table 12a.** Pacific sardine population numbers-at-age (1,000s) by model year and semester for update model T.

| Calendar<br>Yr-Sem | Model<br>Yr-Seas | POPULATION NUMBERS-AT-AGE (1,000s of fish) |           |           |           |           |           |         |         |         |         |         |
|--------------------|------------------|--------------------------------------------|-----------|-----------|-----------|-----------|-----------|---------|---------|---------|---------|---------|
|                    |                  | 0 (R)                                      | 1         | 2         | 3         | 4         | 5         | 6       | 7       | 8       | 9       | 10+     |
| ---                | VIRG             | 2,884,210                                  | 1,933,340 | 1,295,960 | 868,708   | 582,312   | 390,335   | 261,650 | 175,389 | 117,567 | 78,807  | 160,235 |
| ---                | VIRG             | 2,361,390                                  | 1,582,890 | 1,061,040 | 711,238   | 476,757   | 319,580   | 214,221 | 143,596 | 96,256  | 64,522  | 131,189 |
| ---                | INIT             | 2,308,880                                  | 1,547,690 | 1,037,450 | 695,422   | 466,155   | 312,473   | 209,457 | 140,403 | 94,115  | 63,087  | 128,272 |
| ---                | INIT             | 1,890,350                                  | 1,267,140 | 849,390   | 569,363   | 381,656   | 255,831   | 171,489 | 114,952 | 77,055  | 51,652  | 105,020 |
| 1993-2             | 1993-1           | 7,374,590                                  | 4,943,330 | 1,239,030 | 544,525   | 277,614   | 190,026   | 135,900 | 140,403 | 94,115  | 63,087  | 128,272 |
| 1994-1             | 1993-2           | 6,037,460                                  | 4,041,050 | 1,011,620 | 444,846   | 227,027   | 155,492   | 111,230 | 114,927 | 77,042  | 51,644  | 105,006 |
| 1994-2             | 1994-1           | 6,665,910                                  | 4,906,830 | 3,215,620 | 810,377   | 360,045   | 184,639   | 126,693 | 90,695  | 93,740  | 62,849  | 127,809 |
| 1995-1             | 1994-2           | 5,455,460                                  | 3,975,230 | 2,583,060 | 653,596   | 292,442   | 150,579   | 103,500 | 74,144  | 76,657  | 51,402  | 104,544 |
| 1995-2             | 1995-1           | 2,246,370                                  | 4,372,810 | 2,998,020 | 1,985,930 | 517,667   | 234,872   | 121,582 | 83,745  | 60,048  | 62,111  | 126,405 |
| 1996-1             | 1995-2           | 1,838,740                                  | 3,557,640 | 2,426,730 | 1,611,350 | 421,795   | 191,837   | 99,407  | 68,500  | 49,125  | 50,817  | 103,429 |
| 1996-2             | 1996-1           | 3,596,460                                  | 1,483,220 | 2,749,850 | 1,901,180 | 1,288,960 | 340,716   | 155,540 | 80,717  | 55,657  | 39,928  | 125,402 |
| 1997-1             | 1996-2           | 2,942,960                                  | 1,196,900 | 2,193,250 | 1,524,790 | 1,043,830 | 277,459   | 126,962 | 65,950  | 45,494  | 32,643  | 102,541 |
| 1997-2             | 1997-1           | 11,285,600                                 | 2,374,370 | 925,757   | 1,719,090 | 1,219,970 | 843,250   | 224,969 | 103,094 | 53,586  | 36,976  | 109,906 |
| 1998-1             | 1997-2           | 9,232,720                                  | 1,903,430 | 729,636   | 1,365,840 | 983,019   | 684,984   | 183,374 | 84,150  | 43,766  | 30,209  | 89,814  |
| 1998-2             | 1998-1           | 7,874,930                                  | 7,424,680 | 1,453,790 | 566,422   | 1,087,320 | 791,841   | 554,258 | 148,642 | 68,265  | 35,518  | 97,438  |
| 1999-1             | 1998-2           | 6,441,700                                  | 5,933,420 | 1,139,060 | 447,747   | 873,331   | 641,891   | 451,062 | 121,160 | 55,682  | 28,981  | 79,529  |
| 1999-2             | 1999-1           | 1,322,740                                  | 5,116,820 | 4,320,670 | 852,493   | 349,604   | 695,578   | 515,137 | 363,079 | 97,656  | 44,909  | 87,569  |
| 2000-1             | 1999-2           | 1,082,640                                  | 4,104,900 | 3,443,490 | 689,222   | 284,338   | 566,359   | 419,511 | 295,689 | 79,531  | 36,574  | 71,316  |
| 2000-2             | 2000-1           | 1,470,010                                  | 806,239   | 2,885,100 | 2,629,760 | 546,996   | 228,065   | 455,585 | 337,770 | 238,158 | 64,067  | 86,923  |
| 2001-1             | 2000-2           | 1,202,640                                  | 627,320   | 2,194,600 | 2,053,310 | 431,268   | 180,007   | 359,558 | 266,554 | 187,937 | 50,556  | 68,591  |
| 2001-2             | 2001-1           | 3,014,670                                  | 879,483   | 428,039   | 1,651,110 | 1,615,640 | 343,509   | 143,854 | 287,647 | 213,330 | 150,438 | 95,387  |
| 2002-1             | 2001-2           | 2,466,480                                  | 686,217   | 325,435   | 1,277,630 | 1,256,970 | 267,185   | 111,842 | 223,594 | 165,813 | 116,926 | 74,137  |
| 2002-2             | 2002-1           | 379,342                                    | 1,707,430 | 428,538   | 234,931   | 985,677   | 987,418   | 210,921 | 88,429  | 176,893 | 131,216 | 151,224 |
| 2003-1             | 2002-2           | 310,213                                    | 1,288,380 | 308,208   | 172,973   | 729,918   | 730,073   | 155,783 | 65,284  | 130,573 | 96,849  | 111,612 |
| 2003-2             | 2003-1           | 15,513,500                                 | 207,709   | 763,012   | 217,685   | 132,555   | 572,064   | 575,701 | 123,083 | 51,619  | 103,276 | 164,920 |
| 2004-1             | 2003-2           | 12,687,200                                 | 157,249   | 545,086   | 156,087   | 94,619    | 406,374   | 408,137 | 87,196  | 36,559  | 73,137  | 116,783 |
| 2004-2             | 2004-1           | 7,293,630                                  | 9,950,400 | 119,990   | 430,139   | 124,926   | 75,992    | 326,667 | 328,182 | 70,123  | 29,402  | 152,748 |
| 2005-1             | 2004-2           | 5,968,730                                  | 7,855,240 | 88,426    | 297,351   | 83,210    | 49,915    | 213,639 | 214,334 | 45,774  | 19,189  | 99,676  |
| 2005-2             | 2005-1           | 12,866,700                                 | 4,750,380 | 6,141,790 | 70,760    | 240,380   | 67,445    | 40,486  | 173,323 | 173,902 | 37,141  | 96,449  |
| 2006-1             | 2005-2           | 10,531,500                                 | 3,804,790 | 4,660,310 | 50,649    | 166,481   | 46,156    | 27,606  | 118,048 | 118,394 | 25,282  | 65,644  |
| 2006-2             | 2006-1           | 3,935,670                                  | 8,352,900 | 2,959,760 | 3,727,560 | 41,037    | 135,367   | 37,566  | 22,476  | 96,119  | 96,406  | 74,042  |
| 2007-1             | 2006-2           | 3,221,100                                  | 6,661,470 | 2,287,370 | 2,830,550 | 30,804    | 101,107   | 28,012  | 16,750  | 71,621  | 71,829  | 55,163  |
| 2007-2             | 2007-1           | 6,596,600                                  | 2,522,970 | 5,078,770 | 1,813,150 | 2,284,670 | 24,988    | 82,128  | 22,764  | 13,614  | 58,217  | 103,231 |
| 2008-1             | 2007-2           | 5,395,640                                  | 1,932,180 | 3,730,480 | 1,352,350 | 1,708,550 | 18,650    | 61,232  | 16,965  | 10,145  | 43,377  | 76,912  |
| 2008-2             | 2008-1           | 2,288,420                                  | 4,130,600 | 1,419,850 | 2,908,070 | 1,083,530 | 1,379,340 | 15,088  | 49,568  | 13,737  | 8,215   | 97,420  |
| 2009-1             | 2008-2           | 1,872,030                                  | 3,191,470 | 1,059,760 | 2,205,250 | 824,692   | 1,048,530 | 11,460  | 37,638  | 10,430  | 6,237   | 73,957  |
| 2009-2             | 2009-1           | 6,301,980                                  | 1,413,320 | 2,293,290 | 817,776   | 1,759,010 | 663,854   | 846,147 | 9,255   | 30,407  | 8,427   | 64,803  |
| 2010-1             | 2009-2           | 5,156,970                                  | 1,115,710 | 1,753,890 | 621,902   | 1,329,640 | 500,024   | 636,490 | 6,959   | 22,859  | 6,335   | 48,710  |
| 2010-2             | 2010-1           | 1,473,040                                  | 3,941,910 | 817,634   | 1,363,970 | 497,000   | 1,070,510 | 403,386 | 513,809 | 5,619   | 18,459  | 44,456  |
| 2011-1             | 2010-2           | 1,205,520                                  | 3,130,460 | 624,942   | 1,018,620 | 365,670   | 782,708   | 294,330 | 374,649 | 4,096   | 13,455  | 32,401  |
| 2011-2             | 2011-1           | 274,733                                    | 924,807   | 2,308,130 | 487,912   | 816,690   | 295,340   | 633,437 | 238,350 | 303,467 | 3,318   | 37,152  |
| 2012-1             | 2011-2           | 224,681                                    | 700,560   | 1,666,000 | 358,651   | 602,310   | 217,334   | 465,555 | 175,097 | 222,893 | 2,437   | 27,284  |
| 2012-2             | 2012-1           | 76,257                                     | 164,892   | 480,151   | 1,249,820 | 280,026   | 475,194   | 171,943 | 368,655 | 138,701 | 176,590 | 23,550  |
| 2013-1             | 2012-2           | 62,424                                     | 132,737   | 357,054   | 837,539   | 177,262   | 294,931   | 106,092 | 227,050 | 85,369  | 108,661 | 14,488  |
| 2013-2             | 2013-1           | 87,128                                     | 43,477    | 83,715    | 258,987   | 647,756   | 139,511   | 233,223 | 84,022  | 179,922 | 67,667  | 97,627  |
| 2014-1             | 2013-2           | 71,318                                     | 34,843    | 61,995    | 173,861   | 411,915   | 87,048    | 144,693 | 52,035  | 111,356 | 41,869  | 60,399  |
| 2014-2             | 2014-1           | 1,718,330                                  | 48,316    | 21,018    | 44,073    | 133,296   | 322,384   | 68,510  | 114,084 | 41,055  | 87,887  | 80,731  |
| 2015-1             | 2014-2           | 1,405,630                                  | 37,221    | 15,404    | 32,154    | 96,524    | 232,264   | 49,263  | 81,978  | 29,494  | 63,131  | 57,987  |
| 2015-2             | 2015-1           | ---                                        | 1,045,560 | 26,091    | 11,714    | 25,368    | 76,906    | 185,550 | 39,388  | 65,567  | 23,593  | 96,897  |

**Table 12b.** Pacific sardine biomass-at-age and summary biomass (metric tons) by model year and semester for update model T.

| Calendar<br>Yr-Sem | Model<br>Yr-Seas | POPULATION BIOMASS-AT-AGE (mt) |         |         |         |         |         |         |        |        |        |        | SUMMARY<br>BIOMASS |           |
|--------------------|------------------|--------------------------------|---------|---------|---------|---------|---------|---------|--------|--------|--------|--------|--------------------|-----------|
|                    |                  | 0                              | 1       | 2       | 3       | 4       | 5       | 6       | 7      | 8      | 9      | 10+    | Ages 0+            | Ages 1+   |
| 1993-2             | 1993-1           | 58,391                         | 184,071 | 92,031  | 59,267  | 37,935  | 29,890  | 23,365  | 25,553 | 17,770 | 12,199 | 25,496 | 565,967            | 507,576   |
| 1994-1             | 1993-2           | 126,301                        | 224,530 | 93,334  | 55,015  | 33,558  | 25,698  | 19,737  | 21,347 | 14,740 | 10,072 | 20,940 | 645,272            | 518,971   |
| 1994-2             | 1994-1           | 52,780                         | 182,712 | 238,845 | 88,202  | 49,199  | 29,043  | 21,782  | 16,506 | 17,699 | 12,153 | 25,404 | 734,325            | 681,545   |
| 1995-1             | 1994-2           | 114,126                        | 220,873 | 238,319 | 80,832  | 43,227  | 24,886  | 18,366  | 13,772 | 14,666 | 10,025 | 20,848 | 799,938            | 685,812   |
| 1995-2             | 1995-1           | 17,786                         | 162,827 | 222,682 | 216,151 | 70,738  | 36,944  | 20,903  | 15,242 | 11,338 | 12,010 | 25,125 | 811,745            | 793,959   |
| 1996-1             | 1995-2           | 38,466                         | 197,671 | 223,895 | 199,279 | 62,347  | 31,705  | 17,639  | 12,723 | 9,399  | 9,911  | 20,625 | 823,660            | 785,194   |
| 1996-2             | 1996-1           | 28,476                         | 55,229  | 204,249 | 206,926 | 176,134 | 53,593  | 26,741  | 14,690 | 10,509 | 7,721  | 24,925 | 809,195            | 780,718   |
| 1997-1             | 1996-2           | 61,566                         | 66,503  | 202,354 | 188,574 | 154,292 | 45,856  | 22,529  | 12,250 | 8,704  | 6,366  | 20,448 | 789,440            | 727,875   |
| 1997-2             | 1997-1           | 89,358                         | 88,413  | 68,762  | 187,107 | 166,706 | 132,640 | 38,678  | 18,763 | 10,118 | 7,150  | 21,880 | 829,574            | 740,216   |
| 1998-1             | 1997-2           | 193,145                        | 105,759 | 67,318  | 168,916 | 145,303 | 113,208 | 32,539  | 15,630 | 8,373  | 5,892  | 17,933 | 874,016            | 680,871   |
| 1998-2             | 1998-1           | 62,353                         | 276,467 | 107,982 | 61,650  | 148,580 | 124,553 | 95,291  | 27,053 | 12,889 | 6,868  | 19,409 | 943,095            | 880,743   |
| 1999-1             | 1998-2           | 134,758                        | 329,674 | 105,092 | 55,374  | 129,090 | 106,086 | 80,039  | 22,505 | 10,653 | 5,652  | 15,887 | 994,809            | 860,052   |
| 1999-2             | 1999-1           | 10,473                         | 190,531 | 320,924 | 92,786  | 47,773  | 109,412 | 88,565  | 66,080 | 18,438 | 8,684  | 17,443 | 971,109            | 960,636   |
| 2000-1             | 1999-2           | 22,648                         | 228,078 | 317,704 | 85,237  | 42,029  | 93,603  | 74,440  | 54,922 | 15,216 | 7,133  | 14,246 | 955,256            | 932,608   |
| 2000-2             | 2000-1           | 11,639                         | 30,021  | 214,295 | 286,226 | 74,746  | 35,874  | 78,327  | 61,474 | 44,967 | 12,388 | 17,290 | 867,247            | 855,607   |
| 2001-1             | 2000-2           | 25,159                         | 34,855  | 202,478 | 253,937 | 63,747  | 29,750  | 63,802  | 49,511 | 35,956 | 9,860  | 13,686 | 782,741            | 757,582   |
| 2001-2             | 2001-1           | 23,870                         | 32,749  | 31,793  | 179,708 | 220,774 | 54,033  | 24,732  | 52,351 | 40,279 | 29,089 | 18,932 | 708,311            | 684,442   |
| 2002-1             | 2001-2           | 51,598                         | 38,128  | 30,025  | 158,007 | 185,797 | 44,158  | 19,846  | 41,531 | 31,723 | 22,804 | 14,767 | 638,384            | 586,786   |
| 2002-2             | 2002-1           | 3,004                          | 63,578  | 31,830  | 25,570  | 134,691 | 155,317 | 36,263  | 16,094 | 33,399 | 25,373 | 29,895 | 555,014            | 552,010   |
| 2003-1             | 2002-2           | 6,490                          | 71,585  | 28,436  | 21,392  | 107,891 | 120,660 | 27,643  | 12,126 | 24,981 | 18,889 | 22,160 | 462,253            | 455,763   |
| 2003-2             | 2003-1           | 122,834                        | 7,734   | 56,674  | 23,693  | 18,113  | 89,983  | 98,978  | 22,401 | 9,746  | 19,970 | 32,639 | 502,766            | 379,932   |
| 2004-1             | 2003-2           | 265,411                        | 8,737   | 50,291  | 19,304  | 13,986  | 67,162  | 72,422  | 16,196 | 6,994  | 14,264 | 23,207 | 557,974            | 292,563   |
| 2004-2             | 2004-1           | 57,750                         | 370,515 | 8,912   | 46,817  | 17,071  | 11,953  | 56,163  | 59,729 | 13,240 | 5,685  | 30,278 | 678,113            | 620,363   |
| 2005-1             | 2004-2           | 124,863                        | 436,455 | 8,158   | 36,774  | 12,300  | 8,250   | 37,909  | 39,811 | 8,757  | 3,742  | 19,833 | 736,854            | 611,990   |
| 2005-2             | 2005-1           | 101,877                        | 176,886 | 456,190 | 7,702   | 32,847  | 10,609  | 6,961   | 31,545 | 32,835 | 7,182  | 19,200 | 883,833            | 781,956   |
| 2006-1             | 2005-2           | 220,315                        | 211,403 | 429,970 | 6,264   | 24,608  | 7,628   | 4,899   | 21,927 | 22,651 | 4,931  | 13,107 | 967,702            | 747,387   |
| 2006-2             | 2006-1           | 31,162                         | 311,030 | 219,840 | 405,711 | 5,608   | 21,293  | 6,459   | 4,091  | 18,148 | 18,642 | 14,742 | 1,056,725          | 1,025,563 |
| 2007-1             | 2006-2           | 67,384                         | 370,127 | 211,038 | 350,060 | 4,553   | 16,710  | 4,971   | 3,111  | 13,703 | 14,009 | 11,015 | 1,066,680          | 999,296   |
| 2007-2             | 2007-1           | 52,231                         | 93,946  | 377,233 | 197,345 | 312,196 | 3,930   | 14,120  | 4,143  | 2,571  | 11,257 | 20,443 | 1,089,414          | 1,037,183 |
| 2008-1             | 2007-2           | 112,875                        | 107,356 | 344,182 | 167,248 | 252,546 | 3,082   | 10,865  | 3,151  | 1,941  | 8,460  | 15,292 | 1,026,998          | 914,123   |
| 2008-2             | 2008-1           | 18,119                         | 153,808 | 105,461 | 316,517 | 148,062 | 216,965 | 2,594   | 9,021  | 2,594  | 1,589  | 19,323 | 994,054            | 975,934   |
| 2009-1             | 2008-2           | 39,162                         | 177,325 | 97,776  | 272,728 | 121,900 | 173,292 | 2,034   | 6,991  | 1,995  | 1,216  | 14,724 | 909,142            | 869,980   |
| 2009-2             | 2009-1           | 49,898                         | 52,627  | 170,337 | 89,008  | 240,365 | 104,422 | 145,475 | 1,684  | 5,741  | 1,629  | 12,922 | 874,109            | 824,211   |
| 2010-1             | 2009-2           | 107,882                        | 61,991  | 161,818 | 76,912  | 196,538 | 82,639  | 112,942 | 1,293  | 4,373  | 1,235  | 9,739  | 817,363            | 709,481   |
| 2010-2             | 2010-1           | 11,663                         | 146,782 | 60,731  | 148,456 | 67,914  | 168,387 | 69,353  | 93,513 | 1,061  | 3,569  | 8,886  | 780,315            | 768,651   |
| 2011-1             | 2010-2           | 25,219                         | 173,936 | 57,658  | 125,975 | 54,051  | 129,359 | 52,227  | 69,588 | 784    | 2,624  | 6,491  | 697,912            | 672,693   |
| 2011-2             | 2011-1           | 2,175                          | 34,436  | 171,440 | 53,105  | 111,599 | 46,456  | 108,904 | 43,379 | 57,298 | 642    | 7,408  | 636,843            | 634,667   |
| 2012-1             | 2011-2           | 4,700                          | 38,925  | 153,709 | 44,355  | 89,029  | 35,919  | 82,610  | 32,523 | 42,644 | 475    | 5,455  | 530,344            | 525,644   |
| 2012-2             | 2012-1           | 604                            | 6,140   | 35,664  | 136,032 | 38,265  | 74,746  | 29,561  | 67,095 | 26,188 | 34,146 | 4,711  | 453,153            | 452,549   |
| 2013-1             | 2012-2           | 1,306                          | 7,375   | 32,943  | 103,580 | 26,202  | 48,744  | 18,825  | 42,173 | 16,333 | 21,192 | 2,904  | 321,577            | 320,271   |
| 2013-2             | 2013-1           | 690                            | 1,619   | 6,218   | 28,188  | 88,515  | 21,945  | 40,097  | 15,292 | 33,971 | 13,084 | 19,223 | 268,842            | 268,152   |
| 2014-1             | 2013-2           | 1,492                          | 1,936   | 5,720   | 21,502  | 60,886  | 14,386  | 25,675  | 9,665  | 21,305 | 8,166  | 11,953 | 182,686            | 181,194   |
| 2014-2             | 2014-1           | 13,606                         | 1,799   | 1,561   | 4,797   | 18,215  | 50,710  | 11,779  | 20,763 | 7,752  | 16,994 | 15,965 | 163,940            | 150,335   |
| 2015-1             | 2014-2           | 29,405                         | 2,068   | 1,421   | 3,977   | 14,268  | 38,387  | 8,741   | 15,227 | 5,643  | 12,312 | 11,516 | 142,965            | 113,560   |
| 2015-2             | 2015-1           | ---                            | 38,933  | 1,938   | 1,275   | 3,466   | 12,097  | 31,901  | 7,169  | 12,380 | 4,562  | 19,163 | ---                | 132,884   |

**Table 13.** Derived SSB (mt) and recruits (year-class abundance, billions of age-0 fish) for base model T. SSB estimates are calculated at the beginning of Season 2 of each model year, e.g. the 2013 value is SSB January 2014. Recruits are age-0 fish calculated at the beginning of each model year (July).

| Calendar<br>Yr-Sem | Model<br>Yr-Seas | SSB<br>(mt) | SSB<br>Std Dev | Year class<br>abundance<br>(billions) | Recruits<br>Std Dev |
|--------------------|------------------|-------------|----------------|---------------------------------------|---------------------|
| ---                | VIRG-1           | ---         | ---            | 2.884                                 | 0.212               |
| ---                | VIRG-2           | 475,035     | 34,512         | ---                                   | ---                 |
| ---                | INIT-1           | ---         | ---            | 2.309                                 | 0.605               |
| ---                | INIT-2           | 380,277     | 99,533         | ---                                   | ---                 |
| 1993-2             | 1993-1           | ---         | ---            | 7.375                                 | ---                 |
| 1994-1             | 1993-2           | 428,804     | 76,971         | ---                                   | ---                 |
| 1994-2             | 1994-1           | ---         | ---            | 6.666                                 | 1.239               |
| 1995-1             | 1994-2           | 581,221     | 92,778         | ---                                   | ---                 |
| 1995-2             | 1995-1           | ---         | ---            | 2.246                                 | 0.621               |
| 1996-1             | 1995-2           | 681,695     | 102,288        | ---                                   | ---                 |
| 1996-2             | 1996-1           | ---         | ---            | 3.596                                 | 0.759               |
| 1997-1             | 1996-2           | 680,194     | 97,832         | ---                                   | ---                 |
| 1997-2             | 1997-1           | ---         | ---            | 11.286                                | 1.420               |
| 1998-1             | 1997-2           | 642,013     | 86,908         | ---                                   | ---                 |
| 1998-2             | 1998-1           | ---         | ---            | 7.875                                 | 1.049               |
| 1999-1             | 1998-2           | 726,025     | 81,830         | ---                                   | ---                 |
| 1999-2             | 1999-1           | ---         | ---            | 1.323                                 | 0.355               |
| 2000-1             | 1999-2           | 809,031     | 79,963         | ---                                   | ---                 |
| 2000-2             | 2000-1           | ---         | ---            | 1.470                                 | 0.306               |
| 2001-1             | 2000-2           | 718,471     | 71,582         | ---                                   | ---                 |
| 2001-2             | 2001-1           | ---         | ---            | 3.015                                 | 0.385               |
| 2002-1             | 2001-2           | 566,791     | 58,560         | ---                                   | ---                 |
| 2002-2             | 2002-1           | ---         | ---            | 0.379                                 | 0.142               |
| 2003-1             | 2002-2           | 422,637     | 46,878         | ---                                   | ---                 |
| 2003-2             | 2003-1           | ---         | ---            | 15.514                                | 1.454               |
| 2004-1             | 2003-2           | 305,319     | 38,207         | ---                                   | ---                 |
| 2004-2             | 2004-1           | ---         | ---            | 7.294                                 | 1.155               |
| 2005-1             | 2004-2           | 445,992     | 45,653         | ---                                   | ---                 |
| 2005-2             | 2005-1           | ---         | ---            | 12.867                                | 1.182               |
| 2006-1             | 2005-2           | 639,018     | 54,433         | ---                                   | ---                 |
| 2006-2             | 2006-1           | ---         | ---            | 3.936                                 | 0.787               |
| 2007-1             | 2006-2           | 827,400     | 56,420         | ---                                   | ---                 |
| 2007-2             | 2007-1           | ---         | ---            | 6.597                                 | 0.853               |
| 2008-1             | 2007-2           | 840,513     | 53,143         | ---                                   | ---                 |
| 2008-2             | 2008-1           | ---         | ---            | 2.288                                 | 0.542               |
| 2009-1             | 2008-2           | 783,997     | 47,716         | ---                                   | ---                 |
| 2009-2             | 2009-1           | ---         | ---            | 6.302                                 | 0.701               |
| 2010-1             | 2009-2           | 673,537     | 42,702         | ---                                   | ---                 |
| 2010-2             | 2010-1           | ---         | ---            | 1.473                                 | 0.309               |
| 2011-1             | 2010-2           | 595,091     | 39,326         | ---                                   | ---                 |
| 2011-2             | 2011-1           | ---         | ---            | 0.275                                 | 0.080               |
| 2012-1             | 2011-2           | 492,999     | 37,406         | ---                                   | ---                 |
| 2012-2             | 2012-1           | ---         | ---            | 0.076                                 | 0.029               |
| 2013-1             | 2012-2           | 310,918     | 32,865         | ---                                   | ---                 |
| 2013-2             | 2013-1           | ---         | ---            | 0.087                                 | 0.037               |
| 2014-1             | 2013-2           | 178,656     | 26,352         | ---                                   | ---                 |
| 2014-2             | 2014-1           | ---         | ---            | 1.718                                 | 1.177               |
| 2015-1             | 2014-2           | 114,566     | 20,330         | ---                                   | ---                 |
| 2015-2             | 2015-1           | ---         | ---            | ---                                   | ---                 |
| 2016-1             | 2015-2           | 109,441     | 27,938         | ---                                   | ---                 |

**Table 14.** Convergence tests of the update model, where randomized parameter phase orders and 10% jittering were applied over a wide range of initial R0 values.

|               | PHASE ORDER BY PARAMETER COMPONENT |    |    |          |       | RESULTS     |               |
|---------------|------------------------------------|----|----|----------|-------|-------------|---------------|
| Initial<br>R0 | Growth                             | R0 | R1 | $\ln(Q)$ | Selex | Final<br>R0 | Total<br>-(L) |
| 14.1          | 1                                  | 4  | 5  | 3        | 2     | 14.8748     | 1164.64       |
| 14.2          | 2                                  | 3  | 5  | 1        | 4     | 14.8782     | 1164.61       |
| 14.3          | 2                                  | 5  | 3  | 4        | 1     | 14.8748     | 1164.64       |
| 14.4          | 4                                  | 2  | 1  | 5        | 3     | 14.8782     | 1164.61       |
| 14.5          | 3                                  | 1  | 5  | 4        | 2     | 14.8748     | 1164.64       |
| 14.6          | 3                                  | 1  | 2  | 5        | 4     | 14.8782     | 1164.61       |
| 14.7          | 3                                  | 5  | 4  | 2        | 1     | 14.8748     | 1164.64       |
| 14.8          | 4                                  | 2  | 3  | 1        | 5     | 14.8748     | 1164.64       |
| 14.9          | 5                                  | 4  | 1  | 2        | 3     | 14.8748     | 1164.64       |
| 15.0          | 2                                  | 3  | 5  | 4        | 1     | 14.8748     | 1164.64       |
| 15.1          | 4                                  | 3  | 1  | 2        | 5     | 14.8782     | 1164.61       |
| 15.2          | 1                                  | 4  | 2  | 3        | 5     | 14.8782     | 1164.61       |
| 15.3          | 3                                  | 5  | 1  | 4        | 2     | 14.8782     | 1164.61       |
| 15.4          | 3                                  | 1  | 4  | 5        | 2     | 14.8782     | 1164.61       |
| 15.5          | 4                                  | 2  | 5  | 3        | 1     | 14.8782     | 1164.61       |
| 15.6          | 1                                  | 5  | 2  | 4        | 3     | 14.8782     | 1164.61       |
| 15.7          | 5                                  | 4  | 1  | 2        | 3     | 14.8782     | 1164.61       |
| 15.8          | 1                                  | 2  | 4  | 5        | 3     | 14.8748     | 1164.64       |
| 15.9          | 4                                  | 1  | 5  | 3        | 2     | 14.8748     | 1164.64       |
| 16.0          | 4                                  | 3  | 5  | 1        | 2     | 14.8782     | 1164.61       |

**Table 15.** Pacific sardine harvest control rules for the 2015-16 management year based on stock biomass estimated in base model T and under two different scenarios regarding 2014 YC strength.

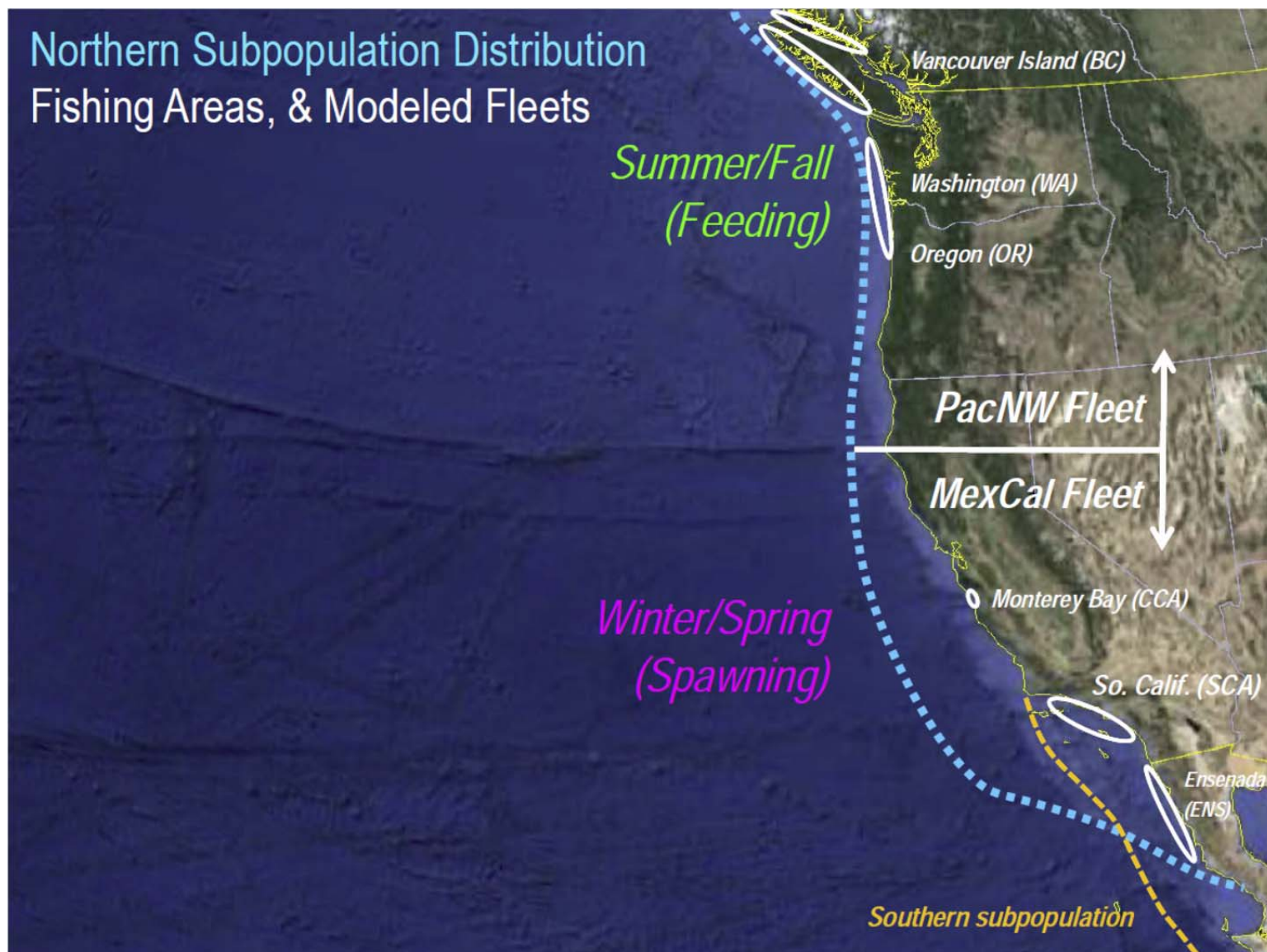
**a) HCRs when 2014 YC is derived from S-R Curve.**

| Harvest Control Rule Formulas                                                                                 |          |        |        |        |        |        |        |        |        |
|---------------------------------------------------------------------------------------------------------------|----------|--------|--------|--------|--------|--------|--------|--------|--------|
| OFL = BIOMASS * $E_{MSY}$ * DISTRIBUTION; where $E_{MSY}$ is bounded 0.00 to 0.25                             |          |        |        |        |        |        |        |        |        |
| $ABC_{P-star} = BIOMASS * BUFFER_{P-star} * E_{MSY} * DISTRIBUTION$ ; where $E_{MSY}$ is bounded 0.00 to 0.25 |          |        |        |        |        |        |        |        |        |
| HG = (BIOMASS - CUT OFF) * FRACTION * DISTRIBUTION; where FRACTION is $E_{MSY}$ bounded 0.05 to 0.20          |          |        |        |        |        |        |        |        |        |
| Harvest Formula Parameters                                                                                    |          |        |        |        |        |        |        |        |        |
| BIOMASS (ages 1+, mt)                                                                                         | 132,884  |        |        |        |        |        |        |        |        |
| P-star                                                                                                        | 0.45     | 0.40   | 0.35   | 0.30   | 0.25   | 0.20   | 0.15   | 0.10   | 0.05   |
| ABC Buffer <sub>Tier 1</sub>                                                                                  | 0.9558   | 0.9128 | 0.8705 | 0.8280 | 0.7844 | 0.7386 | 0.6886 | 0.6304 | 0.5531 |
| CalCOFI SST (2012-2014)                                                                                       | 15.562   |        |        |        |        |        |        |        |        |
| $E_{MSY}$                                                                                                     | 0.157239 |        |        |        |        |        |        |        |        |
| FRACTION                                                                                                      | 0.157239 |        |        |        |        |        |        |        |        |
| CUT OFF (mt)                                                                                                  | 150,000  |        |        |        |        |        |        |        |        |
| DISTRIBUTION (U.S.)                                                                                           | 0.87     |        |        |        |        |        |        |        |        |
| Harvest Control Rule Values (MT)                                                                              |          |        |        |        |        |        |        |        |        |
| OFL =                                                                                                         | 18,178   |        |        |        |        |        |        |        |        |
| $ABC_{Tier 1}$ =                                                                                              | 17,374   | 16,594 | 15,824 | 15,051 | 14,259 | 13,427 | 12,517 | 11,460 | 10,055 |
| HG =                                                                                                          | 0        |        |        |        |        |        |        |        |        |

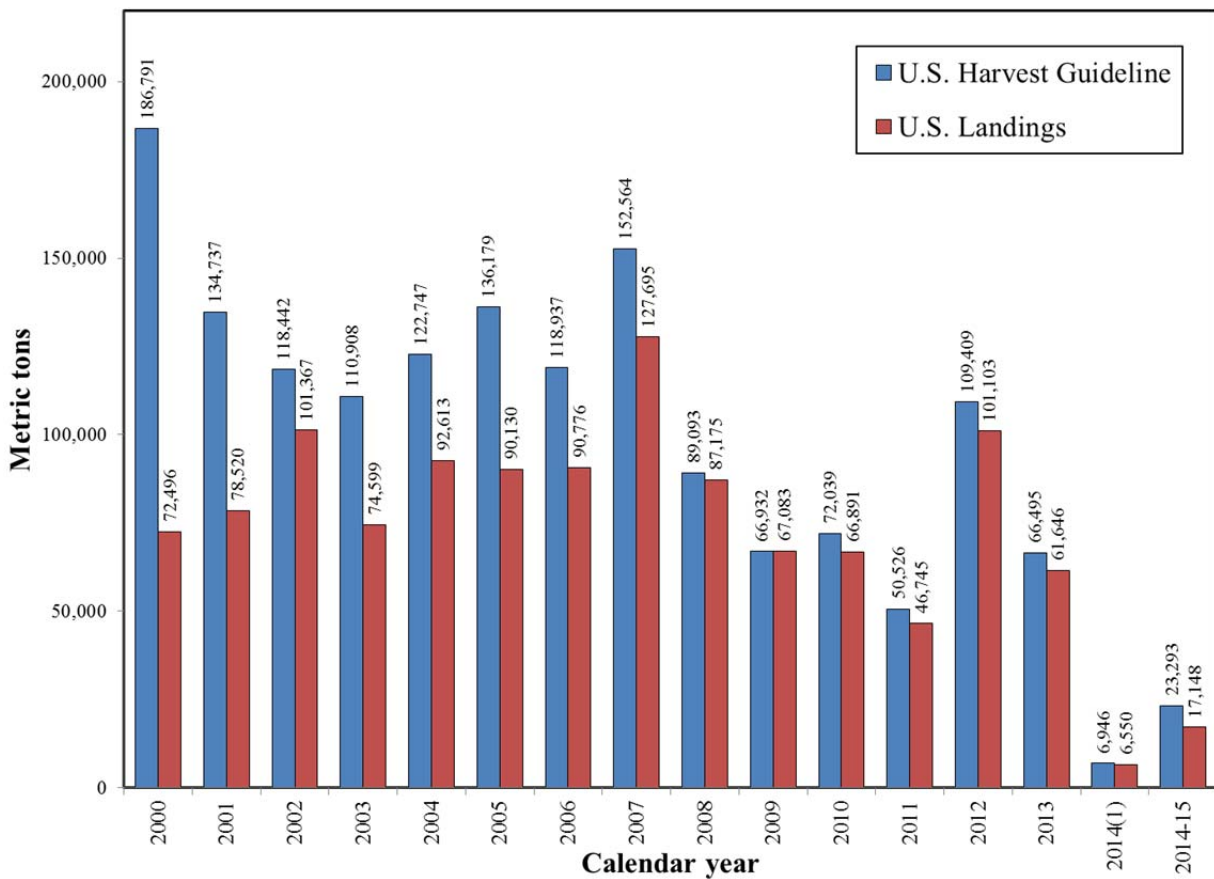
**b) HCRs when 2014 YC is based on the average of 2011-2013 YC sizes.**

| Harvest Control Rule Formulas                                                                                 |          |         |         |         |         |         |         |         |         |
|---------------------------------------------------------------------------------------------------------------|----------|---------|---------|---------|---------|---------|---------|---------|---------|
| OFL = BIOMASS * $E_{MSY}$ * DISTRIBUTION; where $E_{MSY}$ is bounded 0.00 to 0.25                             |          |         |         |         |         |         |         |         |         |
| $ABC_{P-star} = BIOMASS * BUFFER_{P-star} * E_{MSY} * DISTRIBUTION$ ; where $E_{MSY}$ is bounded 0.00 to 0.25 |          |         |         |         |         |         |         |         |         |
| HG = (BIOMASS - CUT OFF) * FRACTION * DISTRIBUTION; where FRACTION is $E_{MSY}$ bounded 0.05 to 0.20          |          |         |         |         |         |         |         |         |         |
| Harvest Formula Parameters                                                                                    |          |         |         |         |         |         |         |         |         |
| BIOMASS (ages 1+, mt)                                                                                         | 96,688   |         |         |         |         |         |         |         |         |
| P-star                                                                                                        | 0.45     | 0.40    | 0.35    | 0.30    | 0.25    | 0.20    | 0.15    | 0.10    | 0.05    |
| ABC Buffer <sub>Tier 1</sub>                                                                                  | 0.95577  | 0.91283 | 0.87048 | 0.82797 | 0.78442 | 0.73861 | 0.68859 | 0.63043 | 0.55314 |
| CalCOFI SST (2012-2014)                                                                                       | 15.562   |         |         |         |         |         |         |         |         |
| $E_{MSY}$                                                                                                     | 0.157239 |         |         |         |         |         |         |         |         |
| FRACTION                                                                                                      | 0.157239 |         |         |         |         |         |         |         |         |
| CUT OFF (mt)                                                                                                  | 150,000  |         |         |         |         |         |         |         |         |
| DISTRIBUTION (U.S.)                                                                                           | 0.87     |         |         |         |         |         |         |         |         |
| Harvest Control Rule Values (MT)                                                                              |          |         |         |         |         |         |         |         |         |
| OFL =                                                                                                         | 13,227   |         |         |         |         |         |         |         |         |
| $ABC_{Tier 1}$ =                                                                                              | 12,642   | 12,074  | 11,514  | 10,951  | 10,375  | 9,769   | 9,108   | 8,338   | 7,316   |
| HG =                                                                                                          | 0        |         |         |         |         |         |         |         |         |

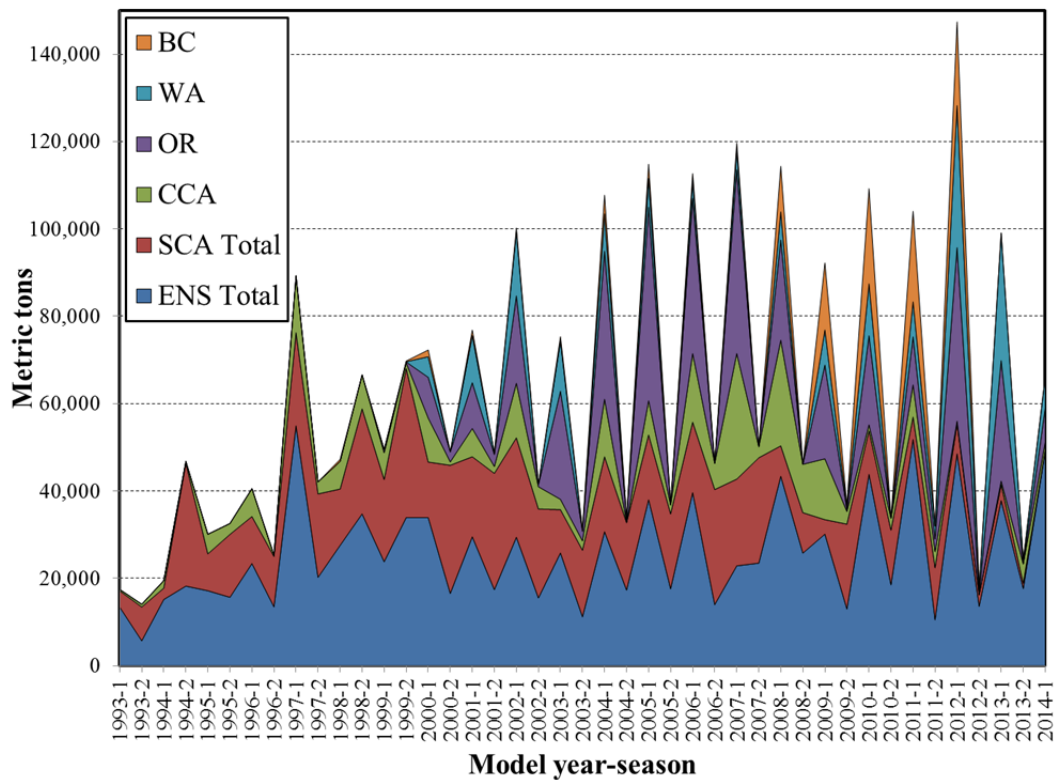
## FIGURES



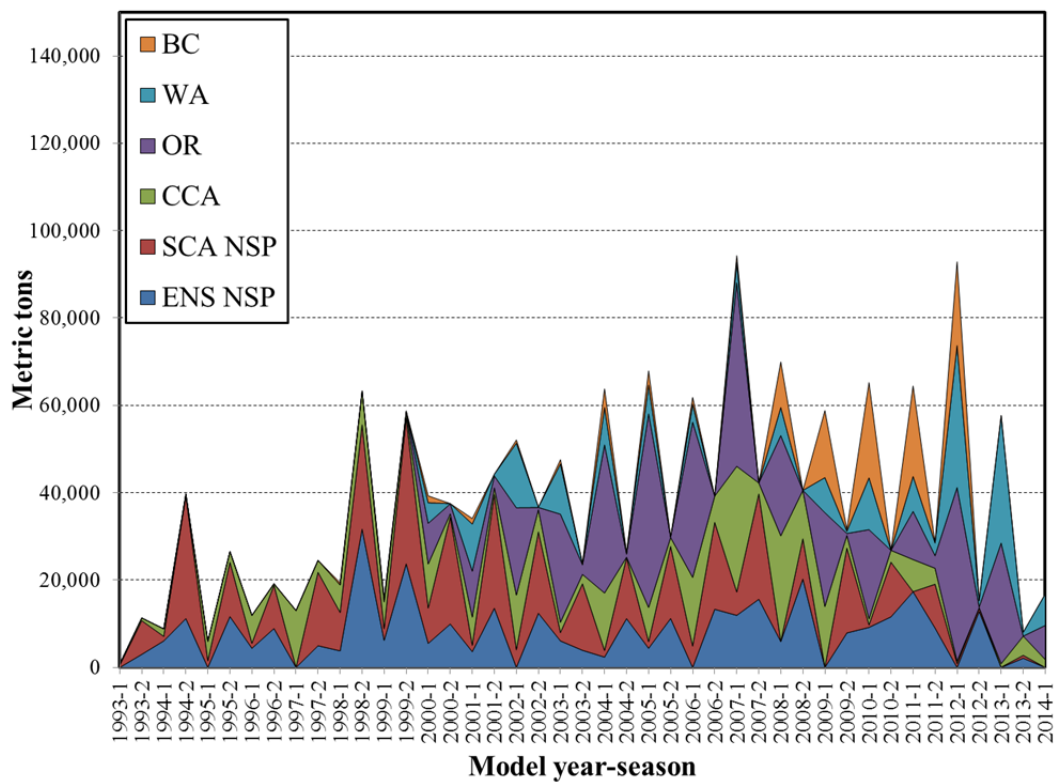
**Figure 1.** Pacific sardine northern subpopulation distribution, primary commercial fishing areas, and modeled fleets.



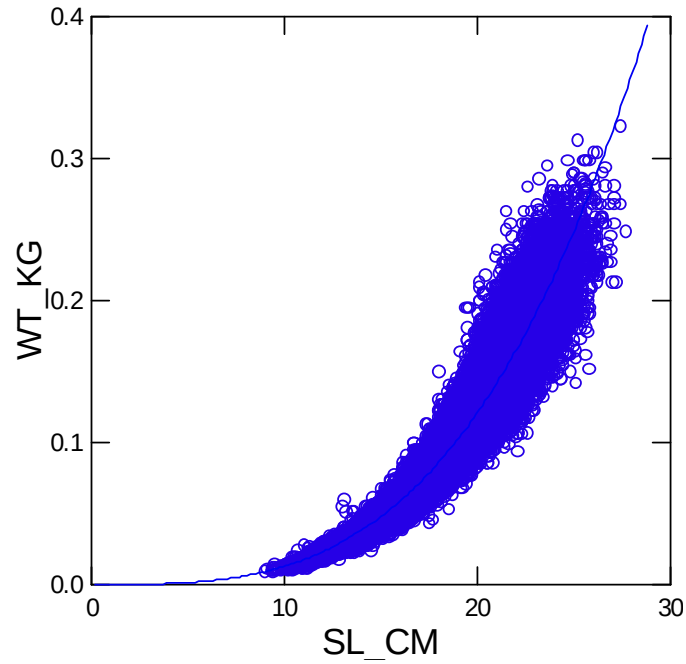
**Figure 2.** U.S. Pacific sardine harvest guidelines and landings since the onset of federal management.



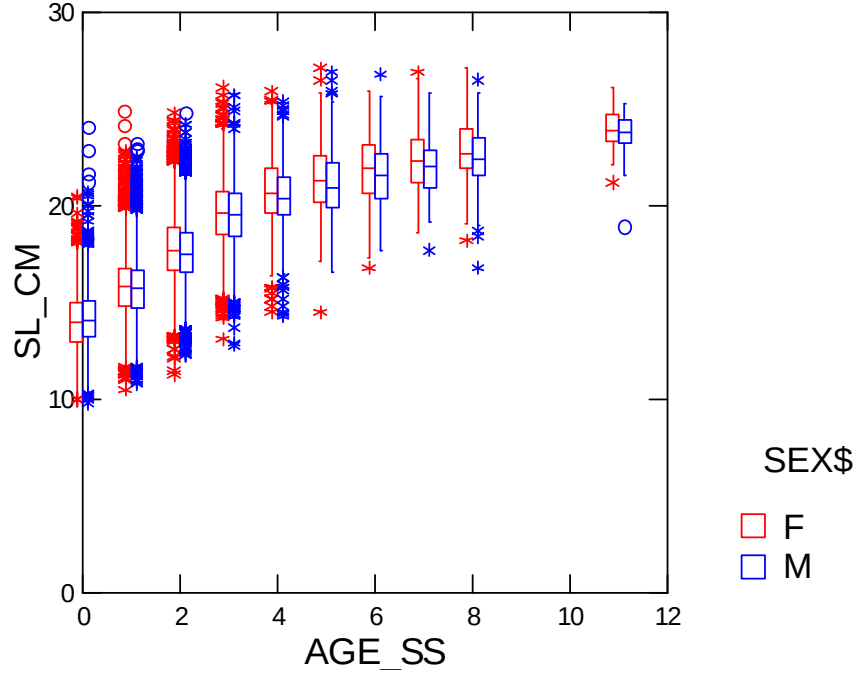
**Figure 3a.** Total Pacific sardine landings (mt) by major fishing region.



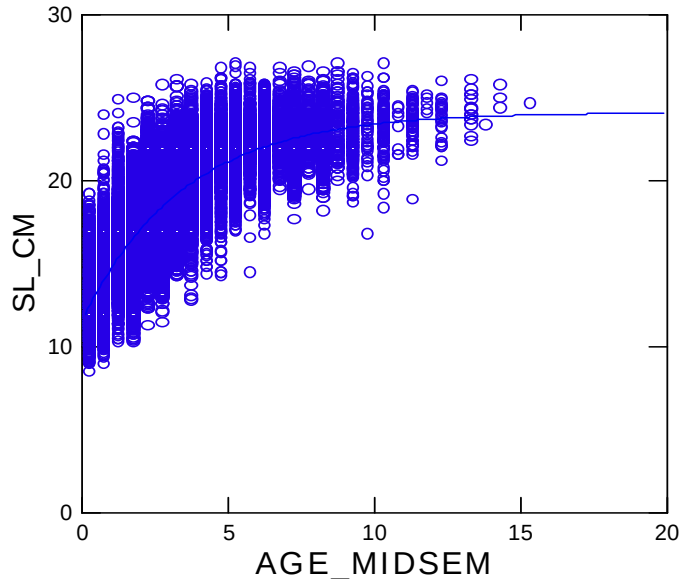
**Figure 3b.** Pacific sardine NSP landings (mt) by major fishing region.



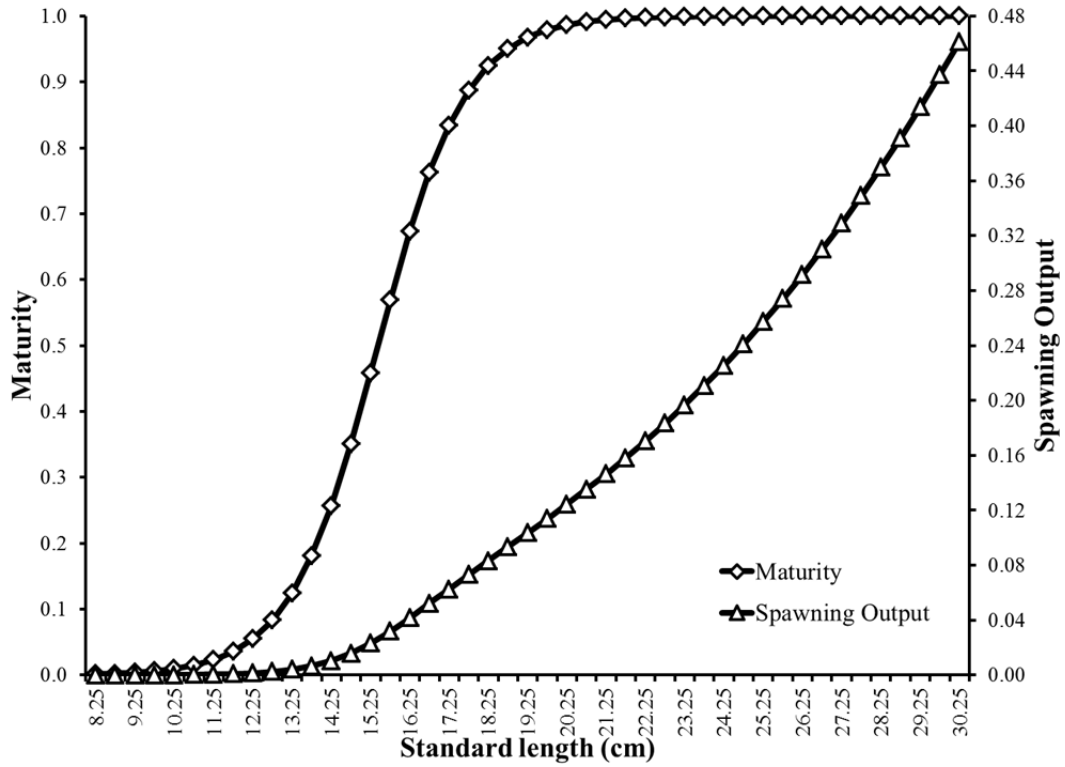
**Figure 4.** Weight-at-length regression from NSP fishery samples as applied in model T, where:  $a = 7.5242\text{e-}06$  and  $b = 3.2332$  ( $n=104,326$ ,  $R^2 = 0.936$ ).



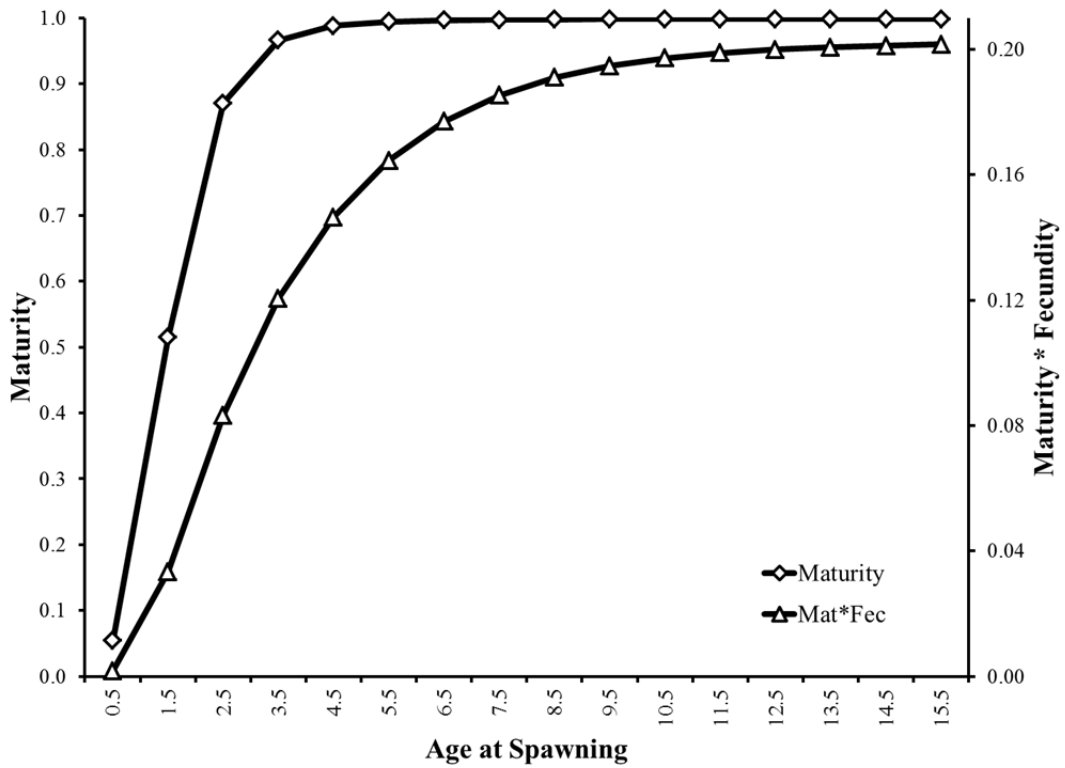
**Figure 5a.** Length-at-age by sex from fishery samples. Box symbols indicate median and quartile ranges for the raw data. The SS model is based on pooled sexes.



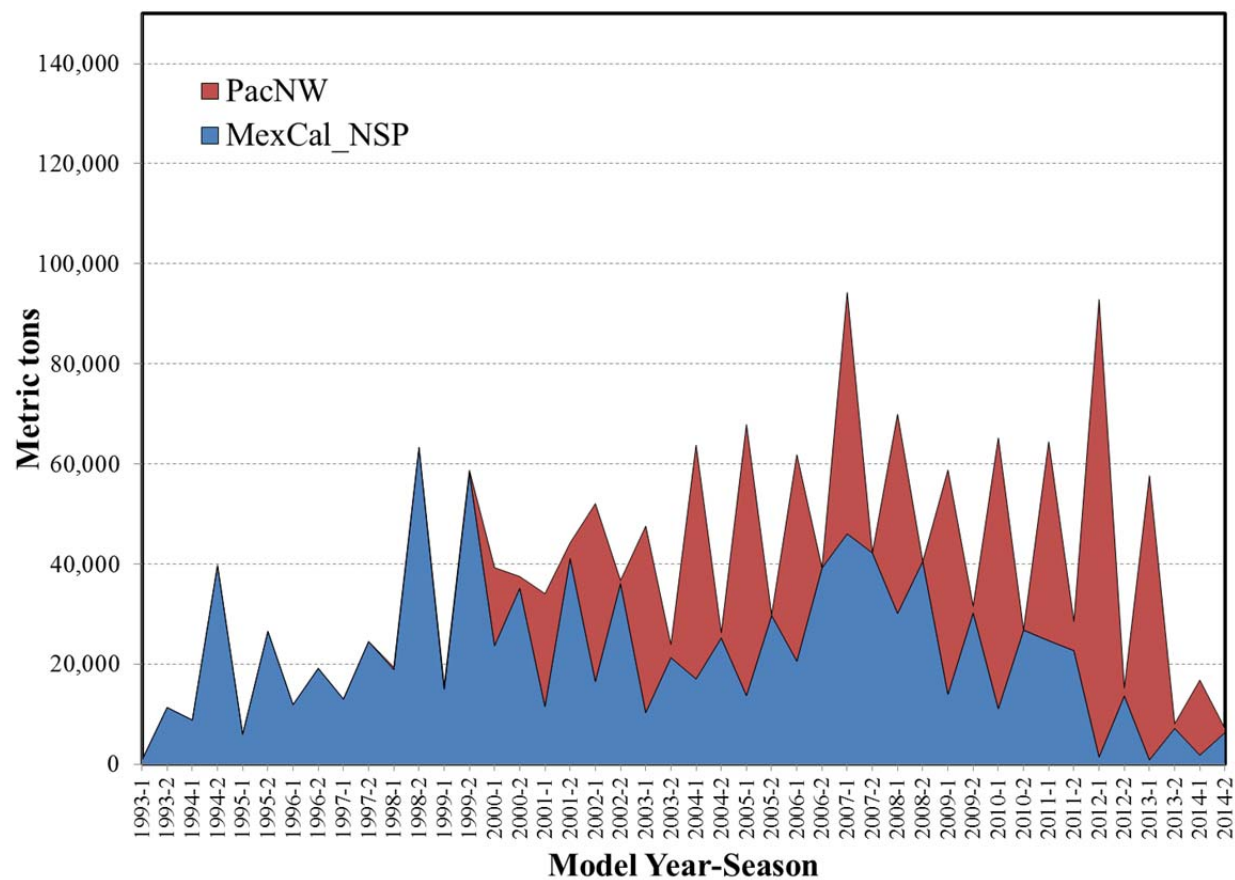
**Figure 5b.** von Bertalanffy growth from NSP fishery samples, sexes combined, as estimated outside of the SS model ( $t_0 = -2.01$ ,  $K = 0.318$ ,  $L_\infty = 23.788$ ).



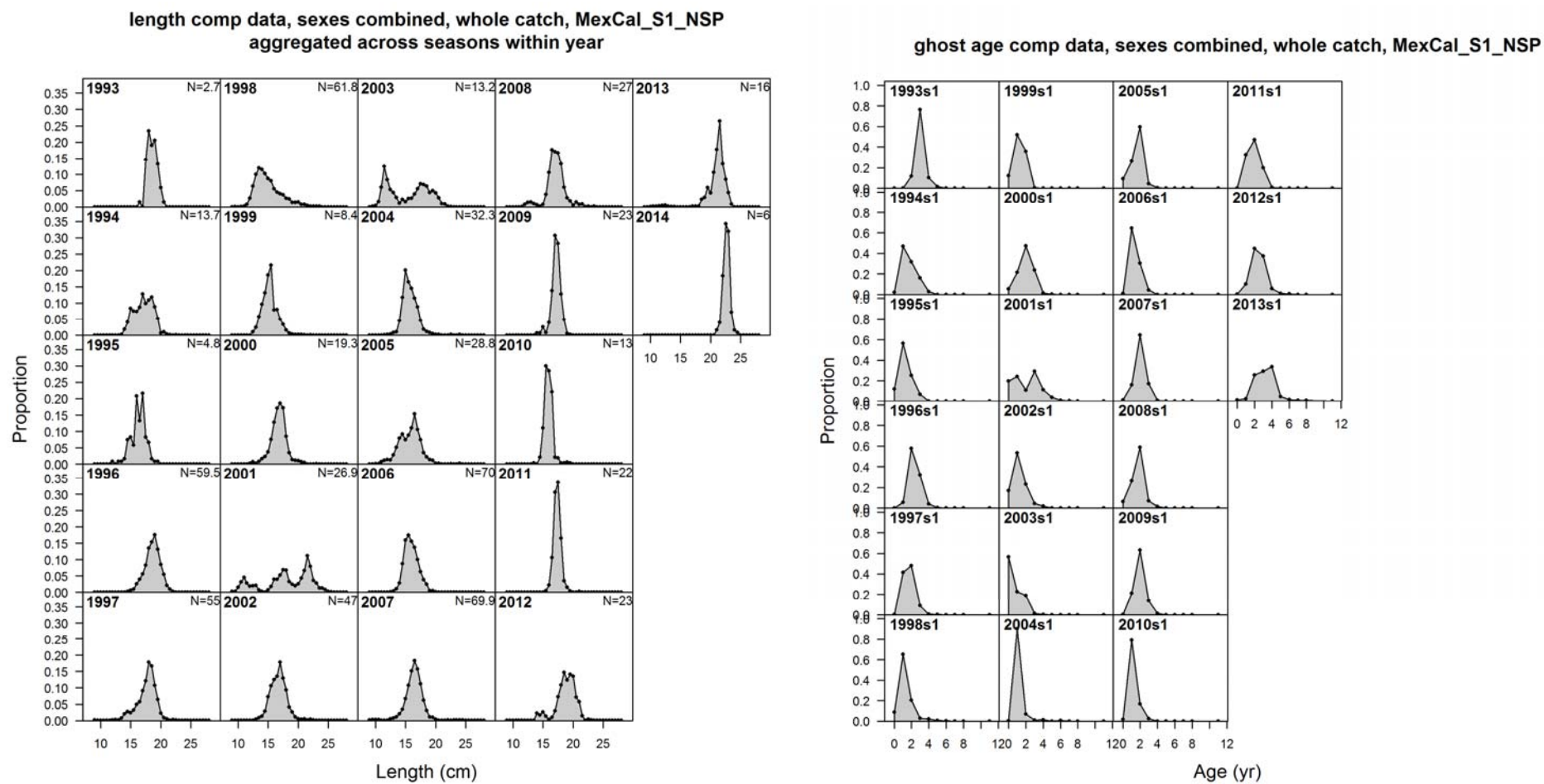
**Figure 6a.** Maturity ( $L_{50} = 15.44$  cm) and spawning output as a function of length.



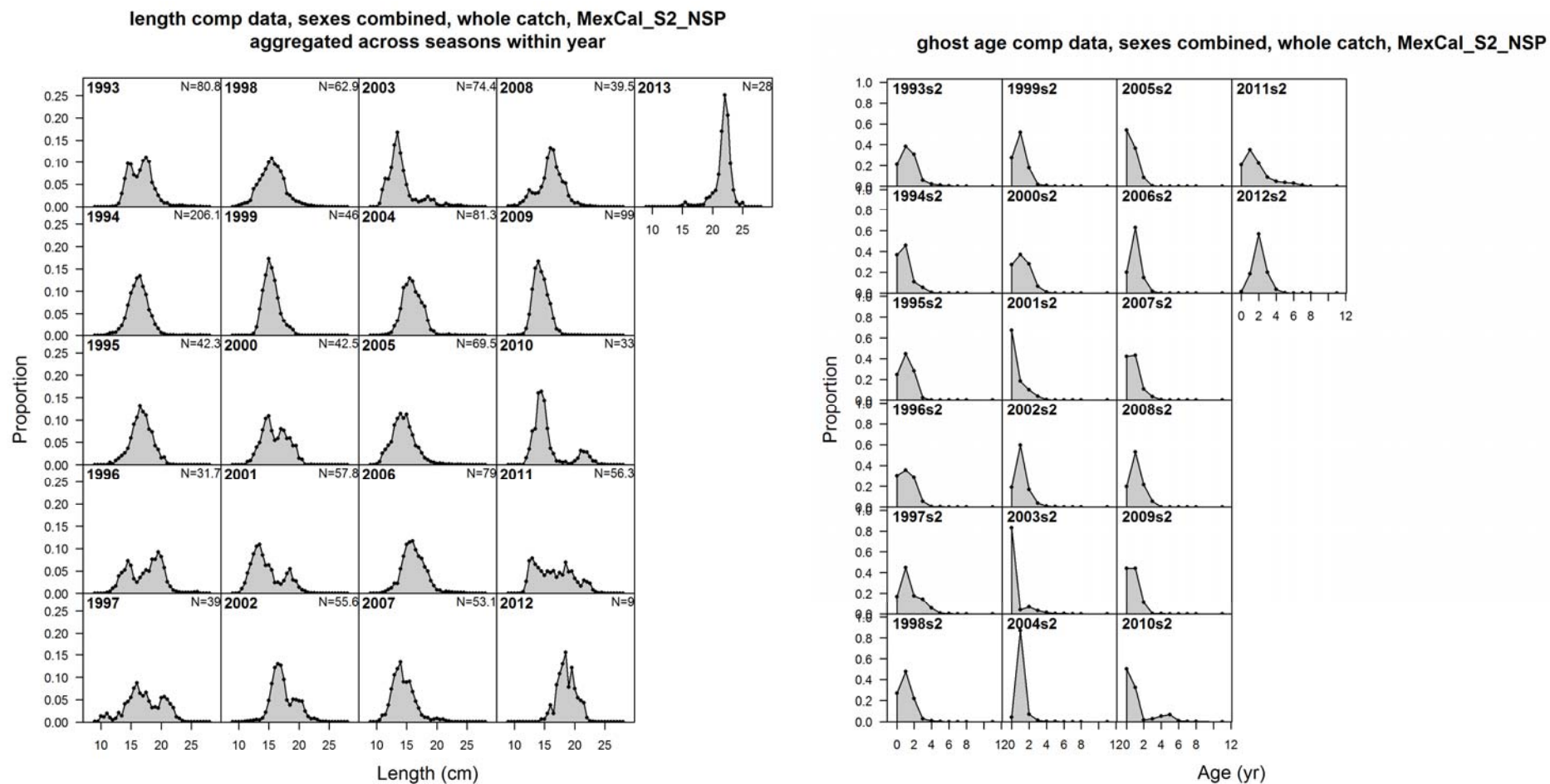
**Figure 6b.** Maturity and fecundity as a function of age derived from growth in model T.



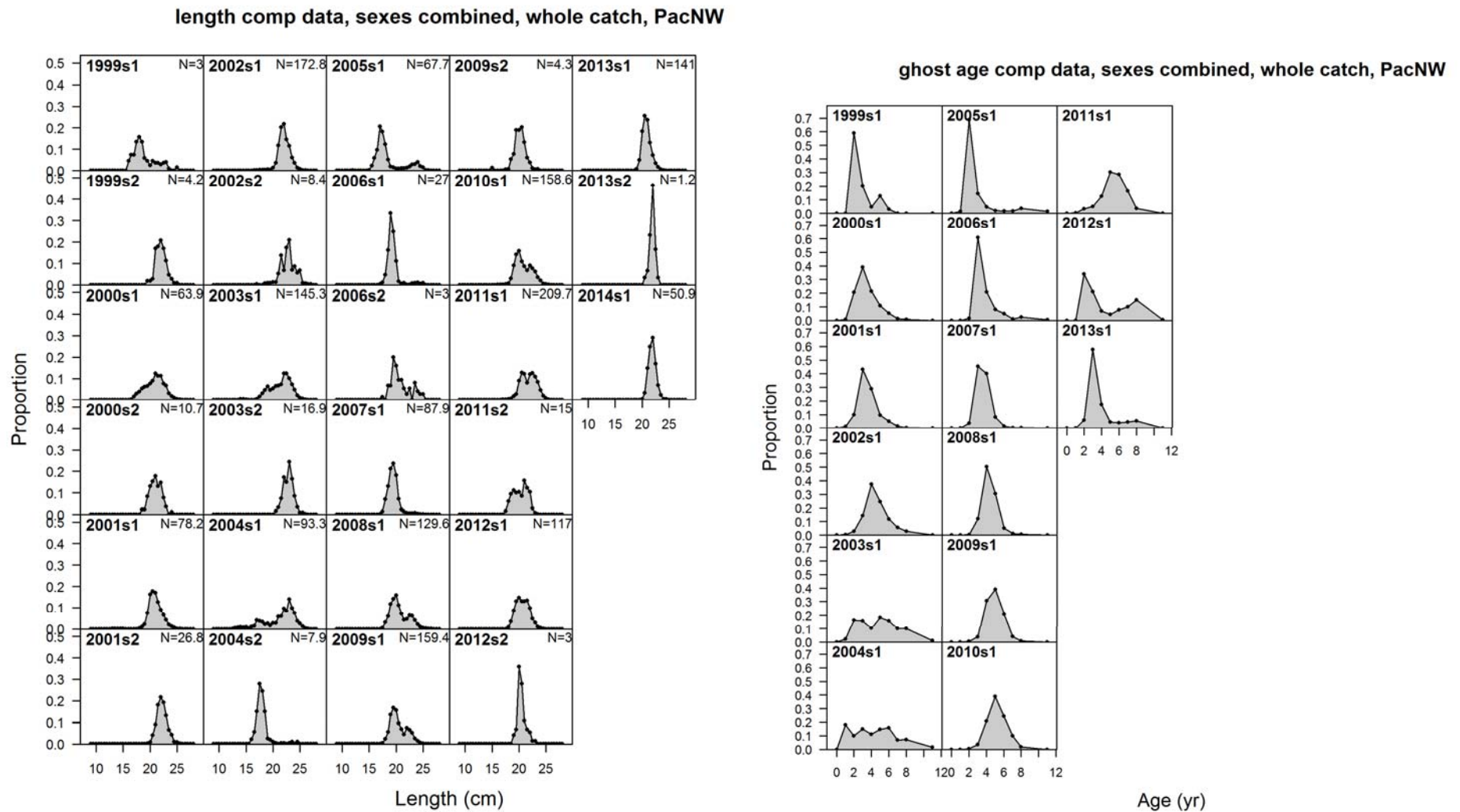
**Figure 7.** Pacific sardine landings (mt) by fleet, model year and semester as used in NSP model scenarios, including final base model T.



**Figure 8.** Length-composition (left panel) and implied age composition (right panel) data for the MexCal\_S1 fleet.

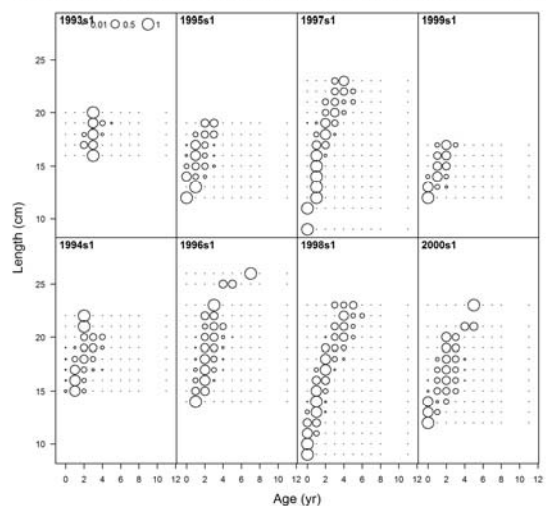


**Figure 9.** Length-composition (left panel) and implied age composition (right panel) data for the MexCal\_S2 fleet.

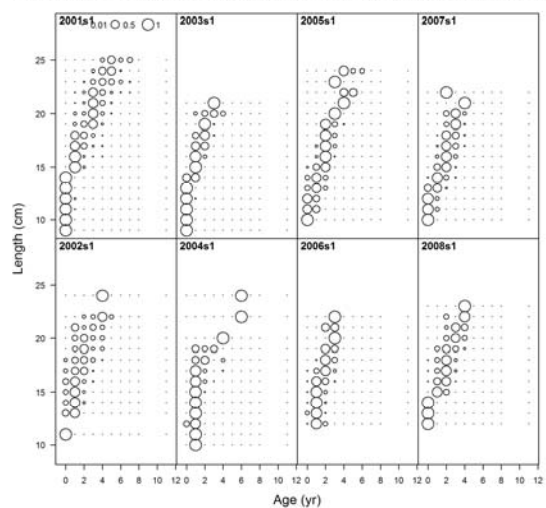


**Figure 10.** Length-composition (left panel) and implied age-composition (right panel) data for the PacNW fleet.

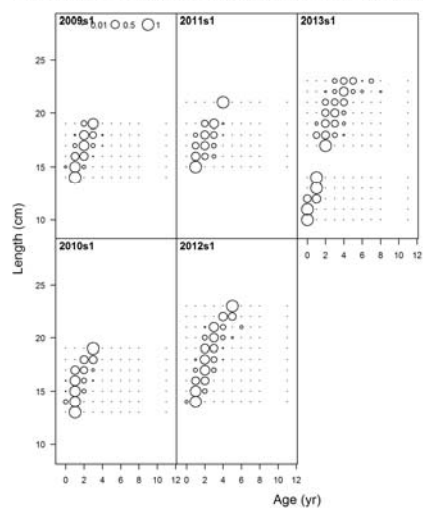
conditional age-at-length data, sexes combined, whole catch, MexCal\_S1\_NSP (max=



conditional age-at-length data, sexes combined, whole catch, MexCal\_S1\_NSP (max=

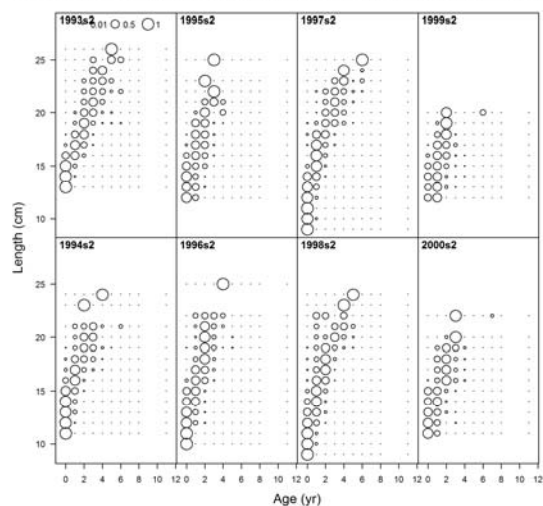


conditional age-at-length data, sexes combined, whole catch, MexCal\_S1\_NSP (max=

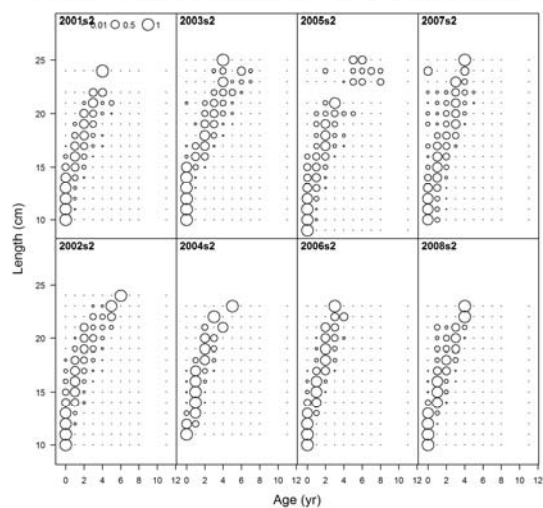


**Figure 11.** Conditional age-at-length data for the MexCal\_S1 fleet.

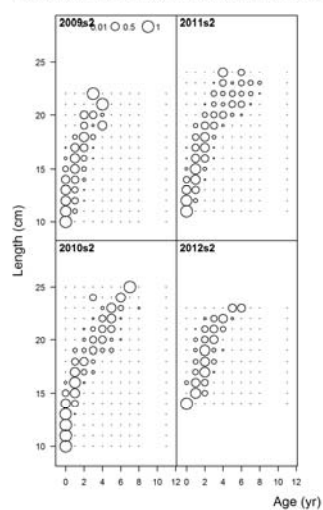
conditional age-at-length data, sexes combined, whole catch, MexCal\_S2\_NSP (max=



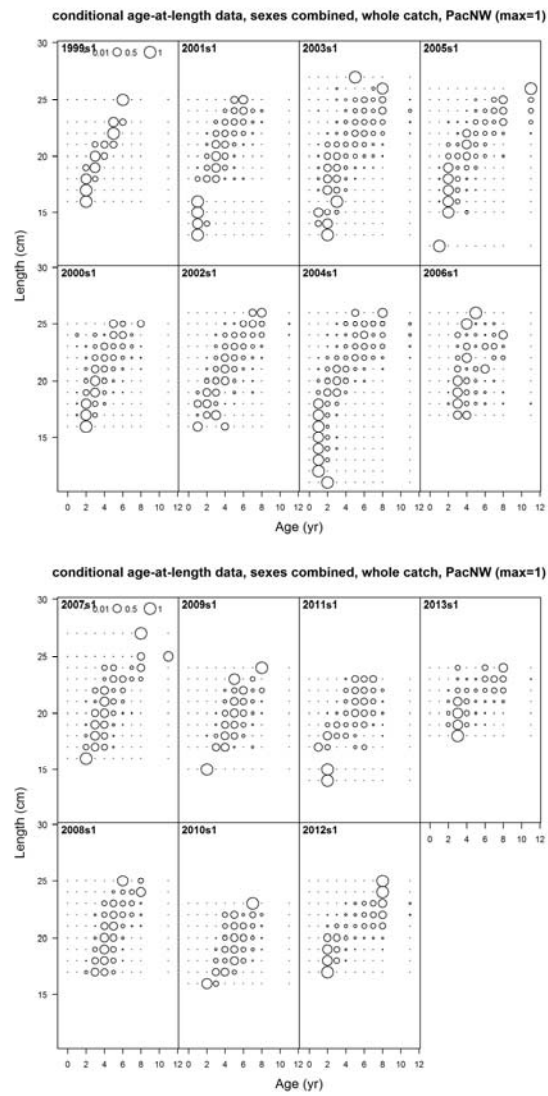
conditional age-at-length data, sexes combined, whole catch, MexCal\_S2\_NSP (max=



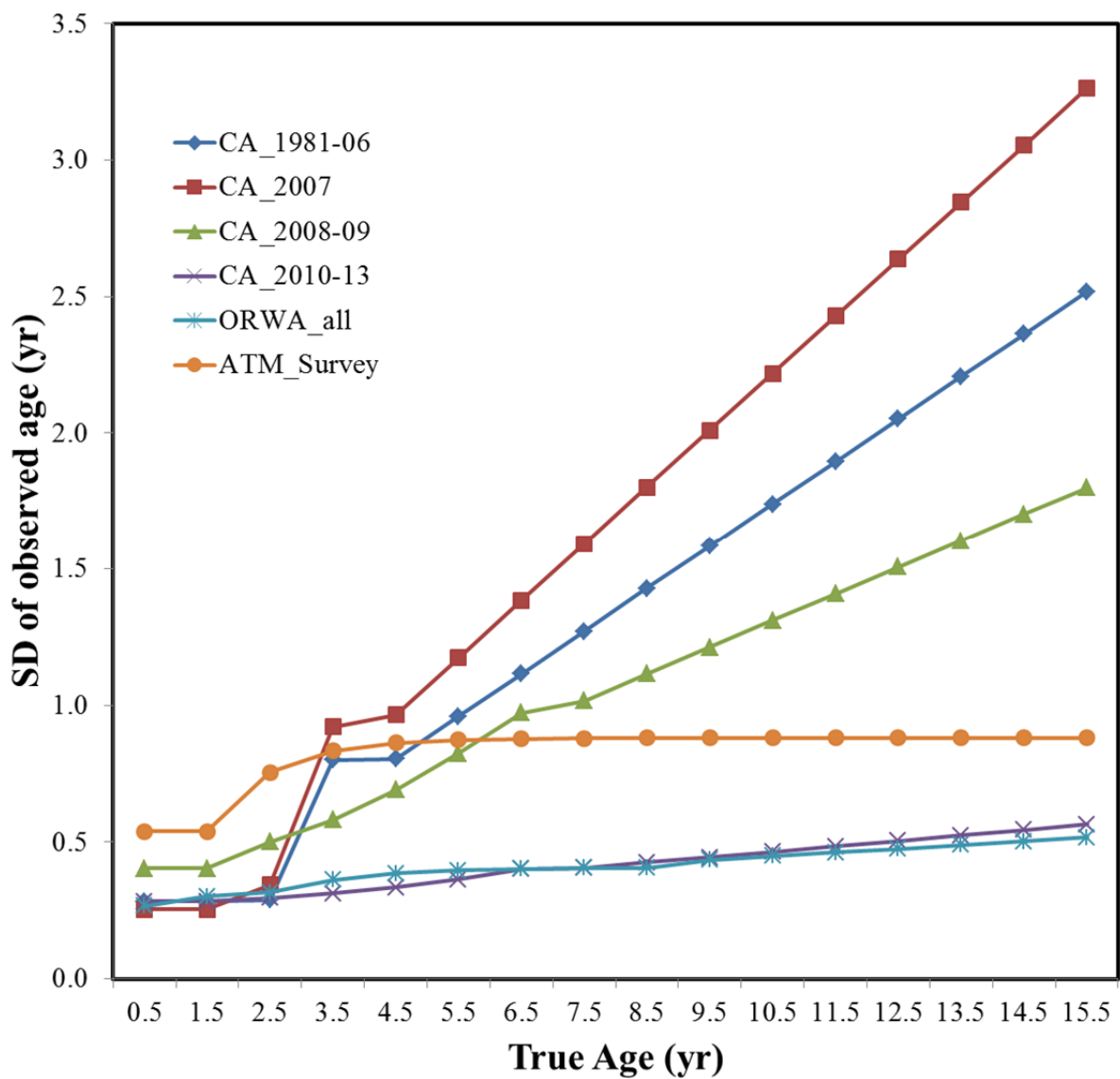
conditional age-at-length data, sexes combined, whole catch, MexCal\_S2\_NSP (max=



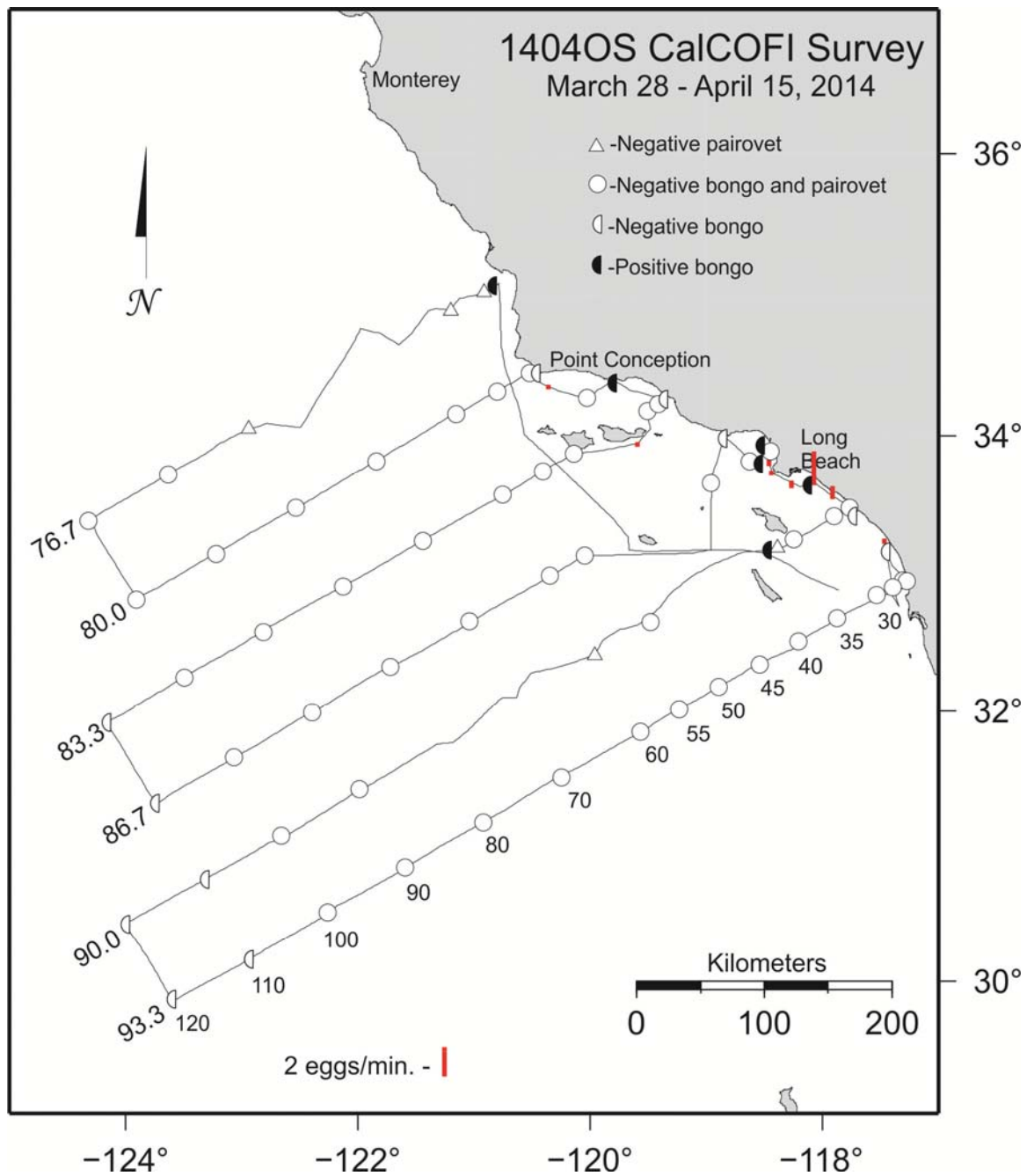
**Figure 12.** Conditional age-at-length data for the MexCal\_S2 fleet.



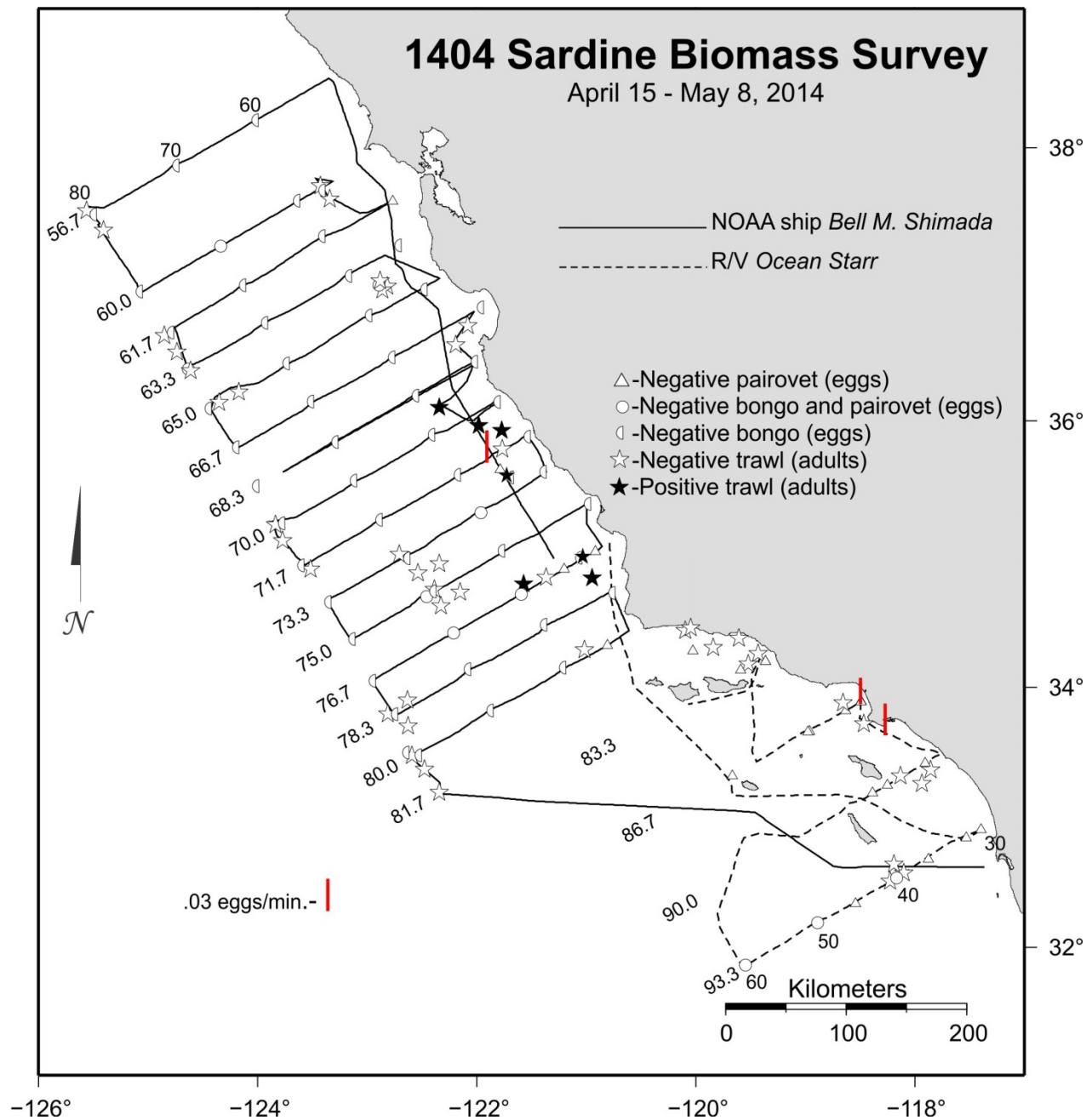
**Figure 13.** Conditional age-at-length data for the PacNW fleet.



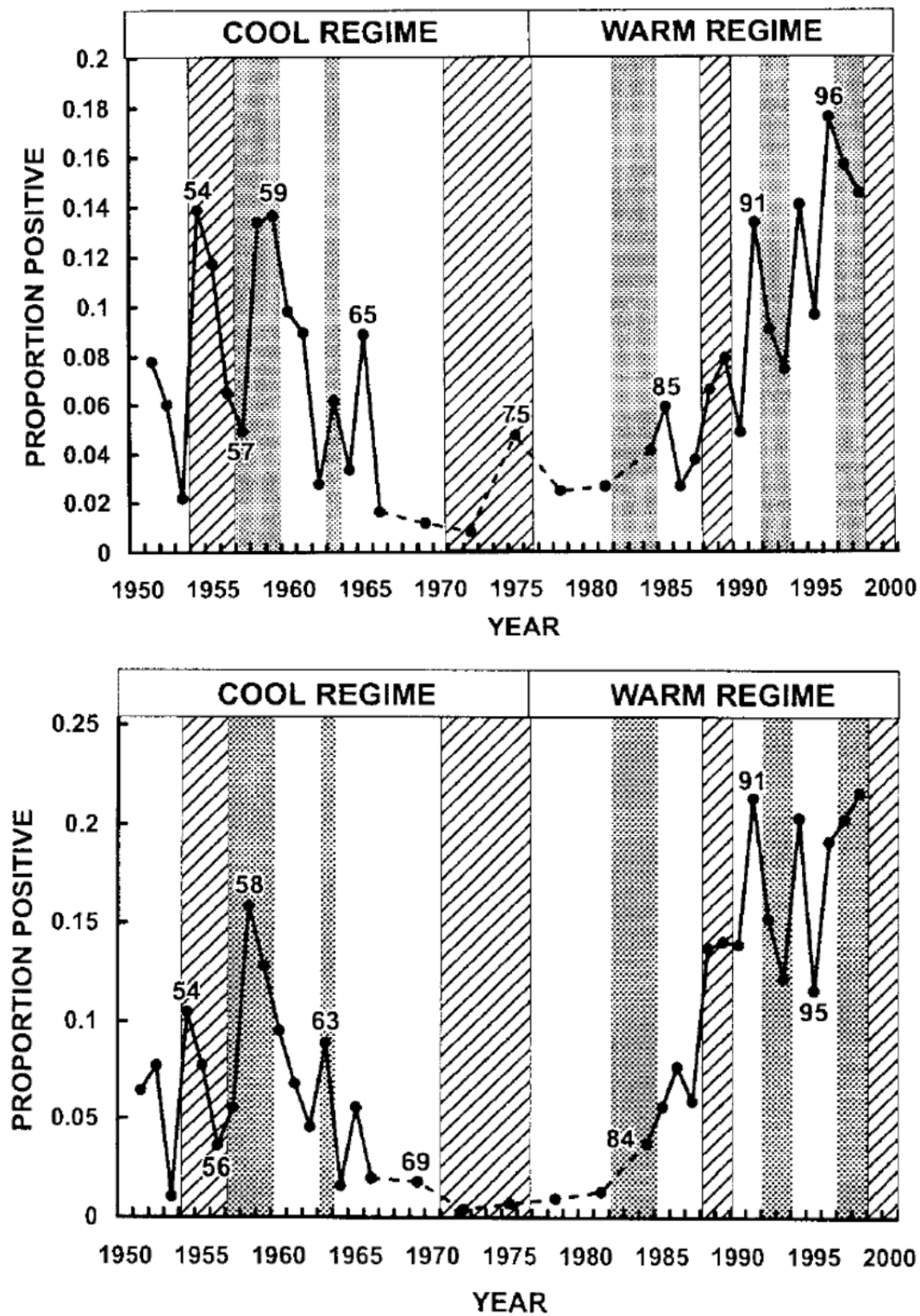
**Figure 14.** Laboratory- and year-specific ageing errors applied in all models.



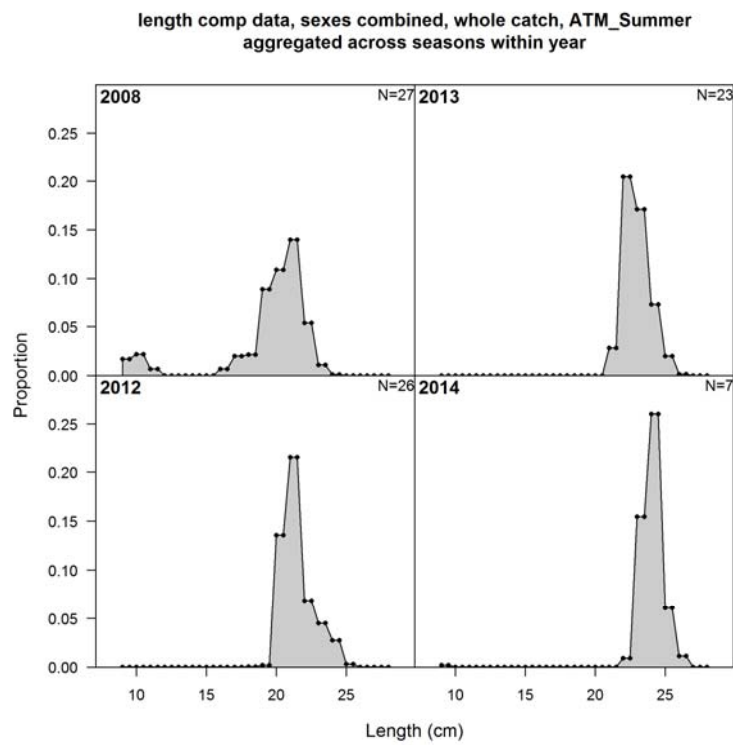
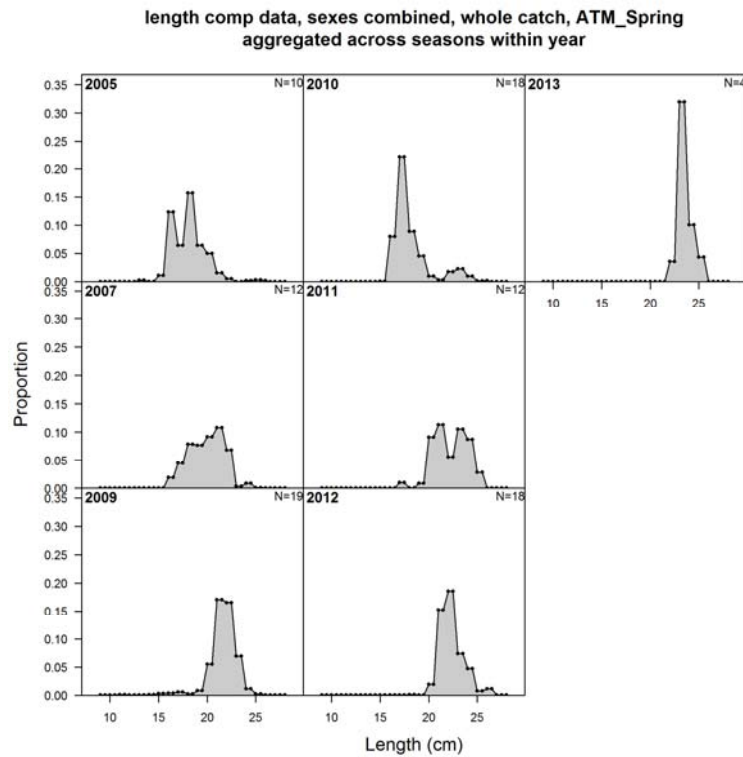
**Figure 15a.** Distribution of CUFES, bongo, and paironet samples from the 1404 CalCOFI survey conducted aboard the R/V *Ocean Starr* during spring 2014.



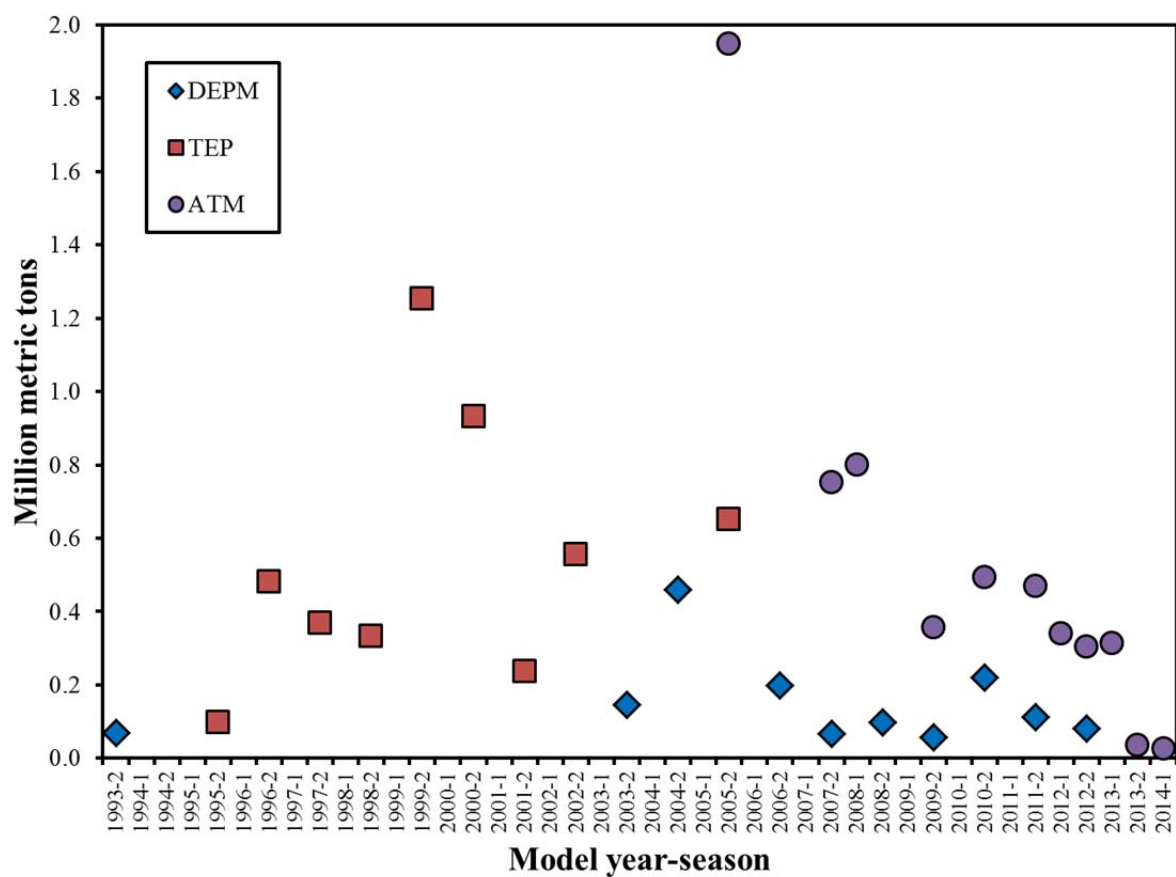
**Figure 15b.** Distribution of CUFES, bongo, pairvet, and adult trawl samples from the 1404 SWFSC sardine survey in the standard DEPM sampling DEPM index, conducted aboard the R/V *Ocean Starr* and the NOAA ship *Bell M. Shimada* during spring 2014.



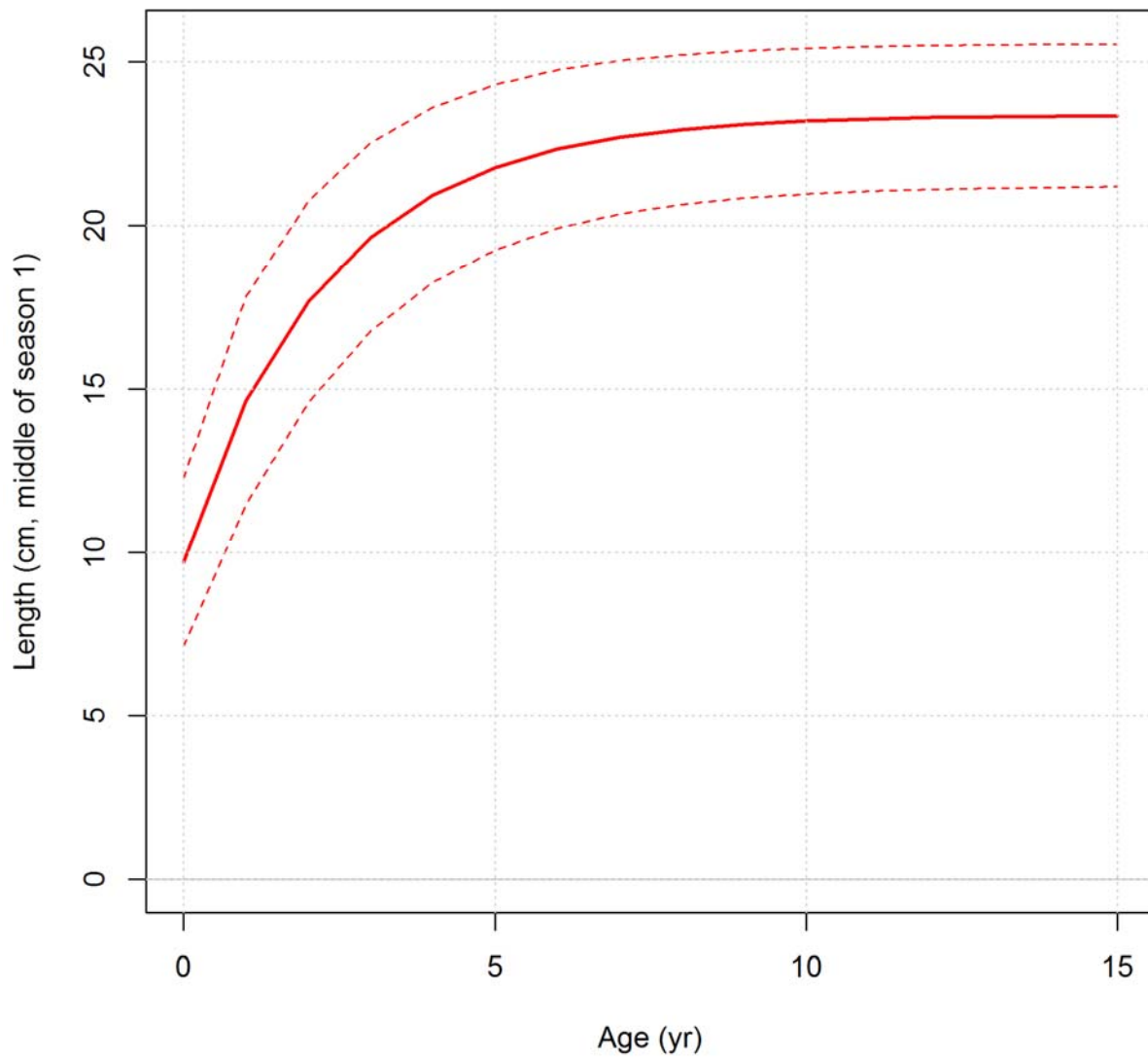
**Figure 16.** Historical time series of Pacific sardine eggs (upper) and larvae (lower) sampled in the current CalCOFI sampling grid (San Diego to Avila Beach, CA). Data are proportion of bongo tows positive for eggs or larvae. Displays are from CalCOFI Atlas No. 34 (Moser et al. 2001).



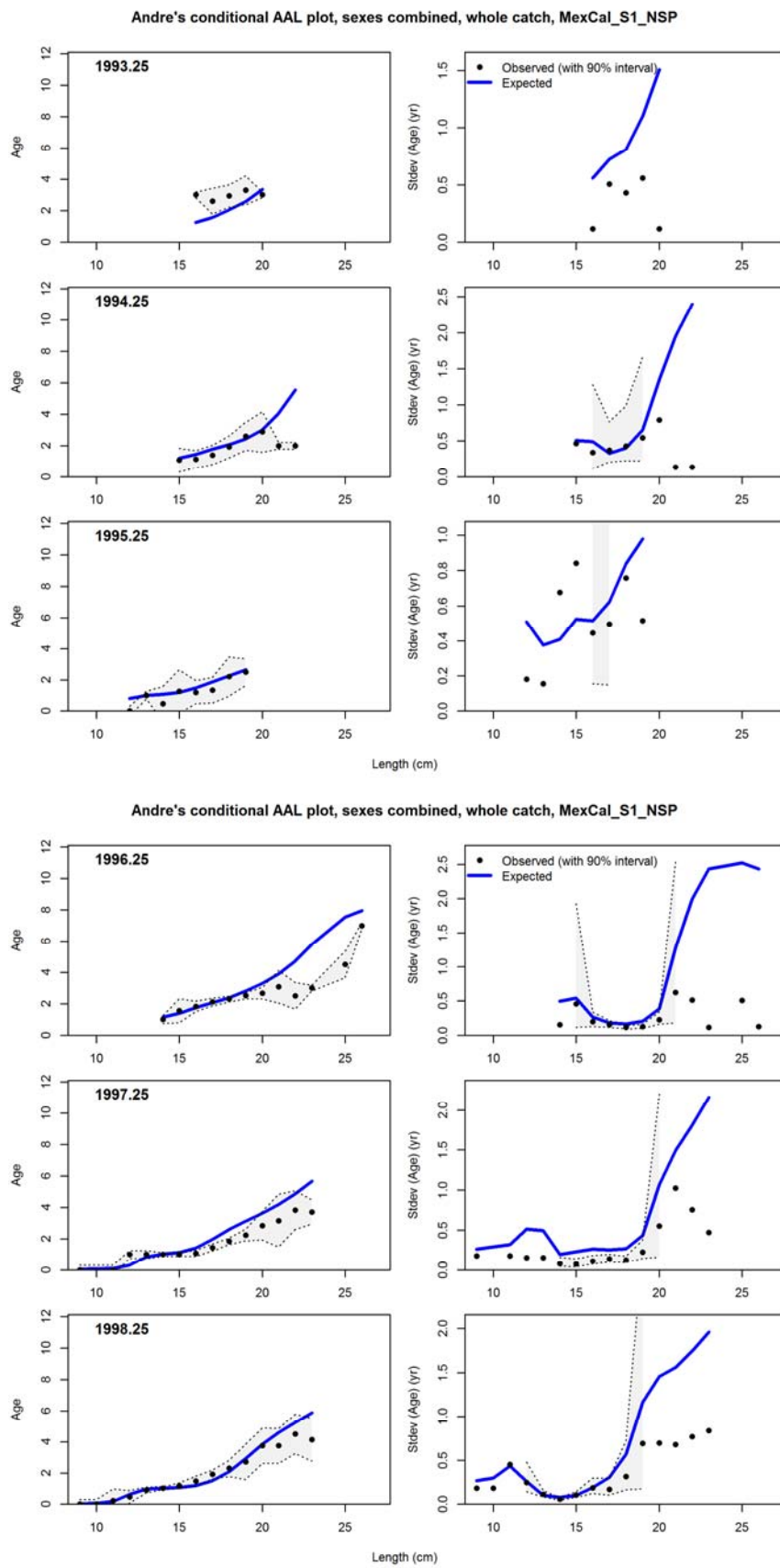
**Figure 17.** Length-composition data (1-cm resolution) for the ATM Spring (upper panel) and Summer (lower panel) surveys.



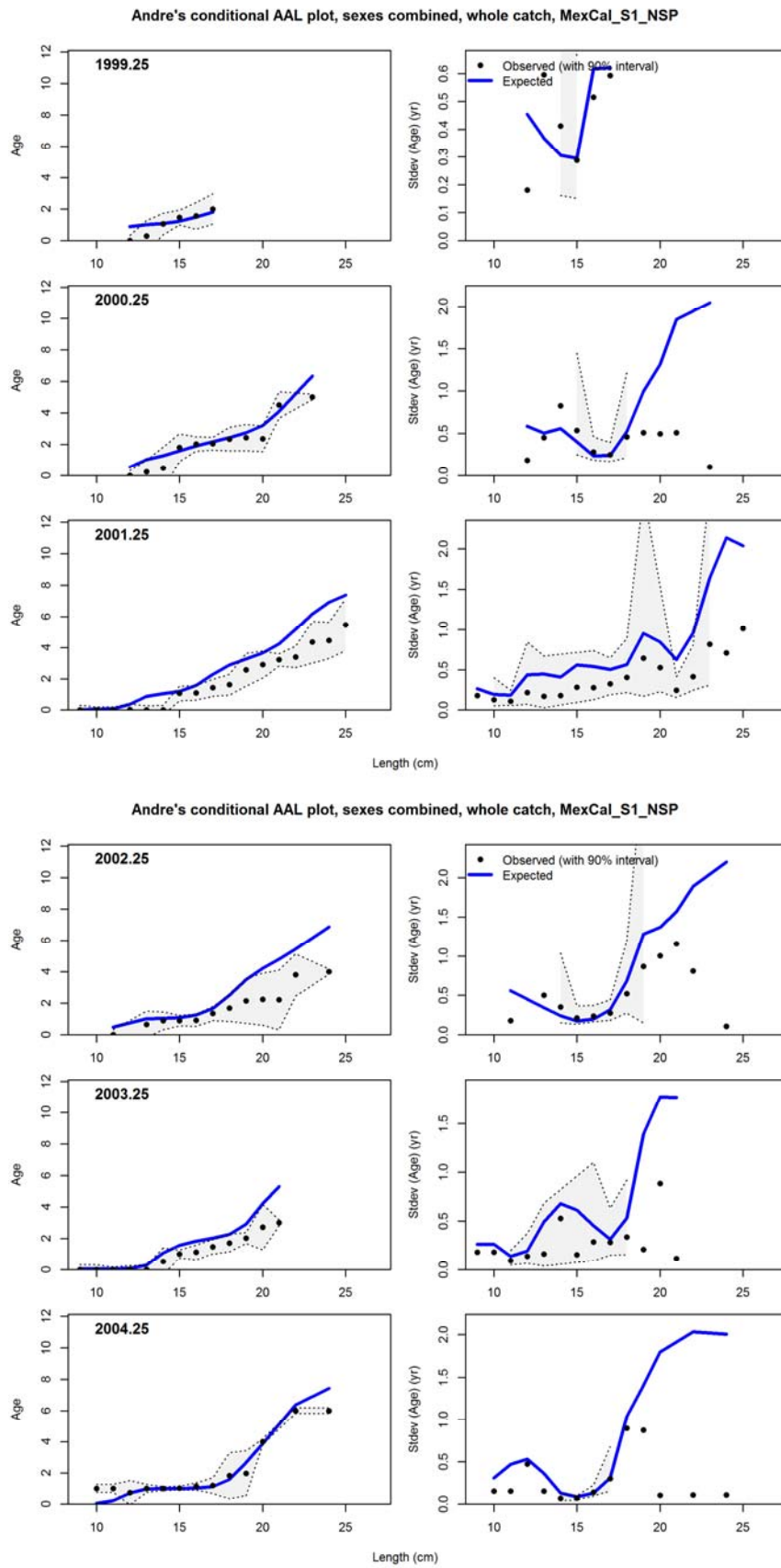
**Figure 18.** Survey indices of abundance (biomass units) included in final base model T. TEP is modeled as total SSB, and DEPM as female SSB. Error bars for survey estimates are shown in subsequent displays for model fits to respective surveys.



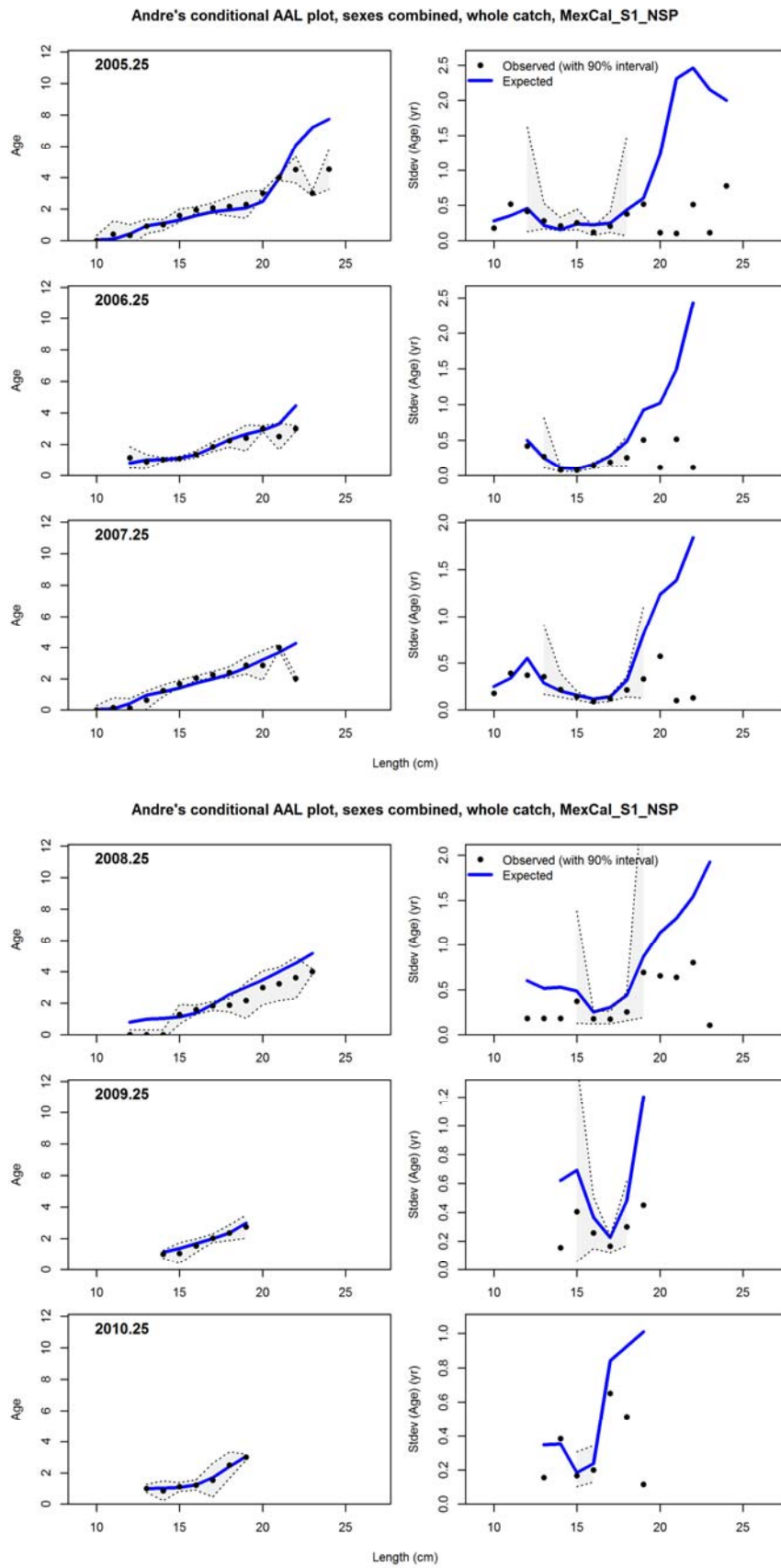
**Figure 19.** Length-at-age relationship estimated in base model T ( $L_{0.5\text{yr}} = 11.3881$  (0.2819),  $L_{\infty} = 23.3801$  (0.1506),  $K = 0.4238$  (0.0234)).



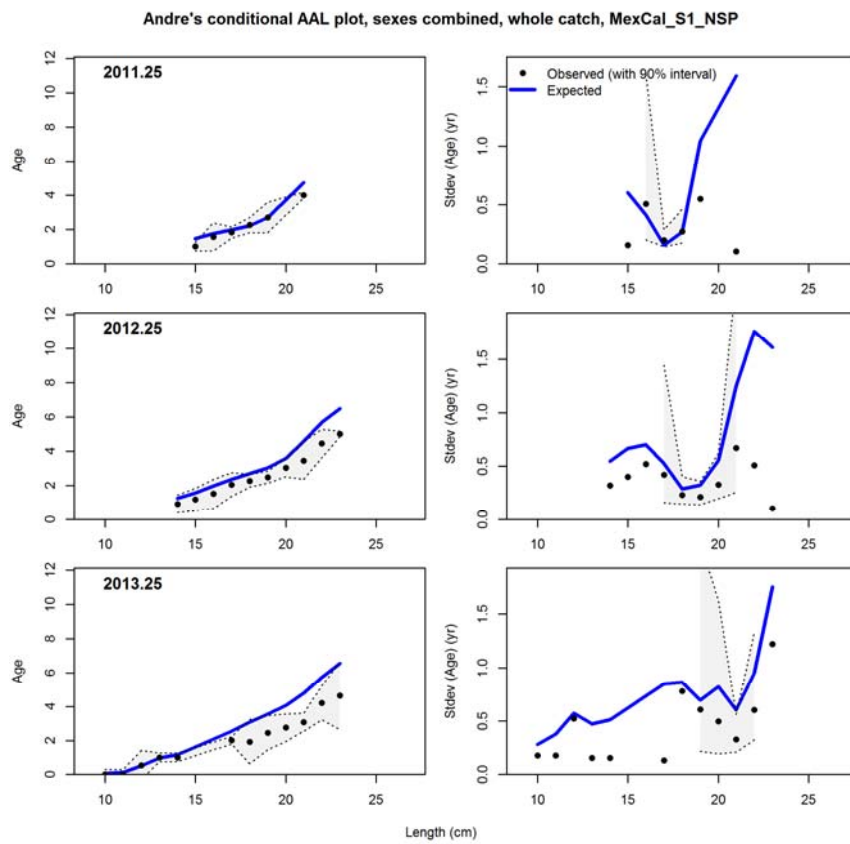
**Figure 20.** Model T fit to conditional age-at-length compositions for the MexCal\_S1 fleet.



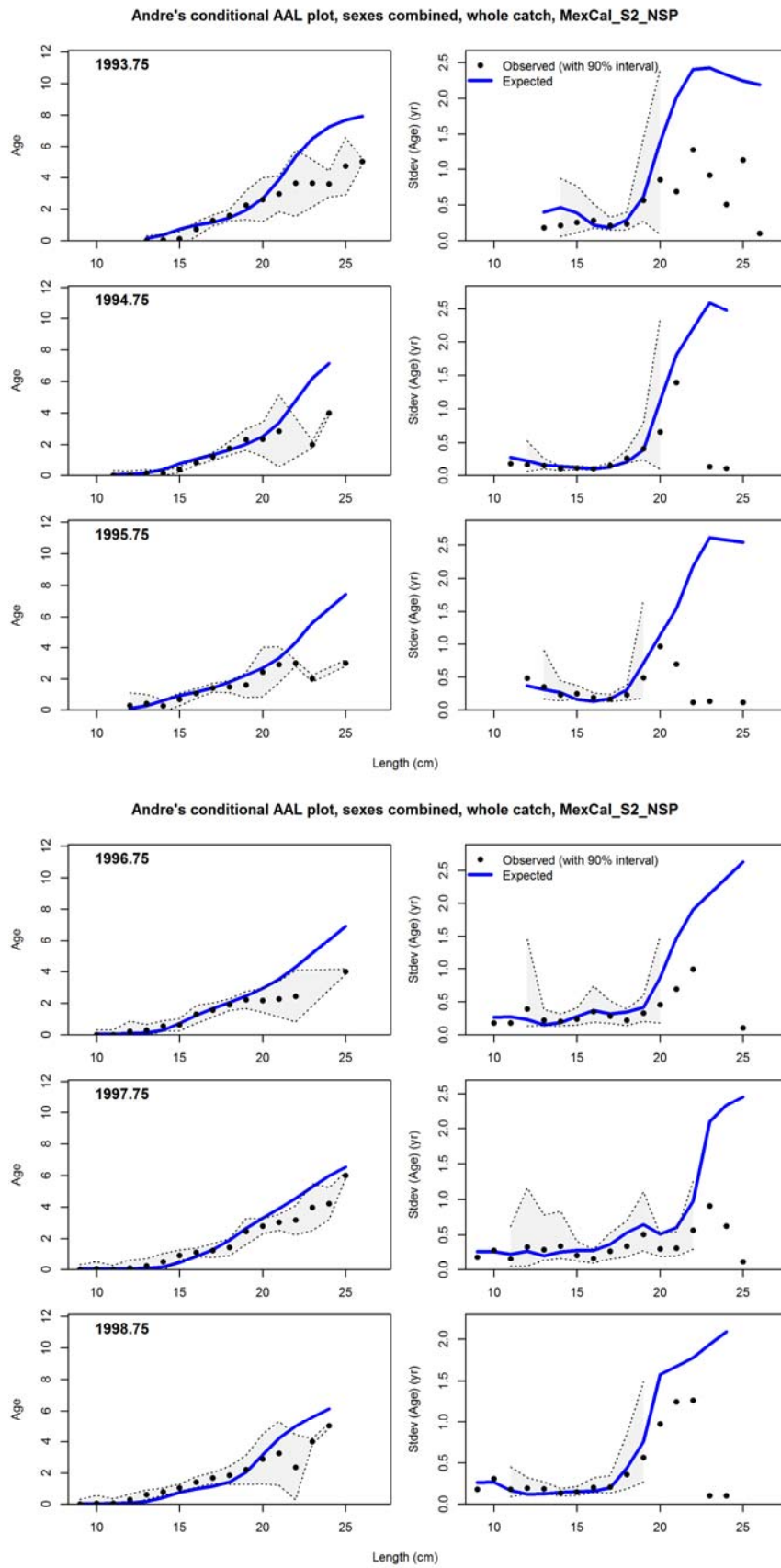
**Figure 20 (cont.).** Model T fit to conditional age-at-length compositions for the MexCal\_S1 fleet.



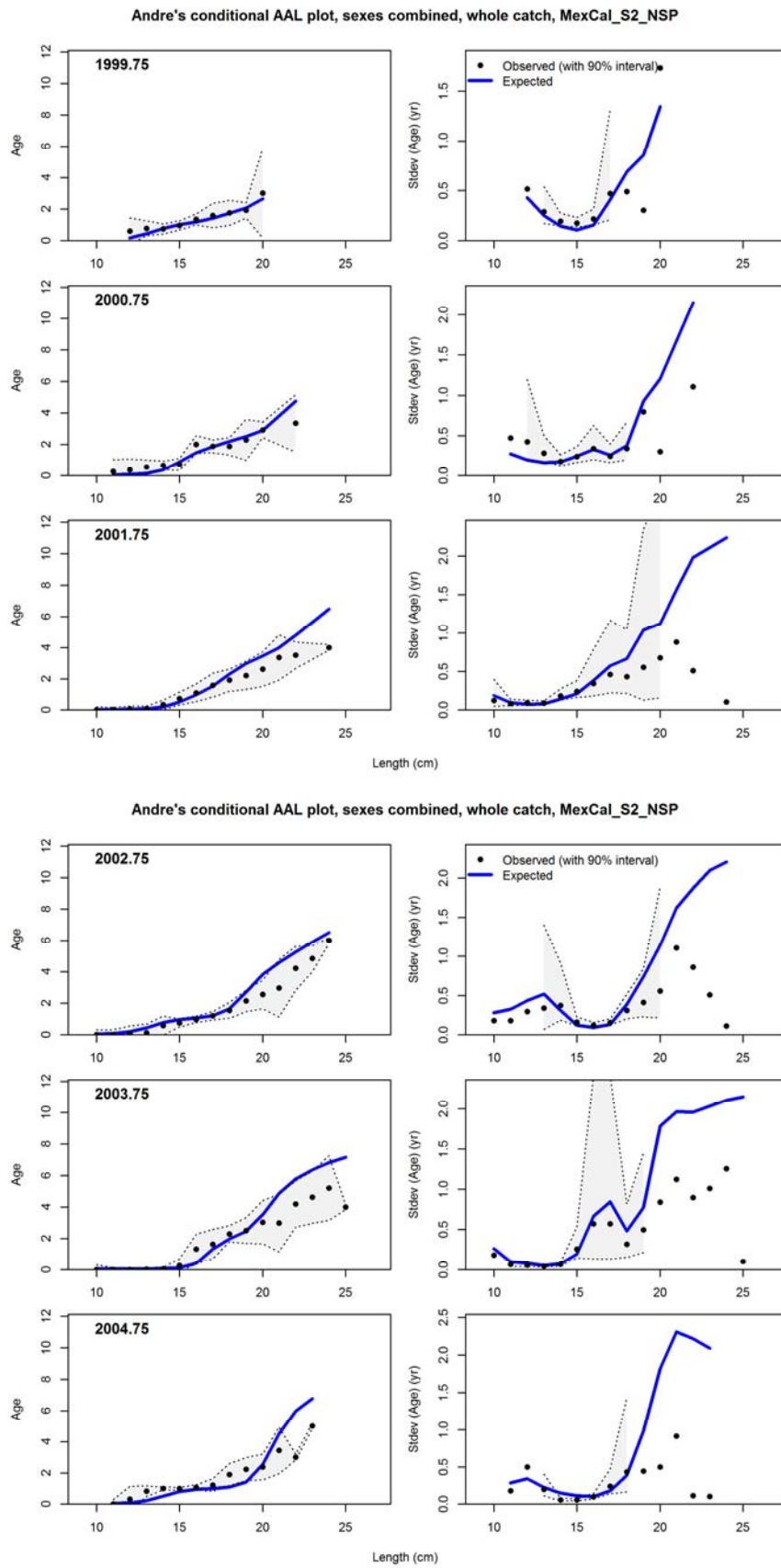
**Figure 20 (cont.).** Model T fit to conditional age-at-length compositions for the MexCal\_S1 fleet.



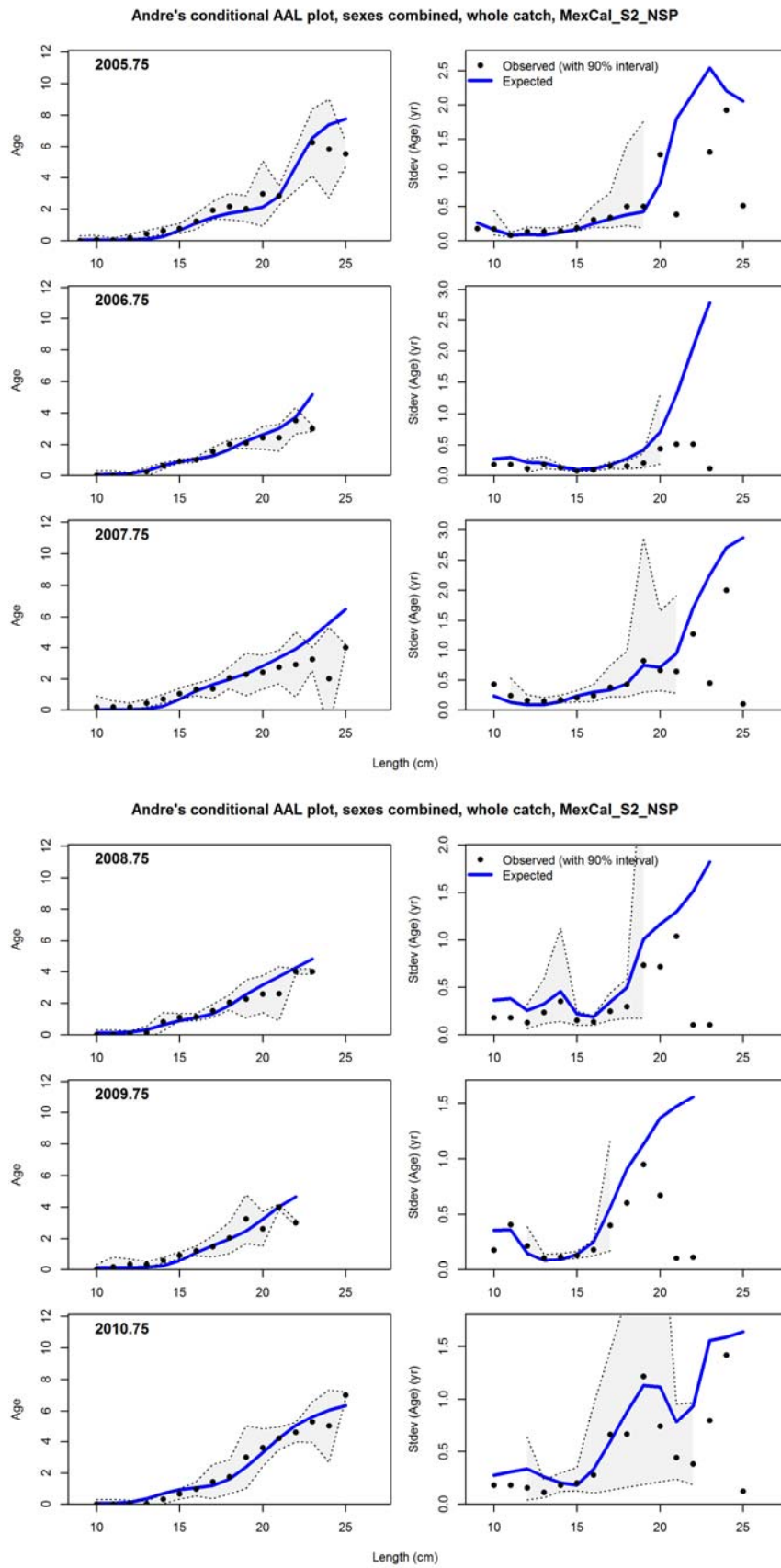
**Figure 20 (cont.).** Model T fit to conditional age-at-length compositions for the MexCal\_S1 fleet.



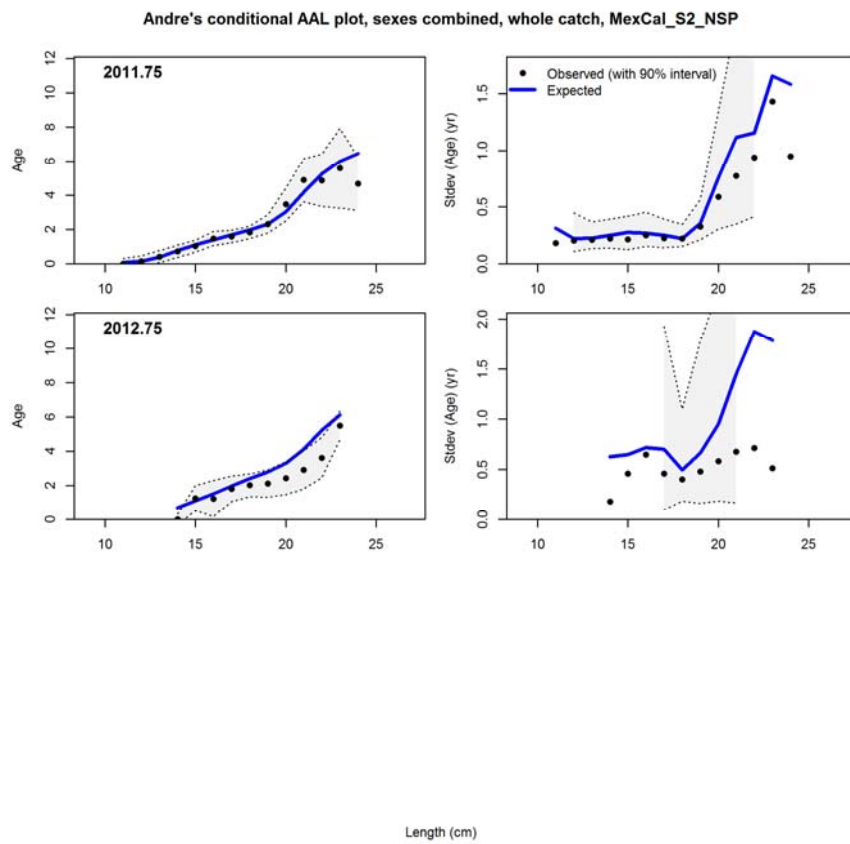
**Figure 21.** Model T fit to conditional age-at-length compositions for the MexCal\_S2 fleet.



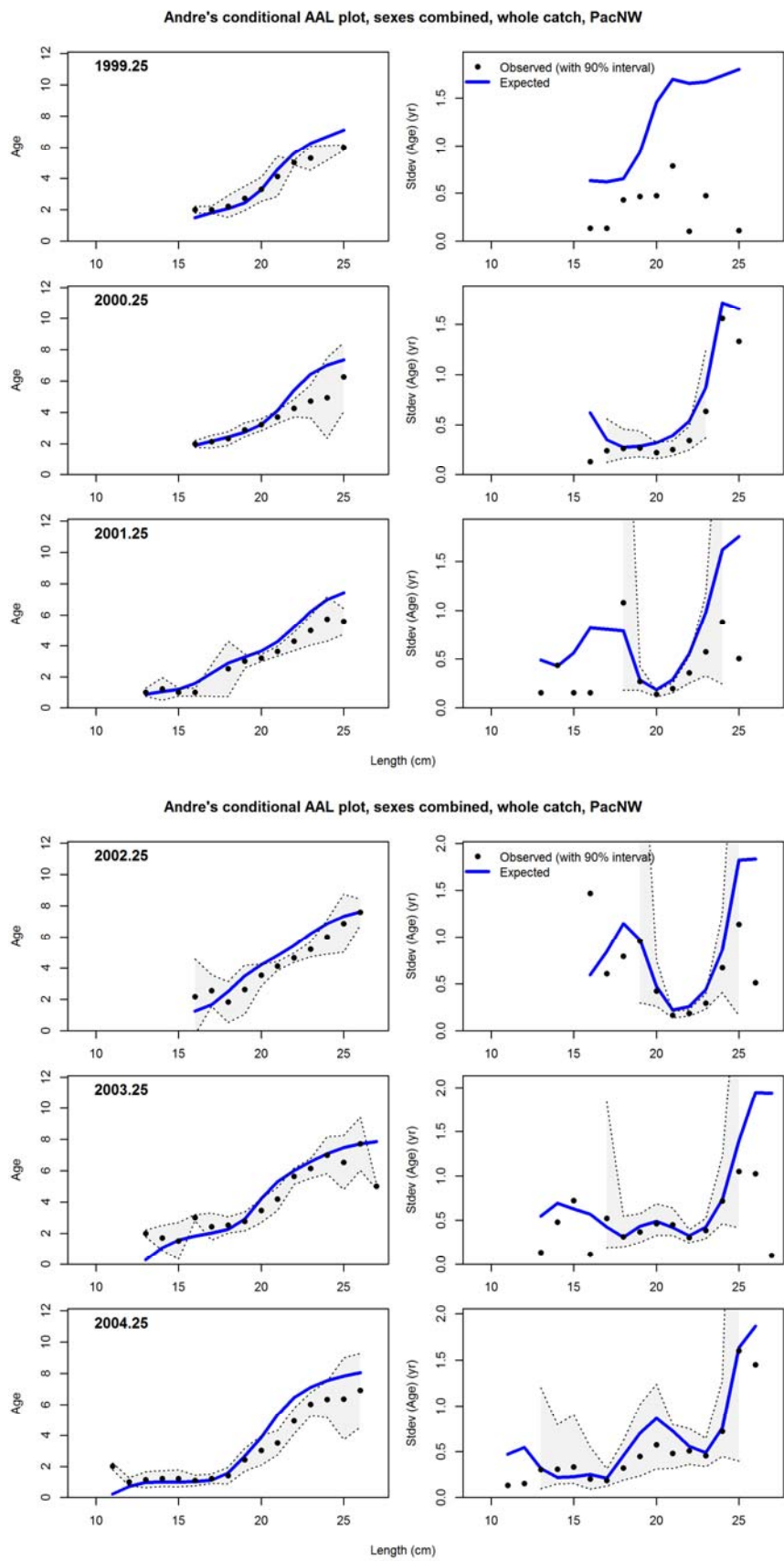
**Figure 21 (cont.).** Model T fit to conditional age-at-length compositions for the MexCal\_S2 fleet.



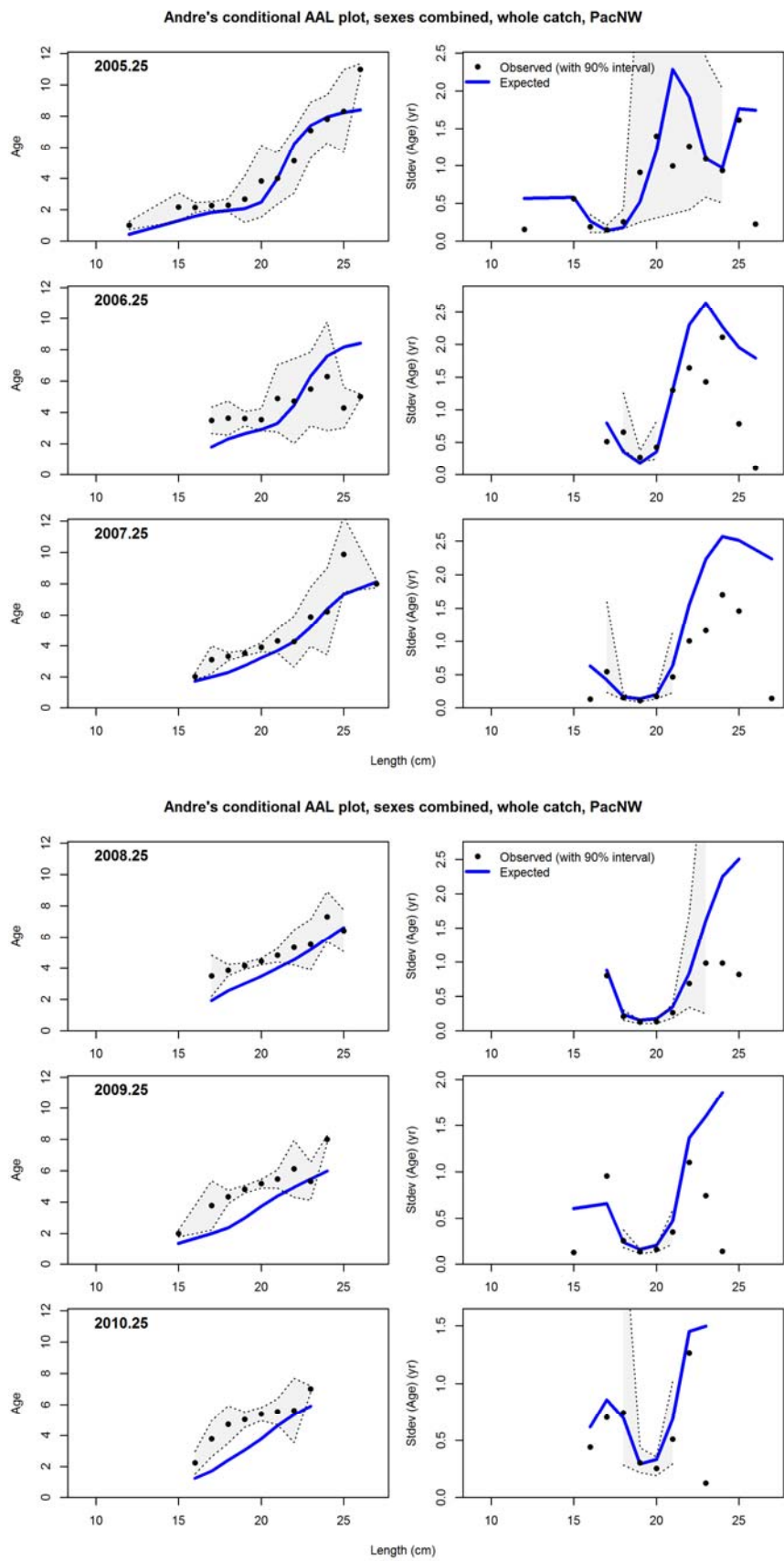
**Figure 21 (cont.).** Model T fit to conditional age-at-length compositions for the MexCal\_S2 fleet.



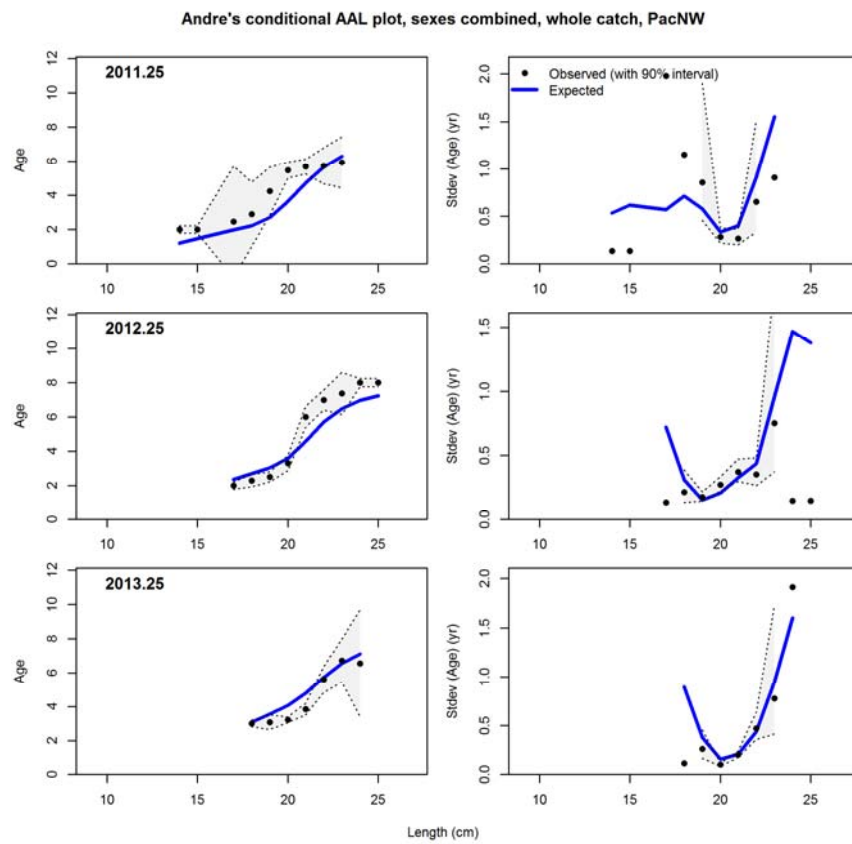
**Figure 21 (cont.).** Model T fit to conditional age-at-length compositions for the MexCal\_S2 fleet.



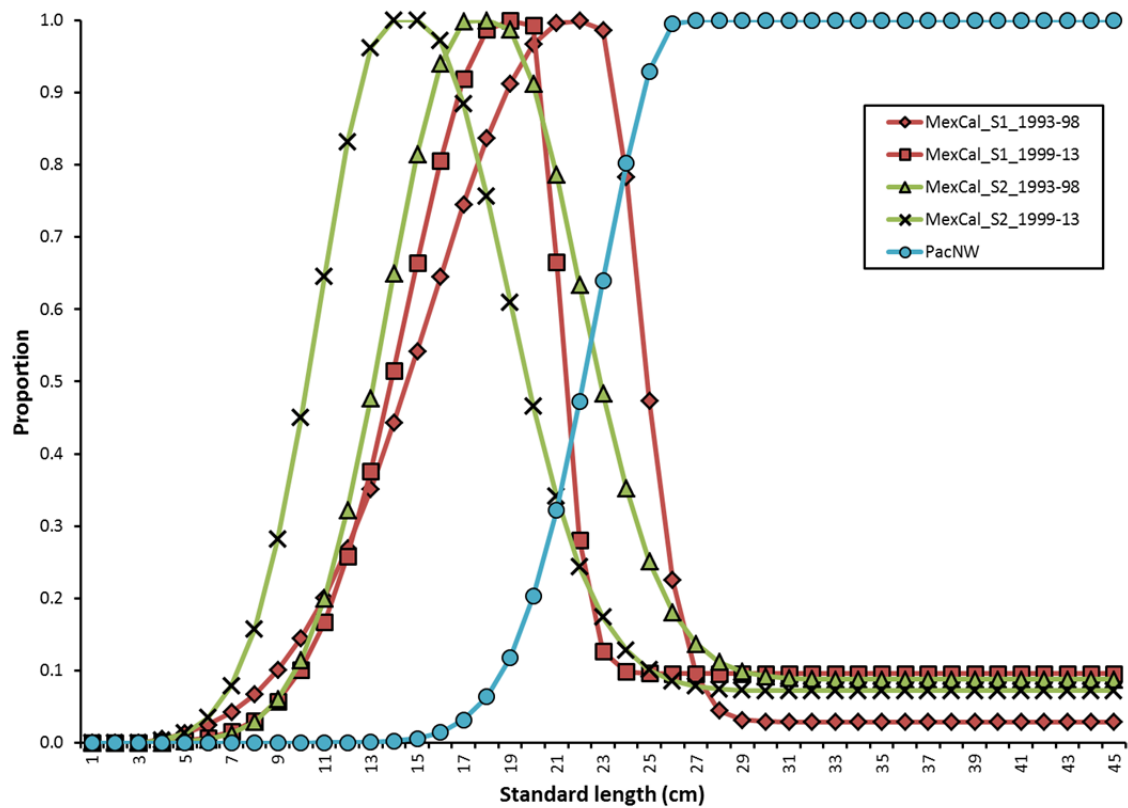
**Figure 22.** Model T fit to conditional age-at-length compositions for the PacNW fleet.



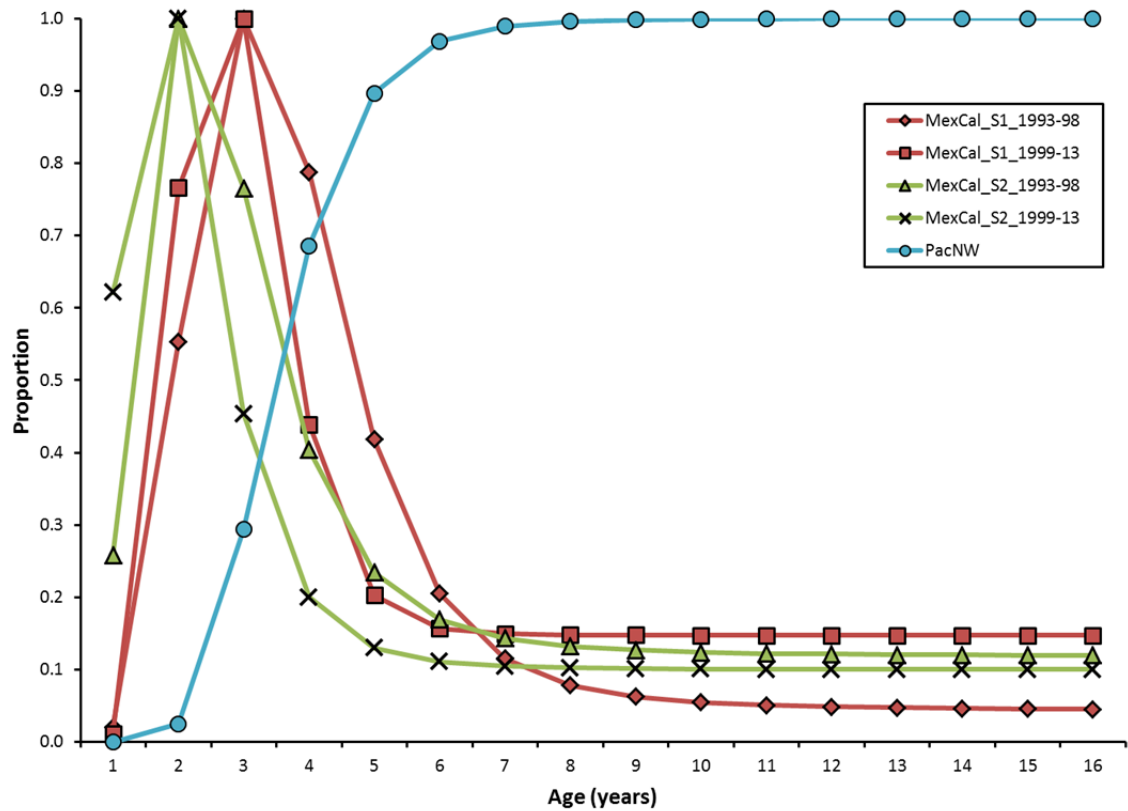
**Figure 22 (cont.).** Model T fit to conditional age-at-length compositions for the PacNW fleet.



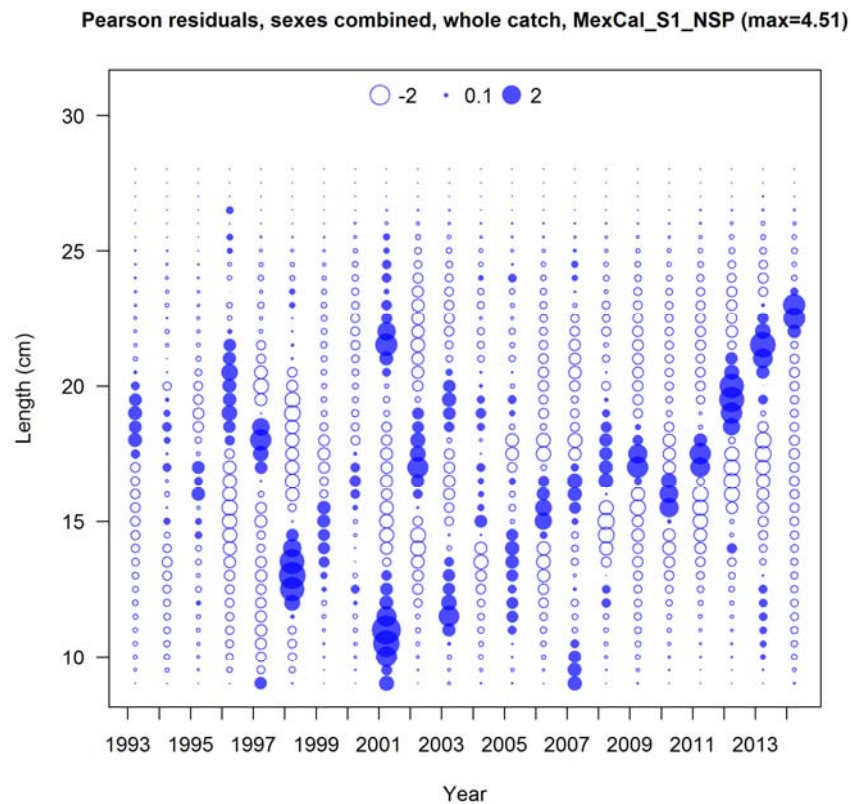
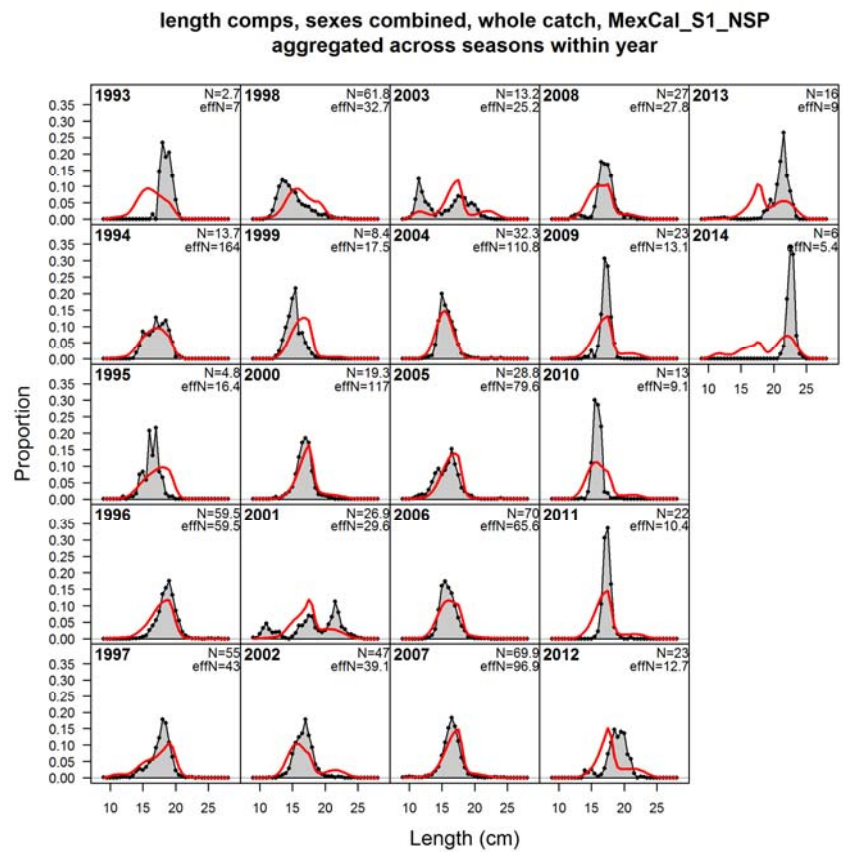
**Figure 22 (cont.).** Model T fit to conditional age-at-length compositions for the PacNW fleet.



**Figure 23a.** Length-based selectivity patterns for fleets in base model T.

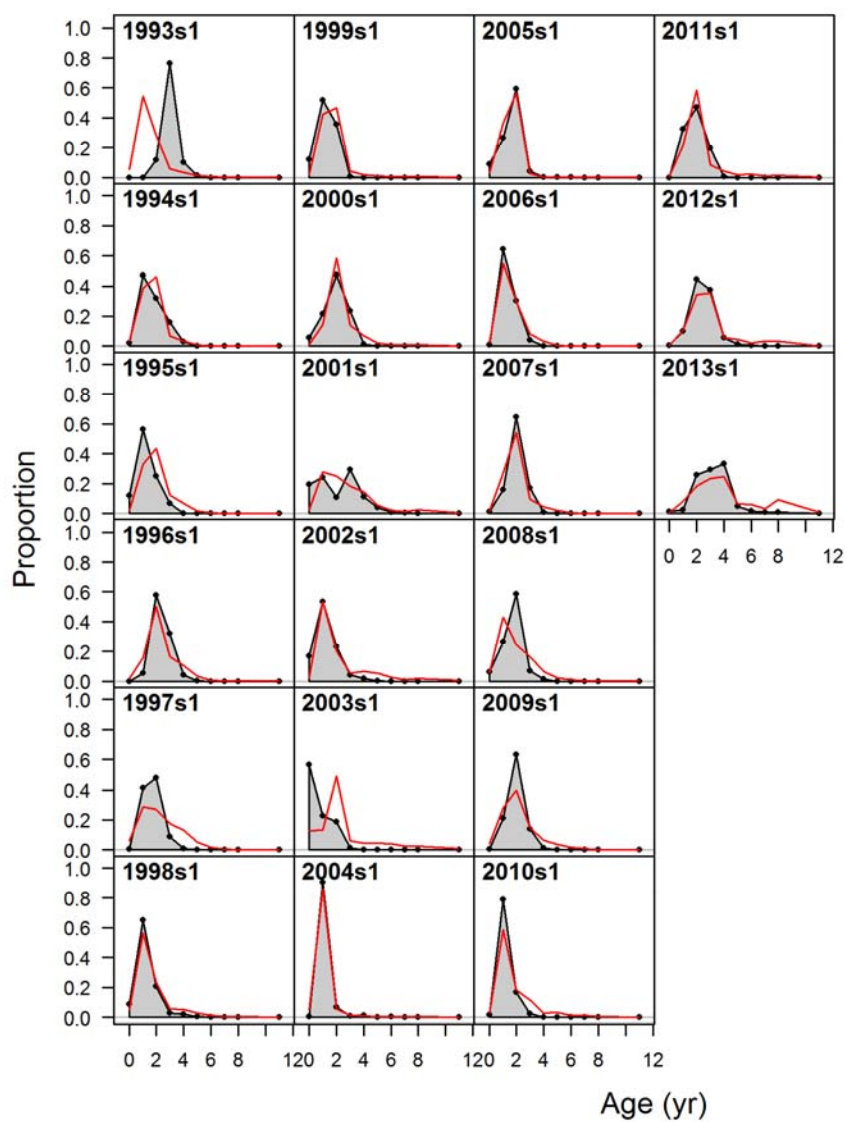


**Figure 23b.** Implied age-selectivity patterns for fleets in base model T.

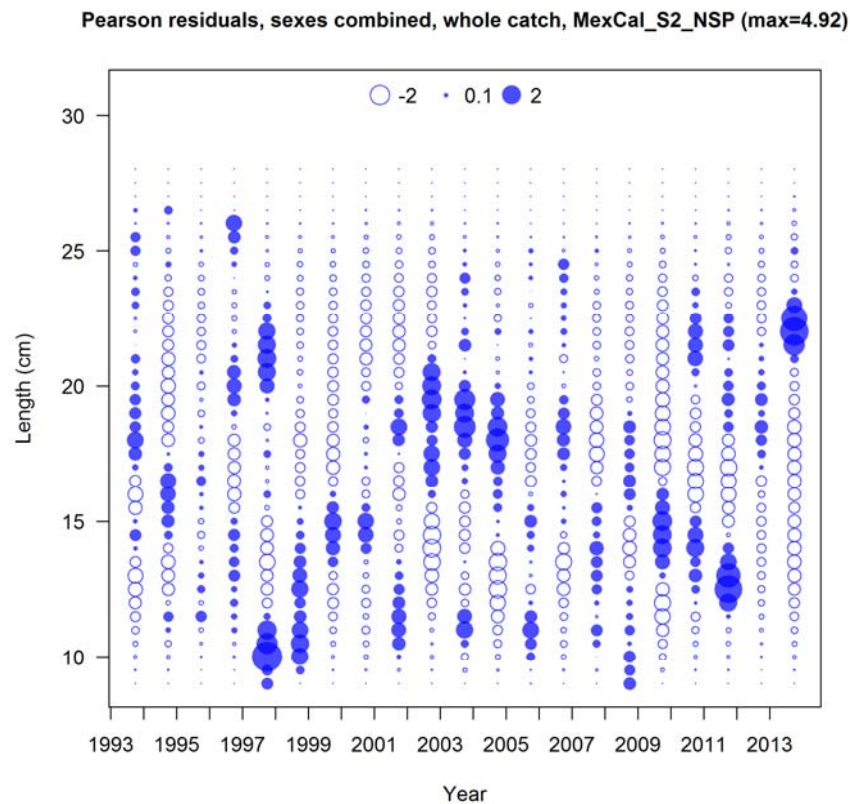
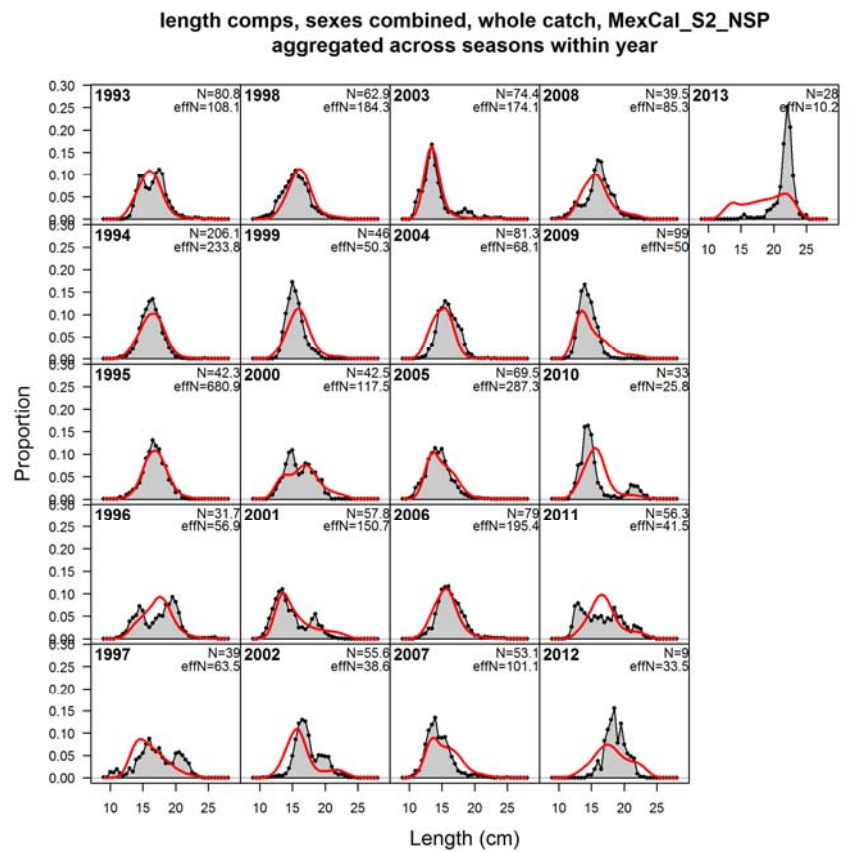


**Figure 24a.** Fits to length compositions and associated residual plot for MexCal\_S1 fishery for base model T.

ghost age comps, sexes combined, whole catch, MexCal\_S1\_NSP

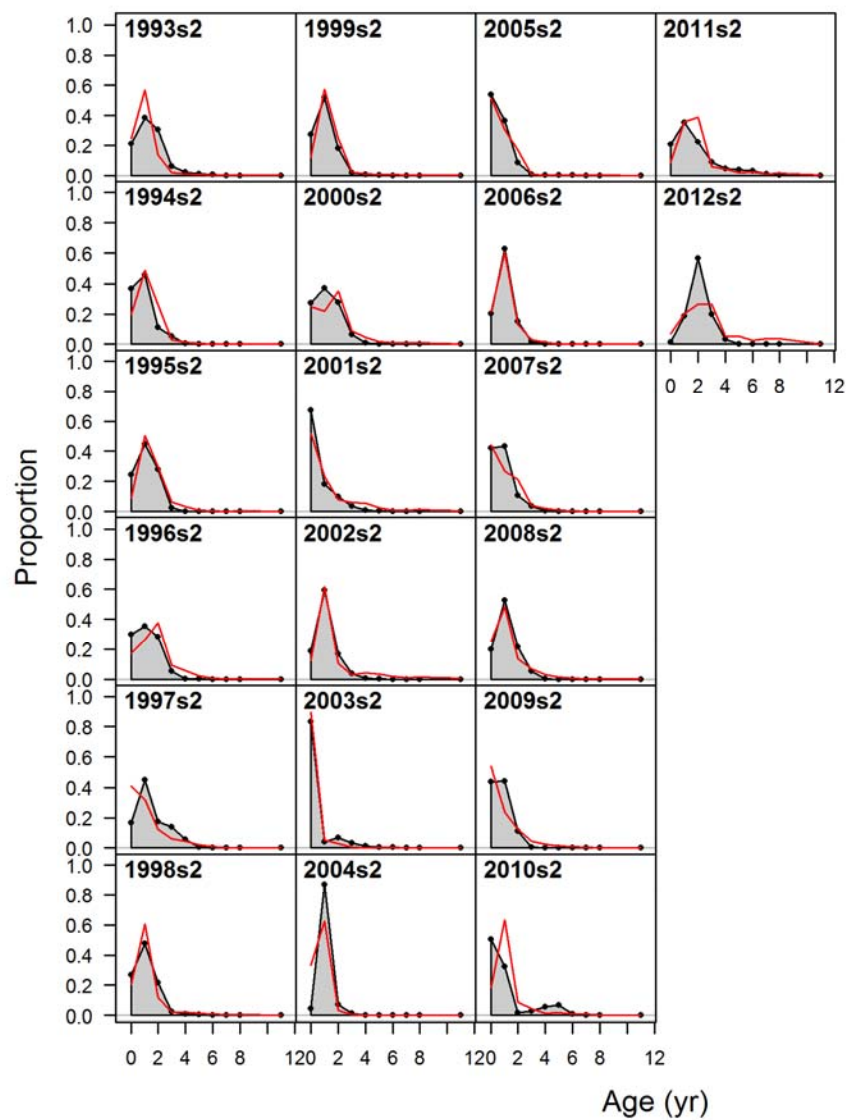


**Figure 24b.** Fits to implied age compositions for MexCal\_S1 fleet in base model T.

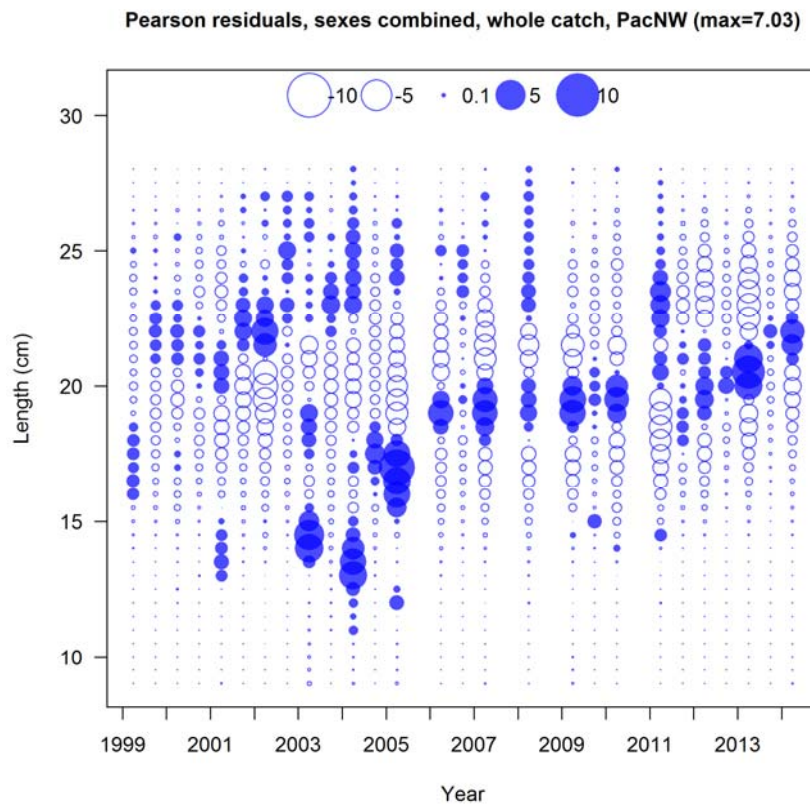
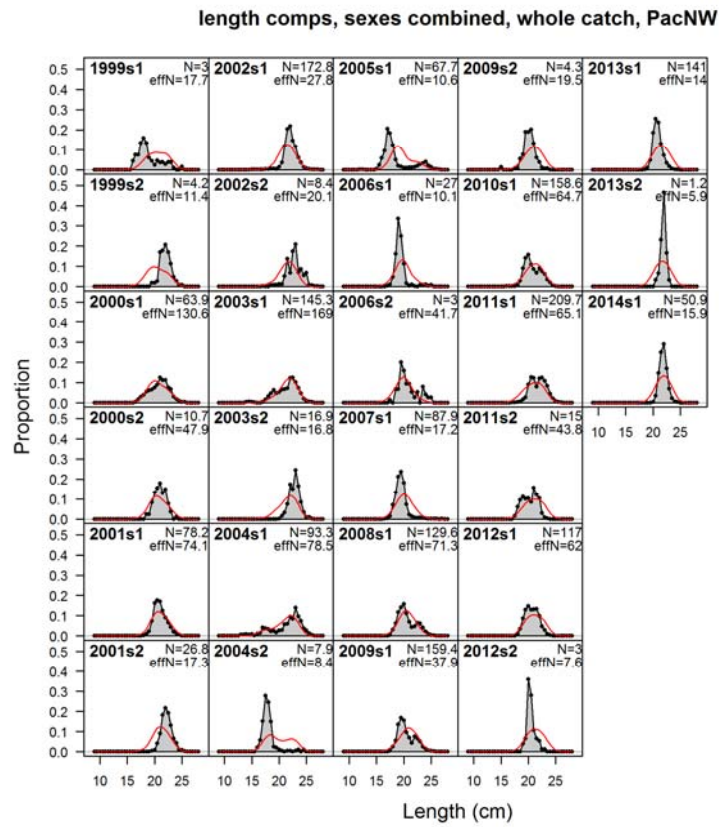


**Figure 25a.** Fits to length compositions and associated residual plot for MexCal\_S2 fleet for base model T.

ghost age comps, sexes combined, whole catch, MexCal\_S2\_NSP

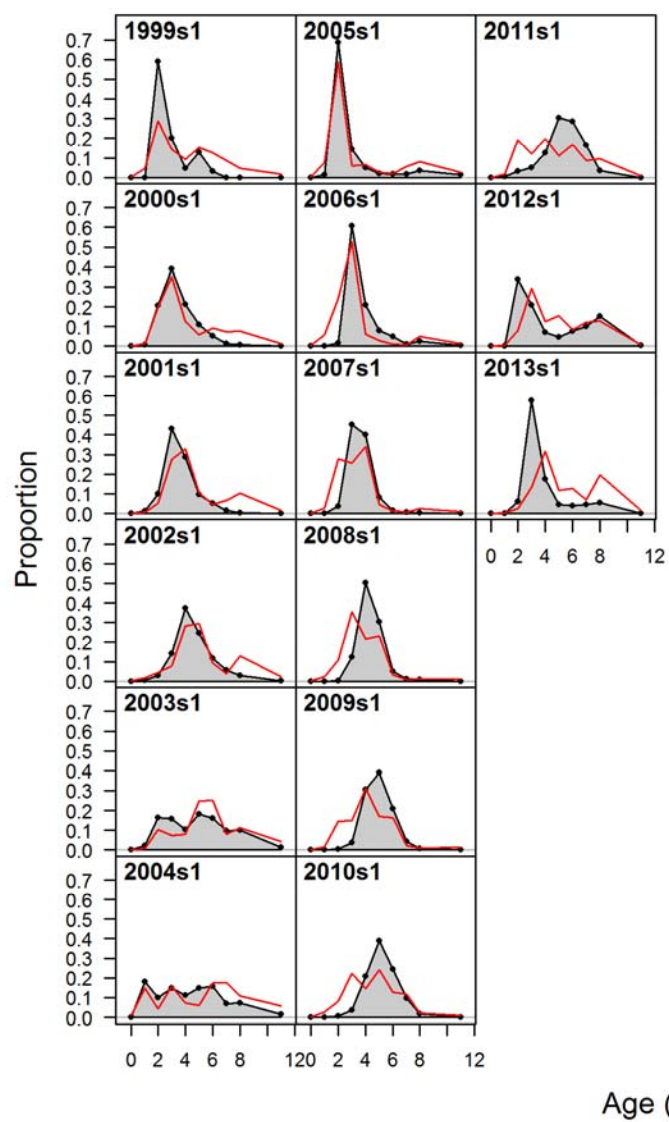


**Figure 25b.** Fits to implied age-compositions for MexCal\_S2 fleet for base model T.

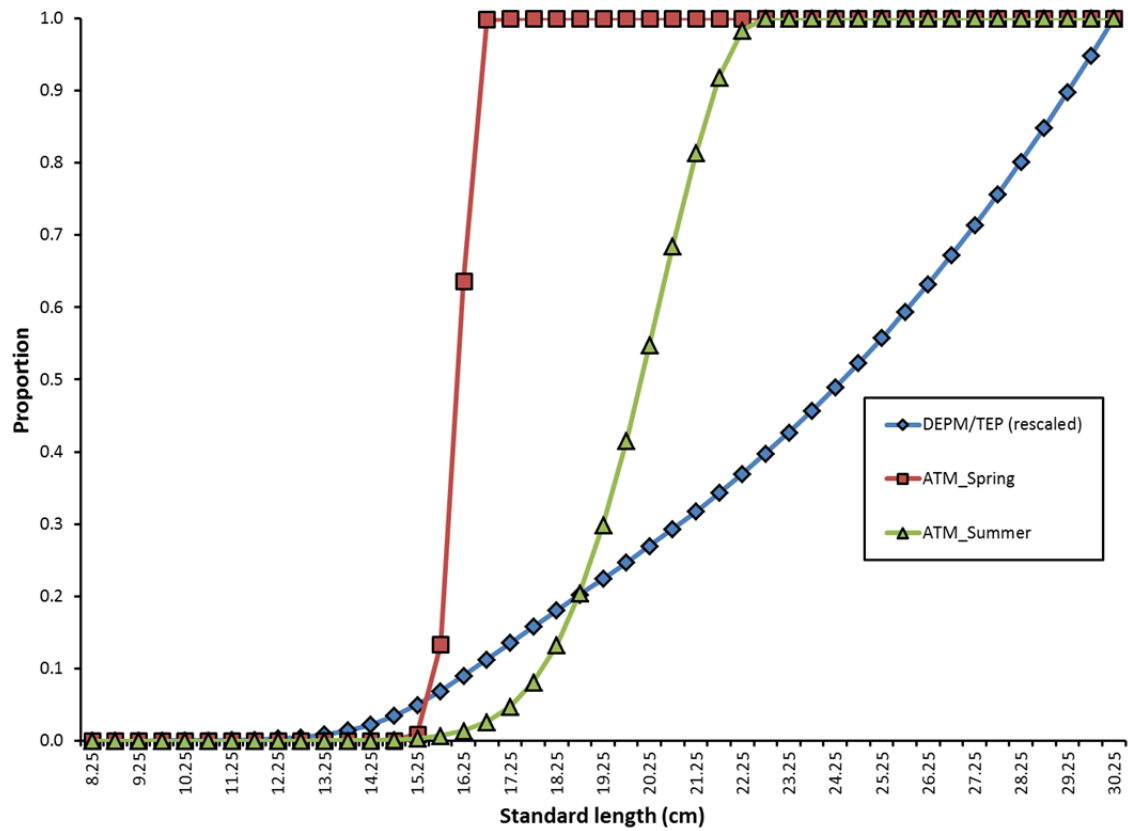


**Figure 26a.** Fits to length compositions and associated residual plot for PacNW fishery for base model T.

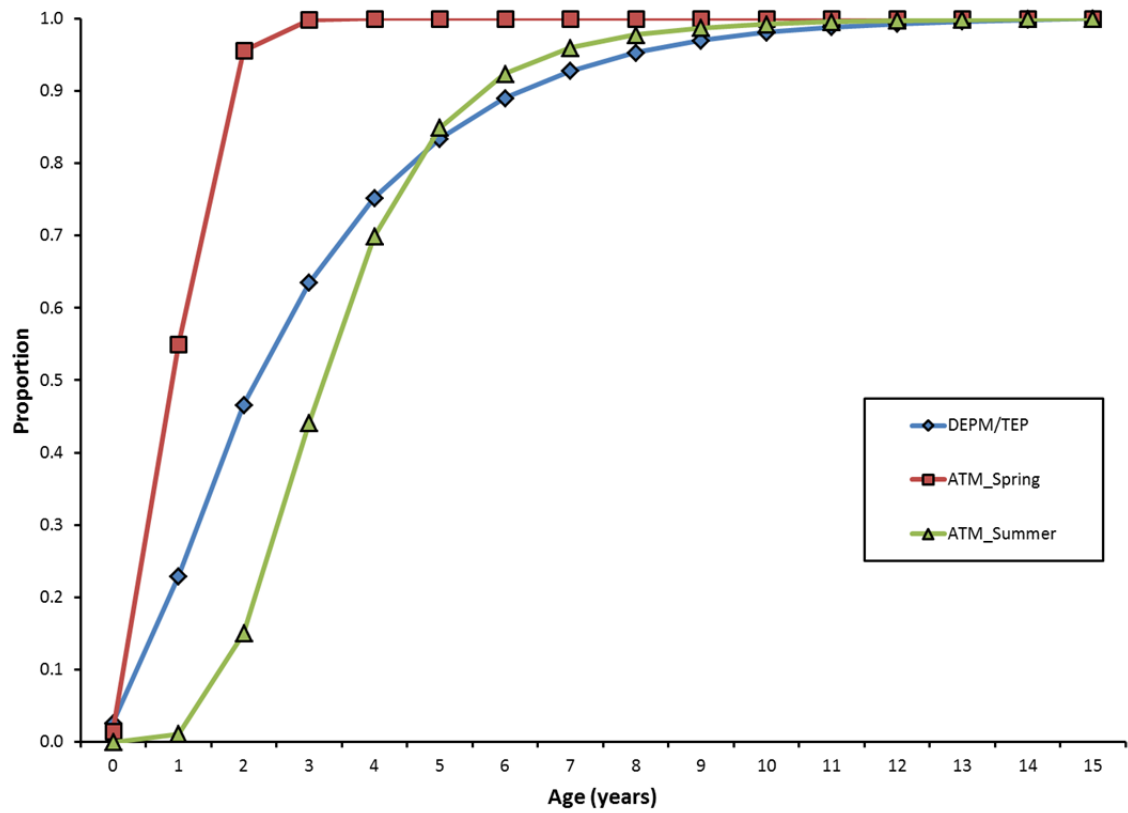
ghost age comps, sexes combined, whole catch, PacNW



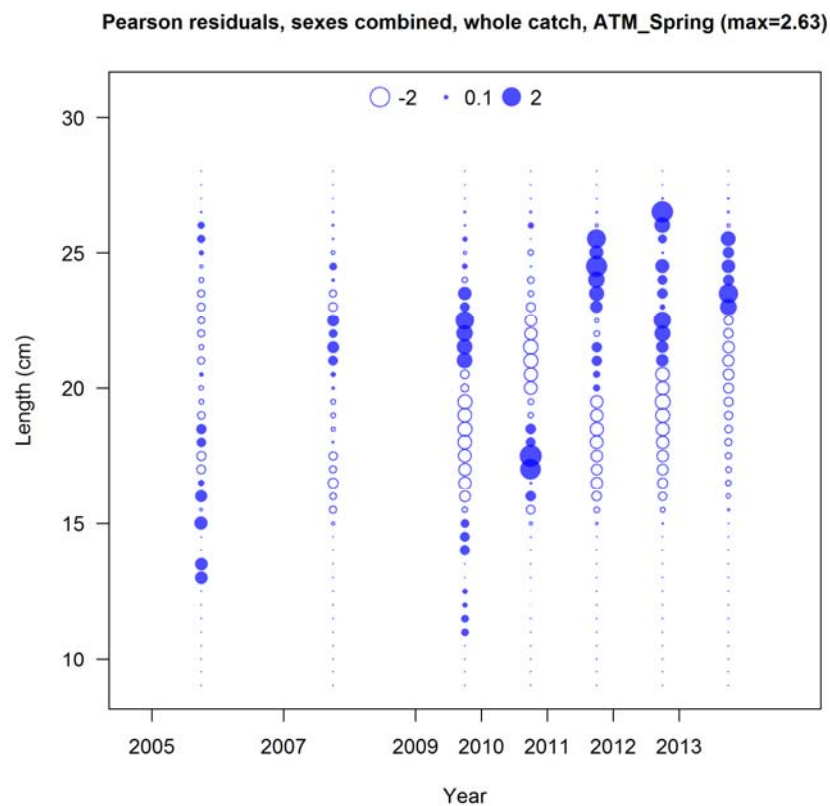
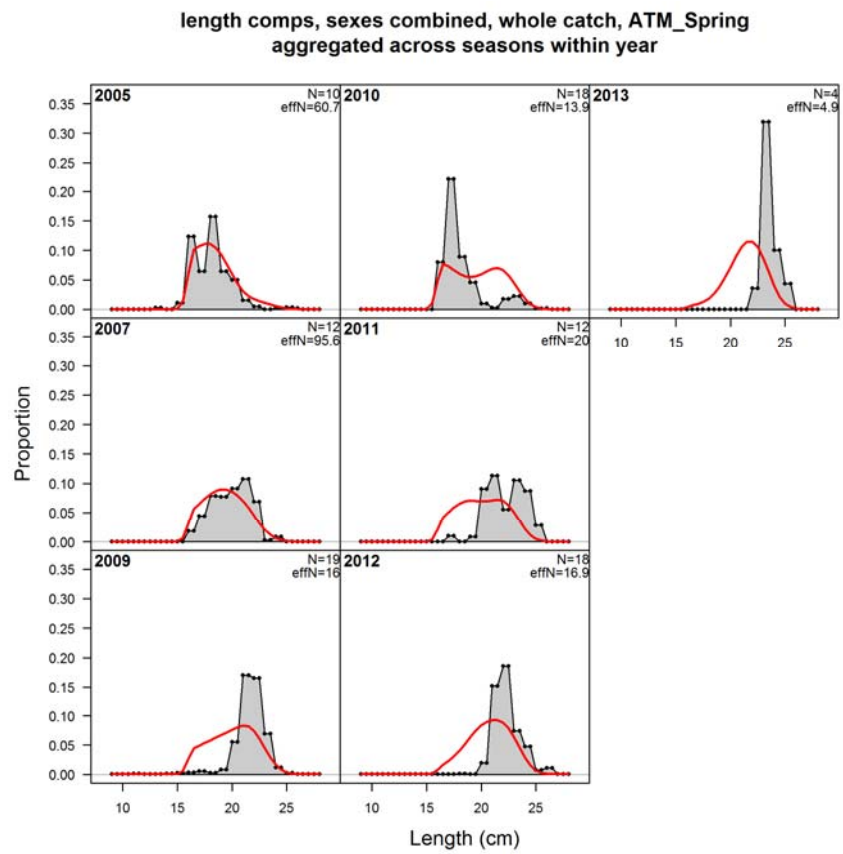
**Figure 26b.** Fits to implied age compositions for PacNW fishery for base model T.



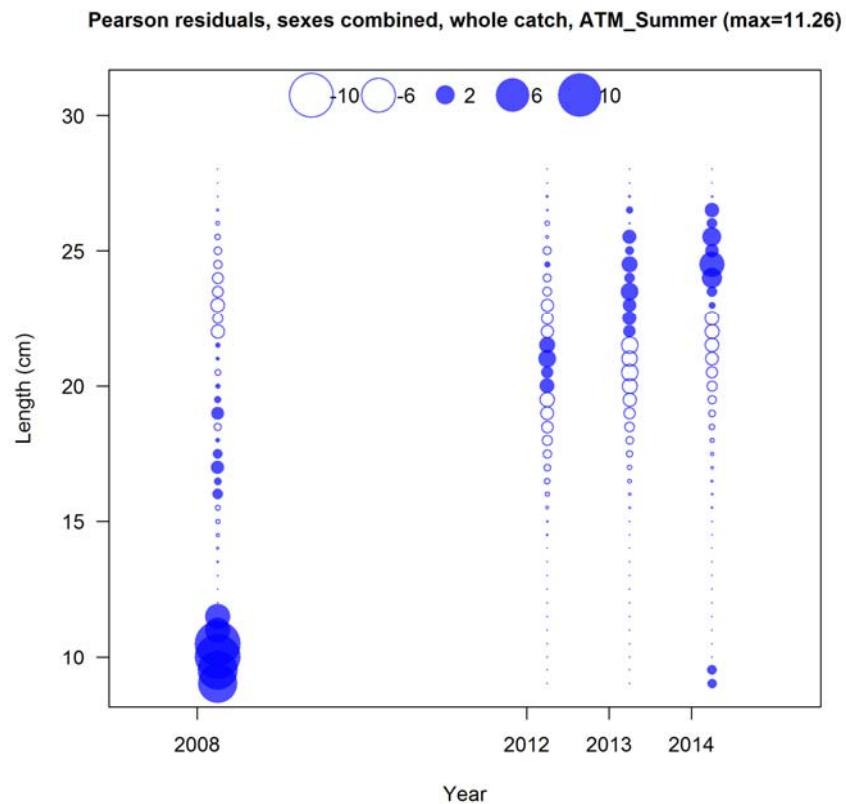
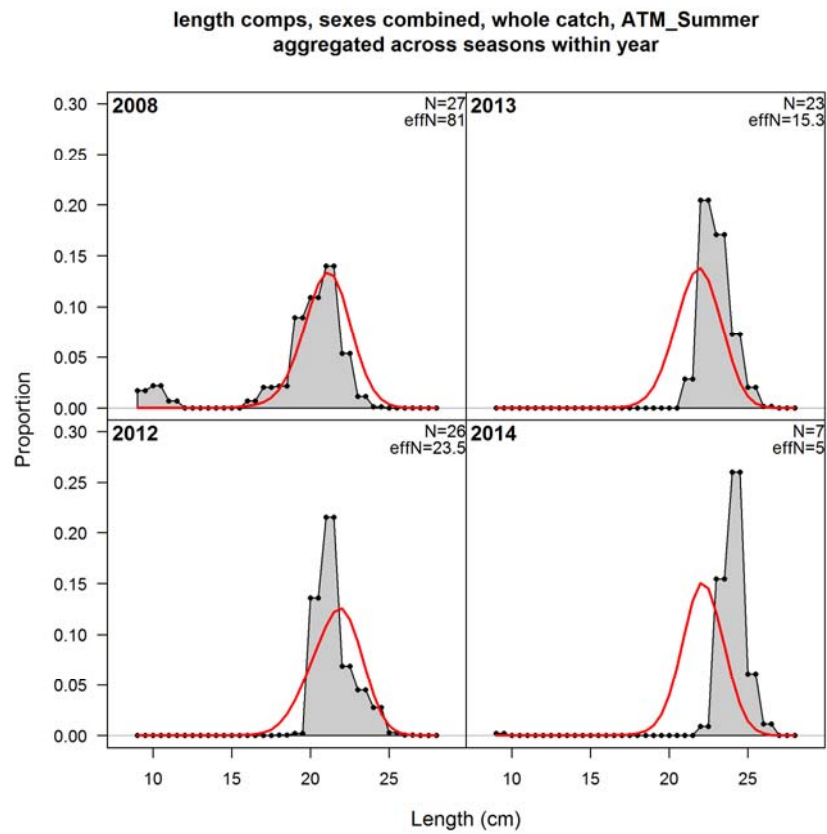
**Figure 27a.** Length-based selectivity patterns for surveys in base model T.



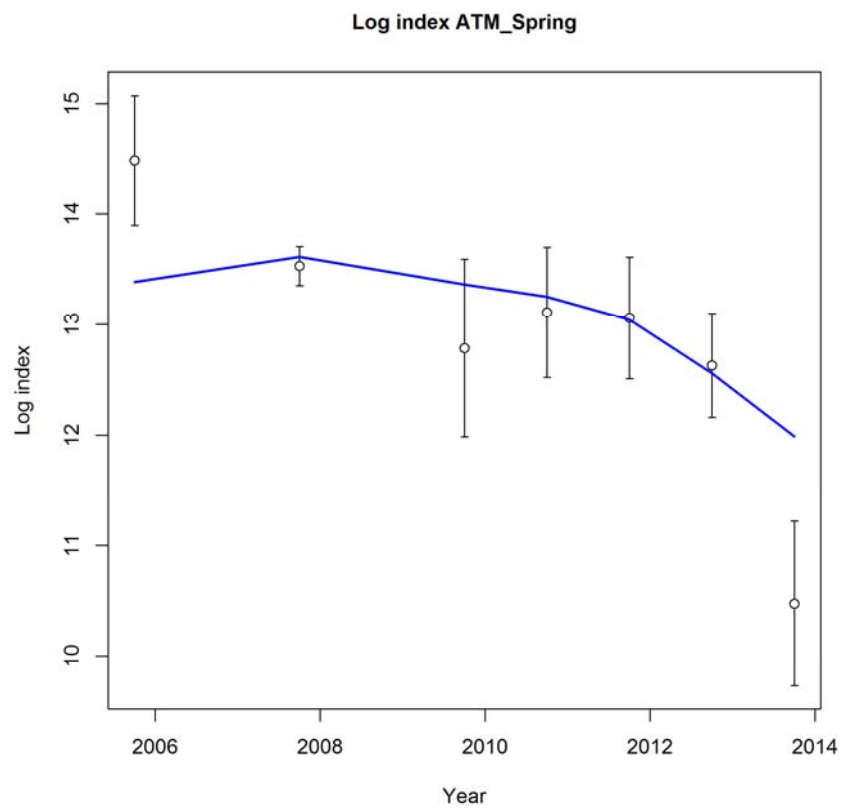
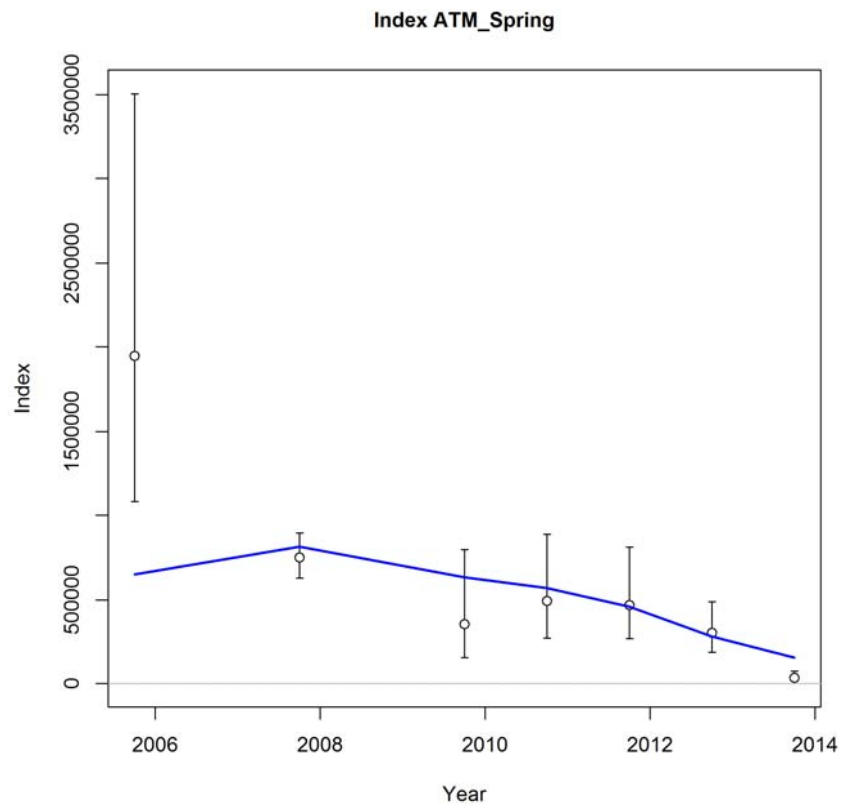
**Figure 27b.** Implied age-selectivity patterns for surveys in base model T.



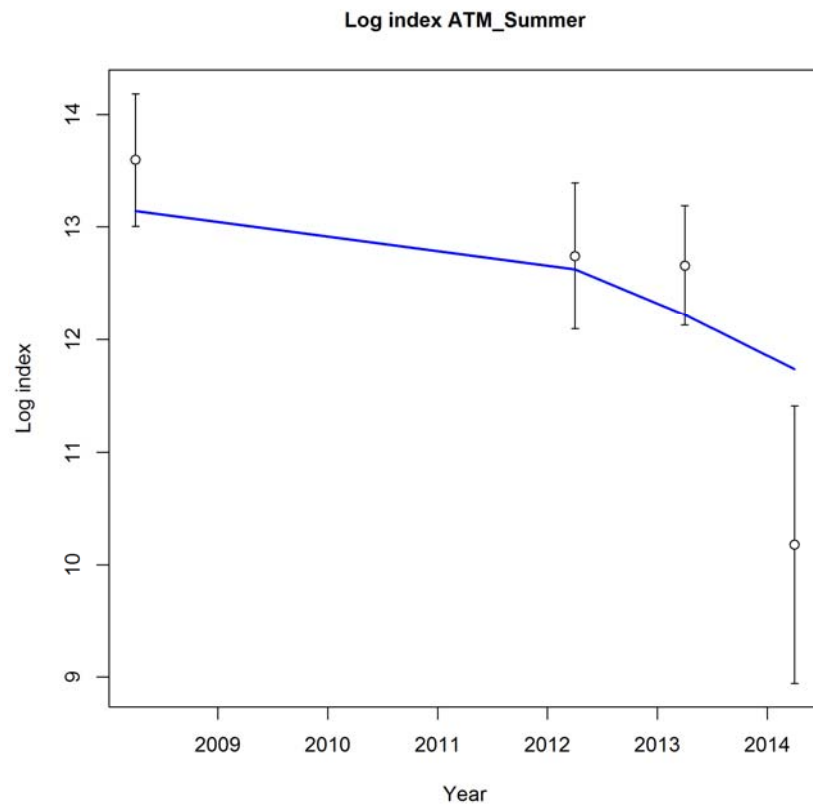
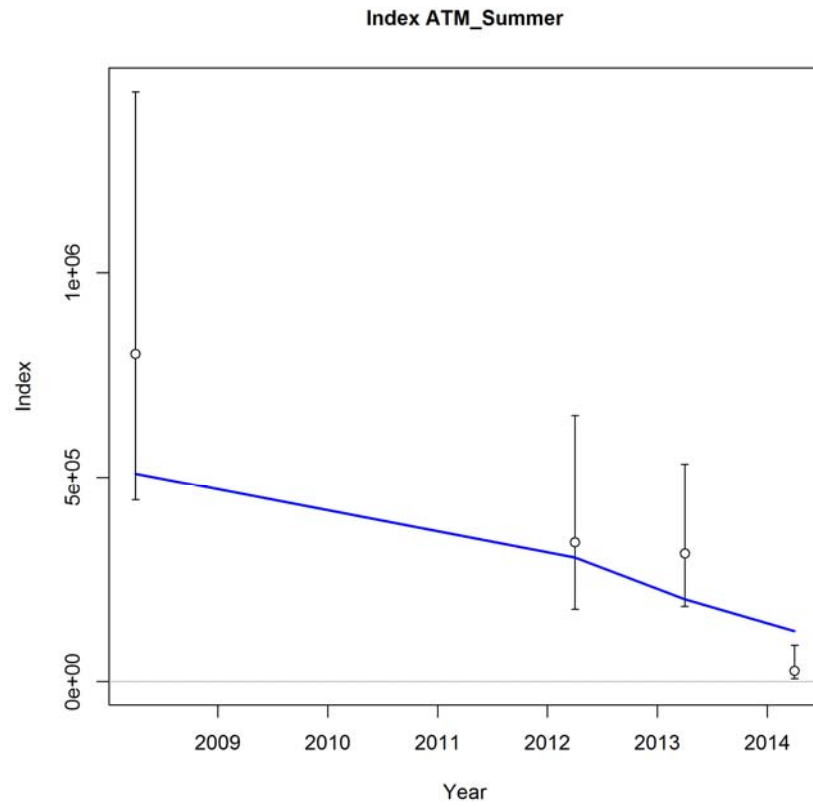
**Figure 28.** Fits to length compositions and associated residual plot for the Spring ATM survey for base model T.



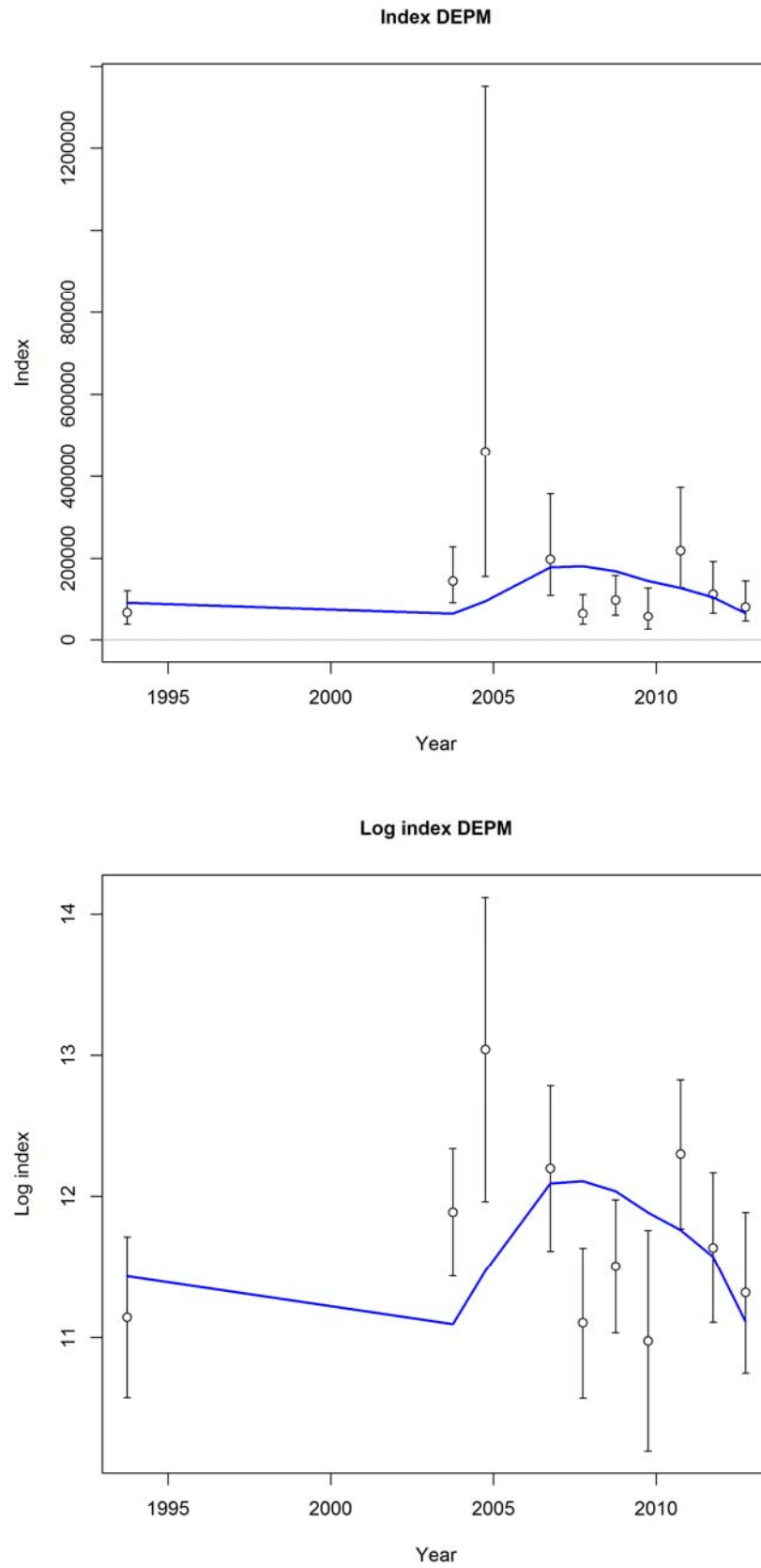
**Figure 29.** Fits to length compositions and associated residual plot for the Summer ATM survey for base model T.



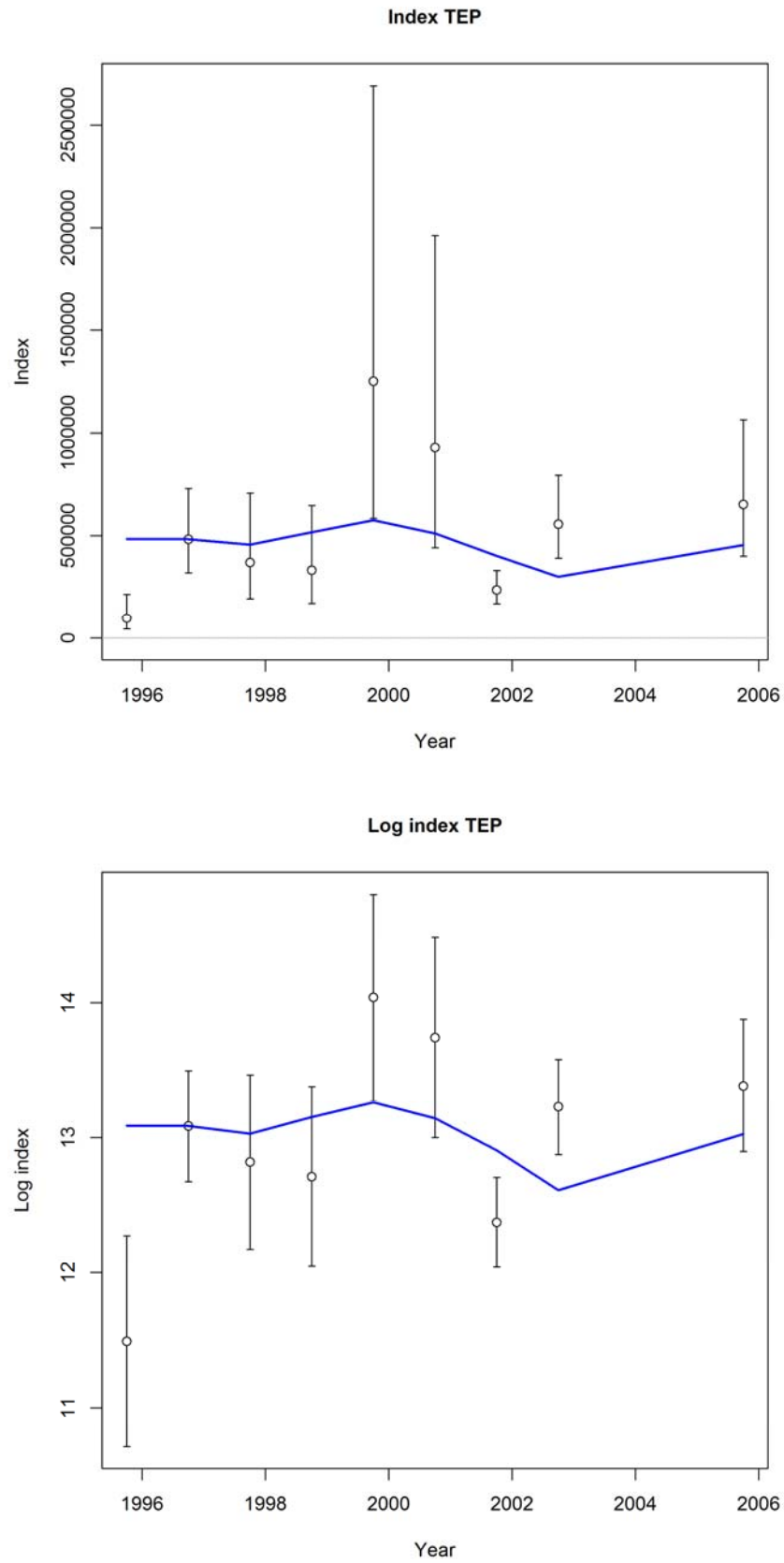
**Figure 30.** Fits to Spring ATM survey abundance index for base model T: arithmetic (upper) and log (lower) scales.  $q=1.0$  (fixed).



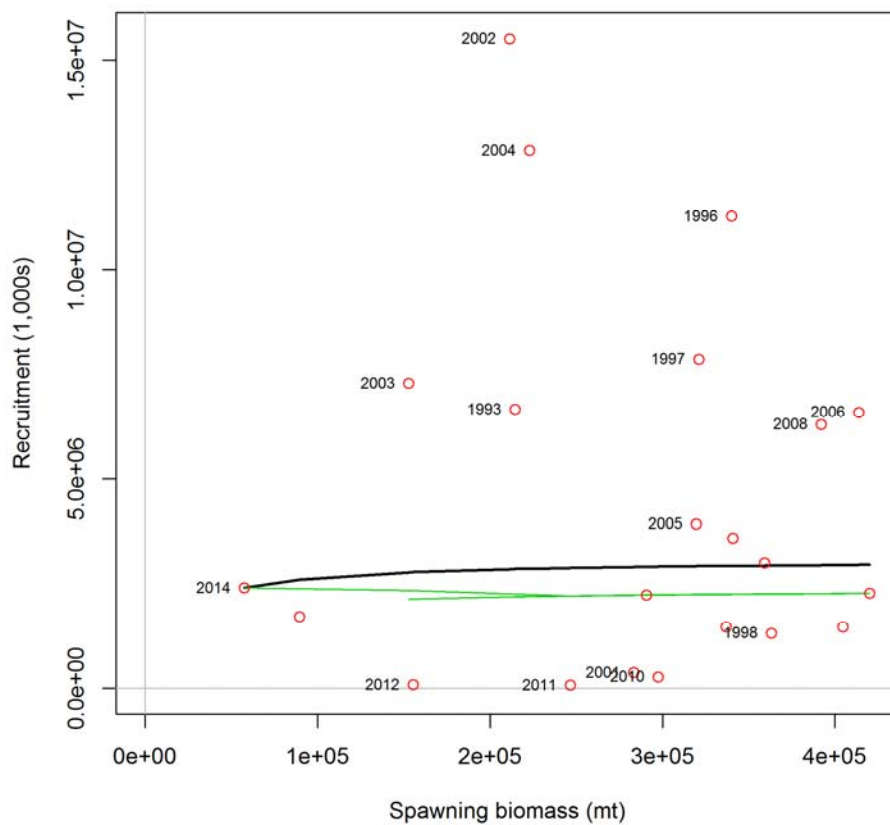
**Figure 31.** Fits to Summer ATM survey abundance index for base model T: arithmetic (upper) and log (lower) scales.  $q=1.0$  (fixed).



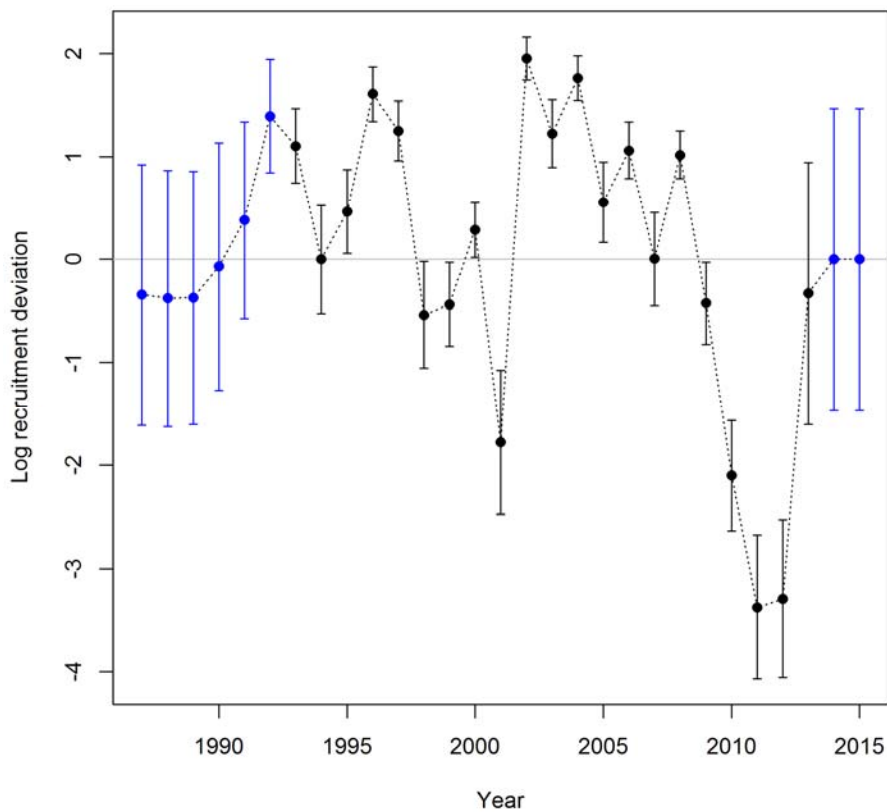
**Figure 32.** Fits to DEPM survey abundance index for base model T: arithmetic (upper) and log (lower) scales.  $q=0.215$ .



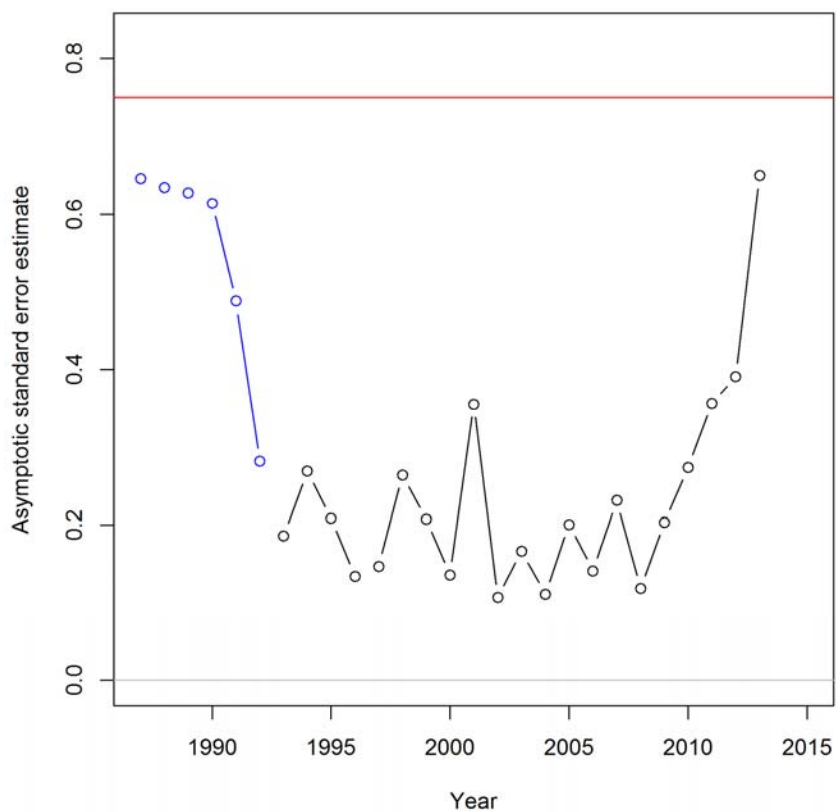
**Figure 33.** Fits to TEP survey abundance index for base model T: arithmetic (upper) and log (lower) scales.  $q=0.710$ .



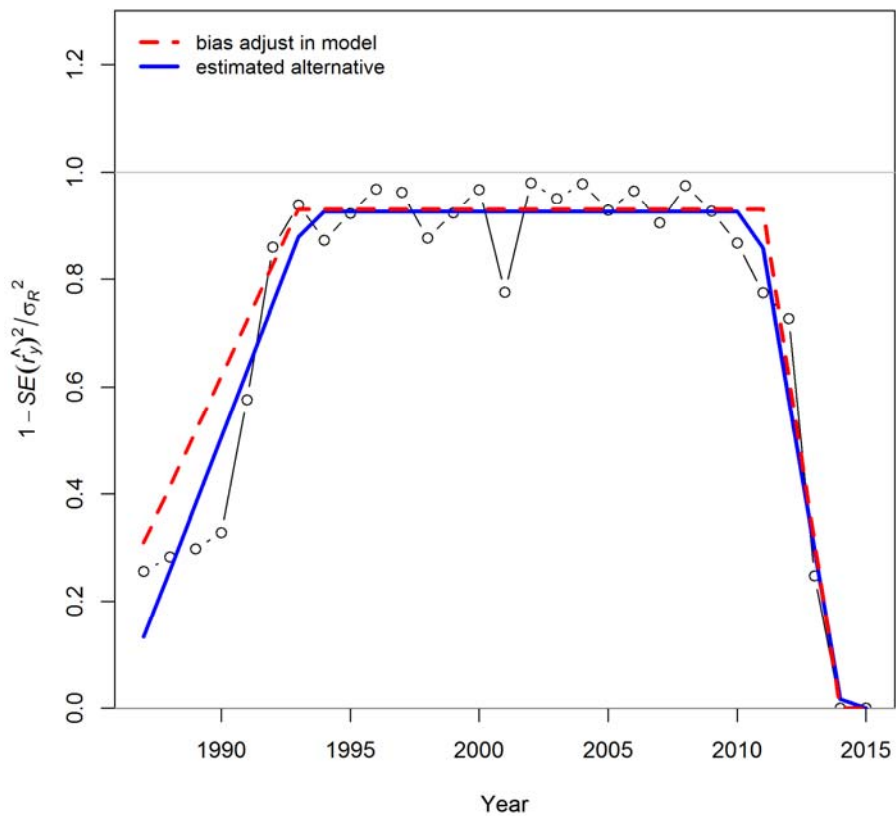
**Figure 34a.** Estimated stock-recruitment (Beverton-Holt) relationship for base model T. Year labels represent year of SSB producing the subsequent year class.



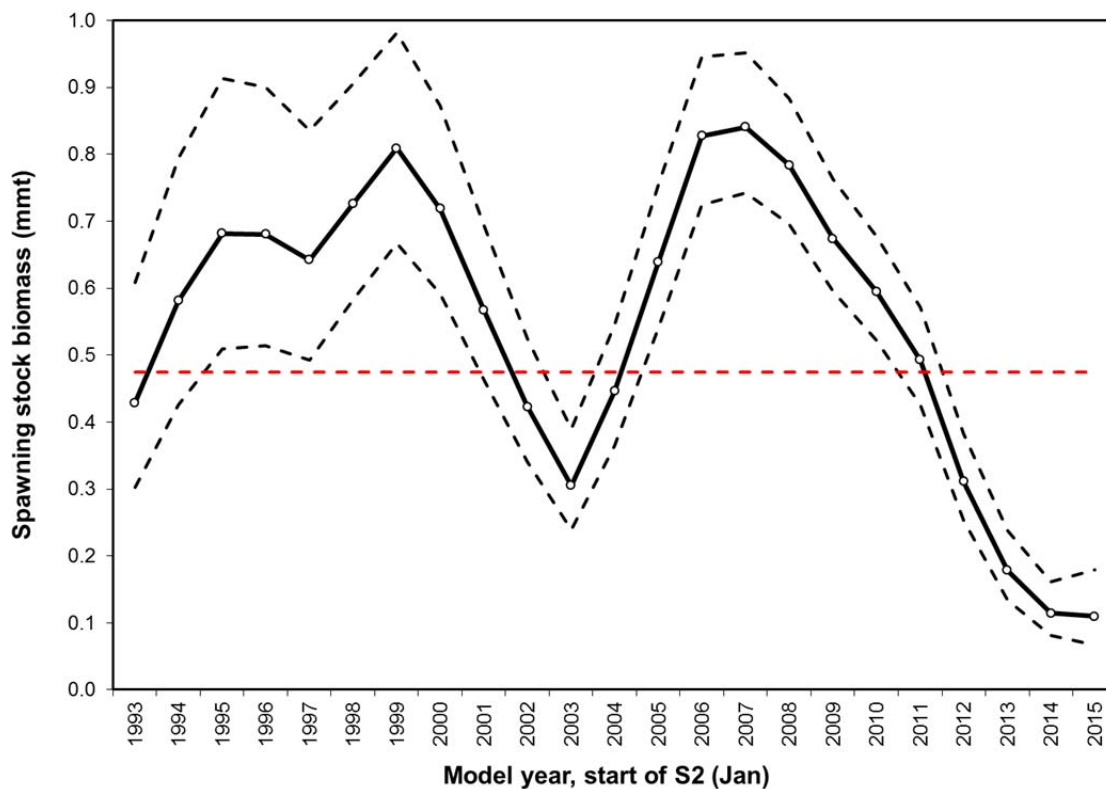
**Figure 34b.** Recruitment deviations and standard errors estimated in base model T ( $\sigma_R = 0.75$ ). Year labels represent year of SSB producing the subsequent year class.



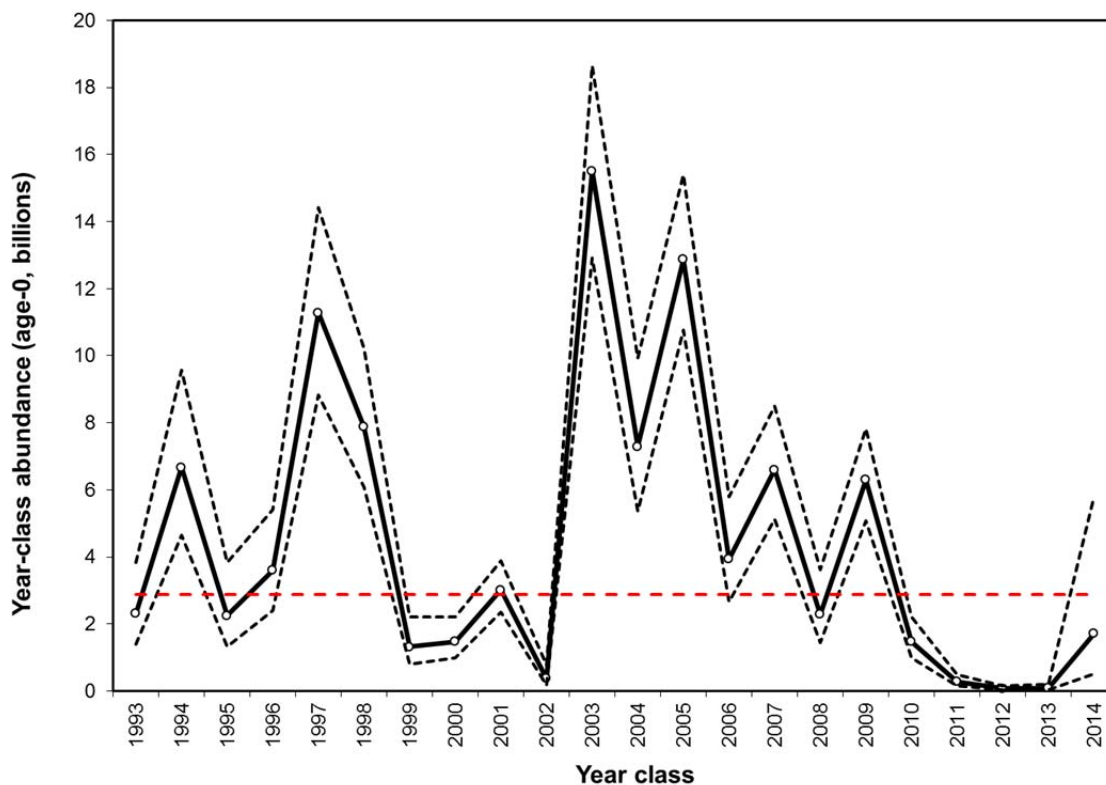
**Figure 34c.** Asymptotic standard errors for estimated recruitment deviations in base model T.



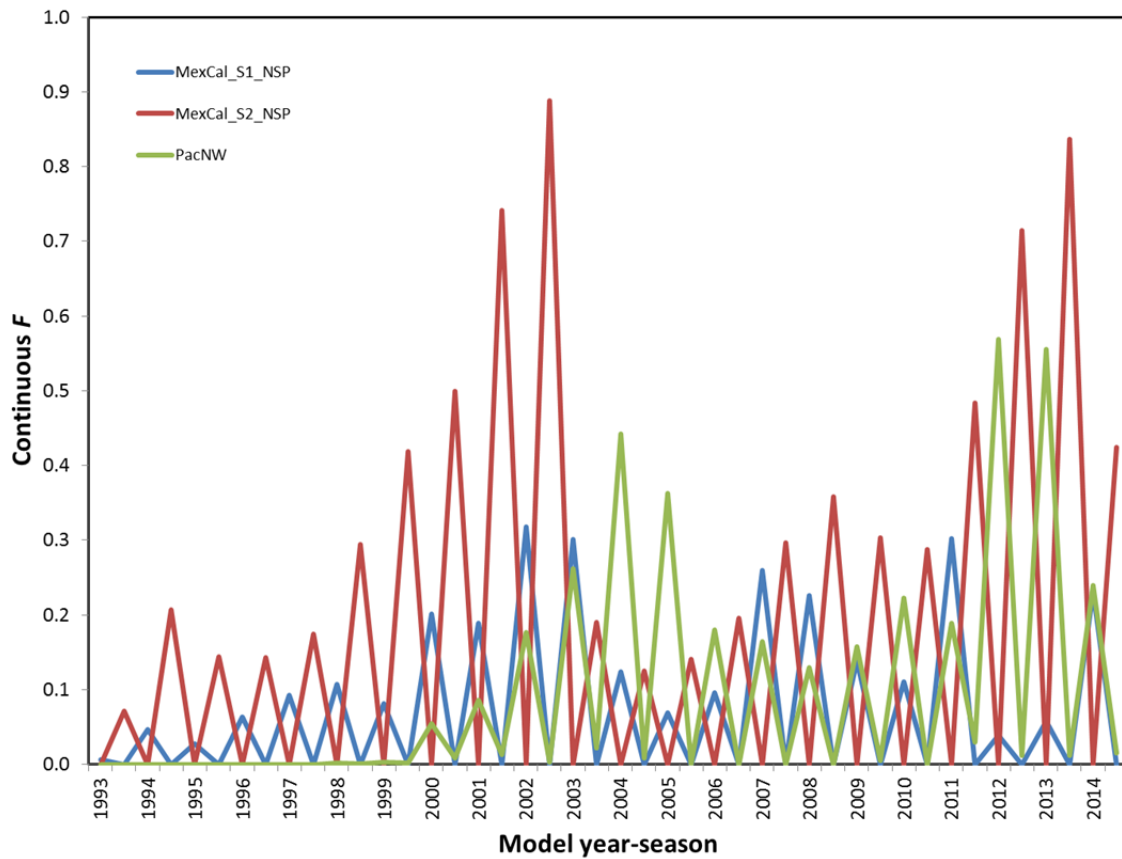
**Figure 34d.** S-R bias adjustment ramp applied in base model T.



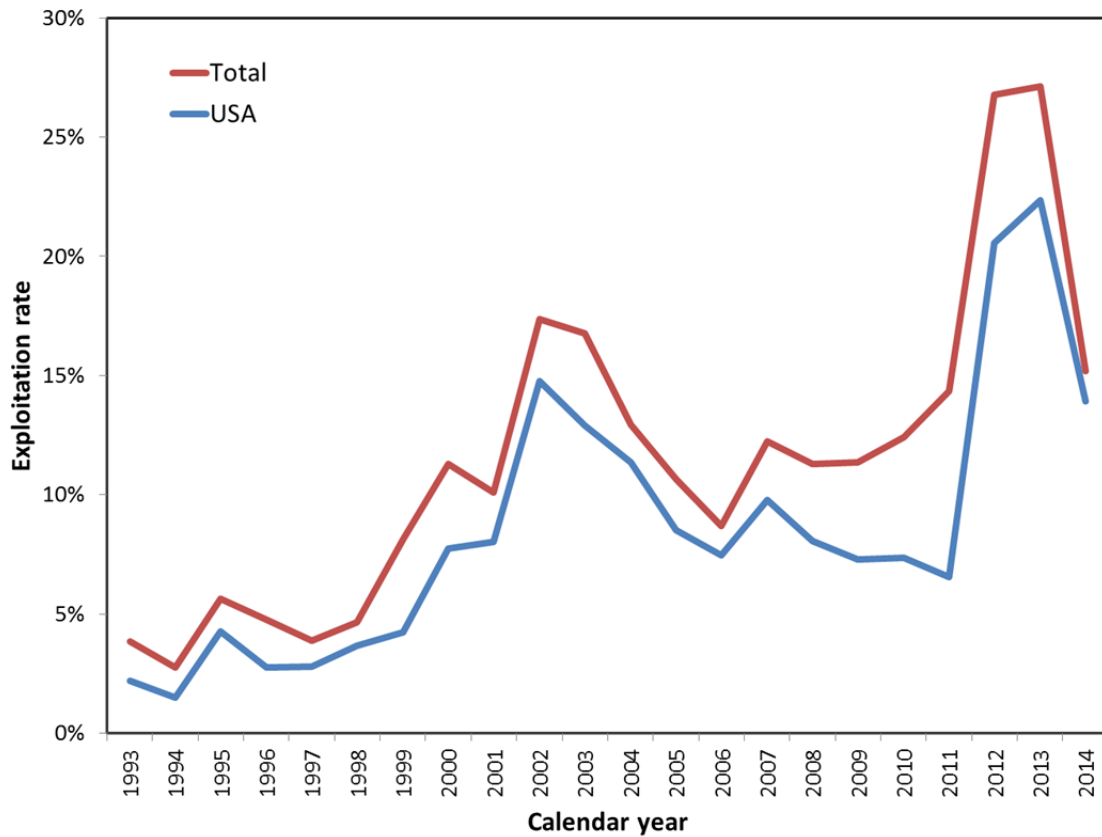
**Figure 35a.** Spawning stock biomass with ~95% confidence intervals for base model T. Red line is SSB-zero.



**Figure 35b.** Year-class abundance with ~95% confidence intervals for base model T. Red line is R-zero.



**Figure 36a.** Estimated fishing mortality ( $F$ ) time series for fisheries for base model T.



**Figure 36b.** Annual exploitation rate (CY landings / July total biomass) for base model T.

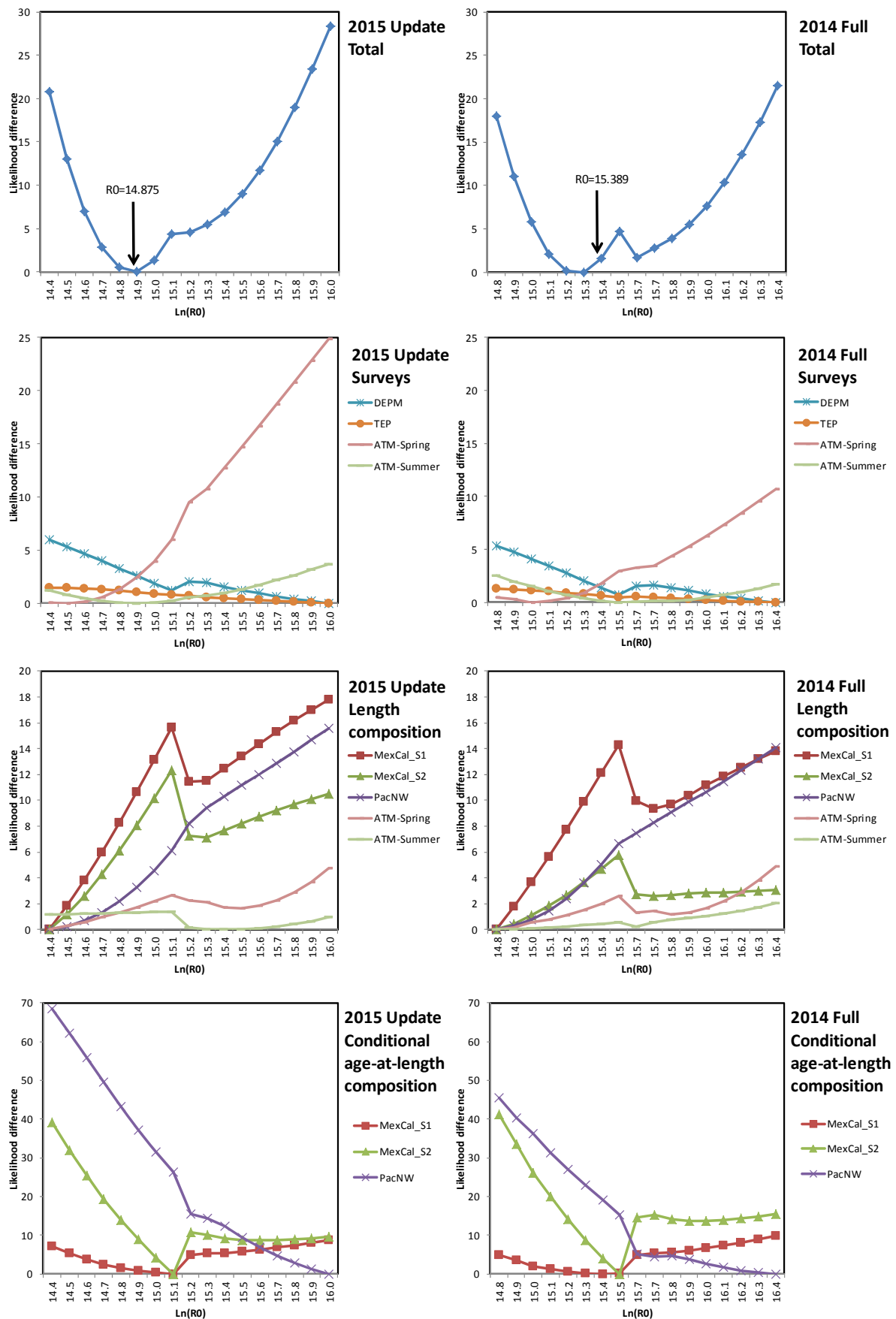
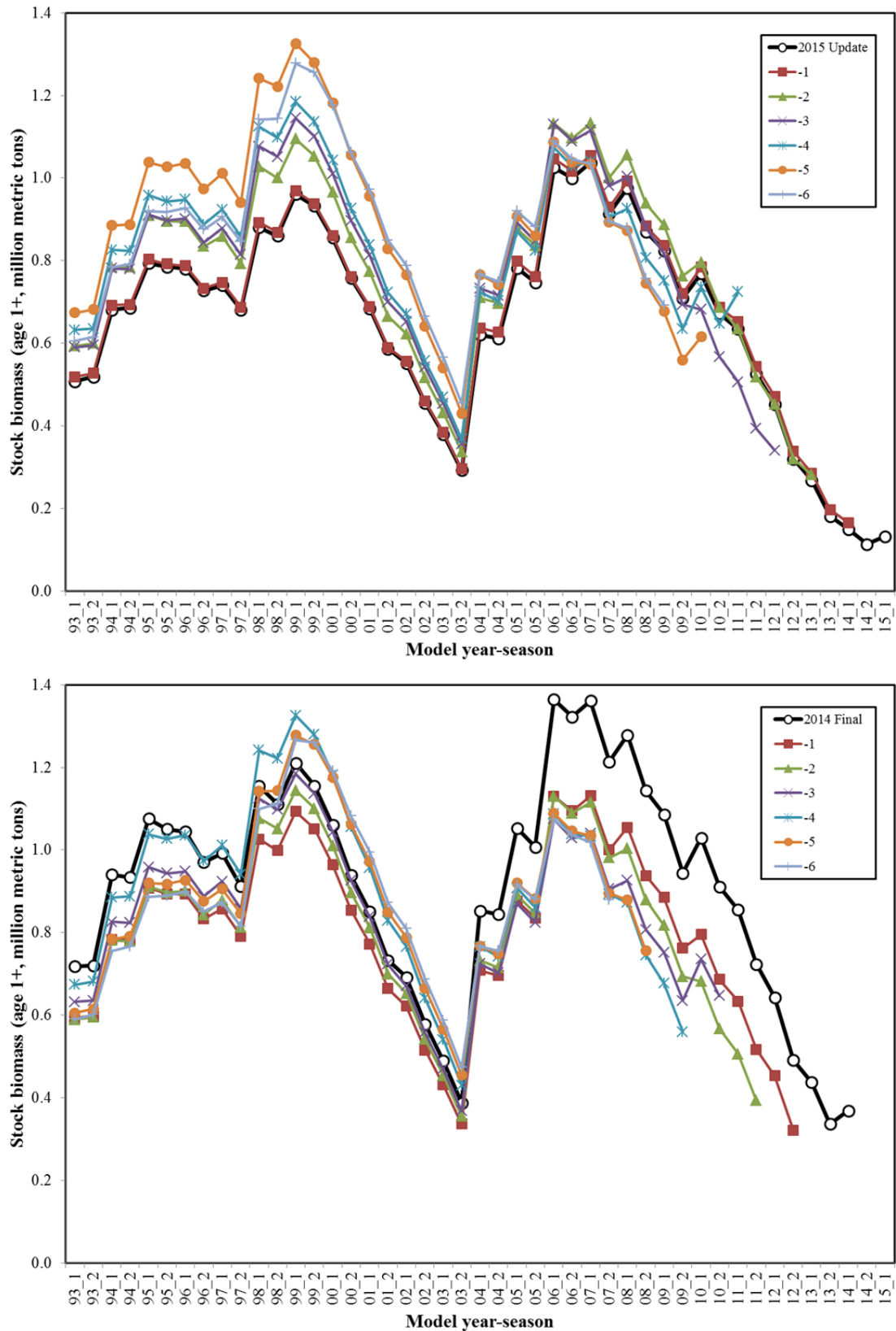
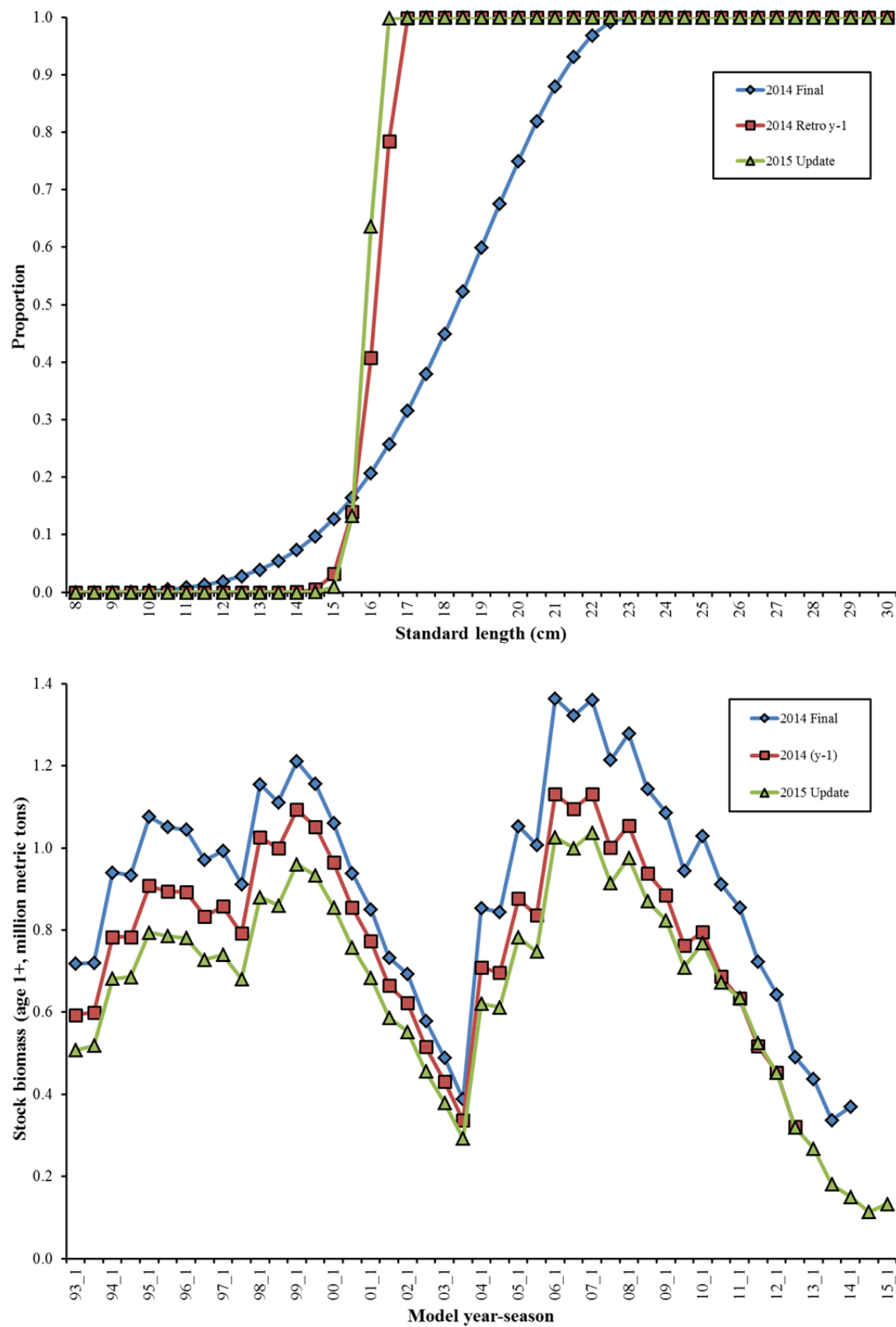


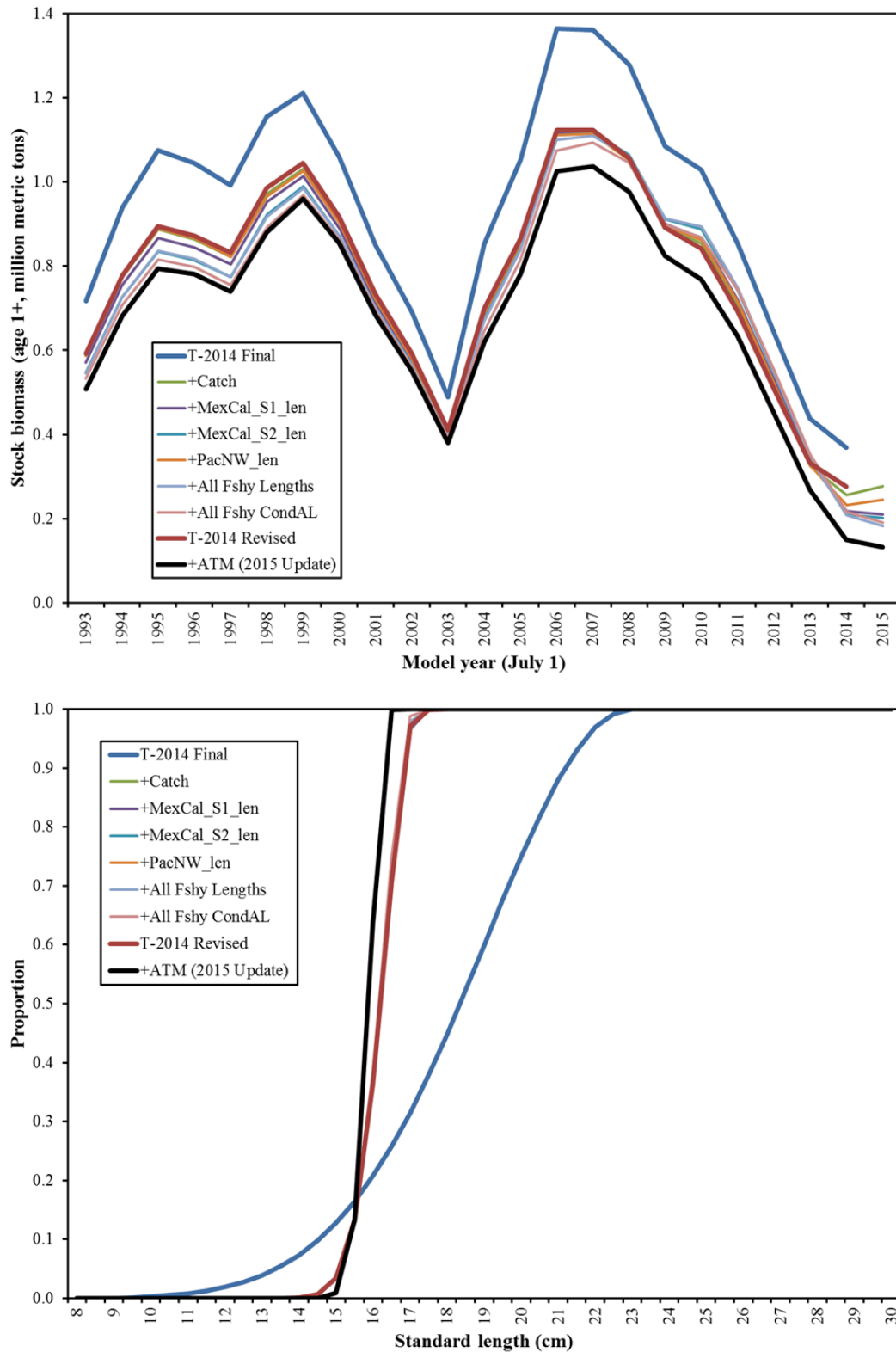
Figure 37.  $R_0$  profiles for 2015 update (left) and 2014 final (right) model components.



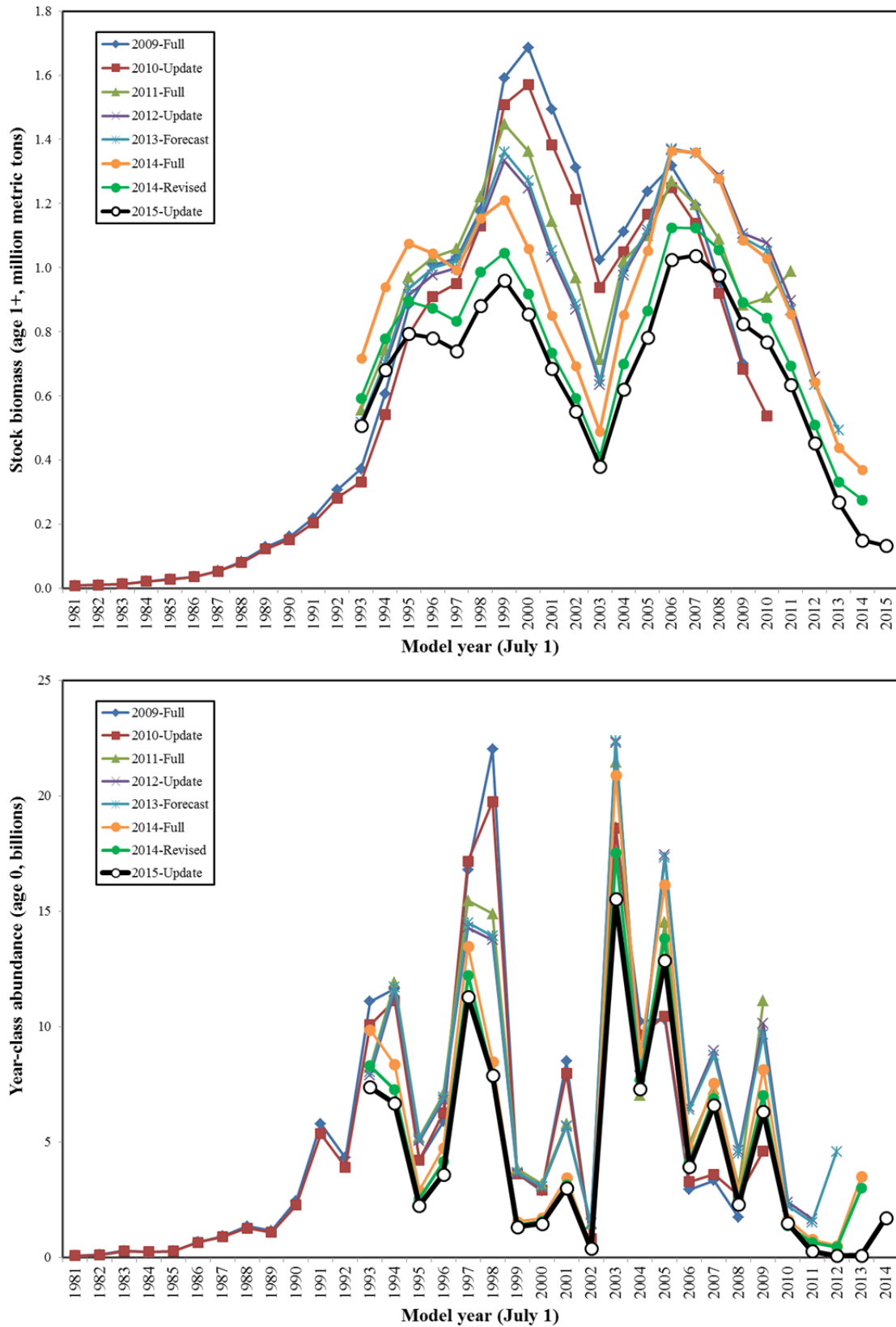
**Figure 38.** Retrospective analyses of stock biomass (age 1+) for the 2015 update (upper) and 2014 final (lower) models.



**Figure 39.** ATM Spring survey selectivities (upper panel) for the final 2014 model, the 2014 retrospective model (year -1), and the 2015 update model. Stock biomass series for these models are displayed in the lower panel.



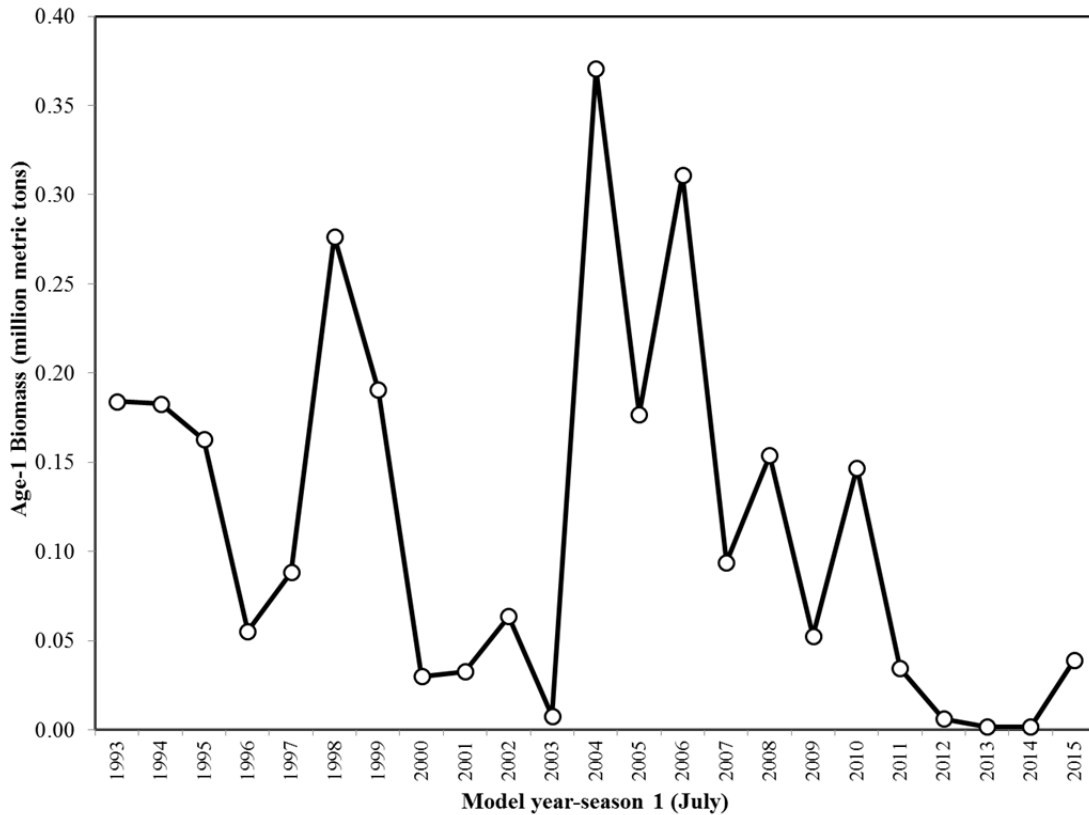
**Figure 40.** Stock biomass (upper) and ATM Spring survey selectivities (lower) for the final 2014 model, the revised 2014 model, and the 2015 update where new data were sequentially added to the model (see Table 9).



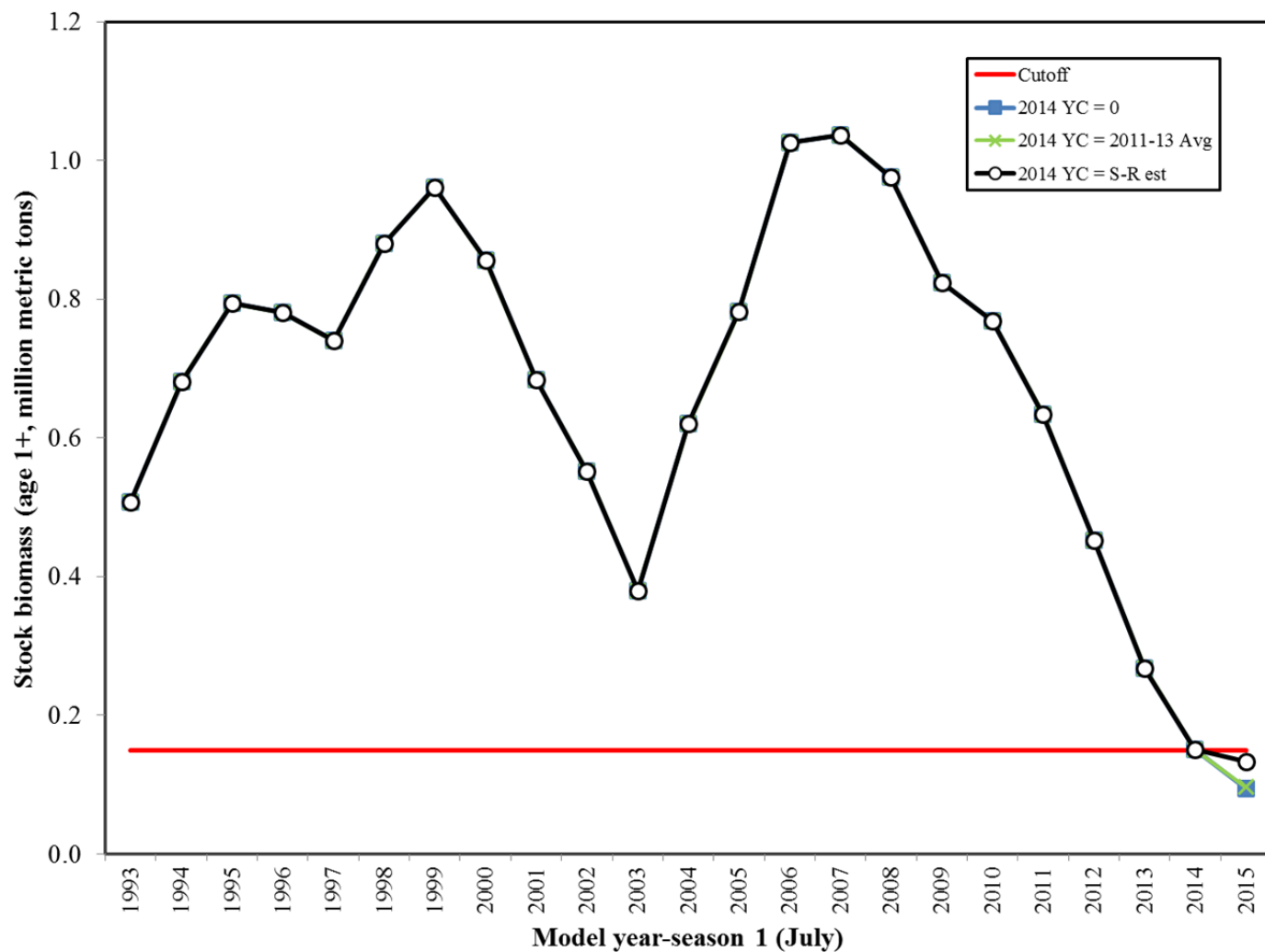
**Figure 41.** Estimated stock biomass (upper) and recruitment (lower) time series for the base model and past management models.



**Figure 42a.** Age 0-1 biomass as percentage of total population biomass (update model).



**Figure 42b.** Biomass of age-1 sardine (update model).



**Figure 43.** Update model stock biomass (age 1+) for a range of possible projection scenarios for July 2015: 1) the 2014 year-class is estimated from the S-R curve; 2) 2014 year-class strength is based on an average of the 2011-13 year-classes; and 3) the 2014 year-class has failed (zero).

## **APPENDICES**

## APPENDIX A

### Acoustic-trawl estimates of sardine biomass off California during spring 2014

Juan P. Zwolinski, David A. Demer, Beverly J. Macewicz, George R. Cutter Jr.,  
Brian E. Elliot, Scott A. Mau, David W. Murfin, Josiah S. Renfree, Thomas S. Sessions,  
and Kevin L. Stierhoff

We report results from the spring 2014 acoustic-trawl method (ATM) survey of the northern sub-population of Pacific sardine off central and southern California (Fig. 1). The survey was conducted from NOAA FSV *Bell M. Shimada* and chartered FV *Ocean Starr*.

The ATM survey spanned the expected distribution of the stock (Fig. 1), from the US-Mexico border to north of San Francisco. From sunrise to sunset, multi-frequency echosounders were used to sample acoustic backscatter from epipelagic coastal pelagic species (CPS). Day and night, a continuous underway fish egg sampler (CUFES) was used to sample CPS eggs within 5 m of the sea-surface. During nighttime, catches from as many as four surface trawls each night were combined into clusters to identify the proportions of CPS and their lengths.

With considerations to the sampling intensity, the presence of CPS in the echosounder and net samples, and the existence of sardine in the trawl catches (Fig. 1), a single, central stratum was defined (Fig. 2). Eight of the 16 trawl-catch clusters included CPS, but only four of these clusters included sardine (18 total). All of the sampled sardine were adults in spawning condition (Table 2 and Fig. 3); and all were located in the central stratum where no sardine eggs were sampled. A few sardine eggs were sampled south of Point Conception where no adult sardine were sampled (Fig. 1).

The estimated total sardine biomass was 0.035 Mt ( $CI_{95\%} = [0.012; 0.077]$ ;  $CV = 39.6\%$ ) (Table 1). The sampled population had no recruits, and a modal standard length ( $SL$ ) of ~ 23 cm (Table 2, Fig. 4).

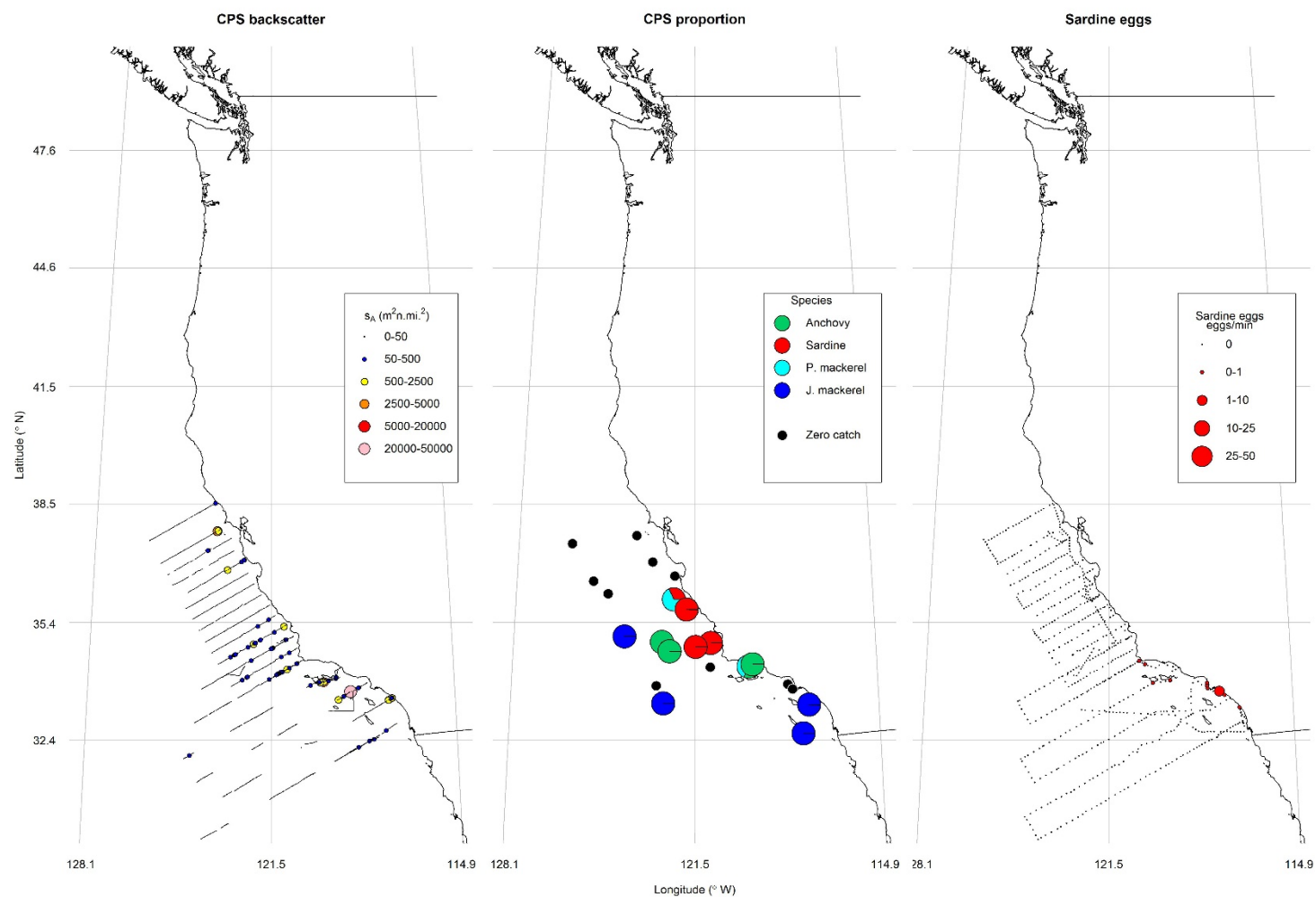
**Table 1.** Sardine biomass by stratum for the spring 2014 survey.

| Stratum |                               | Transect |                     | Trawls          |                      | Sardine                   |                                              |      |
|---------|-------------------------------|----------|---------------------|-----------------|----------------------|---------------------------|----------------------------------------------|------|
| Name    | Area<br>(n.mi. <sup>2</sup> ) | Number   | Distance<br>(n.mi.) | CPS<br>clusters | Number of<br>sardine | Biomass<br>(1000<br>tons) | 95%<br>confidence<br>interval<br>(1000 tons) | CV   |
| Central | 21218                         | 10       | 1279                | 8               | 18                   | 35.3                      | 12.3 – 77.0                                  | 39.6 |
| Total   | 21218                         | 10       | 1279                | 8               | 18                   | 35.3                      | 12.3 – 77.0                                  | 39.6 |

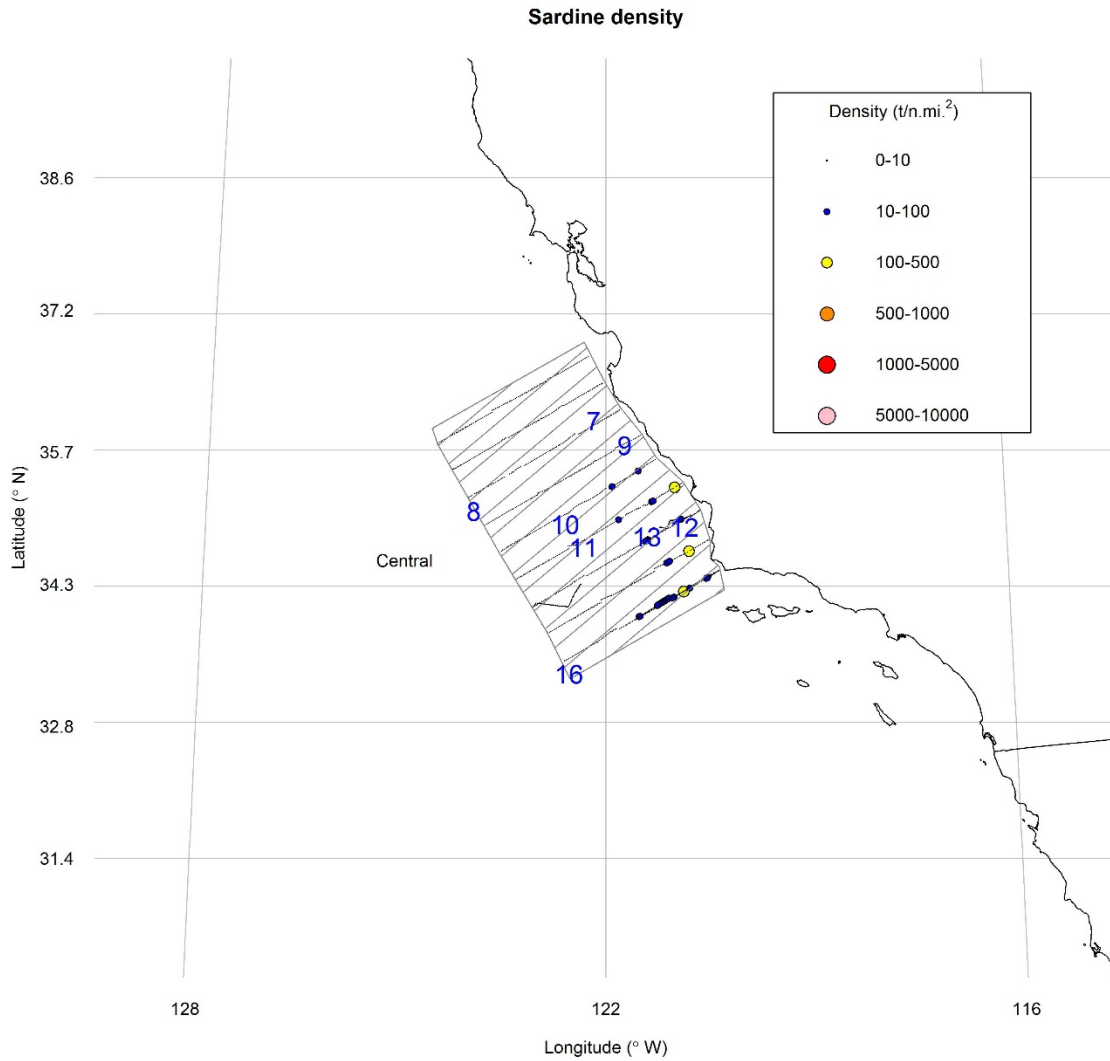
**Table 2.** Sardine abundance versus standard length for the spring 2014 survey.

| Standard length<br>(cm) | Abundance<br>(number); |
|-------------------------|------------------------|
| 8                       | 0                      |
| 9                       | 0                      |
| 10                      | 0                      |
| 11                      | 0                      |
| 12                      | 0                      |
| 13                      | 0                      |
| 14                      | 0                      |
| 15                      | 0                      |
| 16                      | 0                      |
| 17                      | 0                      |
| 18                      | 0                      |
| 19                      | 0                      |
| 20                      | 0                      |
| 21                      | 0                      |
| 22                      | 14773781               |
| 23                      | 133233577              |
| 24                      | 41809882               |
| 25                      | 18033397               |
| 26                      | 0                      |
| 27                      | 0                      |
| 28                      | 0                      |
| 29                      | 0                      |
| 30                      | 0                      |

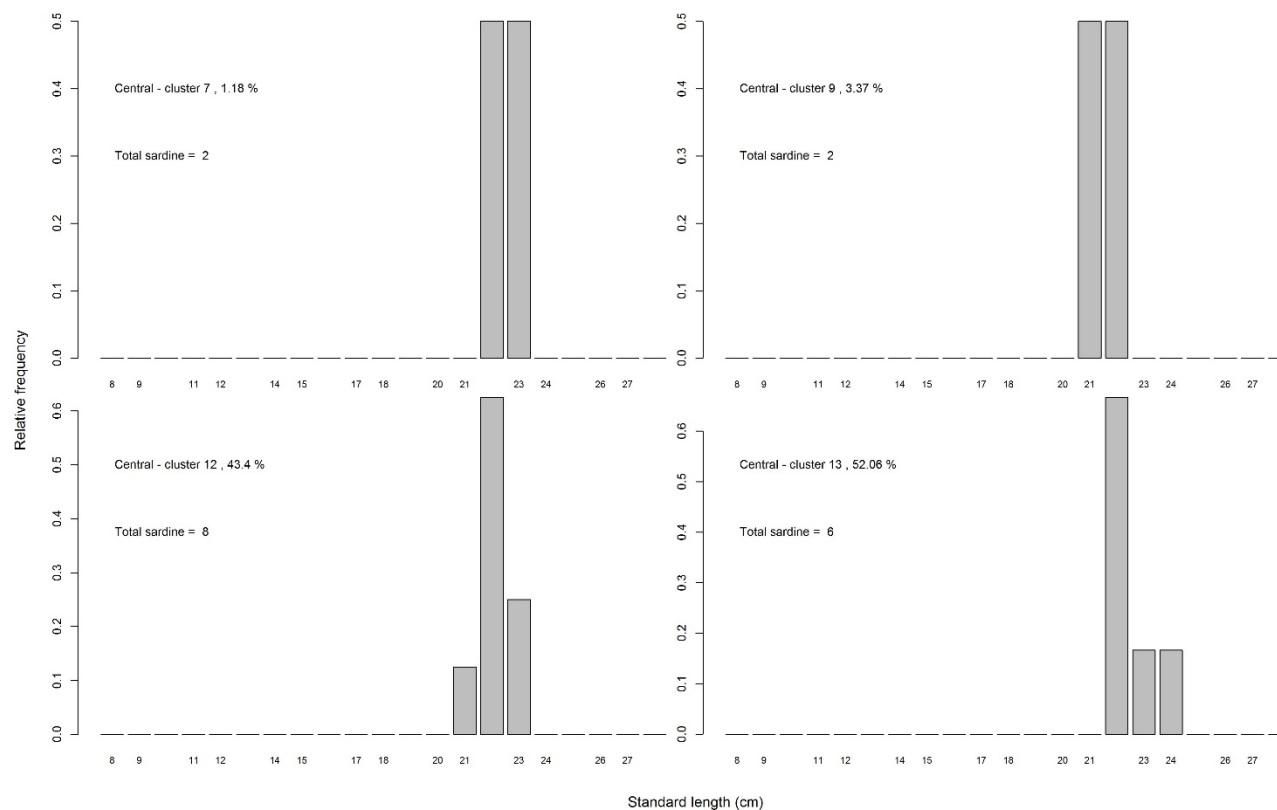
**Figure 1.** Acoustic backscatter from coastal pelagic fish species (CPS, left), acoustic proportions of CPS in trawl clusters (middle), and sardine egg densities from the continuous underway fish egg sampler (CUFE; right).



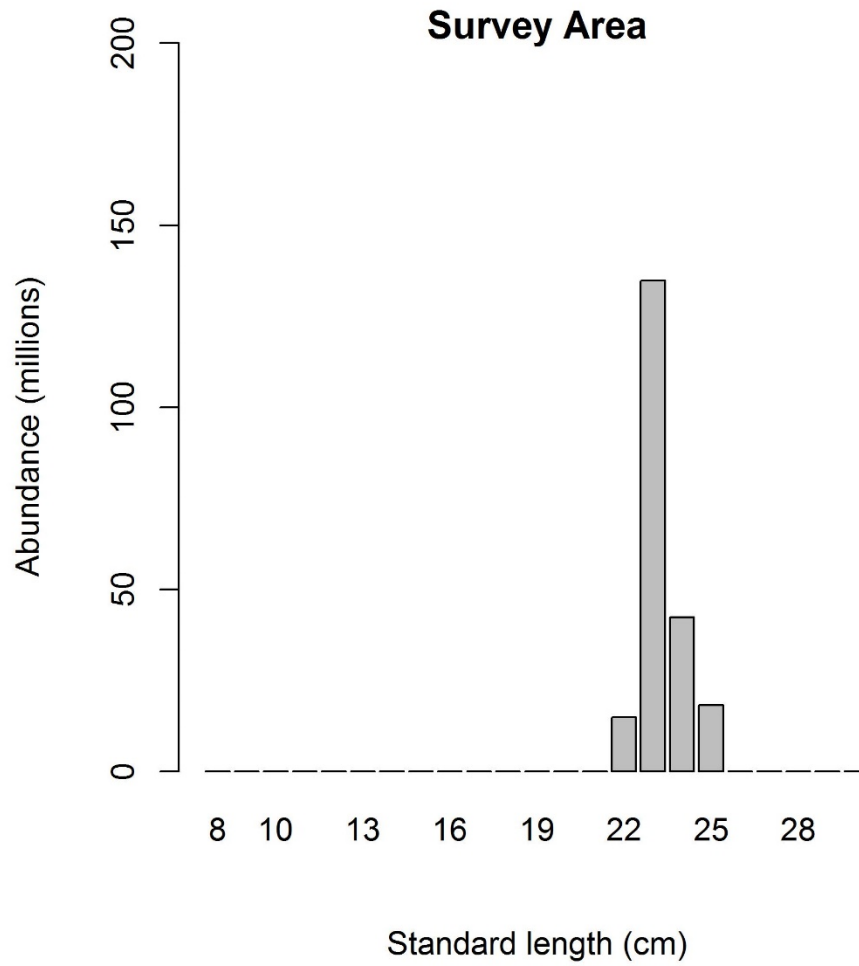
**Figure 2.** Sardine biomass densities for the single, central stratum (Table 1) estimated using the acoustic-trawl method (ATM). The numbers in blue represent the locations of trawl-cluster catches including at least 1 CPS.



**Figure 3.** The sardine length distribution, the total number of sardine caught, and the percentage of sardine abundance in the central stratum, for each cluster with sardine (see Fig. 2 for locations).



**Figure 4.** Sardine abundance versus standard length for spring 2014 survey. Abundance per length class for the survey is provided in **Table 2**.



## APPENDIX B

### Acoustic-trawl estimates of sardine biomass off USA and Canada during summer 2014

Juan P. Zwolinski, David A. Demer, Beverly J. Macewicz, George R. Cutter Jr.,  
Brian E. Elliot, Scott A. Mau, David W. Murfin, Josiah S. Renfree, Thomas S. Sessions,  
and Kevin L. Stierhoff

We report results from the summer 2014 acoustic-trawl method (ATM) survey of the northern sub-population of Pacific sardine off the west coasts of the USA and Vancouver Island, Canada (Fig. 1). The survey was conducted from NOAA FSV *Bell M. Shimada*.

The ATM survey spanned the expected distribution of the stock (Fig. 1), from northern Vancouver Island to the Strait of Juan de Fuca (leg I) and from Cape Flattery, Washington to Morro Bay, California (leg II), to at least 35 n.mi. offshore or 1500 m depth (both legs). The spacing of the east-west tracklines was 20 nm. The aim was to reduce this spacing to 10 nm in areas where schools of coastal pelagic species (CPS) were observed acoustically or in trawl catches, or both.

From sunrise to sunset, multi-frequency echosounders were used to sample acoustic backscatter from epipelagic CPS. During nighttime, catches from as many as four surface trawls each night were combined into clusters to identify the proportions of CPS and their lengths. With considerations to the sampling intensity, the presence of CPS in the echosounder and net samples, and the existence of sardine in the trawl catches (Fig. 1), the survey data were apportioned to four independent and non-overlapping strata (Table 1; Fig 2). Eight of the 21 trawl-catch clusters with CPS included a total of 2085 total sardine.

Sardine were predominantly found in the Washington-Oregon stratum, south of the Columbia River mouth (Figs. 1, and 3). Relatively few sardine were also sampled off southern Vancouver Island, near the Oregon-California border, and south of Monterey, California (Fig. 2). The four strata (Table 1) contained a total sardine biomass of 0.026

Mt ( $CI_{95\%} = [0.002; 0.063]$ ;  $CV = 70.3\%$ ). The sampled population had few recruits, and a modal standard length ( $SL$ ) of  $\sim 24$  cm (Table 2; Fig. 4).

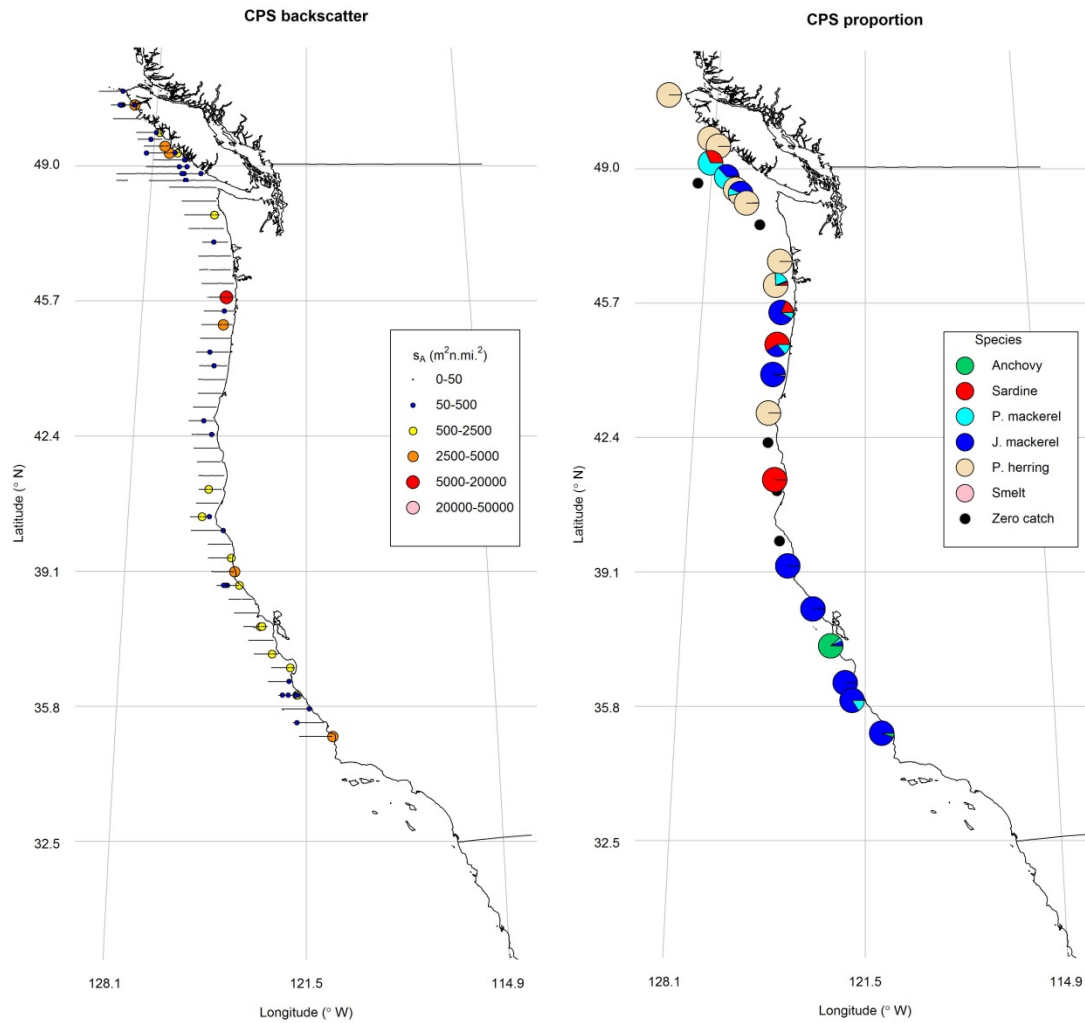
**Table 1.** Estimated sardine biomass by stratum during summer 2014.

| Stratum                    |              | Transect  |                  | Trawls       |                   | Sardine             |                                     |             |
|----------------------------|--------------|-----------|------------------|--------------|-------------------|---------------------|-------------------------------------|-------------|
| Name                       | Area (n.mi.) | Number    | Distance (n.mi.) | CPS clusters | Number of sardine | Biomass (1000 tons) | 95% confidence interval (1000 tons) | CV          |
| Vancouver Island (Leg I)   | 2520         | 4         | 245              | 4            | 28                | 0.15                | 0.02 – 0.29                         | 63.5        |
| Washington-Oregon (Leg II) | 8020         | 9         | 396              | 4            | 2055              | 23.4                | 0.89 – 56.7                         | 72.7        |
| Oregon-California (Leg II) | 4257         | 6         | 208              | 1            | 1                 | 0.55                | 0.05 – 1.21                         | 59.5        |
| California (Leg II)        | 2459         | 3         | 121              | 3            | 1                 | 0.00                | 0.00 – 0.01                         | 91.4        |
| <b>Total</b>               | <b>17256</b> | <b>22</b> | <b>970</b>       | <b>12</b>    | <b>2085</b>       | <b>26.3</b>         | <b>1.57 – 62.7</b>                  | <b>70.3</b> |

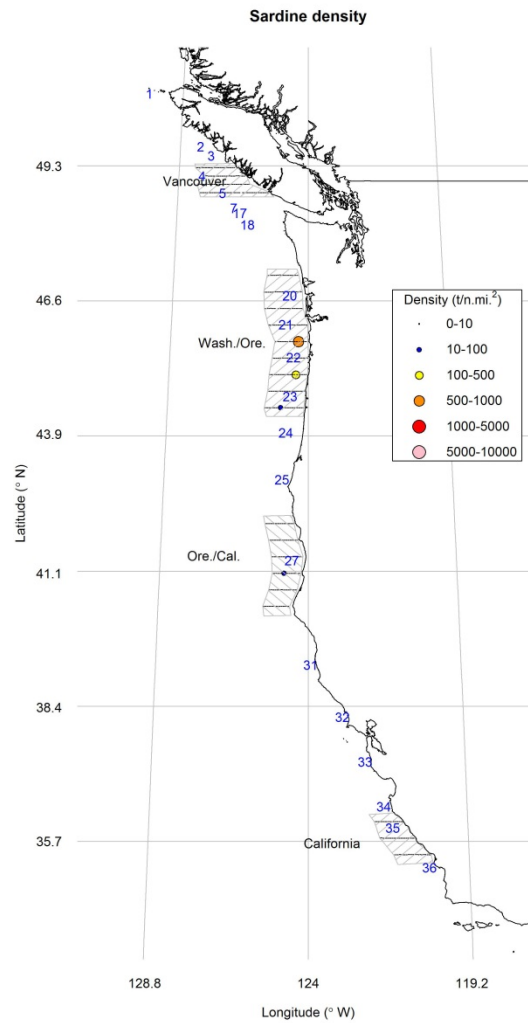
**Table 2.** Estimated sardine abundance versus standard length during summer 2014.

| Standard length (cm) | Abundance (number); |
|----------------------|---------------------|
| $\leq 8$             | 578323              |
| 9                    | 0                   |
| 10                   | 0                   |
| 11                   | 0                   |
| 12                   | 0                   |
| 13                   | 0                   |
| 14                   | 1042                |
| 15                   | 0                   |
| 16                   | 0                   |
| 17                   | 0                   |
| 18                   | 0                   |
| 19                   | 0                   |
| 20                   | 0                   |
| 21                   | 0                   |
| 22                   | 2547916             |
| 23                   | 43793993            |
| 24                   | 73635878            |
| 25                   | 17319748            |
| 26                   | 3191613             |
| 27                   | 0                   |
| 28                   | 0                   |
| 29                   | 0                   |
| 30                   | 0                   |

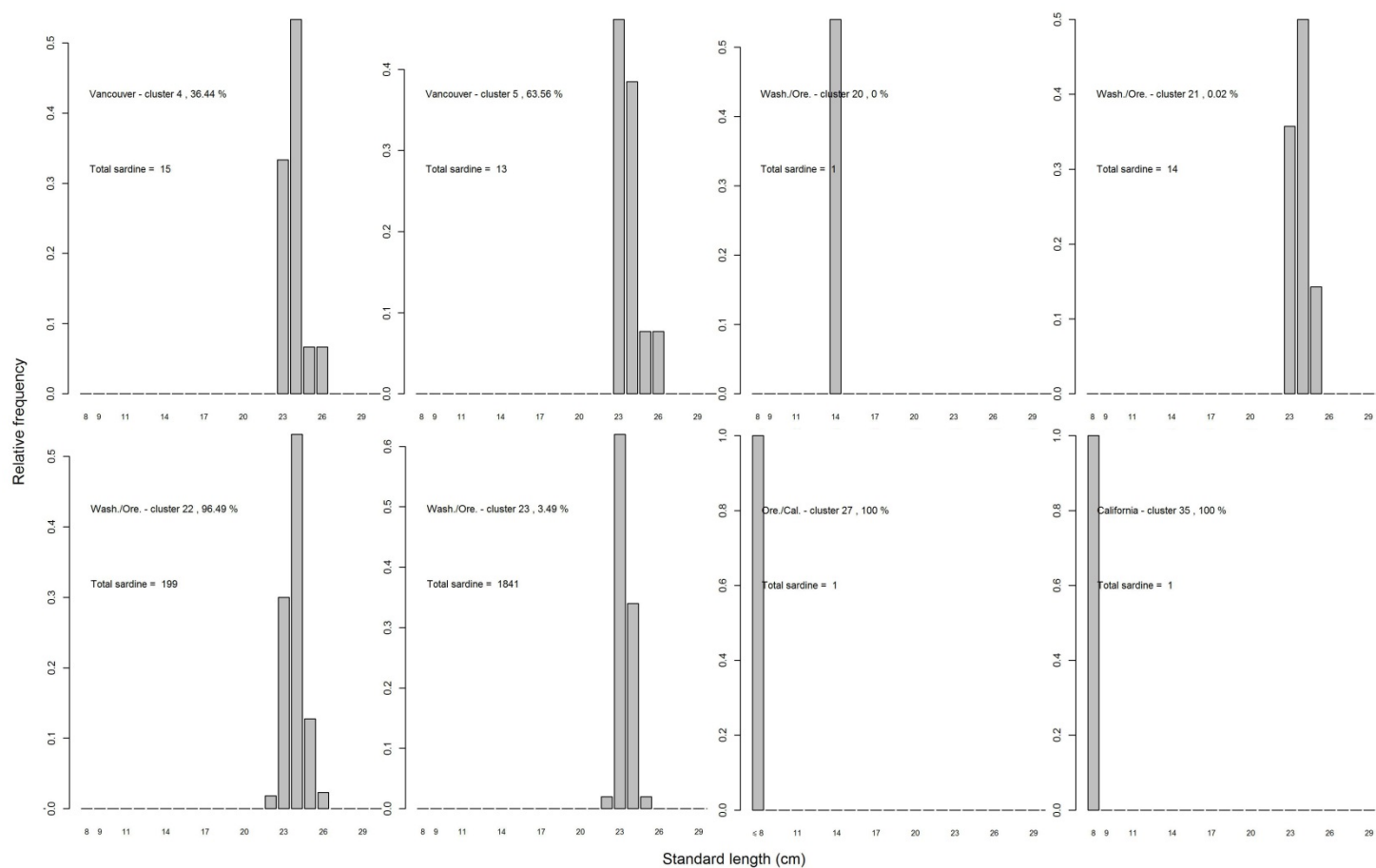
**Figure 1.** Acoustic backscatter from coastal pelagic fish species (CPS; left) and the proportions of CPS in trawl clusters (right).



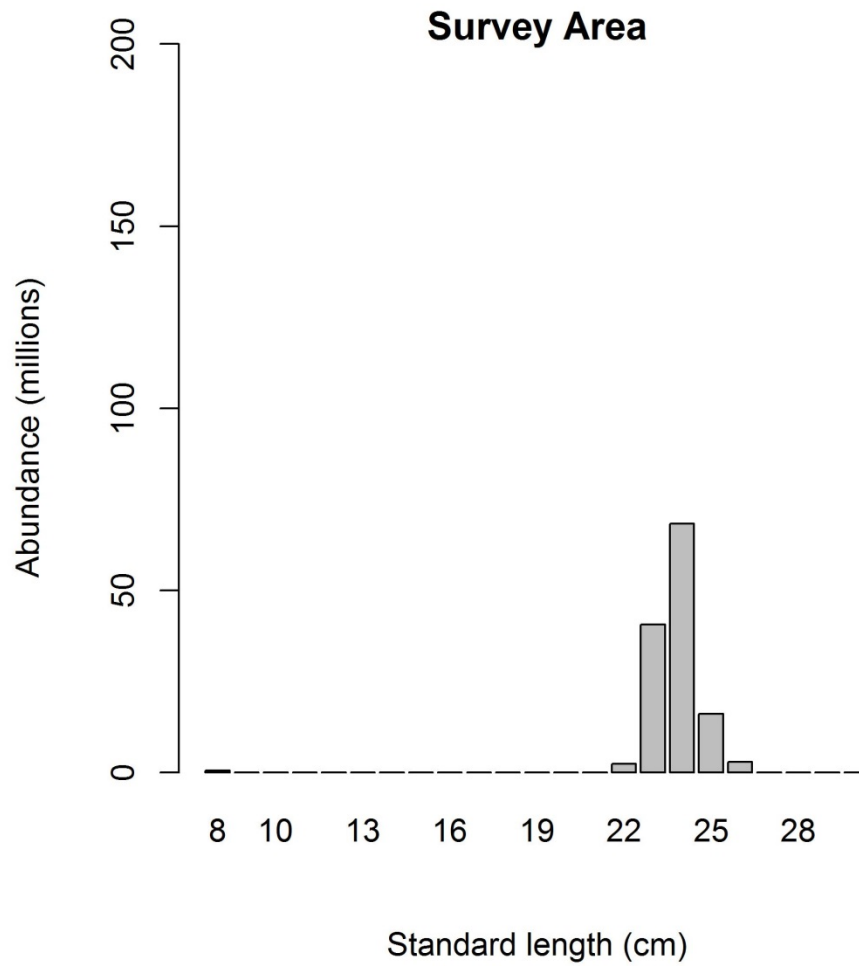
**Figure 2.** Estimated sardine biomass densities by stratum (see **Table 1**). The numbers in blue represent the locations of trawl cluster catches with at least one CPS specimen.



**Figure 3.** The sardine length distribution, the total number of sardine caught, and the percentage of sardine abundance in the associated stratum, for each cluster with sardine (see Fig. 2 for locations).



**Figure 4.** Estimated sardine abundance versus standard length during summer 2014 (see Table 2).



## Appendix C

### SS Input Files for the 2015 Update Model

#### STARTER.SS

```
# Pacific sardine stock assessment update for 2015-16
# K. T. Hill and P. R. Crone (Jan 2015)
# 2014 final model 'T' updated with new landings, comps, and survey estimates
# SS model ver. 3.24s
T_2015.dat
T_2015.ctf
0 # 0=use init values in control file; 1=use ss3.par
1 # Run display detail (0,1,2)
2 # Detailed age-structured reports in REPORT.SS0: (0,1,2)
1 # Write detailed checkup.sso file (0,1)
3 # Write parm values to ParmTrace.sso (0=no,1=good,active; 2=good,all; 3=every_iter,all_parms; 4=every,active)
2 # Write to cumreport.sso (0=no, 1=like&timeseries, 2=add survey fits)
0 # Include prior_like for non-estimated parameters (0,1)
1 # Use soft boundaries to aid convergence: (0,1)
1 # Number of datafiles to produce: 1st is input, 2nd is estimates, 3rd and higher are bootstrap
10 # Turn off estimation for parameters entering after this phase
10 # MCEval burn interval
2 # MCEval thin interval
0 # Jitter initial parm value by this fraction
-1 # Min yr for sdreport outputs (-1 for styr)
-2 # Max yr for sdreport outputs (-1 for endyr; -2 for endyr+Nforecastyrs)
0 # N individual STD years
# Vector of year values
0.00001 # Final convergence criteria (e.g., 1.0e-05)
0 # Retrospective year relative to end year (e.g. -4)
1 # Min age for calc of summary biomass
1 # Depletion basis: denom is: 0=skip; 1=rel X*B0; 2=rel X*Bmsy; 3=rel X*B_styr
1 # Fraction (X) for depletion denominator (e.g. 0.4)
4 # SPR_report_basis: 0=skip; 1=(1-SPR)/(1-SPR_tgt); 2=(1-SPR)/(1-SPR_MSY); 3=(1-SPR)/(1-SPR_Btarget); 4=rawSPR
4 # F_report_units: 0=skip; 1=exploitation(Bio); 2=exploitation(Num); 3=sum(Frates); 4=true F for range of ages
0 13 # Min and max age over which average F will be calculated with F_reporting=4
2 # F_report_basis: 0=raw; 1=F/Fspr; 2=F/Fmsy ; 3=F/Fbtgt
999 # End of file
```

#### FORECAST.SS

```
# Pacific sardine stock assessment update for 2015-16
# K. T. Hill and P. R. Crone (Jan 2015)
# 2014 final model 'T' updated with new landings, comps, and survey estimates
# SS model ver. 3.24s
# FORECAST FILE
# Note: for all year entries except rebuilder, enter either: actual year, -999 for styr, 0 for endyr, neg number
for relative endyr
1 #_Benchmarks: 0=skip, 1=calc F_spr,F_btgt,F_msy
2 #_MSY: 1= set to F(SPR), 2=calc F(MSY), 3=set to F(Btgt), 4=set to F(endyr)
0.4 #_SPR target (e.g., 0.40)
0.4 #_Biomass target (e.g., 0.40)
# Bmark_years: beg_bio, end_bio, beg_selex, end_selex, beg_relF, end_relF (enter actual year, or values of 0 or
-integer to be rel. endyr)
0 0 0 0 0 0
1 # Bmark_relF_basis: 1 = use year range; 2 = set relF same as forecast below
1 # Forecast: 0=none; 1=F(SPR); 2=F(MSY) 3=F(Btgt); 4=Ave F (uses first-last relF yrs); 5=input annual F scalar
1 # N forecast years
0 # F scalar (only used for Do_Forecast==5)
# Fcast_years: beg_selex, end_selex, beg_relF, end_relF (enter actual year, or values of 0 or -integer to be
rel. endyr)
0 0 0 0
1 # Control rule method (1=catch=f(SSB) west coast, 2=F=f(SSB) )
0.5 # Control rule Biomass level for constant F (as frac of Bzero, e.g. 0.40); (Must be > the no F level below)
0.1 # Control rule Biomass level for no F (as frac of Bzero, e.g. 0.10)
0.75 # Control rule target as fraction of Flimit (e.g. 0.75)
3 # N forecast loops
3 # First forecast loop with stochastic recruitment
0 # Forecast loop control #3 (reserved for future bells&whistles)
0 # Forecast loop control #4 (reserved for future bells&whistles)
0 # Forecast loop control #5 (reserved for future bells&whistles)
2020 # FirstYear for caps and allocations (should be after years with fixed inputs)
0 # Stddev of log(realized catch/target catch) in forecast (set value>0.0 to cause active impl_error)
```

```

0 # Do West Coast gfish rebuilder output (0/1)
0 # Rebuilder: first year catch could have been set to zero (Ydecl)(-1 to set to 1999)
0 # Rebuilder: year for current age structure (Yinit) (-1 to set to endyear+1)
1 # Fleet relative F: 1=use first-last alloc year, 2=read seas(row) x fleet(col) below
# Note: fleet allocation is used directly as average F if Do_Forecast=4
2 # Basis for forecast catch tuning and for forecast catch caps and allocation: 2=deadbio, 3=retainbio,
5=deadnum, 6=retainnum
# Conditional input if relative F option=2
# Fleet relative F: rows are seasons, columns are fleets
# Fleet: MexCal_S1 MexCal_S2 PNW
# 0 0 0 # S1
# 0 0 0 # S2
# Max total catch by fleet (-1 to have no max): must enter value for each fleet
-1 -1 -1
# Max total catch by area (-1 to have no max): must enter value for each fleet
-1
# Fleet assignment to allocation group (enter group ID# for each fleet, 0 for not included in an alloc group)
0 0 0
# Conditional on >1 allocation group
# Allocation fraction for each of: 0 allocation groups
# No allocation groups
6 # Number of forecast catch levels to input (or else calculate catch from forecast F)
2 # Basis for input forecast catch: 2=dead catch, 3=retained catch, 99 = input Hrate(F) with units that are from
fishery units
# Input fixed catch values
# Year Season Fleet Catch/F
2015 1 1 1000
2015 2 1 0
2015 1 2 0
2015 2 2 1000
2015 1 3 1000
2015 2 3 1000
999 # End of file

```

## **CONTROL FILE 'T 2015.CTL'**

```

# Pacific sardine stock assessment update for 2015-16
# K. T. Hill and P. R. Crone (Jan 2015)
# 2014 final model 'T' updated with new landings, comps, and survey estimates
# SS model ver. 3.24s
# CONTROL FILE 'A2.CTL' (NORTHERN SUBPOPULATION)
1 # N_growth patterns
1 # N_Morphs within growth pattern
# Cond 1 # Morph between/within SD ratio (no read if N_morphs=1)
# Cond 1 # Vector Morphdist (-1 in first value gives normal approximation)
1 # N_recruitment assignments (overrides GP*area*season parameter values)
0 # Recruitment interaction requested
# GP season area for each recruitment assignment
1 1 1
# Cond 0 # N_movement_definitions goes here if N_areas >1
# Cond 1 # First age that moves (real age at begin of season, not integer) also conditioned on Do_migration >0
# Cond 1 1 1 2 4 10 # example move definition for seas=1, morph=1, source=1 dest=2, age1=4, age2=10
1 # N_block patterns - selectivity
1 # N_blocks per pattern 1
# Begin and end years of block patterns
1999 2014 # Block pattern 1 - MexCal_S1 and MexCal_S2
0.5 # Fraction female
0 # Natural mortality type: 0=1 Parm, 1=N_breakpoints, 2=Lorenzen, 3=agespecific, 4=age-specific with season
interpolation
# No additional input for M_type=0 (read 1 parametr per morph)
1 # Growth model: 1=vonBert with L1&L2, 2=Richards with L1&L2, 3=age_speciific_K, 4=not implemented
0.5 # Growth_age for_L1
999 # Growth_age for_L2 (999=use Linf)
0 # SD add to LAA (set to 0.1 for SS2 V1.x compatibility)
0 # CV_growth pattern: (0) CV=f(LAA), (1) CV=F(A), (2) SD=F(LAA), (3) SD=F(A), (4) log(SD)=F(A)
1 # Maturity_option: 1=length logistic, 2=age logistic, 3=read age-maturity matrix by growth pattern, 4=read
age-fecundity, 5=read fecundity/wt from wtatage.ss
# Placeholder for empirical age-maturity by growth pattern
0 # First mature age
1 # Fecundity option: (1) eggs=Wt*(a+b*Wt), (2) eggs=a*L^b, (3) eggs=a*Wt^b, (4) eggs=a+b*L, (5) eggs=a+b*W
0 # Hermaphroditism option: 0=none, 1=age-specific
1 # Parameter offset approach: 1=none, 2=Mortality, growth, CV_growth as offset from female-GP1, 3=like SS2 V1.x
1 # Env/block/dev adjust method: 1=standard, 2=logistic transform keeps in base parm bounds, 3=standard w/ no
bound check

```

```

# Growth parameters
# LO HI INIT PRIOR PR_type SD PHASE env-var use_dev dev_minyr dev_maxyr dev_stddev block block_Fxn
0.3 0.7 0.4 0 -1 99 -3 0 0 0 0 0 0 0 # NatM_p_1_Fem_GP_1
3 15 10 0 -1 99 3 0 0 0 0 0 0 0 # LAA_min_Fem_GP_1
20 30 25 0 -1 99 3 0 0 0 0 0 0 0 # LAA_max_Fem_GP_1
0.05 0.99 0.4 0 -1 99 3 0 0 0 0 0 0 # VonBert_K_Fem_GP_1
0.05 0.3 0.14 0 -1 99 3 0 0 0 0 0 0 # CV_young_Fem_GP_1
0.01 0.1 0.05 0 -1 99 3 0 0 0 0 0 0 # CV_old_Fem_GP_1
-3 3 7.5242e-006 0 -1 99 -3 0 0 0 0 0 0 # WtLt_1_Fem
-3 5 3.233205 0 -1 99 -3 0 0 0 0 0 0 # WtLt_2_Fem
9 19 15.44 0 -1 99 -3 0 0 0 0 0 0 # Mat50%_Fem
-20 3 -0.89252 0 -1 99 -3 0 0 0 0 0 0 # Mat_slope_Fem
0 10 1 0 -1 99 -3 0 0 0 0 0 0 # Eggs/kg_inter_Fem
-1 5 0 0 -1 99 -3 0 0 0 0 0 0 # Eggs/kg_slope_wt_Fem
-4 4 0 0 -1 99 -3 0 0 0 0 0 0 # RecrDist_GP_1
-4 4 1 0 -1 99 -3 0 0 0 0 0 0 # RecrDist_Area_1
-4 4 1 0 -1 99 -3 0 0 0 0 0 0 # RecrDist_Seas_1
-4 4 0 0 -1 99 -3 0 0 0 0 0 0 # RecrDist_Seas_2
1 1 1 0 -1 99 -3 0 0 0 0 0 0 # Cohort Growth_Dev
# Cond 0 # Custom MG-env_setup (0/1)
# Cond -2 2 0 0 -1 99 -2 # Placeholder when no MG-env parameters
# Custom MG-block_setup (0/1)
# Cond No MG parm trends
# Seasonal effects on biology parameter
0 0 0 0 0 0 0 0 0 # femwtlt1, femwtlt2, mat1, mat2, fec1, fec2, malewtlt1, malewtlt2, L1, K
# Cond -2 2 0 0 -1 99 -2 # Placeholder when no seasonal MG parameters
# Cond -4 # MGparm_dev Phase
# Spawner-recruit (SR) parameters
3 # SR function: 1=Null, 2=Ricker (2 parm), 3=std_B-H (2 parm), 4=S-CAA, 5=Hockey stick, 6=flat-top_B-H,
7=Survival_3Parm
# LO HI INIT PRIOR PR_type SD PHASE
3 25 16 0 -1 99 1 # SR_R0
0.2 1 0.8 0 -1 99 -6 # SR_steepness (Ricker= 0.2 4 2.5 0 -1 99 6)(B-H= 0.2 1 0.8 0 -1 99 6)
0 2 0.75 0 -1 99 -3 # SR_sigmaR
-5 5 0 0 -1 99 -3 # SR_env link
-15 15 0 0 -1 99 2 # SR_R1_offset
0 0 0 0 -1 99 -3 # SR_autocorr
0 # SR_env link
0 # SR_env target: 0=none, 1=devs, 2=R0, 3=steepness
1 # Do recdev: 0=none, 1=devvector, 2=simple deviations
1993 # First year of main rec_devs (early devs can precede this era)
2013 # Last year of main rec_devs (forecast devs start in following year) (was 2012 for 2014 full)
1 # Rec_dev phase
1 # Read 13 advanced options (0/1)
-6 # Rec_dev early start: 0=none (neg value makes relative to rec_dev)
2 # Rec_dev early phase
0 # Forecast rec phase (includes late rec): 0 value sets to maxphase+1
1 # Lambda for Forecast rec likelihood occurring before endyr+1
# FOLLOWING ARE BIAS RAMP VALUES USED FOR A1:
1984 # Last early_yr nobias adjustment in MPD
1993 # First yr fullbias adjustment in MPD
2011 # Last yr fullbias adjustment in MPD (was 2010 in last full)
2014 # First recent_yr nobias adjustment in MPD (was 2013 in last full)
0.93 # Max bias adjustment in_MPD (-1 to override ramp and set bias adjustment=1.0 for all estimated rec_devs)
0 # Period of cycles in recruitment (N_parms read below)
-5 # Min rec_dev
5 # Max rec_dev
0 # Read rec_devs
# End of advanced SR options
# Placeholder for full parameter lines for recruitment cycles
# Read specified rec_devs
# Yr Input_value
# Fishing mortality (F) parameters
0.1 # F ballpark for tuning early phases
-2006 # F ballpark year (neg value to disable)
3 # F method: 1=Pope, 2=instant F, 3=hybrid
4 # Max F or harvest rate (depends on F method)
# No additional F input needed for F method 1
# If F method=2 then read overall start F value, overall phase, N_detailed inputs to read
# If F method=3 then read N_iterations for tuning for F method=3
10 # N_iterations for tuning F (F method=3 only, e.g., 3-7)
# Initial F parameters
# LO HI INIT PRIOR PR_type SD PHASE
0 4 0 0 -1 99 -1 # Init F_MexCal_S1
0 4 0 0 -1 99 -1 # Init F_MexCal_S2

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0 4 0 0 -1 99 -1 # Init F_PacNW
# Catchability (Q) parameters
# Den_dep: 0=off and survey is proportional to abundance, 1=add parameter for non-linearity
# Env_var: 0=off, 1 = add parameter for env effect on Q
# Extra_SE: 0=off, 1 = add parameter for additive constant to input SE in ln space
# Q_type: <0=mirror, 0=median_float, 1=mean_float, 2=estimate parameter for ln(Q), 3=parameter with random_dev,
4=parameter with random walk, 5=mean unbiased float assigned to parameter
#
# <0=mirror
#
# 0=Q floats as a scaling factor (no variance bias adjustment is taken into account)
#
# 1=Q floats as scaling factor (variance bias adjustment is used) ** recommended option **
#
# 2=Q is a parameter (variance bias adjustment is NOT used, so produces same result as option=0)
#
# 3=parameter with random_dev
#
# 4=parameter with random walk
#
# 5=mean unbiased float assigned to parameter
# Note: a new option will be created to include bias adjustment in the parameter approach
# Den-dep Env-var Extra_SE Q_type
0 0 0 0 # 1 MexCal_S1
0 0 0 0 # 2 MexCal_S2
0 0 0 0 # 3 PacNW
0 0 0 2 # 4 DEPM
0 0 0 2 # 5 TEP
0 0 0 2 # 6 TEP_all
0 0 0 2 # 7 Aerial
0 0 0 2 # 8 Acoustic_Spring
0 0 0 -8 # 9 Acoustic_Summer
# Cond # If Q has random component then 0=read one parameter for each fleet with random Q, 1=read a parameter
for each year of index
# Q parameters (if any)
# LO HI INIT PRIOR PR_type SD PHASE
-3 3 -1.39 0 -1 99 5 # Q_DEPM
-3 3 -0.69 0 -1 99 5 # Q_TEP
-3 3 -0.69 0 -1 99 5 # Q_TEP_full
-3 3 0 0 -1 99 5 # Q_Aerial
-3 3 0 0 -1 99 -5 # Q_Acoustic_Spring
# -3 3 0 0 -1 99 5 # Q_Acoustic_Summer
# Size selectivity types
# Pattern Discard Male Special
24 0 0 0 # 1 MexCal_S1
24 0 0 0 # 2 MexCal_S2
24 0 0 0 # 3 PacNW
30 0 0 0 # 4 DEPM
30 0 0 0 # 5 TEP
30 0 0 0 # 6 TEP_full
24 0 0 0 # 7 Aerial
24 0 0 0 # 8 Acoustic_Spring
24 0 0 0 # 9 Acoustic_Summer
# Age selectivity types
# Pattern Discard Male Special
0 0 0 0 # 1 MexCal_S1
0 0 0 0 # 2 MexCal_S2
0 0 0 0 # 3 PacNW
0 0 0 0 # 4 DEPM
0 0 0 0 # 5 TEP
0 0 0 0 # 6 TEP_full
0 0 0 0 # 7 Aerial
0 0 0 0 # 8 Acoustic_Spring
0 0 0 0 # 9 Acoustic_Summer
# Size selectivity
# LO HI INIT PRIOR PR_type SD PHASE env-var use_dev dev_minyr dev_maxyr dev_stddev Block Block_Fxn
# MexCal_S1 (dome)
10 28 18 0 -1 99 4 0 0 0 0 0 1 2 # SizeSel_P1_MexCal_S1
-5 3 -4.985 0 -1 99 -4 0 0 0 0 0 1 2 # SizeSel_P2_MexCal_S1
-1 9 2.5 0 -1 99 4 0 0 0 0 0 1 2 # SizeSel_P3_MexCal_S1
-1 9 4 0 -1 99 4 0 0 0 0 0 1 2 # SizeSel_P4_MexCal_S1
-10 10 -10 0 -1 99 -4 0 0 0 0 0 1 2 # SizeSel_P5_MexCal_S1
-10 10 -10 0 -1 99 4 0 0 0 0 0 1 2 # SizeSel_P6_MexCal_S1
# MexCal_S2 (dome)
10 28 18 0 -1 99 4 0 0 0 0 0 1 2 # SizeSel_P1_MexCal_S2
-5 3 -4.993 0 -1 99 -4 0 0 0 0 0 1 2 # SizeSel_P2_MexCal_S2
-1 9 2.5 0 -1 99 4 0 0 0 0 0 1 2 # SizeSel_P3_MexCal_S2
-1 9 4 0 -1 99 4 0 0 0 0 0 1 2 # SizeSel_P4_MexCal_S2
-10 10 -10 0 -1 99 -4 0 0 0 0 0 1 2 # SizeSel_P5_MexCal_S2
-10 10 -10 0 -1 99 4 0 0 0 0 0 1 2 # SizeSel_P6_MexCal_S2
# PacNW (Asymptotic)
10 28 19 0 -1 99 4 0 0 0 0 0 0 0 # SizeSel_P1_PNW

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-5 10 2.5 0 -1 99 -4 0 0 0 0 0 0 0 # SizeSel_P2_PNW
-5 10 5 0 -1 99 4 0 0 0 0 0 0 0 # SizeSel_P3_PNW
-5 10 5 0 -1 99 -4 0 0 0 0 0 0 0 # SizeSel_P4_PNW
-10 10 -10 0 -1 99 -4 0 0 0 0 0 0 0 # SizeSel_P5_PNW
-10 10 10 0 -1 99 -4 0 0 0 0 0 0 0 # SizeSel_P6_PNW
# Aerial (Asymptotic)
10 28 18 0 -1 99 4 0 0 0 0 0 0 0 # SizeSel_P1_Aerial
-5 3 3 0 -1 99 -4 0 0 0 0 0 0 0 # SizeSel_P2_Aerial
-1 9 2.5 0 -1 99 4 0 0 0 0 0 0 0 # SizeSel_P3_Aerial
-1 9 4 0 -1 99 -4 0 0 0 0 0 0 0 # SizeSel_P4_Aerial
-10 10 -10 0 -1 99 -4 0 0 0 0 0 0 0 # SizeSel_P5_Aerial
-10 10 10 0 -1 99 -4 0 0 0 0 0 0 0 # SizeSel_P6_Aerial
# Acoustic_Spring (Asymptotic)
10 28 18 0 -1 99 4 0 0 0 0 0 0 0 # SizeSel_P1_Acoustic
-5 3 3 0 -1 99 -4 0 0 0 0 0 0 0 # SizeSel_P2_Acoustic
-1 9 2.5 0 -1 99 4 0 0 0 0 0 0 0 # SizeSel_P3_Acoustic
-1 9 4 0 -1 99 -4 0 0 0 0 0 0 0 # SizeSel_P4_Acoustic
-10 10 -10 0 -1 99 -4 0 0 0 0 0 0 0 # SizeSel_P5_Acoustic
-10 10 10 0 -1 99 -4 0 0 0 0 0 0 0 # SizeSel_P6_Acoustic
# Acoustic_Summer (Asymptotic)
10 28 18 0 -1 99 4 0 0 0 0 0 0 0 # SizeSel_P1_Acoustic
-5 3 3 0 -1 99 -4 0 0 0 0 0 0 0 # SizeSel_P2_Acoustic
-1 9 2.5 0 -1 99 4 0 0 0 0 0 0 0 # SizeSel_P3_Acoustic
-1 9 4 0 -1 99 -4 0 0 0 0 0 0 0 # SizeSel_P4_Acoustic
-10 10 -10 0 -1 99 -4 0 0 0 0 0 0 0 # SizeSel_P5_Acoustic
-10 10 10 0 -1 99 -4 0 0 0 0 0 0 0 # SizeSel_P6_Acoustic
# Cond 0 # Custom sel-env setup (0/1)
# Cond -2 2 0 0 -1 99 -2 # Placeholder when no env_fxns
1 # Custom sel-blk setup (0/1)
#_MexCal_S1 (Block 2)
10 28 18 0 -1 99 4 # SizeSel_P1_MexCal_S1_Blk2
-5 3 -4.998 0 -1 99 -4 # SizeSel_P2_MexCal_S1_Blk2
-1 9 2.5 0 -1 99 4 # SizeSel_P3_MexCal_S1_Blk2
-1 9 4 0 -1 99 4 # SizeSel_P4_MexCal_S1_Blk2
-10 10 -10 0 -1 99 -4 # SizeSel_P5_MexCal_S1_Blk2
-10 10 -10 0 -1 99 4 # SizeSel_P6_MexCal_S1_Blk2
#_MexCal_S2 (Block 2)
10 28 18 0 -1 99 4 # SizeSel_P1_MexCal_S2_Blk2
-5 3 -4.997 0 -1 99 -4 # SizeSel_P2_MexCal_S2_Blk2
-1 9 2.5 0 -1 99 4 # SizeSel_P3_MexCal_S2_Blk2
-1 9 4 0 -1 99 4 # SizeSel_P4_MexCal_S2_Blk2
-10 10 -10 0 -1 99 -4 # SizeSel_P5_MexCal_S2_Blk2
-10 10 -10 0 -1 99 4 # SizeSel_P6_MexCal_S2_Blk2
# Cond 1 # No selectivity parameter trends
# Cond 1 # Placeholder for selectivity parm_dev phase
1 # Cond # Env/Block/Dev_adjustment method: 1=standard, 2=logistic trans to keep in base parameter bounds,
3=standard with no bound check
# Tag loss and Tag reporting parameters
0 # Tag custom: 0=no read, 1=read if tags exist
# Cond -6 6 1 1 2 0.01 -4 0 0 0 0 0 0 0 # Placeholder if no parameters
1 # Variance adjustments
# Fleet/Survey: 1 2 3 4 5 6 7 8
0.000000 0.000000 0.000000 0.000000 0.000000 0.000000 0.000000 0.000000
0.000000 0.000000 0.000000 #_add_to_survey_CV
0.000000 0.000000 0.000000 0.000000 0.000000 0.000000 0.000000 0.000000
0.000000 0.000000 0.000000 #_add_to_discard_stddev
0.000000 0.000000 0.000000 0.000000 0.000000 0.000000 0.000000 0.000000
0.000000 0.000000 0.000000 #_add_to_bodywt_CV
1.000000 1.000000 1.000000 1.000000 1.000000 1.000000 1.000000 1.000000
#_mult_by_lencomp_N
1.000000 1.000000 1.000000 1.000000 1.000000 1.000000 1.000000 1.000000
#_mult_by_agecomp_N
1.000000 1.000000 1.000000 1.000000 1.000000 1.000000 1.000000 1.000000
#_mult_by_size-at-age_N
1 # Max lambda phase
1 # SD_offset
25 # Number of changes to make to default Lambdas (default value=1)
# Like_comp codes: 1=survey, 2=discard, 3=mean_wt, 4=length, 5=age, 6=size-freq, 7=size_age, 8=catch,
# 9=initial equilibrium catch, 10=rec_dev, 11=parameter_prior, 12=parameter_dev,
# 13=crash penalty, 14=morph composition; 15=tag composition, 16=tag neg_bin
# Like_comp fleet/survey phase value size-freq_method
1 4 1 1 1 # DEPM
1 5 1 1 1 # TEP
1 6 1 0 1 # TEP_full
1 7 1 0 1 # Aerial

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```

1 8 1 1 1      # Acoustic_Spring
1 9 1 1 1      # Acoustic_Summer
4 1 1 1 1      # MexCal_S1 (length)
4 2 1 1 1      # MexCal_S2 (length)
4 3 1 1 1      # PacNW (length)
4 7 1 0 1      # Aerial (length)
4 8 1 1 1      # Acoustic_Spring (length)
4 9 1 1 1      # Acoustic_Summer (length)
5 1 1 0.2 1     # MexCal_S1 (Cond AAL)
5 2 1 0.2 1     # MexCal_S2 (Cond AAL)
5 3 1 0.2 1     # PacNW (Cond AAL)
5 8 1 0 1      # Acoustic_Spring (Cond AAL)
5 9 1 0 1      # Acoustic_Summer (Cond AAL)
7 1 1 0 1      # MexCal_S1 (Mean LAA)
7 2 1 0 1      # MexCal_S2 (Mean LAA)
7 3 1 0 1      # PacNW (Mean LAA)
7 8 1 0 1      # Acoustic_Spring (Mean LAA)
7 9 1 0 1      # Acoustic_Summer (Mean LAA)
9 1 1 0 1      # Initial equilibrium catch (MexCal_S1)
9 2 1 0 1      # Initial equilibrium catch (MexCal_S2)
9 3 1 0 1      # Initial equilibrium catch (PacNW)
0 # Read specs for more SD reporting (0/1)
# 0 1 -1 5 1 5 1 -1 5 # Placeholder for selectivity type, lt/age, year, N_selectivity bins, growth pattern,
N_growth ages, natage_area (-1 for all), natage_yr, N_natages
# Placeholder for vector of selectivity bins to be reported
# Placeholder for vector of growth ages to be reported
# Placeholder for vector of natage ages to be reported
999 # End of file

```

## **DATA FILE 'T 2015.DAT'**

```

# Pacific sardine stock assessment update for 2015-16
# K. T. Hill and P. R. Crone (Jan 2015)
# 2014 final model 'T' updated with new landings, comps, and survey estimates
# SS model ver. 3.24s
# .DAT FILE FOR 'NORTHERN SUBPOPULATION' DATA FROM ENS to BC
1993 # Start year (July 1993)
2014 # End year (forecast=2015)
2 # N_seasons
6 6 # Months per season (2 semesters per fishing year)
2 # Spawning season (Spring semester)
3 # N_fleets
6 # N_surveys
1 # N_areas
MexCal_S1_NSP%MexCal_S2_NSP%PacNW%DEPM%TEP%TEP_full%Aerial%ATM_Spring%ATM_Summer
0.5 0.5 0.5 0.58 0.58 0.58 0.2 0.58 0.2 # Survey timing in season
1 1 1 1 1 1 1 1 # Area assignments for each fishery/survey
1 1 1 # Units of catch: 1=biomass, 2=number
0.05 0.05 0.05 # SE of log(catch), only used for initial equilibrium catch and for Fmethod=2-3
1 # N_genders
15 # N_ages
0 0 0 # Initial equilibrium catch for each fishery
44 # N_lines of catch to read
# Catch biomass(mt): columns are fisheries, year, season
822.80 0.00 0.00 1993 1
0.00 11345.83 0.00 1993 2
8838.65 0.00 0.00 1994 1
0.00 39748.42 0.00 1994 2
5993.28 0.00 22.68 1995 1
0.00 26565.72 0.00 1995 2
11917.29 0.00 0.00 1996 1
0.00 19158.65 43.54 1996 2
13018.20 0.00 27.22 1997 1
0.00 24527.60 0.82 1997 2
18925.15 0.00 488.25 1998 1
0.00 63278.38 74.39 1998 2
14996.21 0.00 725.20 1999 1
0.00 58341.39 429.59 1999 2
23693.38 0.00 15586.16 2000 1
0.00 35179.21 2336.90 2000 2
11550.53 0.00 22545.99 2001 1
0.00 41118.36 3136.84 2001 2
16562.71 0.00 35525.69 2002 1
0.00 36130.69 597.29 2002 2

```

|           |          |          |      |                        |
|-----------|----------|----------|------|------------------------|
| 10340.64  | 0.00     | 37242.26 | 2003 | 1                      |
| 0.00      | 21300.55 | 2618.43  | 2003 | 2                      |
| 17048.96  | 0.00     | 46730.80 | 2004 | 1                      |
| 0.00      | 25249.92 | 1016.32  | 2004 | 2                      |
| 13730.19  | 0.00     | 54152.62 | 2005 | 1                      |
| 0.00      | 29752.00 | 101.70   | 2005 | 2                      |
| 20620.28  | 0.00     | 41220.90 | 2006 | 1                      |
| 0.00      | 39234.00 | 0.00     | 2006 | 2                      |
| 46047.30  | 0.00     | 48237.10 | 2007 | 1                      |
| 0.00      | 42247.81 | 0.00     | 2007 | 2                      |
| 30147.46  | 0.00     | 39800.10 | 2008 | 1                      |
| 0.00      | 40545.56 | 0.00     | 2008 | 2                      |
| 13964.90  | 0.00     | 44841.15 | 2009 | 1                      |
| 0.00      | 30240.66 | 1369.73  | 2009 | 2                      |
| 11130.97  | 0.00     | 54085.91 | 2010 | 1                      |
| 0.00      | 26817.27 | 0.09     | 2010 | 2                      |
| 24700.00  | 0.00     | 39750.49 | 2011 | 1                      |
| 0.00      | 22717.65 | 5805.63  | 2011 | 2                      |
| 1452.24   | 0.00     | 91425.63 | 2012 | 1                      |
| 0.00      | 13681.80 | 1570.78  | 2012 | 2                      |
| 874.21    | 0.00     | 56802.71 | 2013 | 1                      |
| 0.00      | 7176.11  | 908.01   | 2013 | 2                      |
| 1824.56   | 0.00     | 14996.92 | 2014 | 1                      |
| 0.00      | 6346.70  | 759.46   | 2014 | 2                      |
| # 1000.00 | 0.00     | 1000.00  | 2015 | 1 # Placed in FORECAST |
| # 0.00    | 1000.00  | 1000.00  | 2015 | 2 # Placed in FORECAST |

53 #\_N\_cpue\_and\_surveyabundance\_observations  
 #\_Units: 0=numbers; 1=biomass; 2=F  
 #\_Errtype: -1=normal; 0=lognormal; >0=T  
 #\_Fleet Units Errtype

| # | Year | season | index | obs     | error |               |
|---|------|--------|-------|---------|-------|---------------|
| 1 | 1993 | 2      | 4     | 69065   | 0.29  | #_DEPM_9404   |
| 2 | 2003 | 2      | 4     | 145274  | 0.23  | #_DEPM_0404   |
| 3 | 2004 | 2      | 4     | 459943  | 0.55  | #_DEPM_0504   |
| 4 | 2006 | 2      | 4     | 198404  | 0.30  | #_DEPM_0704   |
| 5 | 2007 | 2      | 4     | 66395   | 0.27  | #_DEPM_0804   |
| 6 | 2008 | 2      | 4     | 99162   | 0.24  | #_DEPM_0905   |
| 7 | 2009 | 2      | 4     | 58447   | 0.40  | #_DEPM_1004   |
| 8 | 2010 | 2      | 4     | 219386  | 0.27  | #_DEPM_1104   |
| 9 | 2011 | 2      | 4     | 113178  | 0.27  | #_DEPM_1204   |
|   | 2012 | 2      | 4     | 82182   | 0.29  | #_DEPM_1304   |
|   | 1995 | 2      | 5     | 97923   | 0.40  | #_TEP_9604    |
|   | 1996 | 2      | 5     | 482246  | 0.21  | #_TEP_9704    |
|   | 1997 | 2      | 5     | 369775  | 0.33  | #_TEP_9804    |
|   | 1998 | 2      | 5     | 332177  | 0.34  | #_TEP_9904    |
|   | 1999 | 2      | 5     | 1252539 | 0.39  | #_TEP_0004    |
|   | 2000 | 2      | 5     | 931377  | 0.38  | #_TEP_0104    |
|   | 2001 | 2      | 5     | 236660  | 0.17  | #_TEP_0204    |
|   | 2002 | 2      | 5     | 556177  | 0.18  | #_TEP_0304    |
|   | 2005 | 2      | 5     | 651994  | 0.25  | #_TEP_0604    |
|   | 1993 | 2      | 6     | 73374   | 0.21  | #_TEPall_9404 |
|   | 1995 | 2      | 6     | 97923   | 0.40  | #_TEPall_9604 |
|   | 1996 | 2      | 6     | 482246  | 0.21  | #_TEPall_9704 |
|   | 1997 | 2      | 6     | 369775  | 0.33  | #_TEPall_9804 |
|   | 1998 | 2      | 6     | 332177  | 0.34  | #_TEPall_9904 |
|   | 1999 | 2      | 6     | 1252539 | 0.39  | #_TEPall_0004 |
|   | 2000 | 2      | 6     | 931377  | 0.38  | #_TEPall_0104 |
|   | 2001 | 2      | 6     | 236660  | 0.17  | #_TEPall_0204 |
|   | 2002 | 2      | 6     | 556177  | 0.18  | #_TEPall_0304 |
|   | 2003 | 2      | 6     | 307795  | 0.24  | #_TEPall_0404 |
|   | 2004 | 2      | 6     | 486950  | 0.40  | #_TEPall_0504 |
|   | 2005 | 2      | 6     | 651994  | 0.25  | #_TEPall_0604 |
|   | 2006 | 2      | 6     | 306297  | 0.26  | #_TEPall_0704 |
|   | 2007 | 2      | 6     | 128118  | 0.21  | #_TEPall_0804 |
|   | 2008 | 2      | 6     | 162188  | 0.22  | #_TEPall_0904 |
|   | 2009 | 2      | 6     | 97838   | 0.39  | #_TEPall_1004 |

```

2010 2 6 364798 0.26 #_TEPall_1104
2011 2 6 227632 0.27 #_TEPall_1204
2012 2 6 198472 0.29 #_TEPall_1304
2009 1 7 1236911 0.90 #_Aerial_09N
2010 1 7 173390 0.40 #_Aerial_10N
2011 1 7 201888 0.29 #_Aerial_11N
2012 1 7 696251 0.37 #_Aerial_12N
2005 2 8 1947063 0.30 #_Acoustic_0604
2007 2 8 751075 0.09 #_Acoustic_0804
2009 2 8 357006 0.41 #_Acoustic_1004
2010 2 8 493672 0.30 #_Acoustic_1104
2011 2 8 469480 0.28 #_Acoustic_1204
2012 2 8 305146 0.24 #_Acoustic_1304
2013 2 8 35339 0.38 #_Acoustic_1404
2008 1 9 801000 0.30 #_Acoustic_0807
2012 1 9 340831 0.33 #_Acoustic_1207
2013 1 9 313746 0.27 #_Acoustic_1307
2014 1 9 26280 0.63 #_Acoustic_1407
0 # N_fleets with discard
# Discard units: 1=same_as_catch units (bio/num), 2=fraction, 3=numbers
# Discard error type: >0 for DF of T-dist(read CV below), 0 for normal with CV, -1 for normal with se, -2 for lognormal
# Fleet discard units and error type
0 # N_discard obs
# Year season index obs error
0 # N_meanbodywt obs
100 # DF_for_meanbodywt t-distribution likelihood
2 # Length bin method: 1=use databins; 2=generate from binwidth,min,max below; 3=read vector
0.5 # Bin width for population size composition
8 # Minimum size in the population (lower edge of first bin and size at age 0)
30 # Maximum size in the population (lower edge of last bin)
-0.0001 # Composition tail compression
0.0001 # Add to composition
0 # Combine males into females at or below this bin number
39 # N_length bins
9 9.5 10 10.5 11 11.5 12 12.5 13 13.5 14 14.5 15 15.5 16 16.5 17 17.5 18 18.5 19 19.5 20 20.5 21 21.5 22 22.5 23
23.5 24 24.5 25 25.5 26 26.5 27 27.5 28
85 # N_length obs
# Year Season Fleet/Survey Gender Part Nsamp Datavector(female-male)
1993 1 1 0 0 2.72 0.00000000 0.00000000 0.00000000 0.00000000
0.00000000 0.00000000 0.00000000 0.00000000 0.00000000 0.00000000 0.00000000 0.00000000
0.00000000 0.00000000 0.00000000 0.00000000 0.01470588 0.00000000 0.14705882
0.23529412 0.19117647 0.20588235 0.13235294 0.05882353 0.01470588 0.00000000
0.00000000 0.00000000 0.00000000 0.00000000 0.00000000 0.00000000 0.00000000
0.00000000 0.00000000 0.00000000 0.00000000 0.00000000 0.00000000 0.00000000
1994 1 1 0 0 13.74 0.00000000 0.00000000 0.00000000 0.00000000
0.00000000 0.00000000 0.00000000 0.00000000 0.00000000 0.00192997 0.01865635
0.04117263 0.08430434 0.07591361 0.07404029 0.08683868 0.12757807 0.09884957
0.10926901 0.11878046 0.08880898 0.05178937 0.00695027 0.01026562 0.00365034
0.00060123 0.00000000 0.00060123 0.00000000 0.00000000 0.00000000 0.00000000
0.00000000 0.00000000 0.00000000 0.00000000 0.00000000 0.00000000 0.00000000
1995 1 1 0 0 4.80 0.00000000 0.00000000 0.00000000 0.00000000 0.00000000
0.00000000 0.00000000 0.00833333 0.00000000 0.00833333 0.00833333 0.01666667
0.07500000 0.08333333 0.05833333 0.20833333 0.13333333 0.21666667 0.08333333
0.06666667 0.01666667 0.00833333 0.00833333 0.00000000 0.00000000 0.00000000
0.00000000 0.00000000 0.00000000 0.00000000 0.00000000 0.00000000 0.00000000
0.00000000 0.00000000 0.00000000 0.00000000 0.00000000 0.00000000 0.00000000
1996 1 1 0 0 59.54 0.00000000 0.00000000 0.00000000 0.00000000
0.00000000 0.00000000 0.00000000 0.00000000 0.00000000 0.00034806 0.00058009
0.00219937 0.00576503 0.00957964 0.02611018 0.04050980 0.05620072 0.08282782
0.13533238 0.15435462 0.17604004 0.13254345 0.08564194 0.05547979 0.02087313
0.00993156 0.00286865 0.00069611 0.00023204 0.00062219 0.00000000 0.00000000
0.00042114 0.00042114 0.00000000 0.00042114 0.00000000 0.00000000 0.00000000
1997 1 1 0 0 54.96 0.00161047 0.00000000 0.00000000 0.00000000 0.00000000
0.00000000 0.00070613 0.00190931 0.00249531 0.00157254 0.00740264 0.02034422
0.02746041 0.02356657 0.03226502 0.04920364 0.05812807 0.09131547 0.12217437
0.17851369 0.16690609 0.10823880 0.06410378 0.02256286 0.00874199 0.00479242
0.00070613 0.00249531 0.00176969 0.00030895 0.00070613 0.00000000 0.00000000
0.00000000 0.00000000 0.00000000 0.00000000 0.00000000 0.00000000 0.00000000
1998 1 1 0 0 61.82 0.00000000 0.00013950 0.00000000 0.00054913
0.00217145 0.00754043 0.02660605 0.06328062 0.09928446 0.12017588 0.11452861
0.10222652 0.08662035 0.08022393 0.05559320 0.04519876 0.03979356 0.03720684
0.02689637 0.02425384 0.01374267 0.01309129 0.01455336 0.00735521 0.00736115
0.00379924 0.00202174 0.00182034 0.00226600 0.00169950 0.00000000 0.00000000
0.00000000 0.00000000 0.00000000 0.00000000 0.00000000 0.00000000 0.00000000

```



|      |   |            |            |            |            |            |            |            |
|------|---|------------|------------|------------|------------|------------|------------|------------|
|      |   | 0.16548304 | 0.03472523 | 0.01524281 | 0.00344984 | 0.00000000 | 0.00000000 | 0.00275080 |
|      |   | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 |
|      |   | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 |
| 2012 | 1 | 1          | 0          | 22.96      | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 |
|      |   | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.02288534 |
|      |   | 0.01634667 | 0.02615468 | 0.01307734 | 0.00326933 | 0.00980800 | 0.02916482 | 0.07258330 |
|      |   | 0.10858359 | 0.14709358 | 0.12463433 | 0.14112953 | 0.13635974 | 0.07152817 | 0.05732066 |
|      |   | 0.01399447 | 0.00048164 | 0.00372320 | 0.00186160 | 0.00000000 | 0.00000000 | 0.00000000 |
|      |   | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 |
| 2013 | 1 | 1          | 0          | 16.00      | 0.00000000 | 0.00000000 | 0.00074231 | 0.00148463 |
|      |   | 0.00222694 | 0.00296925 | 0.00371157 | 0.00519619 | 0.00222694 | 0.00074231 | 0.00074231 |
|      |   | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00148463 | 0.00148463 |
|      |   | 0.00234205 | 0.02328286 | 0.02859415 | 0.05945618 | 0.04296925 | 0.10566584 | 0.17808666 |
|      |   | 0.26589605 | 0.13284417 | 0.08507572 | 0.04410319 | 0.00867218 | 0.00000000 | 0.00000000 |
|      |   | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 |
| 2014 | 1 | 1          | 0          | 6.00       | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 |
|      |   | 0.00000896 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000896 | 0.00003138 | 0.00003586 |
|      |   | 0.00001793 | 0.00000448 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 |
|      |   | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.01599821 |
|      |   | 0.03999552 | 0.00026691 | 0.34396593 | 0.31996414 | 0.07199193 | 0.01599821 | 0.00799910 |
|      |   | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 |
| 1993 | 2 | 2          | 0          | 80.83      | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 |
|      |   | 0.00000000 | 0.00000000 | 0.00024233 | 0.00140226 | 0.00726413 | 0.02974873 | 0.06247855 |
|      |   | 0.09739572 | 0.09557449 | 0.07134655 | 0.06703480 | 0.08193713 | 0.10366195 | 0.11143525 |
|      |   | 0.10144129 | 0.05447251 | 0.03973350 | 0.02527592 | 0.01453475 | 0.00850628 | 0.00787906 |
|      |   | 0.00345701 | 0.00250677 | 0.00214831 | 0.00346978 | 0.00312588 | 0.00135054 | 0.00021661 |
|      |   | 0.00128376 | 0.00093526 | 0.00000000 | 0.00014086 | 0.00000000 | 0.00000000 | 0.00000000 |
| 1994 | 2 | 2          | 0          | 206.08     | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 |
|      |   | 0.00145457 | 0.00504078 | 0.00606898 | 0.00700771 | 0.01410691 | 0.02242621 | 0.04034287 |
|      |   | 0.06906816 | 0.09654861 | 0.11238178 | 0.12955228 | 0.13501642 | 0.11091489 | 0.09320556 |
|      |   | 0.05899874 | 0.04552064 | 0.02495894 | 0.01511850 | 0.00540478 | 0.00359894 | 0.00066879 |
|      |   | 0.00092576 | 0.00026691 | 0.00000000 | 0.00012087 | 0.00000000 | 0.00029208 | 0.00069722 |
|      |   | 0.00000000 | 0.00000000 | 0.00000000 | 0.00029208 | 0.00000000 | 0.00000000 | 0.00000000 |
| 1995 | 2 | 2          | 0          | 42.30      | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 |
|      |   | 0.00000000 | 0.00483005 | 0.00181639 | 0.00978760 | 0.01443863 | 0.02041858 | 0.02632739 |
|      |   | 0.03677194 | 0.05949862 | 0.09049866 | 0.10561619 | 0.13138787 | 0.11886270 | 0.11101527 |
|      |   | 0.07941884 | 0.07368271 | 0.04314995 | 0.03412017 | 0.01538229 | 0.01735834 | 0.00323563 |
|      |   | 0.00100235 | 0.00056203 | 0.00000000 | 0.00040900 | 0.00000000 | 0.00000000 | 0.00000000 |
|      |   | 0.00040900 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 |
| 1996 | 2 | 2          | 0          | 31.69      | 0.00000000 | 0.00000000 | 0.00000001 | 0.00000006 |
|      |   | 0.00208698 | 0.00474184 | 0.01105977 | 0.01641602 | 0.03848093 | 0.04640019 | 0.05225376 |
|      |   | 0.07284165 | 0.06293899 | 0.03267289 | 0.02526977 | 0.03481597 | 0.04474040 | 0.05224002 |
|      |   | 0.05002577 | 0.07588550 | 0.07647282 | 0.09283255 | 0.08189359 | 0.05770817 | 0.02553826 |
|      |   | 0.01572120 | 0.00742768 | 0.00448802 | 0.00253262 | 0.00168842 | 0.00168842 | 0.00168842 |
|      |   | 0.00168842 | 0.00238407 | 0.00337683 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 |
| 1997 | 2 | 2          | 0          | 39.04      | 0.00116688 | 0.00116688 | 0.01283567 | 0.01168079 |
|      |   | 0.01911496 | 0.00995550 | 0.00463359 | 0.00836094 | 0.02093227 | 0.01412310 | 0.04077870 |
|      |   | 0.04592240 | 0.05486011 | 0.07529587 | 0.08758462 | 0.06419613 | 0.05883337 | 0.06624342 |
|      |   | 0.04634799 | 0.03286001 | 0.03351542 | 0.03099222 | 0.05453763 | 0.05713365 | 0.05113369 |
|      |   | 0.04096875 | 0.03221245 | 0.01144112 | 0.00765009 | 0.00308468 | 0.00057263 | 0.00023650 |
|      |   | 0.00020197 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 |
| 1998 | 2 | 2          | 0          | 62.89      | 0.00000000 | 0.00052375 | 0.00292399 | 0.00531268 |
|      |   | 0.00807976 | 0.00892394 | 0.01445008 | 0.04007347 | 0.04947419 | 0.06018640 | 0.07160912 |
|      |   | 0.08430841 | 0.09930662 | 0.11026781 | 0.09545976 | 0.09022715 | 0.07892527 | 0.06308014 |
|      |   | 0.02943892 | 0.02494755 | 0.01733738 | 0.01275855 | 0.01065188 | 0.00689855 | 0.00555941 |
|      |   | 0.00337949 | 0.00283313 | 0.00163188 | 0.00071536 | 0.00040797 | 0.00030739 | 0.00000000 |
|      |   | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 |
| 1999 | 2 | 2          | 0          | 45.97      | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 |
|      |   | 0.00000000 | 0.00000000 | 0.00000000 | 0.00373364 | 0.01858885 | 0.06092482 | 0.10283009 |
|      |   | 0.13630227 | 0.17321851 | 0.15257482 | 0.12476550 | 0.08514671 | 0.05049129 | 0.03310700 |
|      |   | 0.02304860 | 0.01857073 | 0.01262764 | 0.00349994 | 0.00042741 | 0.00014219 | 0.00000000 |
|      |   | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 |
|      |   | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 |
| 2000 | 2 | 2          | 0          | 42.47      | 0.00000000 | 0.00000000 | 0.00000000 | 0.00007818 |
|      |   | 0.00031273 | 0.00695721 | 0.00948363 | 0.02298990 | 0.03958827 | 0.04929372 | 0.07791587 |
|      |   | 0.10364298 | 0.10939476 | 0.07624154 | 0.05471634 | 0.05940971 | 0.08000407 | 0.07736515 |
|      |   | 0.05906656 | 0.05988523 | 0.04314596 | 0.04274591 | 0.01443181 | 0.01154905 | 0.00083513 |
|      |   | 0.00000000 | 0.00086812 | 0.00007818 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 |
|      |   | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 |
| 2001 | 2 | 2          | 0          | 57.78      | 0.00000000 | 0.00000000 | 0.00114442 | 0.01008725 |
|      |   | 0.02360642 | 0.04515338 | 0.06577894 | 0.08827063 | 0.10528246 | 0.11005028 | 0.08543740 |
|      |   | 0.06257413 | 0.06371308 | 0.05222215 | 0.02452615 | 0.02527951 | 0.02070571 | 0.02867169 |
|      |   | 0.04446623 | 0.05499618 | 0.03036332 | 0.02717653 | 0.01354428 | 0.00784013 | 0.00561628 |
|      |   | 0.00208727 | 0.00069576 | 0.00069576 | 0.00000000 | 0.00000000 | 0.00001467 | 0.00000000 |
|      |   | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 |

|      |   |   |   |   |            |            |            |            |            |
|------|---|---|---|---|------------|------------|------------|------------|------------|
| 2002 | 2 | 2 | 0 | 0 | 55.61      | 0.00000000 | 0.00000000 | 0.00000000 | 0.00037996 |
|      |   |   |   |   | 0.00113988 | 0.00189980 | 0.00264471 | 0.00378459 | 0.00573358 |
|      |   |   |   |   | 0.02153204 | 0.04856377 | 0.08579611 | 0.12189739 | 0.13011447 |
|      |   |   |   |   | 0.04868384 | 0.03776127 | 0.05061458 | 0.05005716 | 0.04759173 |
|      |   |   |   |   | 0.01196384 | 0.00688184 | 0.00781155 | 0.00573013 | 0.00095678 |
|      |   |   |   |   | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 |
| 2003 | 2 | 2 | 0 | 0 | 74.37      | 0.00000000 | 0.00000000 | 0.00002333 | 0.00737407 |
|      |   |   |   |   | 0.03796815 | 0.06330862 | 0.06164288 | 0.08781023 | 0.13955871 |
|      |   |   |   |   | 0.08096378 | 0.04889651 | 0.02406924 | 0.01538764 | 0.01563158 |
|      |   |   |   |   | 0.01561320 | 0.02270900 | 0.01540512 | 0.01581931 | 0.00585443 |
|      |   |   |   |   | 0.00690423 | 0.00409315 | 0.00215683 | 0.00243203 | 0.00283737 |
|      |   |   |   |   | 0.00040534 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 |
| 2004 | 2 | 2 | 0 | 0 | 81.35      | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 |
|      |   |   |   |   | 0.00093783 | 0.00153447 | 0.00348067 | 0.00686443 | 0.02125242 |
|      |   |   |   |   | 0.10844211 | 0.11494040 | 0.12997977 | 0.12299243 | 0.09934347 |
|      |   |   |   |   | 0.06642619 | 0.03374981 | 0.01274994 | 0.00944827 | 0.00238726 |
|      |   |   |   |   | 0.00101954 | 0.00203739 | 0.00000000 | 0.00066788 | 0.00000000 |
|      |   |   |   |   | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 |
| 2005 | 2 | 2 | 0 | 0 | 69.54      | 0.00003323 | 0.00016617 | 0.00198183 | 0.00724287 |
|      |   |   |   |   | 0.02546488 | 0.03423464 | 0.04343134 | 0.05161252 | 0.08921533 |
|      |   |   |   |   | 0.10395214 | 0.11260776 | 0.08466520 | 0.06700801 | 0.04312203 |
|      |   |   |   |   | 0.01505989 | 0.01090155 | 0.00709011 | 0.00530332 | 0.00273073 |
|      |   |   |   |   | 0.00095835 | 0.00156157 | 0.00078078 | 0.00027632 | 0.00048453 |
|      |   |   |   |   | 0.00032302 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 |
| 2006 | 2 | 2 | 0 | 0 | 79.01      | 0.00000000 | 0.00000000 | 0.00000000 | 0.00007155 |
|      |   |   |   |   | 0.00193274 | 0.00448013 | 0.00870836 | 0.01190914 | 0.02276871 |
|      |   |   |   |   | 0.08312489 | 0.10950482 | 0.11508847 | 0.11718795 | 0.09778619 |
|      |   |   |   |   | 0.05950222 | 0.04982304 | 0.02853562 | 0.01769640 | 0.00778031 |
|      |   |   |   |   | 0.00407420 | 0.00371857 | 0.00243818 | 0.00184306 | 0.00148743 |
|      |   |   |   |   | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 |
| 2007 | 2 | 2 | 0 | 0 | 53.13      | 0.00000000 | 0.00000000 | 0.00056916 | 0.00458294 |
|      |   |   |   |   | 0.01523107 | 0.01624194 | 0.03828270 | 0.07429633 | 0.10589583 |
|      |   |   |   |   | 0.09028317 | 0.08948056 | 0.09093413 | 0.06813034 | 0.04676708 |
|      |   |   |   |   | 0.01102726 | 0.00991497 | 0.00445812 | 0.00594738 | 0.00799020 |
|      |   |   |   |   | 0.00305137 | 0.00193240 | 0.00055948 | 0.00018649 | 0.00055948 |
|      |   |   |   |   | 0.00037299 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 |
| 2008 | 2 | 2 | 0 | 0 | 39.53      | 0.00130827 | 0.00130827 | 0.00261985 | 0.00174435 |
|      |   |   |   |   | 0.00820997 | 0.01240801 | 0.02192600 | 0.03724275 | 0.03155898 |
|      |   |   |   |   | 0.04421268 | 0.06406849 | 0.11119877 | 0.13321561 | 0.12895909 |
|      |   |   |   |   | 0.05604855 | 0.05270723 | 0.02472053 | 0.01390128 | 0.00841632 |
|      |   |   |   |   | 0.00313298 | 0.00174435 | 0.00198249 | 0.00043609 | 0.00067422 |
|      |   |   |   |   | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 |
| 2009 | 2 | 2 | 0 | 0 | 99.00      | 0.00000000 | 0.00000000 | 0.00000000 | 0.00033110 |
|      |   |   |   |   | 0.00098937 | 0.00364222 | 0.01526663 | 0.04815485 | 0.10491762 |
|      |   |   |   |   | 0.14395945 | 0.12763433 | 0.09200956 | 0.07251219 | 0.03921100 |
|      |   |   |   |   | 0.00259569 | 0.00164641 | 0.00095708 | 0.00053046 | 0.00065827 |
|      |   |   |   |   | 0.00000000 | 0.00000000 | 0.00007860 | 0.00000000 | 0.00000000 |
|      |   |   |   |   | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 |
| 2010 | 2 | 2 | 0 | 0 | 32.96      | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000329 |
|      |   |   |   |   | 0.00000986 | 0.00000000 | 0.01533814 | 0.03545198 | 0.07505310 |
|      |   |   |   |   | 0.16409807 | 0.14395429 | 0.08121932 | 0.03649645 | 0.02499783 |
|      |   |   |   |   | 0.00505031 | 0.00646200 | 0.00190905 | 0.00326271 | 0.00879883 |
|      |   |   |   |   | 0.02910381 | 0.02842698 | 0.01759765 | 0.00812199 | 0.00744516 |
|      |   |   |   |   | 0.00067683 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 |
| 2011 | 2 | 2 | 0 | 0 | 56.28      | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 |
|      |   |   |   |   | 0.00042055 | 0.00393862 | 0.02649871 | 0.07254863 | 0.07899923 |
|      |   |   |   |   | 0.04957664 | 0.04043675 | 0.05008019 | 0.04620495 | 0.05065969 |
|      |   |   |   |   | 0.04153957 | 0.06936597 | 0.04808470 | 0.04969147 | 0.03341529 |
|      |   |   |   |   | 0.02905829 | 0.02593557 | 0.02224027 | 0.00818459 | 0.00324890 |
|      |   |   |   |   | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 |
| 2012 | 2 | 2 | 0 | 0 | 9.00       | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 |
|      |   |   |   |   | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 |
|      |   |   |   |   | 0.00634863 | 0.00634863 | 0.01904590 | 0.03809180 | 0.01904590 |
|      |   |   |   |   | 0.13008930 | 0.15627021 | 0.07814954 | 0.12219678 | 0.07438000 |
|      |   |   |   |   | 0.04339435 | 0.00937866 | 0.00227252 | 0.00151501 | 0.00000000 |
|      |   |   |   |   | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 |
| 2013 | 2 | 2 | 0 | 0 | 28.00      | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 |
|      |   |   |   |   | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 |
|      |   |   |   |   | 0.00026894 | 0.00287596 | 0.00971450 | 0.00404500 | 0.00323817 |
|      |   |   |   |   | 0.00360037 | 0.00476941 | 0.01809207 | 0.02177791 | 0.03006646 |
|      |   |   |   |   | 0.17035400 | 0.25213401 | 0.20643699 | 0.09677617 | 0.03764854 |
|      |   |   |   |   | 0.00887556 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 |
| 1999 | 1 | 3 | 0 | 0 | 3.04       | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 |
|      |   |   |   |   | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 |
|      |   |   |   |   | 0.00000095 | 0.00000285 | 0.00001236 | 0.04484245 | 0.07472347 |

|      |   |            |            |            |            |            |            |            |
|------|---|------------|------------|------------|------------|------------|------------|------------|
|      |   | 0.15869488 | 0.13446554 | 0.05976204 | 0.04482153 | 0.02422648 | 0.04642701 | 0.03714674 |
|      |   | 0.03716576 | 0.02788359 | 0.03717908 | 0.03919457 | 0.00929548 | 0.00000666 | 0.00000285 |
|      |   | 0.01494051 | 0.00000000 | 0.00000095 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 |
| 1999 | 2 | 3          | 0          | 4.24       | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 |
|      |   | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 |
|      |   | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 |
|      |   | 0.00000000 | 0.00000000 | 0.00000000 | 0.01886792 | 0.01886792 | 0.02830189 | 0.16981132 |
|      |   | 0.17924528 | 0.20754717 | 0.16981132 | 0.11320755 | 0.04716981 | 0.02830189 | 0.00943396 |
|      |   | 0.00943396 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 |
| 2000 | 1 | 3          | 0          | 63.93      | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 |
|      |   | 0.00000000 | 0.00000000 | 0.00003375 | 0.00006482 | 0.00000000 | 0.00003375 | 0.00000000 |
|      |   | 0.00003375 | 0.00000000 | 0.00000000 | 0.00063677 | 0.00308924 | 0.01570860 | 0.02898601 |
|      |   | 0.03823612 | 0.05495875 | 0.06093348 | 0.06560425 | 0.07664897 | 0.09104633 | 0.12502336 |
|      |   | 0.11358864 | 0.11316074 | 0.07608888 | 0.06753608 | 0.03163643 | 0.01814741 | 0.01018023 |
|      |   | 0.00428843 | 0.00365138 | 0.00060061 | 0.00003107 | 0.00003970 | 0.00000000 | 0.00001246 |
| 2000 | 2 | 3          | 0          | 10.72      | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 |
|      |   | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000026 | 0.00012460 | 0.00000000 | 0.00000000 |
|      |   | 0.00000026 | 0.00000000 | 0.00000026 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 |
|      |   | 0.00000000 | 0.02350879 | 0.02375825 | 0.08315347 | 0.13179081 | 0.15417981 | 0.17881393 |
|      |   | 0.13080486 | 0.14894118 | 0.07718786 | 0.03579353 | 0.00003091 | 0.01189510 | 0.00000951 |
|      |   | 0.00000449 | 0.00000106 | 0.00000079 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000026 |
| 2001 | 1 | 3          | 0          | 78.15      | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 |
|      |   | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00087005 | 0.00156608 | 0.00121806 |
|      |   | 0.00115894 | 0.00060192 | 0.00046425 | 0.00000000 | 0.00046425 | 0.00000000 | 0.00000002 |
|      |   | 0.00261835 | 0.01024098 | 0.02323570 | 0.07467192 | 0.16300429 | 0.17738632 | 0.16996193 |
|      |   | 0.12669923 | 0.09158078 | 0.06693893 | 0.04293152 | 0.02073142 | 0.01275755 | 0.00758599 |
|      |   | 0.00156533 | 0.00158897 | 0.00011092 | 0.00004628 | 0.00000000 | 0.00000000 | 0.00000002 |
| 2001 | 2 | 3          | 0          | 26.76      | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 |
|      |   | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 |
|      |   | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00048288 | 0.00048288 | 0.00000053 |
|      |   | 0.00000000 | 0.00000000 | 0.00000000 | 0.00367294 | 0.00879451 | 0.04010952 | 0.09046219 |
|      |   | 0.18199439 | 0.21660795 | 0.19187645 | 0.13186477 | 0.06604471 | 0.04323092 | 0.01074198 |
|      |   | 0.00880089 | 0.00289994 | 0.00048341 | 0.00096629 | 0.00048288 | 0.00000000 | 0.00000000 |
| 2002 | 1 | 3          | 0          | 172.79     | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000313 |
|      |   | 0.00000626 | 0.00000626 | 0.00000626 | 0.00000313 | 0.00000938 | 0.00000626 | 0.00001363 |
|      |   | 0.00000313 | 0.00062473 | 0.00031198 | 0.00094645 | 0.00136169 | 0.00143519 | 0.00317196 |
|      |   | 0.00361648 | 0.00444832 | 0.00536365 | 0.00421846 | 0.01381946 | 0.03565991 | 0.11857744 |
|      |   | 0.20342331 | 0.21914500 | 0.14683906 | 0.11571644 | 0.06020604 | 0.03543252 | 0.01287390 |
|      |   | 0.00777273 | 0.00240956 | 0.00164771 | 0.00033310 | 0.00054432 | 0.00001901 | 0.00002414 |
| 2002 | 2 | 3          | 0          | 8.44       | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 |
|      |   | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 |
|      |   | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00312357 | 0.00000000 |
|      |   | 0.00000000 | 0.00624714 | 0.00937071 | 0.00937295 | 0.01249428 | 0.01249652 | 0.05221134 |
|      |   | 0.13789484 | 0.06785376 | 0.17431751 | 0.21008191 | 0.06999081 | 0.08758723 | 0.05631804 |
|      |   | 0.06875428 | 0.00938411 | 0.00624714 | 0.00312580 | 0.00312357 | 0.00000000 | 0.00000446 |
| 2003 | 1 | 3          | 0          | 145.33     | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 |
|      |   | 0.00000000 | 0.00000397 | 0.00000000 | 0.00000397 | 0.00000397 | 0.00081444 | 0.00403192 |
|      |   | 0.00514471 | 0.00338591 | 0.00141363 | 0.00001985 | 0.00029674 | 0.00455528 | 0.01661655 |
|      |   | 0.03216569 | 0.04716668 | 0.06356196 | 0.04611645 | 0.05368928 | 0.06537740 | 0.06742541 |
|      |   | 0.07208935 | 0.12367128 | 0.12474048 | 0.10239500 | 0.07361669 | 0.04797912 | 0.02147233 |
|      |   | 0.01095014 | 0.00687007 | 0.00305615 | 0.00071418 | 0.00062688 | 0.00001260 | 0.00001191 |
| 2003 | 2 | 3          | 0          | 16.88      | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 |
|      |   | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 |
|      |   | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 |
|      |   | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00068529 | 0.01626167 | 0.03183805 |
|      |   | 0.07470549 | 0.17346083 | 0.15096679 | 0.24561041 | 0.16554308 | 0.08604058 | 0.03407916 |
|      |   | 0.01027932 | 0.00915877 | 0.00137058 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 |
| 2004 | 1 | 3          | 0          | 93.35      | 0.00001567 | 0.00001567 | 0.00000000 | 0.00000000 |
|      |   | 0.00056254 | 0.00028127 | 0.00056254 | 0.00142204 | 0.00609585 | 0.00738530 | 0.00901487 |
|      |   | 0.00780880 | 0.00880757 | 0.00314547 | 0.01122084 | 0.01449783 | 0.04081487 | 0.03735165 |
|      |   | 0.03390459 | 0.02231370 | 0.02555715 | 0.01629821 | 0.02816169 | 0.02899177 | 0.05840626 |
|      |   | 0.06057283 | 0.09562618 | 0.08453840 | 0.14026268 | 0.09805984 | 0.07524450 | 0.03709070 |
|      |   | 0.02707205 | 0.01236191 | 0.00425655 | 0.00131717 | 0.00055007 | 0.00017067 | 0.00024033 |
| 2004 | 2 | 3          | 0          | 7.88       | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 |
|      |   | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 |
|      |   | 0.00000000 | 0.00000000 | 0.00000000 | 0.02131378 | 0.05692221 | 0.15080485 | 0.27920147 |
|      |   | 0.24587915 | 0.15038613 | 0.02495166 | 0.02063744 | 0.00998066 | 0.00499033 | 0.00000000 |
|      |   | 0.00499033 | 0.00499033 | 0.00000000 | 0.00499033 | 0.00998066 | 0.00000000 | 0.00998066 |
|      |   | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 |
| 2005 | 1 | 3          | 0          | 67.68      | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 |
|      |   | 0.00000553 | 0.00001355 | 0.00159531 | 0.00039392 | 0.00002710 | 0.00004066 | 0.00020755 |
|      |   | 0.00020258 | 0.00270103 | 0.02291847 | 0.05924987 | 0.09616749 | 0.20727817 | 0.18328761 |
|      |   | 0.12443673 | 0.05097571 | 0.01877167 | 0.01515760 | 0.00998755 | 0.00942919 | 0.01080600 |
|      |   | 0.01225695 | 0.01347518 | 0.01909393 | 0.02824136 | 0.03110144 | 0.04082612 | 0.02108261 |
|      |   | 0.01447999 | 0.00282130 | 0.00249264 | 0.00027437 | 0.00014659 | 0.00002710 | 0.00002710 |

|      |   |   |            |            |            |            |            |            |            |            |
|------|---|---|------------|------------|------------|------------|------------|------------|------------|------------|
| 2006 | 1 | 3 | 0          | 0          | 27.00      | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 |
|      |   |   | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 |
|      |   |   | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00385525 | 0.01151585 | 0.01151585 |
|      |   |   | 0.04782390 | 0.16295078 | 0.33602885 | 0.24986185 | 0.11243519 | 0.01737664 | 0.00466226 | 0.00466226 |
|      |   |   | 0.00994350 | 0.00193035 | 0.00122605 | 0.00686819 | 0.00826354 | 0.01135211 | 0.00487000 | 0.00487000 |
|      |   |   | 0.00864962 | 0.00000000 | 0.00000000 | 0.00038607 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 |
| 2006 | 2 | 3 | 0          | 0          | 3.00       | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 |
|      |   |   | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 |
|      |   |   | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.01333333 | 0.01333333 |
|      |   |   | 0.00000000 | 0.06666667 | 0.06666667 | 0.20000000 | 0.16000000 | 0.09333333 | 0.09333333 | 0.09333333 |
|      |   |   | 0.05333333 | 0.02666667 | 0.05333333 | 0.00000000 | 0.08000000 | 0.04000000 | 0.02666667 | 0.02666667 |
|      |   |   | 0.02666667 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 |
| 2007 | 1 | 3 | 0          | 0          | 87.86      | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 |
|      |   |   | 0.00000000 | 0.00000000 | 0.00000737 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 |
|      |   |   | 0.00000000 | 0.00000000 | 0.00000000 | 0.00001639 | 0.00061942 | 0.00255561 | 0.01442330 | 0.01442330 |
|      |   |   | 0.07011329 | 0.13161223 | 0.21359514 | 0.23707687 | 0.18219854 | 0.07245245 | 0.02287642 | 0.02287642 |
|      |   |   | 0.01307278 | 0.00799927 | 0.00556329 | 0.00684479 | 0.00802636 | 0.00410422 | 0.00215245 | 0.00215245 |
|      |   |   | 0.00214591 | 0.00115543 | 0.00071927 | 0.00011042 | 0.00050099 | 0.00001250 | 0.00004528 | 0.00004528 |
| 2008 | 1 | 3 | 0          | 0          | 129.64     | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 |
|      |   |   | 0.00000000 | 0.00000000 | 0.00004054 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 |
|      |   |   | 0.00000000 | 0.00000000 | 0.00041928 | 0.00000000 | 0.00000000 | 0.00058332 | 0.00460794 | 0.00460794 |
|      |   |   | 0.03193930 | 0.06132653 | 0.11715864 | 0.14270701 | 0.15921219 | 0.11117985 | 0.07109068 | 0.07109068 |
|      |   |   | 0.04339494 | 0.04764464 | 0.06409722 | 0.06209469 | 0.04086420 | 0.02147774 | 0.01039633 | 0.01039633 |
|      |   |   | 0.00450936 | 0.00253737 | 0.00106315 | 0.00059479 | 0.00056213 | 0.00027694 | 0.00022122 | 0.00022122 |
| 2009 | 1 | 3 | 0          | 0          | 159.41     | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 |
|      |   |   | 0.00000000 | 0.00000000 | 0.00000722 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 |
|      |   |   | 0.00036834 | 0.00036834 | 0.00000722 | 0.00002165 | 0.00000722 | 0.00001443 | 0.00385185 | 0.00385185 |
|      |   |   | 0.02385351 | 0.05630274 | 0.13546005 | 0.16896254 | 0.15574778 | 0.09681599 | 0.06985591 | 0.06985591 |
|      |   |   | 0.04410210 | 0.07537644 | 0.06582272 | 0.05197468 | 0.02553117 | 0.01450460 | 0.00584005 | 0.00584005 |
|      |   |   | 0.00330284 | 0.00143161 | 0.00023704 | 0.00012583 | 0.00002508 | 0.00004879 | 0.00003229 | 0.00003229 |
| 2009 | 2 | 3 | 0          | 0          | 4.33       | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 |
|      |   |   | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 |
|      |   |   | 0.00000000 | 0.01398663 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00640983 | 0.00640983 |
|      |   |   | 0.00764838 | 0.05363834 | 0.07792424 | 0.18996976 | 0.18962297 | 0.20269211 | 0.13261832 | 0.13261832 |
|      |   |   | 0.06086833 | 0.03818737 | 0.01244710 | 0.00622355 | 0.00776308 | 0.00000000 | 0.00000000 | 0.00000000 |
|      |   |   | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 |
| 2010 | 1 | 3 | 0          | 0          | 158.60     | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 |
|      |   |   | 0.00001429 | 0.00001429 | 0.00001429 | 0.00001429 | 0.00001429 | 0.00001429 | 0.00044699 | 0.00044699 |
|      |   |   | 0.00000000 | 0.00000121 | 0.00000000 | 0.00182244 | 0.00202608 | 0.00164970 | 0.00257329 | 0.00257329 |
|      |   |   | 0.00747769 | 0.02929572 | 0.09131722 | 0.14271426 | 0.15874857 | 0.10985279 | 0.08726802 | 0.08726802 |
|      |   |   | 0.06754262 | 0.09067348 | 0.07714994 | 0.06213060 | 0.03582122 | 0.02020100 | 0.00620373 | 0.00620373 |
|      |   |   | 0.00350799 | 0.00107204 | 0.00019082 | 0.00002417 | 0.00005373 | 0.00002859 | 0.00012036 | 0.00012036 |
| 2011 | 1 | 3 | 0          | 0          | 209.70     | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 |
|      |   |   | 0.00000000 | 0.00000000 | 0.00003151 | 0.00000000 | 0.00000000 | 0.00001309 | 0.00000000 | 0.00000000 |
|      |   |   | 0.00098545 | 0.00003928 | 0.00059179 | 0.00017022 | 0.00011007 | 0.00198926 | 0.00187005 | 0.00187005 |
|      |   |   | 0.00458734 | 0.00621298 | 0.01733638 | 0.02663686 | 0.09056926 | 0.12766615 | 0.12250119 | 0.12250119 |
|      |   |   | 0.08001007 | 0.12016808 | 0.12573893 | 0.10839274 | 0.08486996 | 0.04554796 | 0.01977992 | 0.01977992 |
|      |   |   | 0.00882012 | 0.00339068 | 0.00107283 | 0.00055389 | 0.00018109 | 0.00013134 | 0.00003151 | 0.00003151 |
| 2011 | 2 | 3 | 0          | 0          | 15.00      | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 |
|      |   |   | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 |
|      |   |   | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.01595748 | 0.01595748 |
|      |   |   | 0.06102858 | 0.09574485 | 0.11202126 | 0.10134751 | 0.10393621 | 0.08544319 | 0.15735814 | 0.15735814 |
|      |   |   | 0.12312026 | 0.10388306 | 0.02943256 | 0.00803189 | 0.00269502 | 0.00000000 | 0.00000000 | 0.00000000 |
|      |   |   | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 |
| 2012 | 1 | 3 | 0          | 0          | 117.03     | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 |
|      |   |   | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 |
|      |   |   | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00031117 | 0.00031117 |
|      |   |   | 0.00824020 | 0.03585317 | 0.08625069 | 0.13020785 | 0.14781588 | 0.13078359 | 0.13096350 | 0.13096350 |
|      |   |   | 0.13450060 | 0.09826163 | 0.04865465 | 0.03019293 | 0.01048763 | 0.00505848 | 0.00152875 | 0.00152875 |
|      |   |   | 0.00035161 | 0.00046650 | 0.00003843 | 0.00000000 | 0.00001799 | 0.00000000 | 0.00001476 | 0.00001476 |
| 2012 | 2 | 3 | 0          | 0          | 3.00       | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 |
|      |   |   | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 |
|      |   |   | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 |
|      |   |   | 0.00000000 | 0.00000000 | 0.04000000 | 0.06666667 | 0.36000000 | 0.28000000 | 0.10666667 | 0.10666667 |
|      |   |   | 0.06666667 | 0.05333333 | 0.01333333 | 0.01333333 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 |
|      |   |   | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 |
| 2013 | 1 | 3 | 0          | 0          | 141.00     | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 |
|      |   |   | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 |
|      |   |   | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 |
|      |   |   | 0.00000000 | 0.00030034 | 0.00848199 | 0.04863772 | 0.18497779 | 0.25625100 | 0.23794398 | 0.23794398 |
|      |   |   | 0.13149360 | 0.07286810 | 0.03354368 | 0.01705224 | 0.00630570 | 0.00171729 | 0.00042657 | 0.00042657 |
|      |   |   | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 |
| 2013 | 2 | 3 | 0          | 0          | 1.20       | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 |
|      |   |   | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 |
|      |   |   | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 |

|      |   |            |            |            |            |            |            |            |
|------|---|------------|------------|------------|------------|------------|------------|------------|
|      |   | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.03333333 | 0.06666667 |
|      |   | 0.23333333 | 0.46666667 | 0.16666667 | 0.03333333 | 0.00000000 | 0.00000000 | 0.00000000 |
|      |   | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 |
| 2014 | 1 | 3          | 0          | 50.88      | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 |
|      |   | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 |
|      |   | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 |
|      |   | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00479389 | 0.03381210 | 0.14845967 |
|      |   | 0.25026556 | 0.29135358 | 0.16948725 | 0.06898725 | 0.02331949 | 0.00540271 | 0.00411850 |
|      |   | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 |
| 2009 | 1 | 7          | 0          | 33.20      | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 |
|      |   | 0.00000000 | 0.00052810 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 |
|      |   | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00057622 | 0.00495836 |
|      |   | 0.03103000 | 0.09960013 | 0.16374495 | 0.20219759 | 0.22838807 | 0.15886180 | 0.07916015 |
|      |   | 0.02095343 | 0.00615335 | 0.00086496 | 0.00258641 | 0.00000000 | 0.00039648 | 0.00000000 |
|      |   | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 |
| 2010 | 1 | 7          | 0          | 24.00      | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 |
|      |   | 0.00000000 | 0.00080160 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00051869 | 0.00000000 |
|      |   | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00101947 | 0.00144396 | 0.00068636 |
|      |   | 0.00132264 | 0.00518994 | 0.02150013 | 0.09853051 | 0.21071417 | 0.29173440 | 0.18574131 |
|      |   | 0.11417842 | 0.04092349 | 0.01770211 | 0.0069268  | 0.00000000 | 0.00129411 | 0.00000000 |
|      |   | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 |
| 2011 | 1 | 7          | 0          | 50.00      | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 |
|      |   | 0.00000000 | 0.00032391 | 0.00048844 | 0.00090264 | 0.00004834 | 0.00000000 | 0.00000000 |
|      |   | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00067671 | 0.00000000 |
|      |   | 0.00017503 | 0.00058270 | 0.00081600 | 0.00639086 | 0.02291477 | 0.10158366 | 0.24939403 |
|      |   | 0.26460441 | 0.20025064 | 0.09328675 | 0.03327509 | 0.01190588 | 0.00477899 | 0.00363973 |
|      |   | 0.00294363 | 0.00000000 | 0.00101779 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 |
| 2012 | 1 | 7          | 0          | 23.00      | 0.00000000 | 0.00000000 | 0.00000000 | 0.00096182 |
|      |   | 0.00000000 | 0.00000000 | 0.00325589 | 0.00292761 | 0.00000000 | 0.00000000 | 0.00080840 |
|      |   | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 |
|      |   | 0.00000000 | 0.00198040 | 0.04085942 | 0.12161069 | 0.32194293 | 0.25935231 | 0.10149073 |
|      |   | 0.05042019 | 0.03717053 | 0.03715582 | 0.01294936 | 0.00496227 | 0.00104007 | 0.00111157 |
|      |   | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 |
| 2005 | 2 | 8          | 0          | 10.00      | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 |
|      |   | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00270862 | 0.00270862 | 0.00000000 |
|      |   | 0.00000000 | 0.01100873 | 0.01100873 | 0.12353364 | 0.12353364 | 0.06453880 | 0.06453880 |
|      |   | 0.15773170 | 0.15773170 | 0.06426980 | 0.06426980 | 0.05009669 | 0.05009669 | 0.01516183 |
|      |   | 0.01516183 | 0.00505394 | 0.00505394 | 0.00000000 | 0.00000000 | 0.00168465 | 0.00168465 |
|      |   | 0.00336930 | 0.00336930 | 0.00168465 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 |
| 2007 | 2 | 8          | 0          | 12.00      | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 |
|      |   | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 |
|      |   | 0.00000000 | 0.00000000 | 0.00000000 | 0.01871052 | 0.01871052 | 0.04456086 | 0.04456086 |
|      |   | 0.07885461 | 0.07885461 | 0.07720993 | 0.07720993 | 0.09196321 | 0.09196321 | 0.10803940 |
|      |   | 0.10803940 | 0.06881783 | 0.06881783 | 0.00321240 | 0.00321240 | 0.00825866 | 0.00825866 |
|      |   | 0.00037258 | 0.00037258 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 |
| 2009 | 2 | 8          | 0          | 19.00      | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 |
|      |   | 0.00071913 | 0.00071913 | 0.00036184 | 0.00036184 | 0.00000000 | 0.00000000 | 0.00121512 |
|      |   | 0.00121512 | 0.00265337 | 0.00265337 | 0.00332081 | 0.00332081 | 0.00555546 | 0.00555546 |
|      |   | 0.00224440 | 0.00224440 | 0.00833426 | 0.00833426 | 0.05506318 | 0.05506318 | 0.17107802 |
|      |   | 0.17107802 | 0.16580872 | 0.16580872 | 0.06954074 | 0.06954074 | 0.01153821 | 0.01153821 |
|      |   | 0.00243023 | 0.00243023 | 0.00027301 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 |
| 2010 | 2 | 8          | 0          | 18.00      | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 |
|      |   | 0.00000000 | 0.00000000 | 0.00000449 | 0.00000449 | 0.00000000 | 0.00000000 | 0.00000000 |
|      |   | 0.00000000 | 0.00015121 | 0.00015121 | 0.08020558 | 0.08020558 | 0.22135962 | 0.22135962 |
|      |   | 0.08918809 | 0.08918809 | 0.04535153 | 0.04535153 | 0.00957193 | 0.00957193 | 0.00287216 |
|      |   | 0.00287216 | 0.01710648 | 0.01710648 | 0.02239309 | 0.02239309 | 0.00960401 | 0.00960401 |
|      |   | 0.00139900 | 0.00139900 | 0.00158562 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 |
| 2011 | 2 | 8          | 0          | 12.00      | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 |
|      |   | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 |
|      |   | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00966230 | 0.00966230 |
|      |   | 0.00000000 | 0.00000000 | 0.00874343 | 0.00874343 | 0.09109599 | 0.09109599 | 0.11348639 |
|      |   | 0.11348639 | 0.05587484 | 0.05587484 | 0.10595060 | 0.10595060 | 0.08715280 | 0.08715280 |
|      |   | 0.02797210 | 0.02797210 | 0.00006153 | 0.00006153 | 0.00000000 | 0.00000000 | 0.00000000 |
| 2012 | 2 | 8          | 0          | 18.00      | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 |
|      |   | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 |
|      |   | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 |
|      |   | 0.00087027 | 0.00087027 | 0.00043514 | 0.00043514 | 0.01933857 | 0.01933857 | 0.15265050 |
|      |   | 0.15265050 | 0.18642185 | 0.18642185 | 0.07407997 | 0.07407997 | 0.04749947 | 0.04749947 |
|      |   | 0.00758276 | 0.00758276 | 0.01112147 | 0.01112147 | 0.00000000 | 0.00000000 | 0.00000000 |
| 2013 | 2 | 8          | 0          | 4.00       | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 |
|      |   | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 |
|      |   | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 |
|      |   | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 |
|      |   | 0.00000000 | 0.03553942 | 0.03553942 | 0.32050317 | 0.32050317 | 0.10057675 | 0.10057675 |
|      |   | 0.04338066 | 0.04338066 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 |



|      |   |            |   |            |   |            |      |            |            |            |            |
|------|---|------------|---|------------|---|------------|------|------------|------------|------------|------------|
| 1994 | 1 | 1          | 0 | 0          | 1 | 20.0       | 20.5 | 0.28       | 0.00000000 | 0.00000000 | 0.37554250 |
|      |   | 0.37554250 |   | 0.24891501 |   | 0.00000000 |      | 0.00000000 |            | 0.00000000 | 0.00000000 |
| 1994 | 1 | 1          | 0 | 0          | 1 | 21.0       | 21.5 | 0.08       | 0.00000000 | 0.00000000 | 1.00000000 |
|      |   | 0.00000000 |   | 0.00000000 |   | 0.00000000 |      | 0.00000000 |            | 0.00000000 | 0.00000000 |
| 1994 | 1 | 1          | 0 | 0          | 1 | 22.0       | 22.5 | 0.04       | 0.00000000 | 0.00000000 | 1.00000000 |
|      |   | 0.00000000 |   | 0.00000000 |   | 0.00000000 |      | 0.00000000 |            | 0.00000000 | 0.00000000 |
| 1995 | 1 | 1          | 0 | 0          | 1 | 12.0       | 12.5 | 0.04       | 1.00000000 | 0.00000000 | 0.00000000 |
|      |   | 0.00000000 |   | 0.00000000 |   | 0.00000000 |      | 0.00000000 |            | 0.00000000 | 0.00000000 |
| 1995 | 1 | 1          | 0 | 0          | 1 | 13.0       | 13.5 | 0.08       | 0.00000000 | 1.00000000 | 0.00000000 |
|      |   | 0.00000000 |   | 0.00000000 |   | 0.00000000 |      | 0.00000000 |            | 0.00000000 | 0.00000000 |
| 1995 | 1 | 1          | 0 | 0          | 1 | 14.0       | 14.5 | 0.44       | 0.63636364 | 0.27272727 | 0.09090909 |
|      |   | 0.00000000 |   | 0.00000000 |   | 0.00000000 |      | 0.00000000 |            | 0.00000000 | 0.00000000 |
| 1995 | 1 | 1          | 0 | 0          | 1 | 15.0       | 15.5 | 0.64       | 0.18750000 | 0.43750000 | 0.31250000 |
|      |   | 0.06250000 |   | 0.00000000 |   | 0.00000000 |      | 0.00000000 |            | 0.00000000 | 0.00000000 |
| 1995 | 1 | 1          | 0 | 0          | 1 | 16.0       | 16.5 | 1.64       | 0.04878049 | 0.73170732 | 0.19512195 |
|      |   | 0.02439024 |   | 0.00000000 |   | 0.00000000 |      | 0.00000000 |            | 0.00000000 | 0.00000000 |
| 1995 | 1 | 1          | 0 | 0          | 1 | 17.0       | 17.5 | 1.44       | 0.02777778 | 0.63888889 | 0.30555556 |
|      |   | 0.02777778 |   | 0.00000000 |   | 0.00000000 |      | 0.00000000 |            | 0.00000000 | 0.00000000 |
| 1995 | 1 | 1          | 0 | 0          | 1 | 18.0       | 18.5 | 0.40       | 0.00000000 | 0.20000000 | 0.40000000 |
|      |   | 0.40000000 |   | 0.00000000 |   | 0.00000000 |      | 0.00000000 |            | 0.00000000 | 0.00000000 |
| 1995 | 1 | 1          | 0 | 0          | 1 | 19.0       | 19.5 | 0.08       | 0.00000000 | 0.00000000 | 0.50000000 |
|      |   | 0.50000000 |   | 0.00000000 |   | 0.00000000 |      | 0.00000000 |            | 0.00000000 | 0.00000000 |
| 1996 | 1 | 1          | 0 | 0          | 1 | 14.0       | 14.5 | 0.12       | 0.00000000 | 1.00000000 | 0.00000000 |
|      |   | 0.00000000 |   | 0.00000000 |   | 0.00000000 |      | 0.00000000 |            | 0.00000000 | 0.00000000 |
| 1996 | 1 | 1          | 0 | 0          | 1 | 15.0       | 15.5 | 1.28       | 0.00000000 | 0.44897248 | 0.55102752 |
|      |   | 0.00000000 |   | 0.00000000 |   | 0.00000000 |      | 0.00000000 |            | 0.00000000 | 0.00000000 |
| 1996 | 1 | 1          | 0 | 0          | 1 | 16.0       | 16.5 | 6.24       | 0.00000000 | 0.20902801 | 0.75030358 |
|      |   | 0.04066841 |   | 0.00000000 |   | 0.00000000 |      | 0.00000000 |            | 0.00000000 | 0.00000000 |
| 1996 | 1 | 1          | 0 | 0          | 1 | 17.0       | 17.5 | 14.96      | 0.00000000 | 0.10419308 | 0.69554700 |
|      |   | 0.18400205 |   | 0.01500520 |   | 0.00125267 |      | 0.00000000 |            | 0.00000000 | 0.00000000 |
| 1996 | 1 | 1          | 0 | 0          | 1 | 18.0       | 18.5 | 28.44      | 0.00000000 | 0.04005148 | 0.64987230 |
|      |   | 0.28378437 |   | 0.02424253 |   | 0.00204932 |      | 0.00000000 |            | 0.00000000 | 0.00000000 |
| 1996 | 1 | 1          | 0 | 0          | 1 | 19.0       | 19.5 | 26.68      | 0.00000000 | 0.01621994 | 0.50808503 |
|      |   | 0.42049373 |   | 0.05031671 |   | 0.00488459 |      | 0.00000000 |            | 0.00000000 | 0.00000000 |
| 1996 | 1 | 1          | 0 | 0          | 1 | 20.0       | 20.5 | 9.92       | 0.00000000 | 0.01435739 | 0.40880868 |
|      |   | 0.48247061 |   | 0.07970037 |   | 0.01466295 |      | 0.00000000 |            | 0.00000000 | 0.00000000 |
| 1996 | 1 | 1          | 0 | 0          | 1 | 21.0       | 21.5 | 1.40       | 0.00000000 | 0.00000000 | 0.23003121 |
|      |   | 0.45723664 |   | 0.31273215 |   | 0.00000000 |      | 0.00000000 |            | 0.00000000 | 0.00000000 |
| 1996 | 1 | 1          | 0 | 0          | 1 | 22.0       | 22.5 | 0.08       | 0.00000000 | 0.00000000 | 0.50000000 |
|      |   | 0.50000000 |   | 0.00000000 |   | 0.00000000 |      | 0.00000000 |            | 0.00000000 | 0.00000000 |
| 1996 | 1 | 1          | 0 | 0          | 1 | 23.0       | 23.5 | 0.04       | 0.00000000 | 0.00000000 | 0.00000000 |
|      |   | 1.00000000 |   | 0.00000000 |   | 0.00000000 |      | 0.00000000 |            | 0.00000000 | 0.00000000 |
| 1996 | 1 | 1          | 0 | 0          | 1 | 25.0       | 25.5 | 0.08       | 0.00000000 | 0.00000000 | 0.00000000 |
|      |   | 0.00000000 |   | 0.50000000 |   | 0.50000000 |      | 0.00000000 |            | 0.00000000 | 0.00000000 |
| 1996 | 1 | 1          | 0 | 0          | 1 | 26.0       | 26.5 | 0.04       | 0.00000000 | 0.00000000 | 0.00000000 |
|      |   | 0.00000000 |   | 0.00000000 |   | 0.00000000 |      | 0.00000000 |            | 1.00000000 | 0.00000000 |
| 1997 | 1 | 1          | 0 | 0          | 1 | 9.0        | 9.5  | 0.04       | 1.00000000 | 0.00000000 | 0.00000000 |
|      |   | 0.00000000 |   | 0.00000000 |   | 0.00000000 |      | 0.00000000 |            | 0.00000000 | 0.00000000 |
| 1997 | 1 | 1          | 0 | 0          | 1 | 11.0       | 11.5 | 0.04       | 1.00000000 | 0.00000000 | 0.00000000 |
|      |   | 0.00000000 |   | 0.00000000 |   | 0.00000000 |      | 0.00000000 |            | 0.00000000 | 0.00000000 |
| 1997 | 1 | 1          | 0 | 0          | 1 | 12.0       | 12.5 | 0.16       | 0.00000000 | 1.00000000 | 0.00000000 |
|      |   | 0.00000000 |   | 0.00000000 |   | 0.00000000 |      | 0.00000000 |            | 0.00000000 | 0.00000000 |
| 1997 | 1 | 1          | 0 | 0          | 1 | 13.0       | 13.5 | 0.72       | 0.00000000 | 1.00000000 | 0.00000000 |
|      |   | 0.00000000 |   | 0.00000000 |   | 0.00000000 |      | 0.00000000 |            | 0.00000000 | 0.00000000 |
| 1997 | 1 | 1          | 0 | 0          | 1 | 14.0       | 14.5 | 4.04       | 0.00000000 | 1.00000000 | 0.00000000 |
|      |   | 0.00000000 |   | 0.00000000 |   | 0.00000000 |      | 0.00000000 |            | 0.00000000 | 0.00000000 |
| 1997 | 1 | 1          | 0 | 0          | 1 | 15.0       | 15.5 | 4.56       | 0.00000000 | 1.00000000 | 0.00000000 |
|      |   | 0.00000000 |   | 0.00000000 |   | 0.00000000 |      | 0.00000000 |            | 0.00000000 | 0.00000000 |
| 1997 | 1 | 1          | 0 | 0          | 1 | 16.0       | 16.5 | 7.36       | 0.00000000 | 0.92361566 | 0.07638434 |
|      |   | 0.00000000 |   | 0.00000000 |   | 0.00000000 |      | 0.00000000 |            | 0.00000000 | 0.00000000 |
| 1997 | 1 | 1          | 0 | 0          | 1 | 17.0       | 17.5 | 13.84      | 0.00000000 | 0.56076615 | 0.43632757 |
|      |   | 0.00290628 |   | 0.00000000 |   | 0.00000000 |      | 0.00000000 |            | 0.00000000 | 0.00000000 |
| 1997 | 1 | 1          | 0 | 0          | 1 | 18.0       | 18.5 | 15.36      | 0.00000000 | 0.20645551 | 0.74805856 |
|      |   | 0.04548592 |   | 0.00000000 |   | 0.00000000 |      | 0.00000000 |            | 0.00000000 | 0.00000000 |
| 1997 | 1 | 1          | 0 | 0          | 1 | 19.0       | 19.5 | 6.88       | 0.00934460 | 0.04764680 | 0.63951375 |
|      |   | 0.30349485 |   | 0.00000000 |   | 0.00000000 |      | 0.00000000 |            | 0.00000000 | 0.00000000 |
| 1997 | 1 | 1          | 0 | 0          | 1 | 20.0       | 20.5 | 1.44       | 0.00000000 | 0.00000000 | 0.31385049 |
|      |   | 0.54512566 |   | 0.14102386 |   | 0.00000000 |      | 0.00000000 |            | 0.00000000 | 0.00000000 |
| 1997 | 1 | 1          | 0 | 0          | 1 | 21.0       | 21.5 | 0.24       | 0.00000000 | 0.00000000 | 0.29289001 |
|      |   | 0.41776573 |   | 0.12842148 |   | 0.16092278 |      | 0.00000000 |            | 0.00000000 | 0.00000000 |
| 1997 | 1 | 1          | 0 | 0          | 1 | 22.0       | 22.5 | 0.16       | 0.00000000 | 0.00000000 | 0.00000000 |
|      |   | 0.37760183 |   | 0.41493211 |   | 0.20746606 |      | 0.00000000 |            | 0.00000000 | 0.00000000 |
| 1997 | 1 | 1          | 0 | 0          | 1 | 23.0       | 23.5 | 0.08       | 0.00000000 | 0.00000000 | 0.00000000 |
|      |   | 0.30435611 |   | 0.69564389 |   | 0.00000000 |      | 0.00000000 |            | 0.00000000 | 0.00000000 |

|      |            |            |            |            |            |            |            |            |            |            |            |
|------|------------|------------|------------|------------|------------|------------|------------|------------|------------|------------|------------|
| 1998 | 1          | 1          | 0          | 0          | 1          | 9.0        | 9.5        | 0.04       | 1.00000000 | 0.00000000 | 0.00000000 |
|      | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 |
| 1998 | 1          | 1          | 0          | 0          | 1          | 10.0       | 10.5       | 0.08       | 1.00000000 | 0.00000000 | 0.00000000 |
|      | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 |
| 1998 | 1          | 1          | 0          | 0          | 1          | 11.0       | 11.5       | 0.72       | 0.77179412 | 0.22820588 | 0.00000000 |
|      | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 |
| 1998 | 1          | 1          | 0          | 0          | 1          | 12.0       | 12.5       | 4.56       | 0.52354126 | 0.47645874 | 0.00000000 |
|      | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 |
| 1998 | 1          | 1          | 0          | 0          | 1          | 13.0       | 13.5       | 14.04      | 0.12472173 | 0.83932736 | 0.03595091 |
|      | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 |
| 1998 | 1          | 1          | 0          | 0          | 1          | 14.0       | 14.5       | 19.88      | 0.00755918 | 0.95562857 | 0.03681224 |
|      | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 |
| 1998 | 1          | 1          | 0          | 0          | 1          | 15.0       | 15.5       | 15.92      | 0.00189458 | 0.81696133 | 0.18114409 |
|      | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 |
| 1998 | 1          | 1          | 0          | 0          | 1          | 16.0       | 16.5       | 7.84       | 0.00000000 | 0.51773405 | 0.48226595 |
|      | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 |
| 1998 | 1          | 1          | 0          | 0          | 1          | 17.0       | 17.5       | 5.72       | 0.00000000 | 0.12190583 | 0.84714166 |
|      | 0.03095251 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 |
| 1998 | 1          | 1          | 0          | 0          | 1          | 18.0       | 18.5       | 3.20       | 0.00000000 | 0.00000000 | 0.75348715 |
|      | 0.19827166 | 0.04824119 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 |
| 1998 | 1          | 1          | 0          | 0          | 1          | 19.0       | 19.5       | 1.28       | 0.00000000 | 0.00000000 | 0.48477799 |
|      | 0.31566788 | 0.19955413 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 |
| 1998 | 1          | 1          | 0          | 0          | 1          | 20.0       | 20.5       | 0.88       | 0.00000000 | 0.00000000 | 0.02174408 |
|      | 0.33200944 | 0.52769706 | 0.11854942 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 |
| 1998 | 1          | 1          | 0          | 0          | 1          | 21.0       | 21.5       | 0.64       | 0.00000000 | 0.00000000 | 0.00000000 |
|      | 0.39164730 | 0.47995442 | 0.12839828 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 |
| 1998 | 1          | 1          | 0          | 0          | 1          | 22.0       | 22.5       | 0.24       | 0.00000000 | 0.00000000 | 0.00000000 |
|      | 0.00000000 | 0.66666667 | 0.16666667 | 0.16666667 | 0.16666667 | 0.16666667 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 |
| 1998 | 1          | 1          | 0          | 0          | 1          | 23.0       | 23.5       | 0.28       | 0.00000000 | 0.00000000 | 0.00000000 |
|      | 0.28571429 | 0.28571429 | 0.42857143 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 |
| 1999 | 1          | 1          | 0          | 0          | 1          | 12.0       | 12.5       | 0.08       | 1.00000000 | 0.00000000 | 0.00000000 |
|      | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 |
| 1999 | 1          | 1          | 0          | 0          | 1          | 13.0       | 13.5       | 0.68       | 0.76470588 | 0.17647059 | 0.05882353 |
|      | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 |
| 1999 | 1          | 1          | 0          | 0          | 1          | 14.0       | 14.5       | 1.88       | 0.12765957 | 0.70212766 | 0.17021277 |
|      | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 |
| 1999 | 1          | 1          | 0          | 0          | 1          | 15.0       | 15.5       | 3.24       | 0.00000000 | 0.54320988 | 0.45679012 |
|      | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 |
| 1999 | 1          | 1          | 0          | 0          | 1          | 16.0       | 16.5       | 0.84       | 0.00000000 | 0.42857143 | 0.57142857 |
|      | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 |
| 1999 | 1          | 1          | 0          | 0          | 1          | 17.0       | 17.5       | 0.24       | 0.00000000 | 0.16666667 | 0.66666667 |
|      | 0.16666667 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 |
| 2000 | 1          | 1          | 0          | 0          | 1          | 12.0       | 12.5       | 0.24       | 1.00000000 | 0.00000000 | 0.00000000 |
|      | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 |
| 2000 | 1          | 1          | 0          | 0          | 1          | 13.0       | 13.5       | 0.20       | 0.77547183 | 0.22452817 | 0.00000000 |
|      | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 |
| 2000 | 1          | 1          | 0          | 0          | 1          | 14.0       | 14.5       | 0.76       | 0.73513244 | 0.05947023 | 0.20539733 |
|      | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 |
| 2000 | 1          | 1          | 0          | 0          | 1          | 15.0       | 15.5       | 2.48       | 0.04184241 | 0.34985918 | 0.38220788 |
|      | 0.22609053 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 |
| 2000 | 1          | 1          | 0          | 0          | 1          | 16.0       | 16.5       | 7.32       | 0.00789018 | 0.23451758 | 0.50324882 |
|      | 0.24287279 | 0.01147062 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 |
| 2000 | 1          | 1          | 0          | 0          | 1          | 17.0       | 17.5       | 8.52       | 0.00000000 | 0.22372714 | 0.52623066 |
|      | 0.23738678 | 0.01265541 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 |
| 2000 | 1          | 1          | 0          | 0          | 1          | 18.0       | 18.5       | 2.52       | 0.00000000 | 0.10780866 | 0.49898474 |
|      | 0.35130144 | 0.04190515 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 |
| 2000 | 1          | 1          | 0          | 0          | 1          | 19.0       | 19.5       | 0.28       | 0.00000000 | 0.00000000 | 0.57142857 |
|      | 0.42857143 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 |
| 2000 | 1          | 1          | 0          | 0          | 1          | 20.0       | 20.5       | 0.20       | 0.00000000 | 0.00000000 | 0.64477748 |
|      | 0.35522252 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 |
| 2000 | 1          | 1          | 0          | 0          | 1          | 21.0       | 21.5       | 0.08       | 0.00000000 | 0.00000000 | 0.00000000 |
|      | 0.00000000 | 0.50000000 | 0.50000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 |
| 2000 | 1          | 1          | 0          | 0          | 1          | 23.0       | 23.5       | 0.04       | 0.00000000 | 0.00000000 | 0.00000000 |
|      | 0.00000000 | 0.00000000 | 1.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 |
| 2001 | 1          | 1          | 0          | 0          | 1          | 9.0        | 9.5        | 0.28       | 1.00000000 | 0.00000000 | 0.00000000 |
|      | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 |
| 2001 | 1          | 1          | 0          | 0          | 1          | 10.0       | 10.5       | 2.00       | 1.00000000 | 0.00000000 | 0.00000000 |
|      | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 |
| 2001 | 1          | 1          | 0          | 0          | 1          | 11.0       | 11.5       | 3.44       | 0.98962726 | 0.01037274 | 0.00000000 |
|      | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 |
| 2001 | 1          | 1          | 0          | 0          | 1          | 12.0       | 12.5       | 1.52       | 0.95694052 | 0.04305948 | 0.00000000 |
|      | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 |
| 2001 | 1          | 1          | 0          | 0          | 1          | 13.0       | 13.5       | 1.12       | 1.00000000 | 0.00000000 | 0.00000000 |
|      | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 |

|      |   |            |   |            |   |            |      |            |            |            |            |
|------|---|------------|---|------------|---|------------|------|------------|------------|------------|------------|
| 2001 | 1 | 1          | 0 | 0          | 1 | 14.0       | 14.5 | 0.12       | 1.00000000 | 0.00000000 | 0.00000000 |
|      |   | 0.00000000 |   | 0.00000000 |   | 0.00000000 |      | 0.00000000 |            | 0.00000000 | 0.00000000 |
| 2001 | 1 | 1          | 0 | 0          | 1 | 15.0       | 15.5 | 0.72       | 0.00000000 | 0.94144234 | 0.05855766 |
|      |   | 0.00000000 |   | 0.00000000 |   | 0.00000000 |      | 0.00000000 |            | 0.00000000 | 0.00000000 |
| 2001 | 1 | 1          | 0 | 0          | 1 | 16.0       | 16.5 | 2.52       | 0.00000000 | 0.93072865 | 0.04908709 |
|      |   | 0.01009213 |   | 0.01009213 |   | 0.00000000 |      | 0.00000000 |            | 0.00000000 | 0.00000000 |
| 2001 | 1 | 1          | 0 | 0          | 1 | 17.0       | 17.5 | 4.32       | 0.00000000 | 0.65761214 | 0.28043072 |
|      |   | 0.04490983 |   | 0.01704730 |   | 0.00000000 |      | 0.00000000 |            | 0.00000000 | 0.00000000 |
| 2001 | 1 | 1          | 0 | 0          | 1 | 18.0       | 18.5 | 3.48       | 0.00000000 | 0.52059262 | 0.35201836 |
|      |   | 0.11348088 |   | 0.01390813 |   | 0.00000000 |      | 0.00000000 |            | 0.00000000 | 0.00000000 |
| 2001 | 1 | 1          | 0 | 0          | 1 | 19.0       | 19.5 | 1.32       | 0.00000000 | 0.09566902 | 0.28511142 |
|      |   | 0.57373618 |   | 0.04548338 |   | 0.00000000 |      | 0.00000000 |            | 0.00000000 | 0.00000000 |
| 2001 | 1 | 1          | 0 | 0          | 1 | 20.0       | 20.5 | 2.20       | 0.00000000 | 0.08098452 | 0.09414834 |
|      |   | 0.69451401 |   | 0.11021743 |   | 0.02013571 |      | 0.00000000 |            | 0.00000000 | 0.00000000 |
| 2001 | 1 | 1          | 0 | 0          | 1 | 21.0       | 21.5 | 6.68       | 0.00000000 | 0.01097761 | 0.04893767 |
|      |   | 0.69266867 |   | 0.21654653 |   | 0.03086952 |      | 0.00000000 |            | 0.00000000 | 0.00000000 |
| 2001 | 1 | 1          | 0 | 0          | 1 | 22.0       | 22.5 | 4.56       | 0.00000000 | 0.01013073 | 0.06708930 |
|      |   | 0.56915583 |   | 0.26557073 |   | 0.06115037 |      | 0.01677232 |            | 0.01013073 | 0.00000000 |
| 2001 | 1 | 1          | 0 | 0          | 1 | 23.0       | 23.5 | 1.80       | 0.00000000 | 0.00000000 | 0.02801048 |
|      |   | 0.19328092 |   | 0.36134382 |   | 0.26859609 |      | 0.12075821 |            | 0.02801048 | 0.00000000 |
| 2001 | 1 | 1          | 0 | 0          | 1 | 24.0       | 24.5 | 0.96       | 0.00000000 | 0.00000000 | 0.00000000 |
|      |   | 0.08790503 |   | 0.40295158 |   | 0.47433427 |      | 0.03480912 |            | 0.00000000 | 0.00000000 |
| 2001 | 1 | 1          | 0 | 0          | 1 | 25.0       | 25.5 | 0.20       | 0.00000000 | 0.00000000 | 0.00000000 |
|      |   | 0.00000000 |   | 0.15206736 |   | 0.46391019 |      | 0.15206736 |            | 0.23195510 | 0.00000000 |
| 2002 | 1 | 1          | 0 | 0          | 1 | 11.0       | 11.5 | 0.04       | 1.00000000 | 0.00000000 | 0.00000000 |
|      |   | 0.00000000 |   | 0.00000000 |   | 0.00000000 |      | 0.00000000 |            | 0.00000000 | 0.00000000 |
| 2002 | 1 | 1          | 0 | 0          | 1 | 13.0       | 13.5 | 0.64       | 0.34819315 | 0.65180685 | 0.00000000 |
|      |   | 0.00000000 |   | 0.00000000 |   | 0.00000000 |      | 0.00000000 |            | 0.00000000 | 0.00000000 |
| 2002 | 1 | 1          | 0 | 0          | 1 | 14.0       | 14.5 | 2.16       | 0.19080057 | 0.74295168 | 0.06624776 |
|      |   | 0.00000000 |   | 0.00000000 |   | 0.00000000 |      | 0.00000000 |            | 0.00000000 | 0.00000000 |
| 2002 | 1 | 1          | 0 | 0          | 1 | 15.0       | 15.5 | 6.08       | 0.18228648 | 0.74492089 | 0.07279263 |
|      |   | 0.00000000 |   | 0.00000000 |   | 0.00000000 |      | 0.00000000 |            | 0.00000000 | 0.00000000 |
| 2002 | 1 | 1          | 0 | 0          | 1 | 16.0       | 16.5 | 8.64       | 0.26111752 | 0.60128336 | 0.11432186 |
|      |   | 0.02327725 |   | 0.00000000 |   | 0.00000000 |      | 0.00000000 |            | 0.00000000 | 0.00000000 |
| 2002 | 1 | 1          | 0 | 0          | 1 | 17.0       | 17.5 | 7.48       | 0.12851185 | 0.43163453 | 0.41302223 |
|      |   | 0.02683138 |   | 0.00000000 |   | 0.00000000 |      | 0.00000000 |            | 0.00000000 | 0.00000000 |
| 2002 | 1 | 1          | 0 | 0          | 1 | 18.0       | 18.5 | 3.24       | 0.10308813 | 0.30784160 | 0.40739980 |
|      |   | 0.16097894 |   | 0.02069153 |   | 0.00000000 |      | 0.00000000 |            | 0.00000000 | 0.00000000 |
| 2002 | 1 | 1          | 0 | 0          | 1 | 19.0       | 19.5 | 1.12       | 0.00000000 | 0.22094657 | 0.54446895 |
|      |   | 0.10340392 |   | 0.13118056 |   | 0.00000000 |      | 0.00000000 |            | 0.00000000 | 0.00000000 |
| 2002 | 1 | 1          | 0 | 0          | 1 | 20.0       | 20.5 | 0.44       | 0.00000000 | 0.24521992 | 0.42641430 |
|      |   | 0.16884672 |   | 0.15951906 |   | 0.00000000 |      | 0.00000000 |            | 0.00000000 | 0.00000000 |
| 2002 | 1 | 1          | 0 | 0          | 1 | 21.0       | 21.5 | 0.20       | 0.00000000 | 0.41949119 | 0.11978151 |
|      |   | 0.29970968 |   | 0.16101762 |   | 0.00000000 |      | 0.00000000 |            | 0.00000000 | 0.00000000 |
| 2002 | 1 | 1          | 0 | 0          | 1 | 22.0       | 22.5 | 0.24       | 0.00000000 | 0.00000000 | 0.10316942 |
|      |   | 0.13868663 |   | 0.61945732 |   | 0.13868663 |      | 0.00000000 |            | 0.00000000 | 0.00000000 |
| 2002 | 1 | 1          | 0 | 0          | 1 | 24.0       | 24.5 | 0.04       | 0.00000000 | 0.00000000 | 0.00000000 |
|      |   | 0.00000000 |   | 1.00000000 |   | 0.00000000 |      | 0.00000000 |            | 0.00000000 | 0.00000000 |
| 2003 | 1 | 1          | 0 | 0          | 1 | 9.0        | 9.5  | 0.08       | 1.00000000 | 0.00000000 | 0.00000000 |
|      |   | 0.00000000 |   | 0.00000000 |   | 0.00000000 |      | 0.00000000 |            | 0.00000000 | 0.00000000 |
| 2003 | 1 | 1          | 0 | 0          | 1 | 10.0       | 10.5 | 0.84       | 1.00000000 | 0.00000000 | 0.00000000 |
|      |   | 0.00000000 |   | 0.00000000 |   | 0.00000000 |      | 0.00000000 |            | 0.00000000 | 0.00000000 |
| 2003 | 1 | 1          | 0 | 0          | 1 | 11.0       | 11.5 | 3.72       | 1.00000000 | 0.00000000 | 0.00000000 |
|      |   | 0.00000000 |   | 0.00000000 |   | 0.00000000 |      | 0.00000000 |            | 0.00000000 | 0.00000000 |
| 2003 | 1 | 1          | 0 | 0          | 1 | 12.0       | 12.5 | 2.52       | 0.98245740 | 0.01754260 | 0.00000000 |
|      |   | 0.00000000 |   | 0.00000000 |   | 0.00000000 |      | 0.00000000 |            | 0.00000000 | 0.00000000 |
| 2003 | 1 | 1          | 0 | 0          | 1 | 13.0       | 13.5 | 1.24       | 1.00000000 | 0.00000000 | 0.00000000 |
|      |   | 0.00000000 |   | 0.00000000 |   | 0.00000000 |      | 0.00000000 |            | 0.00000000 | 0.00000000 |
| 2003 | 1 | 1          | 0 | 0          | 1 | 14.0       | 14.5 | 0.44       | 0.48294759 | 0.51705241 | 0.00000000 |
|      |   | 0.00000000 |   | 0.00000000 |   | 0.00000000 |      | 0.00000000 |            | 0.00000000 | 0.00000000 |
| 2003 | 1 | 1          | 0 | 0          | 1 | 15.0       | 15.5 | 0.52       | 0.00000000 | 1.00000000 | 0.00000000 |
|      |   | 0.00000000 |   | 0.00000000 |   | 0.00000000 |      | 0.00000000 |            | 0.00000000 | 0.00000000 |
| 2003 | 1 | 1          | 0 | 0          | 1 | 16.0       | 16.5 | 1.52       | 0.00000000 | 0.88536046 | 0.11463954 |
|      |   | 0.00000000 |   | 0.00000000 |   | 0.00000000 |      | 0.00000000 |            | 0.00000000 | 0.00000000 |
| 2003 | 1 | 1          | 0 | 0          | 1 | 17.0       | 17.5 | 3.36       | 0.00000000 | 0.54652359 | 0.45347641 |
|      |   | 0.00000000 |   | 0.00000000 |   | 0.00000000 |      | 0.00000000 |            | 0.00000000 | 0.00000000 |
| 2003 | 1 | 1          | 0 | 0          | 1 | 18.0       | 18.5 | 2.40       | 0.00000000 | 0.31560192 | 0.66200264 |
|      |   | 0.02239544 |   | 0.00000000 |   | 0.00000000 |      | 0.00000000 |            | 0.00000000 | 0.00000000 |
| 2003 | 1 | 1          | 0 | 0          | 1 | 19.0       | 19.5 | 0.72       | 0.00000000 | 0.97348824 | 0.00000000 |
|      |   | 0.02651176 |   | 0.00000000 |   | 0.00000000 |      | 0.00000000 |            | 0.00000000 | 0.00000000 |
| 2003 | 1 | 1          | 0 | 0          | 1 | 20.0       | 20.5 | 0.36       | 0.00000000 | 0.09488687 | 0.28466061 |
|      |   | 0.43351017 |   | 0.18694235 |   | 0.00000000 |      | 0.00000000 |            | 0.00000000 | 0.00000000 |
| 2003 | 1 | 1          | 0 | 0          | 1 | 21.0       | 21.5 | 0.04       | 0.00000000 | 0.00000000 | 0.00000000 |
|      |   | 1.00000000 |   | 0.00000000 |   | 0.00000000 |      | 0.00000000 |            | 0.00000000 | 0.00000000 |

|      |            |            |            |            |            |            |            |            |            |            |            |
|------|------------|------------|------------|------------|------------|------------|------------|------------|------------|------------|------------|
| 2004 | 1          | 1          | 0          | 0          | 1          | 10.0       | 10.5       | 0.04       | 0.00000000 | 1.00000000 | 0.00000000 |
|      | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 |
| 2004 | 1          | 1          | 0          | 0          | 1          | 11.0       | 11.5       | 0.12       | 0.00000000 | 1.00000000 | 0.00000000 |
|      | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 |
| 2004 | 1          | 1          | 0          | 0          | 1          | 12.0       | 12.5       | 0.32       | 0.26982236 | 0.73017764 | 0.00000000 |
|      | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 |
| 2004 | 1          | 1          | 0          | 0          | 1          | 13.0       | 13.5       | 0.60       | 0.00000000 | 1.00000000 | 0.00000000 |
|      | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 |
| 2004 | 1          | 1          | 0          | 0          | 1          | 14.0       | 14.5       | 6.08       | 0.00188560 | 0.99391267 | 0.00420173 |
|      | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 |
| 2004 | 1          | 1          | 0          | 0          | 1          | 15.0       | 15.5       | 13.64      | 0.00000000 | 0.97925637 | 0.01732336 |
|      | 0.00000000 | 0.00342027 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 |
| 2004 | 1          | 1          | 0          | 0          | 1          | 16.0       | 16.5       | 8.20       | 0.00505216 | 0.86811527 | 0.11755742 |
|      | 0.00927515 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 |
| 2004 | 1          | 1          | 0          | 0          | 1          | 17.0       | 17.5       | 3.32       | 0.00000000 | 0.85656519 | 0.11887042 |
|      | 0.00558631 | 0.01897807 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 |
| 2004 | 1          | 1          | 0          | 0          | 1          | 18.0       | 18.5       | 0.76       | 0.00000000 | 0.39684213 | 0.49701007 |
|      | 0.00000000 | 0.10614780 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 |
| 2004 | 1          | 1          | 0          | 0          | 1          | 19.0       | 19.5       | 0.28       | 0.00000000 | 0.38960446 | 0.25214348 |
|      | 0.35825205 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 |
| 2004 | 1          | 1          | 0          | 0          | 1          | 20.0       | 20.5       | 0.08       | 0.00000000 | 0.00000000 | 0.00000000 |
|      | 0.00000000 | 1.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 |
| 2004 | 1          | 1          | 0          | 0          | 1          | 22.0       | 22.5       | 0.04       | 0.00000000 | 0.00000000 | 0.00000000 |
|      | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 1.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 |
| 2004 | 1          | 1          | 0          | 0          | 1          | 24.0       | 24.5       | 0.04       | 0.00000000 | 0.00000000 | 0.00000000 |
|      | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 1.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 |
| 2005 | 1          | 1          | 0          | 0          | 1          | 10.0       | 10.5       | 0.08       | 1.00000000 | 0.00000000 | 0.00000000 |
|      | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 |
| 2005 | 1          | 1          | 0          | 0          | 1          | 11.0       | 11.5       | 1.00       | 0.60000000 | 0.40000000 | 0.00000000 |
|      | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 |
| 2005 | 1          | 1          | 0          | 0          | 1          | 12.0       | 12.5       | 1.48       | 0.66372335 | 0.33627665 | 0.00000000 |
|      | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 |
| 2005 | 1          | 1          | 0          | 0          | 1          | 13.0       | 13.5       | 4.92       | 0.23073098 | 0.62970257 | 0.13956644 |
|      | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 |
| 2005 | 1          | 1          | 0          | 0          | 1          | 14.0       | 14.5       | 8.84       | 0.18573131 | 0.63240199 | 0.18186670 |
|      | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 |
| 2005 | 1          | 1          | 0          | 0          | 1          | 15.0       | 15.5       | 5.60       | 0.04064125 | 0.33093795 | 0.62373605 |
|      | 0.00468476 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 |
| 2005 | 1          | 1          | 0          | 0          | 1          | 16.0       | 16.5       | 6.80       | 0.00000000 | 0.06282689 | 0.91934231 |
|      | 0.01783080 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 |
| 2005 | 1          | 1          | 0          | 0          | 1          | 17.0       | 17.5       | 4.32       | 0.00000000 | 0.05576095 | 0.83201279 |
|      | 0.11222627 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 |
| 2005 | 1          | 1          | 0          | 0          | 1          | 18.0       | 18.5       | 1.12       | 0.00000000 | 0.00000000 | 0.82757016 |
|      | 0.17242984 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 |
| 2005 | 1          | 1          | 0          | 0          | 1          | 19.0       | 19.5       | 0.72       | 0.00000000 | 0.00000000 | 0.74964298 |
|      | 0.22394597 | 0.02641105 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 |
| 2005 | 1          | 1          | 0          | 0          | 1          | 20.0       | 20.5       | 0.08       | 0.00000000 | 0.00000000 | 0.00000000 |
|      | 1.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 |
| 2005 | 1          | 1          | 0          | 0          | 1          | 21.0       | 21.5       | 0.04       | 0.00000000 | 0.00000000 | 0.00000000 |
|      | 0.00000000 | 1.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 |
| 2005 | 1          | 1          | 0          | 0          | 1          | 22.0       | 22.5       | 0.08       | 0.00000000 | 0.00000000 | 0.00000000 |
|      | 0.00000000 | 0.50000000 | 0.50000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 |
| 2005 | 1          | 1          | 0          | 0          | 1          | 23.0       | 23.5       | 0.04       | 0.00000000 | 0.00000000 | 0.00000000 |
|      | 1.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 |
| 2005 | 1          | 1          | 0          | 0          | 1          | 24.0       | 24.5       | 0.12       | 0.00000000 | 0.00000000 | 0.00000000 |
|      | 0.00000000 | 0.65509203 | 0.17245399 | 0.17245399 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 |
| 2006 | 1          | 1          | 0          | 0          | 1          | 12.0       | 12.5       | 0.64       | 0.00969274 | 0.82381022 | 0.16649704 |
|      | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 |
| 2006 | 1          | 1          | 0          | 0          | 1          | 13.0       | 13.5       | 2.12       | 0.12950784 | 0.85495467 | 0.01553749 |
|      | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 |
| 2006 | 1          | 1          | 0          | 0          | 1          | 14.0       | 14.5       | 11.92      | 0.01372349 | 0.94883032 | 0.03744619 |
|      | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 |
| 2006 | 1          | 1          | 0          | 0          | 1          | 15.0       | 15.5       | 24.12      | 0.00827923 | 0.88315188 | 0.10720699 |
|      | 0.00136190 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 |
| 2006 | 1          | 1          | 0          | 0          | 1          | 16.0       | 16.5       | 17.08      | 0.00617434 | 0.64052788 | 0.33200330 |
|      | 0.02129448 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 |
| 2006 | 1          | 1          | 0          | 0          | 1          | 17.0       | 17.5       | 9.12       | 0.00634360 | 0.22254651 | 0.68627996 |
|      | 0.08482992 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 |
| 2006 | 1          | 1          | 0          | 0          | 1          | 18.0       | 18.5       | 3.56       | 0.00000000 | 0.01820135 | 0.73249892 |
|      | 0.24929974 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 |
| 2006 | 1          | 1          | 0          | 0          | 1          | 19.0       | 19.5       | 0.88       | 0.00000000 | 0.00000000 | 0.59828848 |
|      | 0.40171152 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 |
| 2006 | 1          | 1          | 0          | 0          | 1          | 20.0       | 20.5       | 0.20       | 0.00000000 | 0.00000000 | 0.00000000 |
|      | 1.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 |

|      |   |            |            |            |            |            |            |            |            |            |            |
|------|---|------------|------------|------------|------------|------------|------------|------------|------------|------------|------------|
| 2006 | 1 | 1          | 0          | 0          | 1          | 21.0       | 21.5       | 0.08       | 0.00000000 | 0.00000000 | 0.50000000 |
|      |   | 0.50000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 |
| 2006 | 1 | 1          | 0          | 0          | 1          | 22.0       | 22.5       | 0.04       | 0.00000000 | 0.00000000 | 0.00000000 |
|      |   | 1.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 |
| 2007 | 1 | 1          | 0          | 0          | 2          | 10.0       | 10.5       | 0.08       | 1.00000000 | 0.00000000 | 0.00000000 |
|      |   | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 |
| 2007 | 1 | 1          | 0          | 0          | 2          | 11.0       | 11.5       | 0.56       | 0.85714286 | 0.14285714 | 0.00000000 |
|      |   | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 |
| 2007 | 1 | 1          | 0          | 0          | 2          | 12.0       | 12.5       | 0.80       | 0.87626801 | 0.12373199 | 0.00000000 |
|      |   | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 |
| 2007 | 1 | 1          | 0          | 0          | 2          | 13.0       | 13.5       | 2.68       | 0.40483739 | 0.55358268 | 0.04157993 |
|      |   | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 |
| 2007 | 1 | 1          | 0          | 0          | 2          | 14.0       | 14.5       | 5.68       | 0.01803592 | 0.75380995 | 0.20726697 |
|      |   | 0.02088716 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 |
| 2007 | 1 | 1          | 0          | 0          | 2          | 15.0       | 15.5       | 14.56      | 0.00387012 | 0.34648381 | 0.62501079 |
|      |   | 0.02463528 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 |
| 2007 | 1 | 1          | 0          | 0          | 2          | 16.0       | 16.5       | 28.80      | 0.00028385 | 0.09330496 | 0.77807930 |
|      |   | 0.12710868 | 0.00122320 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 |
| 2007 | 1 | 1          | 0          | 0          | 2          | 17.0       | 17.5       | 23.16      | 0.00281026 | 0.04058452 | 0.66877144 |
|      |   | 0.26920715 | 0.01862662 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 |
| 2007 | 1 | 1          | 0          | 0          | 2          | 18.0       | 18.5       | 7.36       | 0.00000000 | 0.01236885 | 0.59949472 |
|      |   | 0.35606275 | 0.03207368 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 |
| 2007 | 1 | 1          | 0          | 0          | 2          | 19.0       | 19.5       | 1.84       | 0.00000000 | 0.00000000 | 0.18710923 |
|      |   | 0.78336207 | 0.02952870 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 |
| 2007 | 1 | 1          | 0          | 0          | 2          | 20.0       | 20.5       | 0.40       | 0.00000000 | 0.00000000 | 0.24239178 |
|      |   | 0.66239470 | 0.09521352 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 |
| 2007 | 1 | 1          | 0          | 0          | 2          | 21.0       | 21.5       | 0.04       | 0.00000000 | 0.00000000 | 0.00000000 |
|      |   | 0.00000000 | 1.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 |
| 2007 | 1 | 1          | 0          | 0          | 2          | 22.0       | 22.5       | 0.04       | 0.00000000 | 0.00000000 | 1.00000000 |
|      |   | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 |
| 2008 | 1 | 1          | 0          | 0          | 3          | 12.0       | 12.5       | 0.56       | 1.00000000 | 0.00000000 | 0.00000000 |
|      |   | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 |
| 2008 | 1 | 1          | 0          | 0          | 3          | 13.0       | 13.5       | 0.52       | 1.00000000 | 0.00000000 | 0.00000000 |
|      |   | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 |
| 2008 | 1 | 1          | 0          | 0          | 3          | 14.0       | 14.5       | 0.12       | 1.00000000 | 0.00000000 | 0.00000000 |
|      |   | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 |
| 2008 | 1 | 1          | 0          | 0          | 3          | 15.0       | 15.5       | 1.60       | 0.00000000 | 0.72257965 | 0.27742035 |
|      |   | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 |
| 2008 | 1 | 1          | 0          | 0          | 3          | 16.0       | 16.5       | 10.08      | 0.01437160 | 0.40213365 | 0.57334683 |
|      |   | 0.01014792 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 |
| 2008 | 1 | 1          | 0          | 0          | 3          | 17.0       | 17.5       | 10.40      | 0.01495756 | 0.20893843 | 0.71709879 |
|      |   | 0.05900522 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 |
| 2008 | 1 | 1          | 0          | 0          | 3          | 18.0       | 18.5       | 5.12       | 0.01158259 | 0.19549447 | 0.70461698 |
|      |   | 0.08830597 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 |
| 2008 | 1 | 1          | 0          | 0          | 3          | 19.0       | 19.5       | 1.36       | 0.00000000 | 0.19981464 | 0.49211465 |
|      |   | 0.25835350 | 0.04971721 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 |
| 2008 | 1 | 1          | 0          | 0          | 3          | 20.0       | 20.5       | 0.60       | 0.00000000 | 0.00000000 | 0.21969054 |
|      |   | 0.58469349 | 0.19561597 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 |
| 2008 | 1 | 1          | 0          | 0          | 3          | 21.0       | 21.5       | 0.36       | 0.00000000 | 0.00000000 | 0.11111111 |
|      |   | 0.55555556 | 0.33333333 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 |
| 2008 | 1 | 1          | 0          | 0          | 3          | 22.0       | 22.5       | 0.08       | 0.00000000 | 0.00000000 | 0.19646010 |
|      |   | 0.00000000 | 0.80353990 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 |
| 2008 | 1 | 1          | 0          | 0          | 3          | 23.0       | 23.5       | 0.04       | 0.00000000 | 0.00000000 | 0.00000000 |
|      |   | 0.00000000 | 1.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 |
| 2009 | 1 | 1          | 0          | 0          | 3          | 14.0       | 14.5       | 0.56       | 0.00000000 | 1.00000000 | 0.00000000 |
|      |   | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 |
| 2009 | 1 | 1          | 0          | 0          | 3          | 15.0       | 15.5       | 1.08       | 0.05215629 | 0.84353112 | 0.10431259 |
|      |   | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 |
| 2009 | 1 | 1          | 0          | 0          | 3          | 16.0       | 16.5       | 4.44       | 0.00000000 | 0.47928776 | 0.50836509 |
|      |   | 0.01234715 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 |
| 2009 | 1 | 1          | 0          | 0          | 3          | 17.0       | 17.5       | 12.64      | 0.00296329 | 0.13276991 | 0.72454418 |
|      |   | 0.12490618 | 0.01481644 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 |
| 2009 | 1 | 1          | 0          | 0          | 3          | 18.0       | 18.5       | 4.00       | 0.00000000 | 0.02948402 | 0.60770512 |
|      |   | 0.33461294 | 0.02819793 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 |
| 2009 | 1 | 1          | 0          | 0          | 3          | 19.0       | 19.5       | 0.16       | 0.00000000 | 0.00000000 | 0.25073428 |
|      |   | 0.74926572 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 |
| 2010 | 1 | 1          | 0          | 0          | 4          | 13.0       | 13.5       | 0.04       | 0.00000000 | 1.00000000 | 0.00000000 |
|      |   | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 |
| 2010 | 1 | 1          | 0          | 0          | 4          | 14.0       | 14.5       | 0.28       | 0.14285714 | 0.85714286 | 0.00000000 |
|      |   | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 |
| 2010 | 1 | 1          | 0          | 0          | 4          | 15.0       | 15.5       | 5.28       | 0.01515152 | 0.86363636 | 0.12121212 |
|      |   | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 |
| 2010 | 1 | 1          | 0          | 0          | 4          | 16.0       | 16.5       | 6.36       | 0.01257862 | 0.77358491 | 0.19496855 |
|      |   | 0.01886792 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 |

|      |   |            |            |            |            |            |            |            |            |            |            |
|------|---|------------|------------|------------|------------|------------|------------|------------|------------|------------|------------|
| 2010 | 1 | 1          | 0          | 0          | 4          | 17.0       | 17.5       | 0.52       | 0.00000000 | 0.53846154 | 0.38461538 |
|      |   | 0.07692308 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 |
| 2010 | 1 | 1          | 0          | 0          | 4          | 18.0       | 18.5       | 0.08       | 0.00000000 | 0.00000000 | 0.50000000 |
|      |   | 0.50000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 |
| 2010 | 1 | 1          | 0          | 0          | 4          | 19.0       | 19.5       | 0.12       | 0.00000000 | 0.00000000 | 0.00000000 |
|      |   | 1.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 |
| 2011 | 1 | 1          | 0          | 0          | 4          | 15.0       | 15.5       | 0.08       | 0.00000000 | 1.00000000 | 0.00000000 |
|      |   | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 |
| 2011 | 1 | 1          | 0          | 0          | 4          | 16.0       | 16.5       | 1.96       | 0.00000000 | 0.55600263 | 0.32620509 |
|      |   | 0.11779228 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 |
| 2011 | 1 | 1          | 0          | 0          | 4          | 17.0       | 17.5       | 12.36      | 0.00000000 | 0.33958915 | 0.50120495 |
|      |   | 0.15920590 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 |
| 2011 | 1 | 1          | 0          | 0          | 4          | 18.0       | 18.5       | 6.60       | 0.00000000 | 0.12877487 | 0.50542429 |
|      |   | 0.35157075 | 0.01423009 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 |
| 2011 | 1 | 1          | 0          | 0          | 4          | 19.0       | 19.5       | 0.60       | 0.00000000 | 0.00000000 | 0.33656921 |
|      |   | 0.62603421 | 0.03739658 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 |
| 2011 | 1 | 1          | 0          | 0          | 4          | 21.0       | 21.5       | 0.04       | 0.00000000 | 0.00000000 | 0.00000000 |
|      |   | 0.00000000 | 1.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 |
| 2012 | 1 | 1          | 0          | 0          | 4          | 14.0       | 14.5       | 0.48       | 0.08333333 | 0.91666667 | 0.00000000 |
|      |   | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 |
| 2012 | 1 | 1          | 0          | 0          | 4          | 15.0       | 15.5       | 0.48       | 0.00000000 | 0.83333333 | 0.16666667 |
|      |   | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 |
| 2012 | 1 | 1          | 0          | 0          | 4          | 16.0       | 16.5       | 0.16       | 0.00000000 | 0.50000000 | 0.50000000 |
|      |   | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 |
| 2012 | 1 | 1          | 0          | 0          | 4          | 17.0       | 17.5       | 1.76       | 0.00000000 | 0.12388536 | 0.70653509 |
|      |   | 0.16957955 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 |
| 2012 | 1 | 1          | 0          | 0          | 4          | 18.0       | 18.5       | 5.92       | 0.00000000 | 0.03878870 | 0.67166629 |
|      |   | 0.27666426 | 0.01288075 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 |
| 2012 | 1 | 1          | 0          | 0          | 4          | 19.0       | 19.5       | 6.60       | 0.00000000 | 0.00093824 | 0.53772555 |
|      |   | 0.44589212 | 0.01544409 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 |
| 2012 | 1 | 1          | 0          | 0          | 4          | 20.0       | 20.5       | 4.92       | 0.00000000 | 0.00000000 | 0.20675044 |
|      |   | 0.59305156 | 0.16229851 | 0.03789949 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 |
| 2012 | 1 | 1          | 0          | 0          | 4          | 21.0       | 21.5       | 1.80       | 0.00000000 | 0.00000000 | 0.02764022 |
|      |   | 0.66790505 | 0.22153409 | 0.00000000 | 0.08292065 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 |
| 2012 | 1 | 1          | 0          | 0          | 4          | 22.0       | 22.5       | 0.16       | 0.00000000 | 0.00000000 | 0.00000000 |
|      |   | 0.00000000 | 0.55727171 | 0.44272829 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 |
| 2012 | 1 | 1          | 0          | 0          | 4          | 23.0       | 23.5       | 0.04       | 0.00000000 | 0.00000000 | 0.00000000 |
|      |   | 0.00000000 | 0.00000000 | 1.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 |
| 2013 | 1 | 1          | 0          | 0          | 4          | 10.0       | 10.5       | 0.12       | 1.00000000 | 0.00000000 | 0.00000000 |
|      |   | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 |
| 2013 | 1 | 1          | 0          | 0          | 4          | 11.0       | 11.5       | 0.28       | 1.00000000 | 0.00000000 | 0.00000000 |
|      |   | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 |
| 2013 | 1 | 1          | 0          | 0          | 4          | 12.0       | 12.5       | 0.44       | 0.45454545 | 0.54545455 | 0.00000000 |
|      |   | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 |
| 2013 | 1 | 1          | 0          | 0          | 4          | 13.0       | 13.5       | 0.16       | 0.00000000 | 1.00000000 | 0.00000000 |
|      |   | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 |
| 2013 | 1 | 1          | 0          | 0          | 4          | 14.0       | 14.5       | 0.04       | 0.00000000 | 1.00000000 | 0.00000000 |
|      |   | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 |
| 2013 | 1 | 1          | 0          | 0          | 4          | 17.0       | 17.5       | 0.16       | 0.00000000 | 0.00000000 | 1.00000000 |
|      |   | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 |
| 2013 | 1 | 1          | 0          | 0          | 4          | 18.0       | 18.5       | 0.64       | 0.00000000 | 0.30945925 | 0.48776178 |
|      |   | 0.17381055 | 0.02896842 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 |
| 2013 | 1 | 1          | 0          | 0          | 4          | 19.0       | 19.5       | 1.68       | 0.00000000 | 0.09006056 | 0.46271615 |
|      |   | 0.35716273 | 0.09006056 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 |
| 2013 | 1 | 1          | 0          | 0          | 4          | 20.0       | 20.5       | 1.88       | 0.00000000 | 0.00000000 | 0.38344689 |
|      |   | 0.48487969 | 0.13167342 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 |
| 2013 | 1 | 1          | 0          | 0          | 4          | 21.0       | 21.5       | 6.40       | 0.00000000 | 0.00000000 | 0.29955967 |
|      |   | 0.33181888 | 0.36495182 | 0.00366964 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 |
| 2013 | 1 | 1          | 0          | 0          | 4          | 22.0       | 22.5       | 3.52       | 0.00000000 | 0.00000000 | 0.04129804 |
|      |   | 0.13019542 | 0.58965328 | 0.12556413 | 0.07552609 | 0.00000000 | 0.00000000 | 0.00000000 | 0.03776305 | 0.00000000 | 0.00000000 |
| 2013 | 1 | 1          | 0          | 0          | 4          | 23.0       | 23.5       | 0.52       | 0.00000000 | 0.00000000 | 0.00000000 |
|      |   | 0.16432241 | 0.34271035 | 0.32864483 | 0.01406552 | 0.15025689 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 |
| 1993 | 2 | 2          | 0          | 0          | 1          | 13.0       | 13.5       | 0.20       | 1.00000000 | 0.00000000 | 0.00000000 |
|      |   | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 |
| 1993 | 2 | 2          | 0          | 0          | 1          | 14.0       | 14.5       | 1.36       | 0.97070472 | 0.02929528 | 0.00000000 |
|      |   | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 |
| 1993 | 2 | 2          | 0          | 0          | 1          | 15.0       | 15.5       | 2.12       | 0.87662406 | 0.12337594 | 0.00000000 |
|      |   | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 |
| 1993 | 2 | 2          | 0          | 0          | 1          | 16.0       | 16.5       | 5.36       | 0.38724536 | 0.51316166 | 0.09959298 |
|      |   | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 |
| 1993 | 2 | 2          | 0          | 0          | 1          | 17.0       | 17.5       | 9.44       | 0.07213542 | 0.61158283 | 0.29388355 |
|      |   | 0.01953423 | 0.00286397 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 |
| 1993 | 2 | 2          | 0          | 0          | 1          | 18.0       | 18.5       | 6.28       | 0.01233362 | 0.40889523 | 0.55275049 |
|      |   | 0.02602066 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 |

|      |   |            |   |            |   |            |      |            |            |            |            |
|------|---|------------|---|------------|---|------------|------|------------|------------|------------|------------|
| 1993 | 2 | 2          | 0 | 0          | 1 | 19.0       | 19.5 | 2.64       | 0.00000000 | 0.10547058 | 0.68579430 |
|      |   | 0.14425622 |   | 0.02149297 |   | 0.02149297 |      | 0.02149297 | 0.00000000 | 0.00000000 | 0.00000000 |
| 1993 | 2 | 2          | 0 | 0          | 1 | 20.0       | 20.5 | 1.04       | 0.00000000 | 0.06147662 | 0.42885278 |
|      |   | 0.41036671 |   | 0.05459334 |   | 0.04471056 |      | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 |
| 1993 | 2 | 2          | 0 | 0          | 1 | 21.0       | 21.5 | 0.56       | 0.00000000 | 0.00000000 | 0.24819545 |
|      |   | 0.54255200 |   | 0.20925255 |   | 0.00000000 |      | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 |
| 1993 | 2 | 2          | 0 | 0          | 1 | 22.0       | 22.5 | 0.52       | 0.00000000 | 0.00000000 | 0.19223104 |
|      |   | 0.33136029 |   | 0.26109730 |   | 0.07177046 |      | 0.14354091 | 0.00000000 | 0.00000000 | 0.00000000 |
| 1993 | 2 | 2          | 0 | 0          | 1 | 23.0       | 23.5 | 0.52       | 0.00000000 | 0.00000000 | 0.12733396 |
|      |   | 0.27876739 |   | 0.42428329 |   | 0.16961536 |      | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 |
| 1993 | 2 | 2          | 0 | 0          | 1 | 24.0       | 24.5 | 0.16       | 0.00000000 | 0.00000000 | 0.00000000 |
|      |   | 0.40563177 |   | 0.59436823 |   | 0.00000000 |      | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 |
| 1993 | 2 | 2          | 0 | 0          | 1 | 25.0       | 25.5 | 0.20       | 0.00000000 | 0.00000000 | 0.00000000 |
|      |   | 0.26700525 |   | 0.00000000 |   | 0.46598950 |      | 0.26700525 | 0.00000000 | 0.00000000 | 0.00000000 |
| 1993 | 2 | 2          | 0 | 0          | 1 | 26.0       | 26.5 | 0.04       | 0.00000000 | 0.00000000 | 0.00000000 |
|      |   | 0.00000000 |   | 0.00000000 |   | 1.00000000 |      | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 |
| 1994 | 2 | 2          | 0 | 0          | 1 | 11.0       | 11.5 | 0.72       | 1.00000000 | 0.00000000 | 0.00000000 |
|      |   | 0.00000000 |   | 0.00000000 |   | 0.00000000 |      | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 |
| 1994 | 2 | 2          | 0 | 0          | 1 | 12.0       | 12.5 | 1.88       | 0.98302973 | 0.01697027 | 0.00000000 |
|      |   | 0.00000000 |   | 0.00000000 |   | 0.00000000 |      | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 |
| 1994 | 2 | 2          | 0 | 0          | 1 | 13.0       | 13.5 | 6.64       | 0.86880561 | 0.12761125 | 0.00358315 |
|      |   | 0.00000000 |   | 0.00000000 |   | 0.00000000 |      | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 |
| 1994 | 2 | 2          | 0 | 0          | 1 | 14.0       | 14.5 | 15.00      | 0.87264589 | 0.12512599 | 0.00228212 |
|      |   | 0.00000000 |   | 0.00000000 |   | 0.00000000 |      | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 |
| 1994 | 2 | 2          | 0 | 0          | 1 | 15.0       | 15.5 | 23.80      | 0.64265504 | 0.33692582 | 0.01875050 |
|      |   | 0.00166863 |   | 0.00000000 |   | 0.00000000 |      | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 |
| 1994 | 2 | 2          | 0 | 0          | 1 | 16.0       | 16.5 | 31.56      | 0.23602009 | 0.70894433 | 0.04969618 |
|      |   | 0.00367082 |   | 0.00000000 |   | 0.00166858 |      | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 |
| 1994 | 2 | 2          | 0 | 0          | 1 | 17.0       | 17.5 | 23.40      | 0.08662464 | 0.67844162 | 0.16526082 |
|      |   | 0.06184184 |   | 0.00783109 |   | 0.00000000 |      | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 |
| 1994 | 2 | 2          | 0 | 0          | 1 | 18.0       | 18.5 | 11.84      | 0.04546867 | 0.40515272 | 0.33567341 |
|      |   | 0.19105666 |   | 0.02083700 |   | 0.00181155 |      | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 |
| 1994 | 2 | 2          | 0 | 0          | 1 | 19.0       | 19.5 | 4.60       | 0.01420067 | 0.14104731 | 0.44919582 |
|      |   | 0.32473849 |   | 0.06329571 |   | 0.00752201 |      | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 |
| 1994 | 2 | 2          | 0 | 0          | 1 | 20.0       | 20.5 | 1.08       | 0.00000000 | 0.11300204 | 0.44817926 |
|      |   | 0.43881870 |   | 0.00000000 |   | 0.00000000 |      | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 |
| 1994 | 2 | 2          | 0 | 0          | 1 | 21.0       | 21.5 | 0.36       | 0.00000000 | 0.16665558 | 0.23680924 |
|      |   | 0.41616224 |   | 0.07015366 |   | 0.00000000 |      | 0.11021929 | 0.00000000 | 0.00000000 | 0.00000000 |
| 1994 | 2 | 2          | 0 | 0          | 1 | 23.0       | 23.5 | 0.04       | 0.00000000 | 0.00000000 | 1.00000000 |
|      |   | 0.00000000 |   | 0.00000000 |   | 0.00000000 |      | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 |
| 1994 | 2 | 2          | 0 | 0          | 1 | 24.0       | 24.5 | 0.04       | 0.00000000 | 0.00000000 | 0.00000000 |
|      |   | 0.00000000 |   | 1.00000000 |   | 0.00000000 |      | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 |
| 1995 | 2 | 2          | 0 | 0          | 1 | 12.0       | 12.5 | 0.44       | 0.71231509 | 0.28768491 | 0.00000000 |
|      |   | 0.00000000 |   | 0.00000000 |   | 0.00000000 |      | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 |
| 1995 | 2 | 2          | 0 | 0          | 1 | 13.0       | 13.5 | 2.68       | 0.59996788 | 0.37064073 | 0.02939139 |
|      |   | 0.00000000 |   | 0.00000000 |   | 0.00000000 |      | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 |
| 1995 | 2 | 2          | 0 | 0          | 1 | 14.0       | 14.5 | 4.80       | 0.73717939 | 0.24782276 | 0.01499785 |
|      |   | 0.00000000 |   | 0.00000000 |   | 0.00000000 |      | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 |
| 1995 | 2 | 2          | 0 | 0          | 1 | 15.0       | 15.5 | 10.08      | 0.50967566 | 0.31351836 | 0.17303392 |
|      |   | 0.00377205 |   | 0.00000000 |   | 0.00000000 |      | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 |
| 1995 | 2 | 2          | 0 | 0          | 1 | 16.0       | 16.5 | 16.44      | 0.23707804 | 0.48564470 | 0.25976314 |
|      |   | 0.01751411 |   | 0.00000000 |   | 0.00000000 |      | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 |
| 1995 | 2 | 2          | 0 | 0          | 1 | 17.0       | 17.5 | 14.76      | 0.04581167 | 0.53108806 | 0.39150329 |
|      |   | 0.03044360 |   | 0.00000000 |   | 0.00115339 |      | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 |
| 1995 | 2 | 2          | 0 | 0          | 1 | 18.0       | 18.5 | 7.20       | 0.01242179 | 0.52624193 | 0.41951324 |
|      |   | 0.04182304 |   | 0.00000000 |   | 0.00000000 |      | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 |
| 1995 | 2 | 2          | 0 | 0          | 1 | 19.0       | 19.5 | 1.76       | 0.00000000 | 0.46335195 | 0.48609034 |
|      |   | 0.03570396 |   | 0.01485375 |   | 0.00000000 |      | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 |
| 1995 | 2 | 2          | 0 | 0          | 1 | 20.0       | 20.5 | 0.32       | 0.00000000 | 0.08174470 | 0.66468272 |
|      |   | 0.00000000 |   | 0.25357259 |   | 0.00000000 |      | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 |
| 1995 | 2 | 2          | 0 | 0          | 1 | 21.0       | 21.5 | 0.24       | 0.00000000 | 0.00000000 | 0.29285599 |
|      |   | 0.51848817 |   | 0.18865585 |   | 0.00000000 |      | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 |
| 1995 | 2 | 2          | 0 | 0          | 1 | 22.0       | 22.5 | 0.04       | 0.00000000 | 0.00000000 | 0.00000000 |
|      |   | 1.00000000 |   | 0.00000000 |   | 0.00000000 |      | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 |
| 1995 | 2 | 2          | 0 | 0          | 1 | 23.0       | 23.5 | 0.04       | 0.00000000 | 0.00000000 | 1.00000000 |
|      |   | 0.00000000 |   | 0.00000000 |   | 0.00000000 |      | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 |
| 1995 | 2 | 2          | 0 | 0          | 1 | 25.0       | 25.5 | 0.04       | 0.00000000 | 0.00000000 | 0.00000000 |
|      |   | 1.00000000 |   | 0.00000000 |   | 0.00000000 |      | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 |
| 1996 | 2 | 2          | 0 | 0          | 1 | 10.0       | 10.5 | 0.40       | 1.00000000 | 0.00000000 | 0.00000000 |
|      |   | 0.00000000 |   | 0.00000000 |   | 0.00000000 |      | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 |
| 1996 | 2 | 2          | 0 | 0          | 1 | 11.0       | 11.5 | 0.60       | 1.00000000 | 0.00000000 | 0.00000000 |
|      |   | 0.00000000 |   | 0.00000000 |   | 0.00000000 |      | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 |
| 1996 | 2 | 2          | 0 | 0          | 1 | 12.0       | 12.5 | 1.60       | 0.80975028 | 0.16683245 | 0.02341728 |
|      |   | 0.00000000 |   | 0.00000000 |   | 0.00000000 |      | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 |

|      |   |            |            |            |   |            |            |            |            |            |            |
|------|---|------------|------------|------------|---|------------|------------|------------|------------|------------|------------|
| 1996 | 2 | 2          | 0          | 0          | 1 | 13.0       | 13.5       | 5.96       | 0.73478866 | 0.24312398 | 0.02208736 |
|      |   | 0.00000000 | 0.00000000 | 0.00000000 |   | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 |
| 1996 | 2 | 2          | 0          | 0          | 1 | 14.0       | 14.5       | 8.12       | 0.46518847 | 0.51089433 | 0.02391719 |
|      |   | 0.00000000 | 0.00000000 | 0.00000000 |   | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 |
| 1996 | 2 | 2          | 0          | 0          | 1 | 15.0       | 15.5       | 6.24       | 0.41849666 | 0.54255775 | 0.03894559 |
|      |   | 0.00000000 | 0.00000000 | 0.00000000 |   | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 |
| 1996 | 2 | 2          | 0          | 0          | 1 | 16.0       | 16.5       | 3.76       | 0.08756362 | 0.56516625 | 0.31965063 |
|      |   | 0.02761951 | 0.00000000 | 0.00000000 |   | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 |
| 1996 | 2 | 2          | 0          | 0          | 1 | 17.0       | 17.5       | 5.36       | 0.00000000 | 0.50925012 | 0.41255772 |
|      |   | 0.07819215 | 0.00000000 | 0.00000000 |   | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 |
| 1996 | 2 | 2          | 0          | 0          | 1 | 18.0       | 18.5       | 5.60       | 0.00000000 | 0.18027972 | 0.73786000 |
|      |   | 0.08186028 | 0.00000000 | 0.00000000 |   | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 |
| 1996 | 2 | 2          | 0          | 0          | 1 | 19.0       | 19.5       | 5.56       | 0.00797248 | 0.09130891 | 0.65341448 |
|      |   | 0.21119852 | 0.00797248 | 0.02813313 |   | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 |
| 1996 | 2 | 2          | 0          | 0          | 1 | 20.0       | 20.5       | 1.88       | 0.00000000 | 0.04190018 | 0.78996467 |
|      |   | 0.14355012 | 0.00000000 | 0.02458503 |   | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 |
| 1996 | 2 | 2          | 0          | 0          | 1 | 21.0       | 21.5       | 0.56       | 0.00000000 | 0.06665516 | 0.66672422 |
|      |   | 0.19996547 | 0.06665516 | 0.00000000 |   | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 |
| 1996 | 2 | 2          | 0          | 0          | 1 | 22.0       | 22.5       | 0.24       | 0.00000000 | 0.20026673 | 0.31989331 |
|      |   | 0.31989331 | 0.15994665 | 0.00000000 |   | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 |
| 1996 | 2 | 2          | 0          | 0          | 1 | 25.0       | 25.5       | 0.04       | 0.00000000 | 0.00000000 | 0.00000000 |
|      |   | 0.00000000 | 1.00000000 | 0.00000000 |   | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 |
| 1997 | 2 | 2          | 0          | 0          | 1 | 9.0        | 9.5        | 0.08       | 1.00000000 | 0.00000000 | 0.00000000 |
|      |   | 0.00000000 | 0.00000000 | 0.00000000 |   | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 |
| 1997 | 2 | 2          | 0          | 0          | 1 | 10.0       | 10.5       | 0.88       | 0.95240426 | 0.04759574 | 0.00000000 |
|      |   | 0.00000000 | 0.00000000 | 0.00000000 |   | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 |
| 1997 | 2 | 2          | 0          | 0          | 1 | 11.0       | 11.5       | 1.40       | 1.00000000 | 0.00000000 | 0.00000000 |
|      |   | 0.00000000 | 0.00000000 | 0.00000000 |   | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 |
| 1997 | 2 | 2          | 0          | 0          | 1 | 12.0       | 12.5       | 1.08       | 0.91020233 | 0.08979767 | 0.00000000 |
|      |   | 0.00000000 | 0.00000000 | 0.00000000 |   | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 |
| 1997 | 2 | 2          | 0          | 0          | 1 | 13.0       | 13.5       | 2.48       | 0.76619269 | 0.23380731 | 0.00000000 |
|      |   | 0.00000000 | 0.00000000 | 0.00000000 |   | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 |
| 1997 | 2 | 2          | 0          | 0          | 1 | 14.0       | 14.5       | 2.80       | 0.51770442 | 0.46377638 | 0.01851919 |
|      |   | 0.00000000 | 0.00000000 | 0.00000000 |   | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 |
| 1997 | 2 | 2          | 0          | 0          | 1 | 15.0       | 15.5       | 4.40       | 0.11696030 | 0.83583819 | 0.04620143 |
|      |   | 0.00100008 | 0.00000000 | 0.00000000 |   | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 |
| 1997 | 2 | 2          | 0          | 0          | 1 | 16.0       | 16.5       | 5.40       | 0.00086050 | 0.87069252 | 0.12844699 |
|      |   | 0.00000000 | 0.00000000 | 0.00000000 |   | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 |
| 1997 | 2 | 2          | 0          | 0          | 1 | 17.0       | 17.5       | 4.48       | 0.02019942 | 0.75406485 | 0.19363098 |
|      |   | 0.02872855 | 0.00337619 | 0.00000000 |   | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 |
| 1997 | 2 | 2          | 0          | 0          | 1 | 18.0       | 18.5       | 3.88       | 0.05477172 | 0.47661077 | 0.43935640 |
|      |   | 0.02926111 | 0.00000000 | 0.00000000 |   | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 |
| 1997 | 2 | 2          | 0          | 0          | 1 | 19.0       | 19.5       | 3.48       | 0.02384269 | 0.09743413 | 0.41598185 |
|      |   | 0.33822133 | 0.11611399 | 0.00840601 |   | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 |
| 1997 | 2 | 2          | 0          | 0          | 1 | 20.0       | 20.5       | 6.56       | 0.00000000 | 0.01314396 | 0.37161014 |
|      |   | 0.43608829 | 0.17341751 | 0.00574010 |   | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 |
| 1997 | 2 | 2          | 0          | 0          | 1 | 21.0       | 21.5       | 6.20       | 0.00000000 | 0.01452790 | 0.19985641 |
|      |   | 0.56258895 | 0.18587032 | 0.03715641 |   | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 |
| 1997 | 2 | 2          | 0          | 0          | 1 | 22.0       | 22.5       | 3.36       | 0.00000000 | 0.02844437 | 0.22226700 |
|      |   | 0.42427703 | 0.23657884 | 0.05998839 |   | 0.02844437 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 |
| 1997 | 2 | 2          | 0          | 0          | 1 | 23.0       | 23.5       | 0.80       | 0.00000000 | 0.00000000 | 0.00000000 |
|      |   | 0.29555010 | 0.55667486 | 0.02630317 |   | 0.12147188 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 |
| 1997 | 2 | 2          | 0          | 0          | 1 | 24.0       | 24.5       | 0.12       | 0.00000000 | 0.00000000 | 0.00000000 |
|      |   | 0.00000000 | 0.89581040 | 0.00000000 |   | 0.10418960 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 |
| 1997 | 2 | 2          | 0          | 0          | 1 | 25.0       | 25.5       | 0.04       | 0.00000000 | 0.00000000 | 0.00000000 |
|      |   | 0.00000000 | 0.00000000 | 0.00000000 |   | 1.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 |
| 1998 | 2 | 2          | 0          | 0          | 1 | 9.0        | 9.5        | 0.08       | 1.00000000 | 0.00000000 | 0.00000000 |
|      |   | 0.00000000 | 0.00000000 | 0.00000000 |   | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 |
| 1998 | 2 | 2          | 0          | 0          | 1 | 10.0       | 10.5       | 1.00       | 0.93302808 | 0.06697192 | 0.00000000 |
|      |   | 0.00000000 | 0.00000000 | 0.00000000 |   | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 |
| 1998 | 2 | 2          | 0          | 0          | 1 | 11.0       | 11.5       | 2.76       | 0.93937164 | 0.06062836 | 0.00000000 |
|      |   | 0.00000000 | 0.00000000 | 0.00000000 |   | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 |
| 1998 | 2 | 2          | 0          | 0          | 1 | 12.0       | 12.5       | 7.20       | 0.70798306 | 0.27701796 | 0.01499898 |
|      |   | 0.00000000 | 0.00000000 | 0.00000000 |   | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 |
| 1998 | 2 | 2          | 0          | 0          | 1 | 13.0       | 13.5       | 11.32      | 0.45328775 | 0.48748534 | 0.05922691 |
|      |   | 0.00000000 | 0.00000000 | 0.00000000 |   | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 |
| 1998 | 2 | 2          | 0          | 0          | 1 | 14.0       | 14.5       | 14.92      | 0.25039999 | 0.70896504 | 0.04063497 |
|      |   | 0.00000000 | 0.00000000 | 0.00000000 |   | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 |
| 1998 | 2 | 2          | 0          | 0          | 1 | 15.0       | 15.5       | 12.56      | 0.10807270 | 0.74316709 | 0.14876021 |
|      |   | 0.00000000 | 0.00000000 | 0.00000000 |   | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 |
| 1998 | 2 | 2          | 0          | 0          | 1 | 16.0       | 16.5       | 8.56       | 0.03179538 | 0.53952165 | 0.41540227 |
|      |   | 0.01328071 | 0.00000000 | 0.00000000 |   | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 |
| 1998 | 2 | 2          | 0          | 0          | 1 | 17.0       | 17.5       | 6.92       | 0.02123072 | 0.29925113 | 0.67254621 |
|      |   | 0.00697193 | 0.00000000 | 0.00000000 |   | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 |

|      |            |            |            |            |            |            |            |            |            |            |            |
|------|------------|------------|------------|------------|------------|------------|------------|------------|------------|------------|------------|
| 1998 | 2          | 2          | 0          | 0          | 1          | 18.0       | 18.5       | 3.08       | 0.03216085 | 0.18604913 | 0.69226176 |
|      | 0.08952826 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 |
| 1998 | 2          | 2          | 0          | 0          | 1          | 19.0       | 19.5       | 2.56       | 0.01770014 | 0.15680268 | 0.53573909 |
|      | 0.21011342 | 0.06194454 | 0.00000000 | 0.01770014 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 |
| 1998 | 2          | 2          | 0          | 0          | 1          | 20.0       | 20.5       | 0.76       | 0.00000000 | 0.12209916 | 0.12209916 |
|      | 0.55328948 | 0.15824033 | 0.04427187 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 |
| 1998 | 2          | 2          | 0          | 0          | 1          | 21.0       | 21.5       | 0.56       | 0.00000000 | 0.18419311 | 0.00000000 |
|      | 0.32230705 | 0.36957328 | 0.12392657 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 |
| 1998 | 2          | 2          | 0          | 0          | 1          | 22.0       | 22.5       | 0.12       | 0.00000000 | 0.34126400 | 0.31747200 |
|      | 0.00000000 | 0.34126400 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 |
| 1998 | 2          | 2          | 0          | 0          | 1          | 23.0       | 23.5       | 0.04       | 0.00000000 | 0.00000000 | 0.00000000 |
|      | 0.00000000 | 1.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 |
| 1998 | 2          | 2          | 0          | 0          | 1          | 24.0       | 24.5       | 0.04       | 0.00000000 | 0.00000000 | 0.00000000 |
|      | 0.00000000 | 0.00000000 | 1.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 |
| 1999 | 2          | 2          | 0          | 0          | 1          | 12.0       | 12.5       | 0.20       | 0.40000000 | 0.60000000 | 0.00000000 |
|      | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 |
| 1999 | 2          | 2          | 0          | 0          | 1          | 13.0       | 13.5       | 4.96       | 0.32014309 | 0.59185826 | 0.07961241 |
|      | 0.00838624 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 |
| 1999 | 2          | 2          | 0          | 0          | 1          | 14.0       | 14.5       | 14.76      | 0.38169092 | 0.53787963 | 0.05824497 |
|      | 0.01109225 | 0.00792438 | 0.00316786 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 |
| 1999 | 2          | 2          | 0          | 0          | 1          | 15.0       | 15.5       | 20.56      | 0.29216020 | 0.50155986 | 0.18149188 |
|      | 0.01622977 | 0.00855830 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 |
| 1999 | 2          | 2          | 0          | 0          | 1          | 16.0       | 16.5       | 11.52      | 0.09831156 | 0.50838282 | 0.36209246 |
|      | 0.02387339 | 0.00733978 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 |
| 1999 | 2          | 2          | 0          | 0          | 1          | 17.0       | 17.5       | 2.32       | 0.01043611 | 0.49352601 | 0.39132747 |
|      | 0.09949235 | 0.00521806 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 |
| 1999 | 2          | 2          | 0          | 0          | 1          | 18.0       | 18.5       | 0.76       | 0.00000000 | 0.26746419 | 0.71685887 |
|      | 0.01567694 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 |
| 1999 | 2          | 2          | 0          | 0          | 1          | 19.0       | 19.5       | 0.16       | 0.00000000 | 0.07997843 | 0.92002157 |
|      | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 |
| 1999 | 2          | 2          | 0          | 0          | 1          | 20.0       | 20.5       | 0.08       | 0.00000000 | 0.00000000 | 0.75037064 |
|      | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.24962936 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 |
| 2000 | 2          | 2          | 0          | 0          | 1          | 11.0       | 11.5       | 0.72       | 0.74752075 | 0.25247925 | 0.00000000 |
|      | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 |
| 2000 | 2          | 2          | 0          | 0          | 1          | 12.0       | 12.5       | 2.28       | 0.69582437 | 0.27982735 | 0.00000000 |
|      | 0.02434828 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 |
| 2000 | 2          | 2          | 0          | 0          | 1          | 13.0       | 13.5       | 5.76       | 0.54811614 | 0.38124029 | 0.06174778 |
|      | 0.00889578 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 |
| 2000 | 2          | 2          | 0          | 0          | 1          | 14.0       | 14.5       | 11.24      | 0.40848094 | 0.55352931 | 0.03355320 |
|      | 0.00443655 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 |
| 2000 | 2          | 2          | 0          | 0          | 1          | 15.0       | 15.5       | 9.52       | 0.42979540 | 0.45185267 | 0.10229483 |
|      | 0.01605710 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 |
| 2000 | 2          | 2          | 0          | 0          | 1          | 16.0       | 16.5       | 5.08       | 0.01642085 | 0.19905252 | 0.60775348 |
|      | 0.13866829 | 0.03810485 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 |
| 2000 | 2          | 2          | 0          | 0          | 1          | 17.0       | 17.5       | 7.80       | 0.00000000 | 0.27828201 | 0.59017585 |
|      | 0.11411492 | 0.01742722 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 |
| 2000 | 2          | 2          | 0          | 0          | 1          | 18.0       | 18.5       | 4.36       | 0.00000000 | 0.28601716 | 0.57222152 |
|      | 0.11953874 | 0.02222258 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 |
| 2000 | 2          | 2          | 0          | 0          | 1          | 19.0       | 19.5       | 0.92       | 0.00000000 | 0.14449116 | 0.48172259 |
|      | 0.31375949 | 0.06002676 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 |
| 2000 | 2          | 2          | 0          | 0          | 1          | 20.0       | 20.5       | 0.24       | 0.00000000 | 0.00000000 | 0.08261869 |
|      | 0.91738131 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 |
| 2000 | 2          | 2          | 0          | 0          | 1          | 22.0       | 22.5       | 0.12       | 0.00000000 | 0.00000000 | 0.00000000 |
|      | 0.91738131 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.08261869 | 0.00000000 | 0.00000000 | 0.00000000 |
| 2001 | 2          | 2          | 0          | 0          | 1          | 10.0       | 10.5       | 2.00       | 1.00000000 | 0.00000000 | 0.00000000 |
|      | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 |
| 2001 | 2          | 2          | 0          | 0          | 1          | 11.0       | 11.5       | 7.60       | 0.97427376 | 0.02572624 | 0.00000000 |
|      | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 |
| 2001 | 2          | 2          | 0          | 0          | 1          | 12.0       | 12.5       | 14.40      | 0.92240780 | 0.07443303 | 0.00000000 |
|      | 0.00315917 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 |
| 2001 | 2          | 2          | 0          | 0          | 1          | 13.0       | 13.5       | 16.48      | 0.90627331 | 0.08890553 | 0.00482116 |
|      | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 |
| 2001 | 2          | 2          | 0          | 0          | 1          | 14.0       | 14.5       | 10.28      | 0.70552085 | 0.25611000 | 0.03357300 |
|      | 0.00479614 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 |
| 2001 | 2          | 2          | 0          | 0          | 1          | 15.0       | 15.5       | 8.20       | 0.39784787 | 0.7685263  | 0.12242888 |
|      | 0.00287063 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 |
| 2001 | 2          | 2          | 0          | 0          | 1          | 16.0       | 16.5       | 3.28       | 0.13467477 | 0.63572470 | 0.22298713 |
|      | 0.00661341 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 |
| 2001 | 2          | 2          | 0          | 0          | 1          | 17.0       | 17.5       | 2.72       | 0.01132070 | 0.51465616 | 0.37410852 |
|      | 0.07508872 | 0.02482590 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 |
| 2001 | 2          | 2          | 0          | 0          | 1          | 18.0       | 18.5       | 2.96       | 0.00000000 | 0.29324400 | 0.54354648 |
|      | 0.13118093 | 0.03202859 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 |
| 2001 | 2          | 2          | 0          | 0          | 1          | 19.0       | 19.5       | 1.24       | 0.00000000 | 0.09918852 | 0.59034994 |
|      | 0.31046154 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 |

|      |   |            |   |            |   |            |      |            |            |            |            |
|------|---|------------|---|------------|---|------------|------|------------|------------|------------|------------|
| 2001 | 2 | 2          | 0 | 0          | 1 | 20.0       | 20.5 | 1.24       | 0.00000000 | 0.00000000 | 0.51528889 |
|      |   | 0.37935414 |   | 0.07775853 |   | 0.02759844 |      | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 |
| 2001 | 2 | 2          | 0 | 0          | 1 | 21.0       | 21.5 | 0.52       | 0.00000000 | 0.00000000 | 0.09031628 |
|      |   | 0.63873488 |   | 0.09031628 |   | 0.18063256 |      | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 |
| 2001 | 2 | 2          | 0 | 0          | 1 | 22.0       | 22.5 | 0.08       | 0.00000000 | 0.00000000 | 0.00000000 |
|      |   | 0.50000000 |   | 0.50000000 |   | 0.00000000 |      | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 |
| 2001 | 2 | 2          | 0 | 0          | 1 | 24.0       | 24.5 | 0.04       | 0.00000000 | 0.00000000 | 0.00000000 |
|      |   | 0.00000000 |   | 1.00000000 |   | 0.00000000 |      | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 |
| 2002 | 2 | 2          | 0 | 0          | 1 | 10.0       | 10.5 | 0.04       | 1.00000000 | 0.00000000 | 0.00000000 |
|      |   | 0.00000000 |   | 0.00000000 |   | 0.00000000 |      | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 |
| 2002 | 2 | 2          | 0 | 0          | 1 | 11.0       | 11.5 | 0.32       | 1.00000000 | 0.00000000 | 0.00000000 |
|      |   | 0.00000000 |   | 0.00000000 |   | 0.00000000 |      | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 |
| 2002 | 2 | 2          | 0 | 0          | 1 | 12.0       | 12.5 | 0.60       | 0.94090193 | 0.05909807 | 0.00000000 |
|      |   | 0.00000000 |   | 0.00000000 |   | 0.00000000 |      | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 |
| 2002 | 2 | 2          | 0 | 0          | 1 | 13.0       | 13.5 | 1.16       | 0.88345627 | 0.11654373 | 0.00000000 |
|      |   | 0.00000000 |   | 0.00000000 |   | 0.00000000 |      | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 |
| 2002 | 2 | 2          | 0 | 0          | 1 | 14.0       | 14.5 | 2.88       | 0.48918927 | 0.44747715 | 0.06333357 |
|      |   | 0.00000000 |   | 0.00000000 |   | 0.00000000 |      | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 |
| 2002 | 2 | 2          | 0 | 0          | 1 | 15.0       | 15.5 | 13.12      | 0.31065759 | 0.63716391 | 0.04841090 |
|      |   | 0.00376759 |   | 0.00000000 |   | 0.00000000 |      | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 |
| 2002 | 2 | 2          | 0 | 0          | 1 | 16.0       | 16.5 | 23.64      | 0.16463876 | 0.70856009 | 0.12022830 |
|      |   | 0.00632938 |   | 0.00000000 |   | 0.00000000 |      | 0.00000000 | 0.00000000 | 0.00024347 | 0.00000000 |
| 2002 | 2 | 2          | 0 | 0          | 1 | 17.0       | 17.5 | 21.24      | 0.11234893 | 0.62532418 | 0.22200514 |
|      |   | 0.03331450 |   | 0.00700723 |   | 0.00000000 |      | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 |
| 2002 | 2 | 2          | 0 | 0          | 1 | 18.0       | 18.5 | 6.84       | 0.05496442 | 0.48012677 | 0.34689512 |
|      |   | 0.10915720 |   | 0.00885649 |   | 0.00000000 |      | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 |
| 2002 | 2 | 2          | 0 | 0          | 1 | 19.0       | 19.5 | 3.96       | 0.00000000 | 0.21147060 | 0.47842753 |
|      |   | 0.26219346 |   | 0.04790841 |   | 0.00000000 |      | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 |
| 2002 | 2 | 2          | 0 | 0          | 1 | 20.0       | 20.5 | 1.80       | 0.00000000 | 0.03922441 | 0.48545390 |
|      |   | 0.36552610 |   | 0.10979558 |   | 0.00000000 |      | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 |
| 2002 | 2 | 2          | 0 | 0          | 1 | 21.0       | 21.5 | 0.40       | 0.00000000 | 0.00000000 | 0.49698361 |
|      |   | 0.18994586 |   | 0.17934508 |   | 0.13372545 |      | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 |
| 2002 | 2 | 2          | 0 | 0          | 1 | 22.0       | 22.5 | 0.24       | 0.00000000 | 0.00000000 | 0.00000000 |
|      |   | 0.27921688 |   | 0.22613844 |   | 0.49464468 |      | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 |
| 2002 | 2 | 2          | 0 | 0          | 1 | 23.0       | 23.5 | 0.20       | 0.00000000 | 0.00000000 | 0.00000000 |
|      |   | 0.05517708 |   | 0.05517708 |   | 0.88964584 |      | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 |
| 2002 | 2 | 2          | 0 | 0          | 1 | 24.0       | 24.5 | 0.04       | 0.00000000 | 0.00000000 | 0.00000000 |
|      |   | 0.00000000 |   | 0.00000000 |   | 0.00000000 |      | 1.00000000 | 0.00000000 | 0.00000000 | 0.00000000 |
| 2003 | 2 | 2          | 0 | 0          | 1 | 10.0       | 10.5 | 0.52       | 1.00000000 | 0.00000000 | 0.00000000 |
|      |   | 0.00000000 |   | 0.00000000 |   | 0.00000000 |      | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 |
| 2003 | 2 | 2          | 0 | 0          | 1 | 11.0       | 11.5 | 7.40       | 1.00000000 | 0.00000000 | 0.00000000 |
|      |   | 0.00000000 |   | 0.00000000 |   | 0.00000000 |      | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 |
| 2003 | 2 | 2          | 0 | 0          | 1 | 12.0       | 12.5 | 11.16      | 1.00000000 | 0.00000000 | 0.00000000 |
|      |   | 0.00000000 |   | 0.00000000 |   | 0.00000000 |      | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 |
| 2003 | 2 | 2          | 0 | 0          | 1 | 13.0       | 13.5 | 26.04      | 0.99216013 | 0.00783987 | 0.00000000 |
|      |   | 0.00000000 |   | 0.00000000 |   | 0.00000000 |      | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 |
| 2003 | 2 | 2          | 0 | 0          | 1 | 14.0       | 14.5 | 15.40      | 0.97074099 | 0.02925901 | 0.00000000 |
|      |   | 0.00000000 |   | 0.00000000 |   | 0.00000000 |      | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 |
| 2003 | 2 | 2          | 0 | 0          | 1 | 15.0       | 15.5 | 3.96       | 0.76533365 | 0.21262370 | 0.02204265 |
|      |   | 0.00000000 |   | 0.00000000 |   | 0.00000000 |      | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 |
| 2003 | 2 | 2          | 0 | 0          | 1 | 16.0       | 16.5 | 1.24       | 0.08207484 | 0.51377819 | 0.40414697 |
|      |   | 0.00000000 |   | 0.00000000 |   | 0.00000000 |      | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 |
| 2003 | 2 | 2          | 0 | 0          | 1 | 17.0       | 17.5 | 1.24       | 0.03396623 | 0.34689388 | 0.57761967 |
|      |   | 0.04152022 |   | 0.00000000 |   | 0.00000000 |      | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 |
| 2003 | 2 | 2          | 0 | 0          | 1 | 18.0       | 18.5 | 2.64       | 0.00000000 | 0.00000000 | 0.74075755 |
|      |   | 0.23570895 |   | 0.02353350 |   | 0.00000000 |      | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 |
| 2003 | 2 | 2          | 0 | 0          | 1 | 19.0       | 19.5 | 2.20       | 0.00000000 | 0.05383938 | 0.46209001 |
|      |   | 0.42658630 |   | 0.04311323 |   | 0.01437108 |      | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 |
| 2003 | 2 | 2          | 0 | 0          | 1 | 20.0       | 20.5 | 0.64       | 0.00000000 | 0.00000000 | 0.28011714 |
|      |   | 0.46931240 |   | 0.19601734 |   | 0.05455312 |      | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 |
| 2003 | 2 | 2          | 0 | 0          | 1 | 21.0       | 21.5 | 0.64       | 0.06615850 | 0.00000000 | 0.18886008 |
|      |   | 0.42216843 |   | 0.27713679 |   | 0.04567620 |      | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 |
| 2003 | 2 | 2          | 0 | 0          | 1 | 22.0       | 22.5 | 0.60       | 0.00000000 | 0.00000000 | 0.00000000 |
|      |   | 0.25966959 |   | 0.36244571 |   | 0.31296731 |      | 0.06491740 | 0.00000000 | 0.00000000 | 0.00000000 |
| 2003 | 2 | 2          | 0 | 0          | 1 | 23.0       | 23.5 | 0.52       | 0.00000000 | 0.00000000 | 0.00000000 |
|      |   | 0.00000000 |   | 0.69230769 |   | 0.07692308 |      | 0.15384615 | 0.07692308 | 0.00000000 | 0.00000000 |
| 2003 | 2 | 2          | 0 | 0          | 1 | 24.0       | 24.5 | 0.40       | 0.00000000 | 0.00000000 | 0.00000000 |
|      |   | 0.10000000 |   | 0.30000000 |   | 0.00000000 |      | 0.50000000 | 0.10000000 | 0.00000000 | 0.00000000 |
| 2003 | 2 | 2          | 0 | 0          | 1 | 25.0       | 25.5 | 0.04       | 0.00000000 | 0.00000000 | 0.00000000 |
|      |   | 0.00000000 |   | 1.00000000 |   | 0.00000000 |      | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 |
| 2004 | 2 | 2          | 0 | 0          | 1 | 11.0       | 11.5 | 0.20       | 1.00000000 | 0.00000000 | 0.00000000 |
|      |   | 0.00000000 |   | 0.00000000 |   | 0.00000000 |      | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 |
| 2004 | 2 | 2          | 0 | 0          | 1 | 12.0       | 12.5 | 0.84       | 0.67276468 | 0.32723532 | 0.00000000 |
|      |   | 0.00000000 |   | 0.00000000 |   | 0.00000000 |      | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 |

|      |   |   |            |            |            |            |            |            |            |            |            |
|------|---|---|------------|------------|------------|------------|------------|------------|------------|------------|------------|
| 2004 | 2 | 2 | 0          | 0          | 1          | 13.0       | 13.5       | 4.20       | 0.17333774 | 0.82666226 | 0.00000000 |
|      |   |   | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 |
| 2004 | 2 | 2 | 0          | 0          | 1          | 14.0       | 14.5       | 14.12      | 0.01354159 | 0.98015485 | 0.00630357 |
|      |   |   | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 |
| 2004 | 2 | 2 | 0          | 0          | 1          | 15.0       | 15.5       | 18.92      | 0.02407765 | 0.96462996 | 0.01129239 |
|      |   |   | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 |
| 2004 | 2 | 2 | 0          | 0          | 1          | 16.0       | 16.5       | 13.52      | 0.02694741 | 0.88209742 | 0.09095517 |
|      |   |   | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 |
| 2004 | 2 | 2 | 0          | 0          | 1          | 17.0       | 17.5       | 4.36       | 0.00662725 | 0.78340253 | 0.18912430 |
|      |   |   | 0.02084592 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 |
| 2004 | 2 | 2 | 0          | 0          | 1          | 18.0       | 18.5       | 1.84       | 0.00000000 | 0.22342592 | 0.66408266 |
|      |   |   | 0.11249141 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 |
| 2004 | 2 | 2 | 0          | 0          | 1          | 19.0       | 19.5       | 0.72       | 0.00000000 | 0.00000000 | 0.76369562 |
|      |   |   | 0.23630438 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 |
| 2004 | 2 | 2 | 0          | 0          | 1          | 20.0       | 20.5       | 0.16       | 0.00000000 | 0.00000000 | 0.62830617 |
|      |   |   | 0.37169383 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 |
| 2004 | 2 | 2 | 0          | 0          | 1          | 21.0       | 21.5       | 0.12       | 0.00000000 | 0.00000000 | 0.28697889 |
|      |   |   | 0.00000000 | 0.71302111 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 |
| 2004 | 2 | 2 | 0          | 0          | 1          | 22.0       | 22.5       | 0.12       | 0.00000000 | 0.00000000 | 0.00000000 |
|      |   |   | 1.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 |
| 2004 | 2 | 2 | 0          | 0          | 1          | 23.0       | 23.5       | 0.04       | 0.00000000 | 0.00000000 | 0.00000000 |
|      |   |   | 0.00000000 | 0.00000000 | 1.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 |
| 2005 | 2 | 2 | 0          | 0          | 1          | 9.0        | 9.5        | 0.24       | 1.00000000 | 0.00000000 | 0.00000000 |
|      |   |   | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 |
| 2005 | 2 | 2 | 0          | 0          | 1          | 10.0       | 10.5       | 2.72       | 0.94665661 | 0.05334339 | 0.00000000 |
|      |   |   | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 |
| 2005 | 2 | 2 | 0          | 0          | 1          | 11.0       | 11.5       | 10.68      | 0.96530636 | 0.03469364 | 0.00000000 |
|      |   |   | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 |
| 2005 | 2 | 2 | 0          | 0          | 1          | 12.0       | 12.5       | 10.36      | 0.81270629 | 0.18729371 | 0.00000000 |
|      |   |   | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 |
| 2005 | 2 | 2 | 0          | 0          | 1          | 13.0       | 13.5       | 17.28      | 0.59682376 | 0.38056749 | 0.02260874 |
|      |   |   | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 |
| 2005 | 2 | 2 | 0          | 0          | 1          | 14.0       | 14.5       | 17.12      | 0.41831331 | 0.53139427 | 0.05029242 |
|      |   |   | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 |
| 2005 | 2 | 2 | 0          | 0          | 1          | 15.0       | 15.5       | 14.80      | 0.39763833 | 0.44064831 | 0.16171335 |
|      |   |   | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 |
| 2005 | 2 | 2 | 0          | 0          | 1          | 16.0       | 16.5       | 6.76       | 0.20647100 | 0.39320685 | 0.38209007 |
|      |   |   | 0.01823208 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 |
| 2005 | 2 | 2 | 0          | 0          | 1          | 17.0       | 17.5       | 4.00       | 0.00145799 | 0.22876657 | 0.64096402 |
|      |   |   | 0.10121078 | 0.02760064 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 |
| 2005 | 2 | 2 | 0          | 0          | 1          | 18.0       | 18.5       | 2.28       | 0.00000000 | 0.13419048 | 0.65656358 |
|      |   |   | 0.12972242 | 0.07952352 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 |
| 2005 | 2 | 2 | 0          | 0          | 1          | 19.0       | 19.5       | 1.72       | 0.00000000 | 0.19742790 | 0.58505873 |
|      |   |   | 0.21751337 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 |
| 2005 | 2 | 2 | 0          | 0          | 1          | 20.0       | 20.5       | 0.40       | 0.00000000 | 0.15374970 | 0.18538703 |
|      |   |   | 0.35336388 | 0.15374970 | 0.15374970 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 |
| 2005 | 2 | 2 | 0          | 0          | 1          | 21.0       | 21.5       | 0.12       | 0.00000000 | 0.00000000 | 0.15765441 |
|      |   |   | 0.84234559 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 |
| 2005 | 2 | 2 | 0          | 0          | 1          | 23.0       | 23.5       | 0.16       | 0.00000000 | 0.00000000 | 0.00000000 |
|      |   |   | 0.00000000 | 0.03208177 | 0.32263941 | 0.32263941 | 0.00000000 | 0.00000000 | 0.32263941 | 0.00000000 | 0.00000000 |
| 2005 | 2 | 2 | 0          | 0          | 1          | 24.0       | 24.5       | 0.32       | 0.00000000 | 0.00000000 | 0.16131970 |
|      |   |   | 0.00000000 | 0.00000000 | 0.16131970 | 0.19340148 | 0.32263941 | 0.00000000 | 0.16131970 | 0.00000000 | 0.00000000 |
| 2005 | 2 | 2 | 0          | 0          | 1          | 25.0       | 25.5       | 0.08       | 0.00000000 | 0.00000000 | 0.00000000 |
|      |   |   | 0.00000000 | 0.00000000 | 0.50000000 | 0.50000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 |
| 2006 | 2 | 2 | 0          | 0          | 1          | 10.0       | 10.5       | 0.04       | 1.00000000 | 0.00000000 | 0.00000000 |
|      |   |   | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 |
| 2006 | 2 | 2 | 0          | 0          | 1          | 11.0       | 11.5       | 0.96       | 1.00000000 | 0.00000000 | 0.00000000 |
|      |   |   | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 |
| 2006 | 2 | 2 | 0          | 0          | 1          | 12.0       | 12.5       | 2.88       | 0.99618629 | 0.00381371 | 0.00000000 |
|      |   |   | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 |
| 2006 | 2 | 2 | 0          | 0          | 1          | 13.0       | 13.5       | 6.12       | 0.77428590 | 0.22571410 | 0.00000000 |
|      |   |   | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 |
| 2006 | 2 | 2 | 0          | 0          | 1          | 14.0       | 14.5       | 16.36      | 0.36825533 | 0.63118455 | 0.00056011 |
|      |   |   | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 |
| 2006 | 2 | 2 | 0          | 0          | 1          | 15.0       | 15.5       | 25.96      | 0.10019307 | 0.88164250 | 0.01816443 |
|      |   |   | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 |
| 2006 | 2 | 2 | 0          | 0          | 1          | 16.0       | 16.5       | 20.96      | 0.06804923 | 0.84951026 | 0.08244051 |
|      |   |   | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 |
| 2006 | 2 | 2 | 0          | 0          | 1          | 17.0       | 17.5       | 13.92      | 0.01400216 | 0.43528504 | 0.53121210 |
|      |   |   | 0.01950069 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 |
| 2006 | 2 | 2 | 0          | 0          | 1          | 18.0       | 18.5       | 9.92       | 0.00000000 | 0.10728396 | 0.77280768 |
|      |   |   | 0.11990836 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 |
| 2006 | 2 | 2 | 0          | 0          | 1          | 19.0       | 19.5       | 5.56       | 0.00000000 | 0.06548736 | 0.77827275 |
|      |   |   | 0.15623989 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 |

|      |   |            |   |            |   |            |      |            |            |            |            |
|------|---|------------|---|------------|---|------------|------|------------|------------|------------|------------|
| 2006 | 2 | 2          | 0 | 0          | 1 | 20.0       | 20.5 | 2.12       | 0.00000000 | 0.01675003 | 0.59447114 |
|      |   | 0.33123547 |   | 0.05754335 |   | 0.00000000 |      | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 |
| 2006 | 2 | 2          | 0 | 0          | 1 | 21.0       | 21.5 | 0.20       | 0.00000000 | 0.00000000 | 0.58224916 |
|      |   | 0.41775084 |   | 0.00000000 |   | 0.00000000 |      | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 |
| 2006 | 2 | 2          | 0 | 0          | 1 | 22.0       | 22.5 | 0.08       | 0.00000000 | 0.00000000 | 0.00000000 |
|      |   | 0.50000000 |   | 0.50000000 |   | 0.00000000 |      | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 |
| 2006 | 2 | 2          | 0 | 0          | 1 | 23.0       | 23.5 | 0.08       | 0.00000000 | 0.00000000 | 0.00000000 |
|      |   | 1.00000000 |   | 0.00000000 |   | 0.00000000 |      | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 |
| 2007 | 2 | 2          | 0 | 0          | 2 | 10.0       | 10.5 | 0.52       | 0.81161422 | 0.18838578 | 0.00000000 |
|      |   | 0.00000000 |   | 0.00000000 |   | 0.00000000 |      | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 |
| 2007 | 2 | 2          | 0 | 0          | 2 | 11.0       | 11.5 | 3.56       | 0.81748933 | 0.16948738 | 0.01302330 |
|      |   | 0.00000000 |   | 0.00000000 |   | 0.00000000 |      | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 |
| 2007 | 2 | 2          | 0 | 0          | 2 | 12.0       | 12.5 | 7.96       | 0.80789846 | 0.18543433 | 0.00666722 |
|      |   | 0.00000000 |   | 0.00000000 |   | 0.00000000 |      | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 |
| 2007 | 2 | 2          | 0 | 0          | 2 | 13.0       | 13.5 | 13.60      | 0.58443765 | 0.40077974 | 0.01478262 |
|      |   | 0.00000000 |   | 0.00000000 |   | 0.00000000 |      | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 |
| 2007 | 2 | 2          | 0 | 0          | 2 | 14.0       | 14.5 | 12.40      | 0.35239361 | 0.57909543 | 0.06851095 |
|      |   | 0.00000000 |   | 0.00000000 |   | 0.00000000 |      | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 |
| 2007 | 2 | 2          | 0 | 0          | 2 | 15.0       | 15.5 | 8.40       | 0.13962133 | 0.67446158 | 0.18591708 |
|      |   | 0.00000000 |   | 0.00000000 |   | 0.00000000 |      | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 |
| 2007 | 2 | 2          | 0 | 0          | 2 | 16.0       | 16.5 | 5.72       | 0.04265578 | 0.60969432 | 0.34455928 |
|      |   | 0.00309062 |   | 0.00000000 |   | 0.00000000 |      | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 |
| 2007 | 2 | 2          | 0 | 0          | 2 | 17.0       | 17.5 | 4.52       | 0.13907978 | 0.44035193 | 0.35454781 |
|      |   | 0.06602048 |   | 0.00000000 |   | 0.00000000 |      | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 |
| 2007 | 2 | 2          | 0 | 0          | 2 | 18.0       | 18.5 | 3.24       | 0.00000000 | 0.25882826 | 0.41917676 |
|      |   | 0.32199498 |   | 0.00000000 |   | 0.00000000 |      | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 |
| 2007 | 2 | 2          | 0 | 0          | 2 | 19.0       | 19.5 | 1.72       | 0.13230410 | 0.04936132 | 0.24787050 |
|      |   | 0.54753177 |   | 0.02293231 |   | 0.00000000 |      | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 |
| 2007 | 2 | 2          | 0 | 0          | 2 | 20.0       | 20.5 | 2.76       | 0.10336144 | 0.05906368 | 0.25102064 |
|      |   | 0.48319280 |   | 0.10336144 |   | 0.00000000 |      | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 |
| 2007 | 2 | 2          | 0 | 0          | 2 | 21.0       | 21.5 | 2.16       | 0.01919929 | 0.09599643 | 0.17973905 |
|      |   | 0.56372476 |   | 0.11519571 |   | 0.02614477 |      | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 |
| 2007 | 2 | 2          | 0 | 0          | 2 | 22.0       | 22.5 | 0.56       | 0.07484045 | 0.07484045 | 0.10191455 |
|      |   | 0.44904273 |   | 0.22452136 |   | 0.07484045 |      | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 |
| 2007 | 2 | 2          | 0 | 0          | 2 | 23.0       | 23.5 | 0.16       | 0.00000000 | 0.00000000 | 0.00000000 |
|      |   | 0.75000000 |   | 0.25000000 |   | 0.00000000 |      | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 |
| 2007 | 2 | 2          | 0 | 0          | 2 | 24.0       | 24.5 | 0.08       | 0.50000000 | 0.00000000 | 0.00000000 |
|      |   | 0.00000000 |   | 0.50000000 |   | 0.00000000 |      | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 |
| 2007 | 2 | 2          | 0 | 0          | 2 | 25.0       | 25.5 | 0.08       | 0.00000000 | 0.00000000 | 0.00000000 |
|      |   | 0.00000000 |   | 1.00000000 |   | 0.00000000 |      | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 |
| 2008 | 2 | 2          | 0 | 0          | 3 | 10.0       | 10.5 | 0.04       | 1.00000000 | 0.00000000 | 0.00000000 |
|      |   | 0.00000000 |   | 0.00000000 |   | 0.00000000 |      | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 |
| 2008 | 2 | 2          | 0 | 0          | 3 | 11.0       | 11.5 | 0.84       | 1.00000000 | 0.00000000 | 0.00000000 |
|      |   | 0.00000000 |   | 0.00000000 |   | 0.00000000 |      | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 |
| 2008 | 2 | 2          | 0 | 0          | 3 | 12.0       | 12.5 | 2.80       | 0.98557929 | 0.01442071 | 0.00000000 |
|      |   | 0.00000000 |   | 0.00000000 |   | 0.00000000 |      | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 |
| 2008 | 2 | 2          | 0 | 0          | 3 | 13.0       | 13.5 | 2.80       | 0.85459472 | 0.14540528 | 0.00000000 |
|      |   | 0.00000000 |   | 0.00000000 |   | 0.00000000 |      | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 |
| 2008 | 2 | 2          | 0 | 0          | 3 | 14.0       | 14.5 | 1.92       | 0.21852994 | 0.75404580 | 0.02742427 |
|      |   | 0.00000000 |   | 0.00000000 |   | 0.00000000 |      | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 |
| 2008 | 2 | 2          | 0 | 0          | 3 | 15.0       | 15.5 | 7.56       | 0.02649326 | 0.84675852 | 0.12433842 |
|      |   | 0.00240980 |   | 0.00000000 |   | 0.00000000 |      | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 |
| 2008 | 2 | 2          | 0 | 0          | 3 | 16.0       | 16.5 | 11.56      | 0.03125844 | 0.83304051 | 0.12357623 |
|      |   | 0.01212482 |   | 0.00000000 |   | 0.00000000 |      | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 |
| 2008 | 2 | 2          | 0 | 0          | 3 | 17.0       | 17.5 | 5.56       | 0.01343018 | 0.47528389 | 0.49238317 |
|      |   | 0.01890276 |   | 0.00000000 |   | 0.00000000 |      | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 |
| 2008 | 2 | 2          | 0 | 0          | 3 | 18.0       | 18.5 | 4.44       | 0.00380832 | 0.15793925 | 0.63661667 |
|      |   | 0.20163576 |   | 0.00000000 |   | 0.00000000 |      | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 |
| 2008 | 2 | 2          | 0 | 0          | 3 | 19.0       | 19.5 | 1.24       | 0.00000000 | 0.22595676 | 0.28517288 |
|      |   | 0.48887036 |   | 0.00000000 |   | 0.00000000 |      | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 |
| 2008 | 2 | 2          | 0 | 0          | 3 | 20.0       | 20.5 | 0.60       | 0.00000000 | 0.09286446 | 0.27321611 |
|      |   | 0.60214765 |   | 0.03177178 |   | 0.00000000 |      | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 |
| 2008 | 2 | 2          | 0 | 0          | 3 | 21.0       | 21.5 | 0.32       | 0.00000000 | 0.24674396 | 0.08441868 |
|      |   | 0.50000000 |   | 0.16883736 |   | 0.00000000 |      | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 |
| 2008 | 2 | 2          | 0 | 0          | 3 | 22.0       | 22.5 | 0.04       | 0.00000000 | 0.00000000 | 0.00000000 |
|      |   | 0.00000000 |   | 1.00000000 |   | 0.00000000 |      | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 |
| 2008 | 2 | 2          | 0 | 0          | 3 | 23.0       | 23.5 | 0.04       | 0.00000000 | 0.00000000 | 0.00000000 |
|      |   | 0.00000000 |   | 1.00000000 |   | 0.00000000 |      | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 |
| 2009 | 2 | 2          | 0 | 0          | 3 | 10.0       | 10.5 | 0.04       | 1.00000000 | 0.00000000 | 0.00000000 |
|      |   | 0.00000000 |   | 0.00000000 |   | 0.00000000 |      | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 |
| 2009 | 2 | 2          | 0 | 0          | 3 | 11.0       | 11.5 | 0.40       | 0.83691728 | 0.16308272 | 0.00000000 |
|      |   | 0.00000000 |   | 0.00000000 |   | 0.00000000 |      | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 |
| 2009 | 2 | 2          | 0 | 0          | 3 | 12.0       | 12.5 | 5.72       | 0.68145305 | 0.30663268 | 0.01191427 |
|      |   | 0.00000000 |   | 0.00000000 |   | 0.00000000 |      | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 |

|      |   |            |   |            |   |            |      |            |            |            |            |
|------|---|------------|---|------------|---|------------|------|------------|------------|------------|------------|
| 2009 | 2 | 2          | 0 | 0          | 3 | 13.0       | 13.5 | 22.80      | 0.68617830 | 0.30180153 | 0.01202017 |
|      |   | 0.00000000 |   | 0.00000000 |   | 0.00000000 |      | 0.00000000 |            | 0.00000000 | 0.00000000 |
| 2009 | 2 | 2          | 0 | 0          | 3 | 14.0       | 14.5 | 31.00      | 0.50072394 | 0.41119099 | 0.08808506 |
|      |   | 0.00000000 |   | 0.00000000 |   | 0.00000000 |      | 0.00000000 |            | 0.00000000 | 0.00000000 |
| 2009 | 2 | 2          | 0 | 0          | 3 | 15.0       | 15.5 | 24.56      | 0.24486876 | 0.58373796 | 0.17103486 |
|      |   | 0.00035843 |   | 0.00000000 |   | 0.00000000 |      | 0.00000000 |            | 0.00000000 | 0.00000000 |
| 2009 | 2 | 2          | 0 | 0          | 3 | 16.0       | 16.5 | 10.52      | 0.06872480 | 0.66651811 | 0.25241790 |
|      |   | 0.01233919 |   | 0.00000000 |   | 0.00000000 |      | 0.00000000 |            | 0.00000000 | 0.00000000 |
| 2009 | 2 | 2          | 0 | 0          | 3 | 17.0       | 17.5 | 2.20       | 0.01588792 | 0.50372935 | 0.45454300 |
|      |   | 0.02583974 |   | 0.00000000 |   | 0.00000000 |      | 0.00000000 |            | 0.00000000 | 0.00000000 |
| 2009 | 2 | 2          | 0 | 0          | 3 | 18.0       | 18.5 | 0.48       | 0.00000000 | 0.15610386 | 0.64984043 |
|      |   | 0.19405571 |   | 0.00000000 |   | 0.00000000 |      | 0.00000000 |            | 0.00000000 | 0.00000000 |
| 2009 | 2 | 2          | 0 | 0          | 3 | 19.0       | 19.5 | 0.16       | 0.00000000 | 0.00000000 | 0.35660263 |
|      |   | 0.05284122 |   | 0.59055614 |   | 0.00000000 |      | 0.00000000 |            | 0.00000000 | 0.00000000 |
| 2009 | 2 | 2          | 0 | 0          | 3 | 20.0       | 20.5 | 0.12       | 0.00000000 | 0.00000000 | 0.47296513 |
|      |   | 0.42445713 |   | 0.10257774 |   | 0.00000000 |      | 0.00000000 |            | 0.00000000 | 0.00000000 |
| 2009 | 2 | 2          | 0 | 0          | 3 | 21.0       | 21.5 | 0.04       | 0.00000000 | 0.00000000 | 0.00000000 |
|      |   | 0.00000000 |   | 1.00000000 |   | 0.00000000 |      | 0.00000000 |            | 0.00000000 | 0.00000000 |
| 2009 | 2 | 2          | 0 | 0          | 3 | 22.0       | 22.5 | 0.04       | 0.00000000 | 0.00000000 | 0.00000000 |
|      |   | 1.00000000 |   | 0.00000000 |   | 0.00000000 |      | 0.00000000 |            | 0.00000000 | 0.00000000 |
| 2010 | 2 | 2          | 0 | 0          | 4 | 10.0       | 10.5 | 0.04       | 1.00000000 | 0.00000000 | 0.00000000 |
|      |   | 0.00000000 |   | 0.00000000 |   | 0.00000000 |      | 0.00000000 |            | 0.00000000 | 0.00000000 |
| 2010 | 2 | 2          | 0 | 0          | 4 | 11.0       | 11.5 | 0.08       | 1.00000000 | 0.00000000 | 0.00000000 |
|      |   | 0.00000000 |   | 0.00000000 |   | 0.00000000 |      | 0.00000000 |            | 0.00000000 | 0.00000000 |
| 2010 | 2 | 2          | 0 | 0          | 4 | 12.0       | 12.5 | 1.36       | 1.00000000 | 0.00000000 | 0.00000000 |
|      |   | 0.00000000 |   | 0.00000000 |   | 0.00000000 |      | 0.00000000 |            | 0.00000000 | 0.00000000 |
| 2010 | 2 | 2          | 0 | 0          | 4 | 13.0       | 13.5 | 4.12       | 0.97937873 | 0.02062127 | 0.00000000 |
|      |   | 0.00000000 |   | 0.00000000 |   | 0.00000000 |      | 0.00000000 |            | 0.00000000 | 0.00000000 |
| 2010 | 2 | 2          | 0 | 0          | 4 | 14.0       | 14.5 | 7.52       | 0.67153245 | 0.32846755 | 0.00000000 |
|      |   | 0.00000000 |   | 0.00000000 |   | 0.00000000 |      | 0.00000000 |            | 0.00000000 | 0.00000000 |
| 2010 | 2 | 2          | 0 | 0          | 4 | 15.0       | 15.5 | 6.28       | 0.34882731 | 0.65117269 | 0.00000000 |
|      |   | 0.00000000 |   | 0.00000000 |   | 0.00000000 |      | 0.00000000 |            | 0.00000000 | 0.00000000 |
| 2010 | 2 | 2          | 0 | 0          | 4 | 16.0       | 16.5 | 1.80       | 0.07426376 | 0.88304453 | 0.04269171 |
|      |   | 0.00000000 |   | 0.00000000 |   | 0.00000000 |      | 0.00000000 |            | 0.00000000 | 0.00000000 |
| 2010 | 2 | 2          | 0 | 0          | 4 | 17.0       | 17.5 | 0.64       | 0.00000000 | 0.66556773 | 0.24839031 |
|      |   | 0.08604197 |   | 0.00000000 |   | 0.00000000 |      | 0.00000000 |            | 0.00000000 | 0.00000000 |
| 2010 | 2 | 2          | 0 | 0          | 4 | 18.0       | 18.5 | 0.48       | 0.00000000 | 0.36659141 | 0.51582438 |
|      |   | 0.11758421 |   | 0.00000000 |   | 0.00000000 |      | 0.00000000 |            | 0.00000000 | 0.00000000 |
| 2010 | 2 | 2          | 0 | 0          | 4 | 19.0       | 19.5 | 0.28       | 0.00000000 | 0.14661550 | 0.14661550 |
|      |   | 0.41353799 |   | 0.14661550 |   | 0.14661550 |      | 0.00000000 |            | 0.00000000 | 0.00000000 |
| 2010 | 2 | 2          | 0 | 0          | 4 | 20.0       | 20.5 | 1.40       | 0.00000000 | 0.00000000 | 0.08571429 |
|      |   | 0.37142857 |   | 0.42857143 |   | 0.08571429 |      | 0.02857143 |            | 0.00000000 | 0.00000000 |
| 2010 | 2 | 2          | 0 | 0          | 4 | 21.0       | 21.5 | 3.60       | 0.00000000 | 0.00000000 | 0.03333333 |
|      |   | 0.15555556 |   | 0.40000000 |   | 0.40000000 |      | 0.01111111 |            | 0.00000000 | 0.00000000 |
| 2010 | 2 | 2          | 0 | 0          | 4 | 22.0       | 22.5 | 2.72       | 0.00000000 | 0.00000000 | 0.00000000 |
|      |   | 0.04411765 |   | 0.33823529 |   | 0.58823529 |      | 0.02941176 |            | 0.00000000 | 0.00000000 |
| 2010 | 2 | 2          | 0 | 0          | 4 | 23.0       | 23.5 | 0.92       | 0.00000000 | 0.00000000 | 0.00000000 |
|      |   | 0.00000000 |   | 0.08695652 |   | 0.65217391 |      | 0.21739130 |            | 0.00000000 | 0.00000000 |
| 2010 | 2 | 2          | 0 | 0          | 4 | 24.0       | 24.5 | 0.12       | 0.00000000 | 0.04347826 | 0.00000000 |
|      |   | 0.33333333 |   | 0.00000000 |   | 0.00000000 |      | 0.66666667 |            | 0.00000000 | 0.00000000 |
| 2010 | 2 | 2          | 0 | 0          | 4 | 25.0       | 25.5 | 0.04       | 0.00000000 | 0.00000000 | 0.00000000 |
|      |   | 0.00000000 |   | 0.00000000 |   | 0.00000000 |      | 0.00000000 |            | 1.00000000 | 0.00000000 |
| 2011 | 2 | 2          | 0 | 0          | 4 | 11.0       | 11.5 | 0.16       | 1.00000000 | 0.00000000 | 0.00000000 |
|      |   | 0.00000000 |   | 0.00000000 |   | 0.00000000 |      | 0.00000000 |            | 0.00000000 | 0.00000000 |
| 2011 | 2 | 2          | 0 | 0          | 4 | 12.0       | 12.5 | 3.48       | 0.87151784 | 0.12848216 | 0.00000000 |
|      |   | 0.00000000 |   | 0.00000000 |   | 0.00000000 |      | 0.00000000 |            | 0.00000000 | 0.00000000 |
| 2011 | 2 | 2          | 0 | 0          | 4 | 13.0       | 13.5 | 6.12       | 0.58895794 | 0.41104206 | 0.00000000 |
|      |   | 0.00000000 |   | 0.00000000 |   | 0.00000000 |      | 0.00000000 |            | 0.00000000 | 0.00000000 |
| 2011 | 2 | 2          | 0 | 0          | 4 | 14.0       | 14.5 | 5.72       | 0.31002959 | 0.66498769 | 0.02498273 |
|      |   | 0.00000000 |   | 0.00000000 |   | 0.00000000 |      | 0.00000000 |            | 0.00000000 | 0.00000000 |
| 2011 | 2 | 2          | 0 | 0          | 4 | 15.0       | 15.5 | 4.40       | 0.07834036 | 0.82494300 | 0.09671665 |
|      |   | 0.00000000 |   | 0.00000000 |   | 0.00000000 |      | 0.00000000 |            | 0.00000000 | 0.00000000 |
| 2011 | 2 | 2          | 0 | 0          | 4 | 16.0       | 16.5 | 5.36       | 0.01103939 | 0.53018555 | 0.43864331 |
|      |   | 0.02013174 |   | 0.00000000 |   | 0.00000000 |      | 0.00000000 |            | 0.00000000 | 0.00000000 |
| 2011 | 2 | 2          | 0 | 0          | 4 | 17.0       | 17.5 | 6.16       | 0.01002697 | 0.40719167 | 0.56696774 |
|      |   | 0.01581362 |   | 0.00000000 |   | 0.00000000 |      | 0.00000000 |            | 0.00000000 | 0.00000000 |
| 2011 | 2 | 2          | 0 | 0          | 4 | 18.0       | 18.5 | 8.72       | 0.00000000 | 0.30312009 | 0.57538979 |
|      |   | 0.11721027 |   | 0.00427985 |   | 0.00000000 |      | 0.00000000 |            | 0.00000000 | 0.00000000 |
| 2011 | 2 | 2          | 0 | 0          | 4 | 19.0       | 19.5 | 6.24       | 0.00000000 | 0.15416024 | 0.43440474 |
|      |   | 0.35481783 |   | 0.05159881 |   | 0.00501838 |      | 0.00000000 |            | 0.00000000 | 0.00000000 |
| 2011 | 2 | 2          | 0 | 0          | 4 | 20.0       | 20.5 | 3.20       | 0.00000000 | 0.00225041 | 0.19916413 |
|      |   | 0.29504166 |   | 0.36341325 |   | 0.10256523 |      | 0.03756533 |            | 0.00000000 | 0.00000000 |
| 2011 | 2 | 2          | 0 | 0          | 4 | 21.0       | 21.5 | 2.36       | 0.00000000 | 0.00000000 | 0.02370815 |
|      |   | 0.15957820 |   | 0.11678121 |   | 0.34331561 |      | 0.32697276 |            | 0.00000000 | 0.00000000 |

|      |   |            |   |            |   |            |      |            |            |            |            |            |
|------|---|------------|---|------------|---|------------|------|------------|------------|------------|------------|------------|
| 2011 | 2 | 2          | 0 | 0          | 4 | 22.0       | 22.5 | 2.28       | 0.00000000 | 0.00000000 | 0.00000000 |            |
|      |   | 0.23982904 |   | 0.15442350 |   | 0.27219333 |      | 0.17317178 |            | 0.14299539 | 0.01738697 | 0.00000000 |
| 2011 | 2 | 2          | 0 | 0          | 4 | 23.0       | 23.5 | 0.56       | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 |
|      |   | 0.02066462 |   | 0.34328736 |   | 0.06199386 |      | 0.26923320 |            | 0.21010218 | 0.09471878 | 0.00000000 |
| 2011 | 2 | 2          | 0 | 0          | 4 | 24.0       | 24.5 | 0.12       | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 |
|      |   | 0.00000000 |   | 0.66666667 |   | 0.00000000 |      | 0.33333333 |            | 0.00000000 | 0.00000000 | 0.00000000 |
| 2012 | 2 | 2          | 0 | 0          | 4 | 14.0       | 14.5 | 0.04       | 1.00000000 | 0.00000000 | 0.00000000 | 0.00000000 |
|      |   | 0.00000000 |   | 0.00000000 |   | 0.00000000 |      | 0.00000000 |            | 0.00000000 | 0.00000000 | 0.00000000 |
| 2012 | 2 | 2          | 0 | 0          | 4 | 15.0       | 15.5 | 0.16       | 0.00000000 | 0.75000000 | 0.25000000 | 0.00000000 |
|      |   | 0.00000000 |   | 0.00000000 |   | 0.00000000 |      | 0.00000000 |            | 0.00000000 | 0.00000000 | 0.00000000 |
| 2012 | 2 | 2          | 0 | 0          | 4 | 16.0       | 16.5 | 0.36       | 0.11111111 | 0.55555556 | 0.33333333 | 0.00000000 |
|      |   | 0.00000000 |   | 0.00000000 |   | 0.00000000 |      | 0.00000000 |            | 0.00000000 | 0.00000000 | 0.00000000 |
| 2012 | 2 | 2          | 0 | 0          | 4 | 17.0       | 17.5 | 1.20       | 0.00000000 | 0.24086491 | 0.72472581 | 0.00000000 |
|      |   | 0.03440927 |   | 0.00000000 |   | 0.00000000 |      | 0.00000000 |            | 0.00000000 | 0.00000000 | 0.00000000 |
| 2012 | 2 | 2          | 0 | 0          | 4 | 18.0       | 18.5 | 2.40       | 0.00000000 | 0.18265179 | 0.63037559 | 0.00000000 |
|      |   | 0.18697263 |   | 0.00000000 |   | 0.00000000 |      | 0.00000000 |            | 0.00000000 | 0.00000000 | 0.00000000 |
| 2012 | 2 | 2          | 0 | 0          | 4 | 19.0       | 19.5 | 1.60       | 0.00000000 | 0.09506487 | 0.73668091 | 0.00000000 |
|      |   | 0.13460337 |   | 0.03365084 |   | 0.00000000 |      | 0.00000000 |            | 0.00000000 | 0.00000000 | 0.00000000 |
| 2012 | 2 | 2          | 0 | 0          | 4 | 20.0       | 20.5 | 1.48       | 0.00000000 | 0.11634427 | 0.34903280 | 0.00000000 |
|      |   | 0.52873563 |   | 0.00588730 |   | 0.00000000 |      | 0.00000000 |            | 0.00000000 | 0.00000000 | 0.00000000 |
| 2012 | 2 | 2          | 0 | 0          | 4 | 21.0       | 21.5 | 1.28       | 0.00000000 | 0.00887236 | 0.31640548 | 0.00000000 |
|      |   | 0.44277321 |   | 0.23194894 |   | 0.00000000 |      | 0.00000000 |            | 0.00000000 | 0.00000000 | 0.00000000 |
| 2012 | 2 | 2          | 0 | 0          | 4 | 22.0       | 22.5 | 0.32       | 0.00000000 | 0.00000000 | 0.06501548 | 0.00000000 |
|      |   | 0.32507740 |   | 0.54489164 |   | 0.06501548 |      | 0.00000000 |            | 0.00000000 | 0.00000000 | 0.00000000 |
| 2012 | 2 | 2          | 0 | 0          | 4 | 23.0       | 23.5 | 0.08       | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 |
|      |   | 0.00000000 |   | 0.00000000 |   | 0.50000000 |      | 0.50000000 |            | 0.00000000 | 0.00000000 | 0.00000000 |
| 1999 | 1 | 3          | 0 | 0          | 5 | 16.0       | 16.5 | 0.32       | 0.00000000 | 0.00000000 | 1.00000000 | 0.00000000 |
|      |   | 0.00000000 |   | 0.00000000 |   | 0.00000000 |      | 0.00000000 |            | 0.00000000 | 0.00000000 | 0.00000000 |
| 1999 | 1 | 3          | 0 | 0          | 5 | 17.0       | 17.5 | 0.56       | 0.00000000 | 0.00000000 | 1.00000000 | 0.00000000 |
|      |   | 0.00000000 |   | 0.00000000 |   | 0.00000000 |      | 0.00000000 |            | 0.00000000 | 0.00000000 | 0.00000000 |
| 1999 | 1 | 3          | 0 | 0          | 5 | 18.0       | 18.5 | 0.76       | 0.00000000 | 0.00000000 | 0.78519341 | 0.00000000 |
|      |   | 0.21480659 |   | 0.00000000 |   | 0.00000000 |      | 0.00000000 |            | 0.00000000 | 0.00000000 | 0.00000000 |
| 1999 | 1 | 3          | 0 | 0          | 5 | 19.0       | 19.5 | 0.28       | 0.00000000 | 0.00000000 | 0.28571429 | 0.00000000 |
|      |   | 0.71428571 |   | 0.00000000 |   | 0.00000000 |      | 0.00000000 |            | 0.00000000 | 0.00000000 | 0.00000000 |
| 1999 | 1 | 3          | 0 | 0          | 5 | 20.0       | 20.5 | 0.24       | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 |
|      |   | 0.69739439 |   | 0.30260561 |   | 0.00000000 |      | 0.00000000 |            | 0.00000000 | 0.00000000 | 0.00000000 |
| 1999 | 1 | 3          | 0 | 0          | 5 | 21.0       | 21.5 | 0.32       | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 |
|      |   | 0.25000000 |   | 0.37500000 |   | 0.37500000 |      | 0.00000000 |            | 0.00000000 | 0.00000000 | 0.00000000 |
| 1999 | 1 | 3          | 0 | 0          | 5 | 22.0       | 22.5 | 0.28       | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 |
|      |   | 0.00000000 |   | 0.00000000 |   | 1.00000000 |      | 0.00000000 |            | 0.00000000 | 0.00000000 | 0.00000000 |
| 1999 | 1 | 3          | 0 | 0          | 5 | 23.0       | 23.5 | 0.16       | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 |
|      |   | 0.00000000 |   | 0.00000000 |   | 0.69162500 |      | 0.30837500 |            | 0.00000000 | 0.00000000 | 0.00000000 |
| 1999 | 1 | 3          | 0 | 0          | 5 | 25.0       | 25.5 | 0.04       | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 |
|      |   | 0.00000000 |   | 0.00000000 |   | 0.00000000 |      | 1.00000000 |            | 0.00000000 | 0.00000000 | 0.00000000 |
| 2000 | 1 | 3          | 0 | 0          | 5 | 16.0       | 16.5 | 0.24       | 0.00000000 | 0.00000000 | 1.00000000 | 0.00000000 |
|      |   | 0.00000000 |   | 0.00000000 |   | 0.00000000 |      | 0.00000000 |            | 0.00000000 | 0.00000000 | 0.00000000 |
| 2000 | 1 | 3          | 0 | 0          | 5 | 17.0       | 17.5 | 3.16       | 0.00000000 | 0.02971019 | 0.81568211 | 0.00000000 |
|      |   | 0.15460770 |   | 0.00000000 |   | 0.00000000 |      | 0.00000000 |            | 0.00000000 | 0.00000000 | 0.00000000 |
| 2000 | 1 | 3          | 0 | 0          | 5 | 18.0       | 18.5 | 6.20       | 0.00000000 | 0.01663748 | 0.69778813 | 0.00000000 |
|      |   | 0.22384006 |   | 0.05787131 |   | 0.00000000 |      | 0.00386302 |            | 0.00000000 | 0.00000000 | 0.00000000 |
| 2000 | 1 | 3          | 0 | 0          | 5 | 19.0       | 19.5 | 7.80       | 0.00000000 | 0.01005256 | 0.26678825 | 0.00000000 |
|      |   | 0.58022529 |   | 0.11436740 |   | 0.02079638 |      | 0.00777013 |            | 0.00000000 | 0.00000000 | 0.00000000 |
| 2000 | 1 | 3          | 0 | 0          | 5 | 20.0       | 20.5 | 12.20      | 0.00000000 | 0.00000000 | 0.12132936 | 0.00000000 |
|      |   | 0.62061646 |   | 0.19578829 |   | 0.04921868 |      | 0.01167967 |            | 0.00000000 | 0.00136755 | 0.00000000 |
| 2000 | 1 | 3          | 0 | 0          | 5 | 21.0       | 21.5 | 18.48      | 0.00000000 | 0.00000000 | 0.07284473 | 0.00000000 |
|      |   | 0.43584726 |   | 0.29043133 |   | 0.13631424 |      | 0.05024663 |            | 0.00393816 | 0.01037764 | 0.00000000 |
| 2000 | 1 | 3          | 0 | 0          | 5 | 22.0       | 22.5 | 13.32      | 0.00000000 | 0.00376028 | 0.04421478 | 0.00000000 |
|      |   | 0.24078300 |   | 0.31639225 |   | 0.25016788 |      | 0.09655734 |            | 0.03249653 | 0.01562794 | 0.00000000 |
| 2000 | 1 | 3          | 0 | 0          | 5 | 23.0       | 23.5 | 4.48       | 0.00000000 | 0.00996131 | 0.02853334 | 0.00000000 |
|      |   | 0.11903465 |   | 0.33924029 |   | 0.19843023 |      | 0.21097310 |            | 0.08115465 | 0.01267242 | 0.00000000 |
| 2000 | 1 | 3          | 0 | 0          | 5 | 24.0       | 24.5 | 0.60       | 0.00000000 | 0.08604282 | 0.00000000 | 0.00000000 |
|      |   | 0.09553265 |   | 0.03549035 |   | 0.35597674 |      | 0.35597674 |            | 0.07098070 | 0.00000000 | 0.00000000 |
| 2000 | 1 | 3          | 0 | 0          | 5 | 25.0       | 25.5 | 0.16       | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 |
|      |   | 0.00000000 |   | 0.00000000 |   | 0.44069022 |      | 0.21415281 |            | 0.00000000 | 0.34515697 | 0.00000000 |
| 2001 | 1 | 3          | 0 | 0          | 5 | 13.0       | 13.5 | 0.56       | 0.00000000 | 1.00000000 | 0.00000000 | 0.00000000 |
|      |   | 0.00000000 |   | 0.00000000 |   | 0.00000000 |      | 0.00000000 |            | 0.00000000 | 0.00000000 | 0.00000000 |
| 2001 | 1 | 3          | 0 | 0          | 5 | 14.0       | 14.5 | 0.36       | 0.00000000 | 0.78526625 | 0.21473375 | 0.00000000 |
|      |   | 0.00000000 |   | 0.00000000 |   | 0.00000000 |      | 0.00000000 |            | 0.00000000 | 0.00000000 | 0.00000000 |
| 2001 | 1 | 3          | 0 | 0          | 5 | 15.0       | 15.5 | 0.16       | 0.00000000 | 1.00000000 | 0.00000000 | 0.00000000 |
|      |   | 0.00000000 |   | 0.00000000 |   | 0.00000000 |      | 0.00000000 |            | 0.00000000 | 0.00000000 | 0.00000000 |
| 2001 | 1 | 3          | 0 | 0          | 5 | 16.0       | 16.5 | 0.04       | 0.00000000 | 1.00000000 | 0.00000000 | 0.00000000 |
|      |   | 0.00000000 |   | 0.00000000 |   | 0.00000000 |      | 0.00000000 |            | 0.00000000 | 0.00000000 | 0.00000000 |
| 2001 | 1 | 3          | 0 | 0          | 5 | 18.0       | 18.5 | 1.12       | 0.00000000 | 0.18051209 | 0.33614455 | 0.00000000 |
|      |   | 0.37483373 |   | 0.03610242 |   | 0.04280481 |      | 0.02960240 |            | 0.00000000 | 0.00000000 | 0.00000000 |

|      |   |            |            |            |   |            |            |            |            |            |            |
|------|---|------------|------------|------------|---|------------|------------|------------|------------|------------|------------|
| 2001 | 1 | 3          | 0          | 0          | 5 | 19.0       | 19.5       | 8.44       | 0.00000000 | 0.01925963 | 0.21266479 |
|      |   | 0.54224992 | 0.19662330 | 0.02920235 |   | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 |
| 2001 | 1 | 3          | 0          | 0          | 5 | 20.0       | 20.5       | 29.64      | 0.00000000 | 0.00422791 | 0.14436947 |
|      |   | 0.54004602 | 0.27399952 | 0.03365278 |   | 0.00370430 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 |
| 2001 | 1 | 3          | 0          | 0          | 5 | 21.0       | 21.5       | 23.96      | 0.00000000 | 0.00526833 | 0.05438869 |
|      |   | 0.44296758 | 0.35803980 | 0.09663834 |   | 0.02718394 | 0.01385955 | 0.00165377 | 0.00000000 | 0.00000000 | 0.00000000 |
| 2001 | 1 | 3          | 0          | 0          | 5 | 22.0       | 22.5       | 11.28      | 0.00000000 | 0.00000000 | 0.02739324 |
|      |   | 0.27709108 | 0.31245259 | 0.20449538 |   | 0.14091520 | 0.03370418 | 0.00394833 | 0.00000000 | 0.00000000 | 0.00000000 |
| 2001 | 1 | 3          | 0          | 0          | 5 | 23.0       | 23.5       | 4.16       | 0.00000000 | 0.00000000 | 0.00000000 |
|      |   | 0.09938270 | 0.26174016 | 0.29696200 |   | 0.25522179 | 0.06547067 | 0.02122267 | 0.00000000 | 0.00000000 | 0.00000000 |
| 2001 | 1 | 3          | 0          | 0          | 5 | 24.0       | 24.5       | 1.36       | 0.00000000 | 0.00000000 | 0.00000000 |
|      |   | 0.00000000 | 0.11400278 | 0.29653276 |   | 0.41151161 | 0.11324999 | 0.06470286 | 0.00000000 | 0.00000000 | 0.00000000 |
| 2001 | 1 | 3          | 0          | 0          | 5 | 25.0       | 25.5       | 0.20       | 0.00000000 | 0.00000000 | 0.00000000 |
|      |   | 0.00000000 | 0.00000000 | 0.42632700 |   | 0.57367300 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 |
| 2002 | 1 | 3          | 0          | 0          | 5 | 16.0       | 16.5       | 0.08       | 0.00000000 | 0.61079433 | 0.00000000 |
|      |   | 0.00000000 | 0.38920567 | 0.00000000 |   | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 |
| 2002 | 1 | 3          | 0          | 0          | 5 | 17.0       | 17.5       | 0.20       | 0.00000000 | 0.05397122 | 0.33719811 |
|      |   | 0.60883067 | 0.00000000 | 0.00000000 |   | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 |
| 2002 | 1 | 3          | 0          | 0          | 5 | 18.0       | 18.5       | 0.96       | 0.00000000 | 0.36692199 | 0.47794134 |
|      |   | 0.13307801 | 0.01102933 | 0.01102933 |   | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 |
| 2002 | 1 | 3          | 0          | 0          | 5 | 19.0       | 19.5       | 1.48       | 0.00000000 | 0.08124207 | 0.44744620 |
|      |   | 0.37831800 | 0.00351850 | 0.06096807 |   | 0.00000000 | 0.02850716 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 |
| 2002 | 1 | 3          | 0          | 0          | 5 | 20.0       | 20.5       | 5.72       | 0.00000000 | 0.00096806 | 0.16028495 |
|      |   | 0.29077515 | 0.43336995 | 0.08898633 |   | 0.00974430 | 0.01587127 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 |
| 2002 | 1 | 3          | 0          | 0          | 5 | 21.0       | 21.5       | 36.20      | 0.00000000 | 0.00138445 | 0.03422952 |
|      |   | 0.20205619 | 0.45716363 | 0.23106171 |   | 0.05486628 | 0.01522131 | 0.00401691 | 0.00000000 | 0.00000000 | 0.00000000 |
| 2002 | 1 | 3          | 0          | 0          | 5 | 22.0       | 22.5       | 40.68      | 0.00000000 | 0.00120007 | 0.00769523 |
|      |   | 0.10957576 | 0.40541534 | 0.26660646 |   | 0.13228271 | 0.05251317 | 0.02390997 | 0.00080130 | 0.00080130 | 0.00080130 |
| 2002 | 1 | 3          | 0          | 0          | 5 | 23.0       | 23.5       | 18.56      | 0.00000000 | 0.00027504 | 0.00304354 |
|      |   | 0.07014138 | 0.23002191 | 0.30895891 |   | 0.22516891 | 0.11658483 | 0.04580547 | 0.00000000 | 0.00000000 | 0.00000000 |
| 2002 | 1 | 3          | 0          | 0          | 5 | 24.0       | 24.5       | 5.08       | 0.00000000 | 0.00000000 | 0.00000000 |
|      |   | 0.03031816 | 0.15396709 | 0.22605776 |   | 0.19593474 | 0.18364555 | 0.20308000 | 0.0069671  | 0.0069671  | 0.0069671  |
| 2002 | 1 | 3          | 0          | 0          | 5 | 25.0       | 25.5       | 1.08       | 0.00000000 | 0.00000000 | 0.00000000 |
|      |   | 0.00000000 | 0.03411823 | 0.03411823 |   | 0.29486547 | 0.38081541 | 0.22892806 | 0.02715461 | 0.02715461 | 0.02715461 |
| 2002 | 1 | 3          | 0          | 0          | 5 | 26.0       | 26.5       | 0.28       | 0.00000000 | 0.00000000 | 0.00000000 |
|      |   | 0.00000000 | 0.00000000 | 0.00000000 |   | 0.00000000 | 0.40176012 | 0.59823988 | 0.00000000 | 0.00000000 | 0.00000000 |
| 2003 | 1 | 3          | 0          | 0          | 5 | 13.0       | 13.5       | 0.04       | 0.00000000 | 0.00000000 | 1.00000000 |
|      |   | 0.00000000 | 0.00000000 | 0.00000000 |   | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 |
| 2003 | 1 | 3          | 0          | 0          | 5 | 14.0       | 14.5       | 0.64       | 0.00000000 | 0.29858794 | 0.70141206 |
|      |   | 0.00000000 | 0.00000000 | 0.00000000 |   | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 |
| 2003 | 1 | 3          | 0          | 0          | 5 | 15.0       | 15.5       | 0.32       | 0.00000000 | 0.62500000 | 0.25000000 |
|      |   | 0.12500000 | 0.00000000 | 0.00000000 |   | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 |
| 2003 | 1 | 3          | 0          | 0          | 5 | 16.0       | 16.5       | 0.04       | 0.00000000 | 0.00000000 | 0.00000000 |
|      |   | 1.00000000 | 0.00000000 | 0.00000000 |   | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 |
| 2003 | 1 | 3          | 0          | 0          | 5 | 17.0       | 17.5       | 1.72       | 0.00000000 | 0.02889942 | 0.59388085 |
|      |   | 0.29995467 | 0.07726506 | 0.00000000 |   | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 |
| 2003 | 1 | 3          | 0          | 0          | 5 | 18.0       | 18.5       | 6.04       | 0.00000000 | 0.04616067 | 0.48016399 |
|      |   | 0.39541506 | 0.05770611 | 0.02055418 |   | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 |
| 2003 | 1 | 3          | 0          | 0          | 5 | 19.0       | 19.5       | 8.72       | 0.00000000 | 0.04256105 | 0.42806829 |
|      |   | 0.36049142 | 0.09471140 | 0.04309680 |   | 0.02116158 | 0.00990946 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 |
| 2003 | 1 | 3          | 0          | 0          | 5 | 20.0       | 20.5       | 10.76      | 0.00000000 | 0.01717435 | 0.29797333 |
|      |   | 0.31388290 | 0.13396080 | 0.11909415 |   | 0.05801165 | 0.05330316 | 0.00659966 | 0.00000000 | 0.00000000 | 0.00000000 |
| 2003 | 1 | 3          | 0          | 0          | 5 | 21.0       | 21.5       | 13.28      | 0.00000000 | 0.00954035 | 0.17388138 |
|      |   | 0.21066376 | 0.16657500 | 0.20443594 |   | 0.15382384 | 0.05487022 | 0.02620950 | 0.00000000 | 0.00000000 | 0.00000000 |
| 2003 | 1 | 3          | 0          | 0          | 5 | 22.0       | 22.5       | 24.52      | 0.00000000 | 0.00433987 | 0.02139465 |
|      |   | 0.05261511 | 0.10155919 | 0.29939187 |   | 0.26100100 | 0.14053818 | 0.11045425 | 0.00870587 | 0.00870587 | 0.00870587 |
| 2003 | 1 | 3          | 0          | 0          | 5 | 23.0       | 23.5       | 17.40      | 0.00000000 | 0.00000000 | 0.00580201 |
|      |   | 0.03805724 | 0.09739760 | 0.22253494 |   | 0.22808285 | 0.19974443 | 0.18466718 | 0.02371374 | 0.02371374 | 0.02371374 |
| 2003 | 1 | 3          | 0          | 0          | 5 | 24.0       | 24.5       | 6.56       | 0.00000000 | 0.00900865 | 0.00193705 |
|      |   | 0.00576173 | 0.04555107 | 0.15018181 |   | 0.20368581 | 0.12017707 | 0.38184532 | 0.08185148 | 0.08185148 | 0.08185148 |
| 2003 | 1 | 3          | 0          | 0          | 5 | 25.0       | 25.5       | 1.92       | 0.00000000 | 0.00000000 | 0.00000000 |
|      |   | 0.03311641 | 0.05115135 | 0.14950034 |   | 0.27774722 | 0.13268709 | 0.34825686 | 0.00754073 | 0.00754073 | 0.00754073 |
| 2003 | 1 | 3          | 0          | 0          | 5 | 26.0       | 26.5       | 0.32       | 0.00000000 | 0.00000000 | 0.00000000 |
|      |   | 0.04130292 | 0.00000000 | 0.00000000 |   | 0.00000000 | 0.08260584 | 0.87609124 | 0.00000000 | 0.00000000 | 0.00000000 |
| 2003 | 1 | 3          | 0          | 0          | 5 | 27.0       | 27.5       | 0.04       | 0.00000000 | 0.00000000 | 0.00000000 |
|      |   | 0.00000000 | 0.00000000 | 1.00000000 |   | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 |
| 2004 | 1 | 3          | 0          | 0          | 5 | 11.0       | 11.5       | 0.04       | 0.00000000 | 0.00000000 | 1.00000000 |
|      |   | 0.00000000 | 0.00000000 | 0.00000000 |   | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 |
| 2004 | 1 | 3          | 0          | 0          | 5 | 12.0       | 12.5       | 0.24       | 0.00000000 | 1.00000000 | 0.00000000 |
|      |   | 0.00000000 | 0.00000000 | 0.00000000 |   | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 |
| 2004 | 1 | 3          | 0          | 0          | 5 | 13.0       | 13.5       | 1.48       | 0.00000000 | 0.86640401 | 0.13359599 |
|      |   | 0.00000000 | 0.00000000 | 0.00000000 |   | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 |
| 2004 | 1 | 3          | 0          | 0          | 5 | 14.0       | 14.5       | 2.64       | 0.00000000 | 0.81022906 | 0.16028563 |
|      |   | 0.02948531 | 0.00000000 | 0.00000000 |   | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 |

|      |   |            |            |            |            |            |            |            |            |            |            |
|------|---|------------|------------|------------|------------|------------|------------|------------|------------|------------|------------|
| 2004 | 1 | 3          | 0          | 0          | 5          | 15.0       | 15.5       | 2.44       | 0.00000000 | 0.81693870 | 0.15224300 |
|      |   | 0.02701525 | 0.00380304 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 |
| 2004 | 1 | 3          | 0          | 0          | 5          | 16.0       | 16.5       | 2.44       | 0.00000000 | 0.91506888 | 0.08493112 |
|      |   | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 |
| 2004 | 1 | 3          | 0          | 0          | 5          | 17.0       | 17.5       | 7.08       | 0.00000000 | 0.82911979 | 0.13811037 |
|      |   | 0.03276984 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 |
| 2004 | 1 | 3          | 0          | 0          | 5          | 18.0       | 18.5       | 4.64       | 0.00000000 | 0.70590326 | 0.18379993 |
|      |   | 0.11029681 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 |
| 2004 | 1 | 3          | 0          | 0          | 5          | 19.0       | 19.5       | 3.28       | 0.00000000 | 0.12849706 | 0.38179877 |
|      |   | 0.42007401 | 0.06963017 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 |
| 2004 | 1 | 3          | 0          | 0          | 5          | 20.0       | 20.5       | 3.60       | 0.00000000 | 0.06764562 | 0.22718819 |
|      |   | 0.43632745 | 0.20513650 | 0.02123408 | 0.04246816 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 |
| 2004 | 1 | 3          | 0          | 0          | 5          | 21.0       | 21.5       | 7.12       | 0.00000000 | 0.02507256 | 0.14317139 |
|      |   | 0.40119569 | 0.27665293 | 0.08143410 | 0.04737353 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 |
| 2004 | 1 | 3          | 0          | 0          | 5          | 22.0       | 22.5       | 10.88      | 0.00000000 | 0.01339372 | 0.07334027 |
|      |   | 0.13251533 | 0.12700182 | 0.29782043 | 0.20631143 | 0.09216441 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 |
| 2004 | 1 | 3          | 0          | 0          | 5          | 23.0       | 23.5       | 13.56      | 0.00000000 | 0.00000000 | 0.01271574 |
|      |   | 0.04461322 | 0.10214081 | 0.22098845 | 0.27593474 | 0.15398881 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 |
| 2004 | 1 | 3          | 0          | 0          | 5          | 24.0       | 24.5       | 5.76       | 0.00000000 | 0.00000000 | 0.01698676 |
|      |   | 0.01580170 | 0.05125012 | 0.18765518 | 0.40400194 | 0.08129150 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 |
| 2004 | 1 | 3          | 0          | 0          | 5          | 25.0       | 25.5       | 1.28       | 0.00000000 | 0.00000000 | 0.00000000 |
|      |   | 0.02532908 | 0.13645475 | 0.14911929 | 0.25845116 | 0.20716081 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 |
| 2004 | 1 | 3          | 0          | 0          | 5          | 26.0       | 26.5       | 0.08       | 0.00000000 | 0.00000000 | 0.00000000 |
|      |   | 0.00000000 | 0.00000000 | 0.36623068 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 |
| 2005 | 1 | 3          | 0          | 0          | 5          | 12.0       | 12.5       | 0.08       | 0.00000000 | 1.00000000 | 0.00000000 |
|      |   | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 |
| 2005 | 1 | 3          | 0          | 0          | 5          | 15.0       | 15.5       | 0.84       | 0.00000000 | 0.00000000 | 0.91882170 |
|      |   | 0.00000000 | 0.08117830 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 |
| 2005 | 1 | 3          | 0          | 0          | 5          | 16.0       | 16.5       | 5.32       | 0.00000000 | 0.02117241 | 0.81569472 |
|      |   | 0.15807194 | 0.00506093 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 |
| 2005 | 1 | 3          | 0          | 0          | 5          | 17.0       | 17.5       | 14.84      | 0.00000000 | 0.00643022 | 0.78357060 |
|      |   | 0.16751096 | 0.03437875 | 0.00732624 | 0.00078323 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 |
| 2005 | 1 | 3          | 0          | 0          | 5          | 18.0       | 18.5       | 7.20       | 0.00000000 | 0.02142792 | 0.74255130 |
|      |   | 0.18572045 | 0.03920476 | 0.00770222 | 0.00134353 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 |
| 2005 | 1 | 3          | 0          | 0          | 5          | 19.0       | 19.5       | 1.36       | 0.00000000 | 0.01819245 | 0.64158675 |
|      |   | 0.08655097 | 0.16711887 | 0.08655097 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 |
| 2005 | 1 | 3          | 0          | 0          | 5          | 20.0       | 20.5       | 0.72       | 0.00000000 | 0.00000000 | 0.18644387 |
|      |   | 0.21159555 | 0.37478461 | 0.11262507 | 0.07764151 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 |
| 2005 | 1 | 3          | 0          | 0          | 5          | 21.0       | 21.5       | 1.00       | 0.00000000 | 0.00000000 | 0.11058216 |
|      |   | 0.08033075 | 0.58483462 | 0.14392172 | 0.08033075 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 |
| 2005 | 1 | 3          | 0          | 0          | 5          | 22.0       | 22.5       | 1.56       | 0.00000000 | 0.00000000 | 0.00000000 |
|      |   | 0.04232762 | 0.46888188 | 0.14965618 | 0.13515448 | 0.12377543 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 |
| 2005 | 1 | 3          | 0          | 0          | 5          | 23.0       | 23.5       | 3.40       | 0.00000000 | 0.00000000 | 0.02270702 |
|      |   | 0.01580238 | 0.01941793 | 0.16224316 | 0.18771401 | 0.09741119 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 |
| 2005 | 1 | 3          | 0          | 0          | 5          | 24.0       | 24.5       | 3.56       | 0.00000000 | 0.00000000 | 0.00000000 |
|      |   | 0.00000000 | 0.01297664 | 0.06131838 | 0.11939381 | 0.25404643 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 |
| 2005 | 1 | 3          | 0          | 0          | 5          | 25.0       | 25.5       | 0.88       | 0.00000000 | 0.00000000 | 0.00000000 |
|      |   | 0.00000000 | 0.00000000 | 0.05049915 | 0.00000000 | 0.20199661 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 |
| 2005 | 1 | 3          | 0          | 0          | 5          | 26.0       | 26.5       | 0.08       | 0.00000000 | 0.00000000 | 0.00000000 |
|      |   | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 |
| 2006 | 1 | 3          | 0          | 0          | 5          | 17.0       | 17.5       | 0.24       | 0.00000000 | 0.00000000 | 0.00000000 |
|      |   | 0.51704397 | 0.48295603 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 |
| 2006 | 1 | 3          | 0          | 0          | 5          | 18.0       | 18.5       | 4.76       | 0.00000000 | 0.00000000 | 0.04347242 |
|      |   | 0.63966086 | 0.16481578 | 0.07602547 | 0.04062132 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 |
| 2006 | 1 | 3          | 0          | 0          | 5          | 19.0       | 19.5       | 14.92      | 0.00000000 | 0.00000000 | 0.00727865 |
|      |   | 0.64061532 | 0.20355835 | 0.08308284 | 0.04645900 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 |
| 2006 | 1 | 3          | 0          | 0          | 5          | 20.0       | 20.5       | 4.56       | 0.00000000 | 0.01900585 | 0.00000000 |
|      |   | 0.62924849 | 0.24556590 | 0.07757939 | 0.00612325 | 0.02943522 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 |
| 2006 | 1 | 3          | 0          | 0          | 5          | 21.0       | 21.5       | 0.72       | 0.00000000 | 0.00000000 | 0.00000000 |
|      |   | 0.28199047 | 0.05286559 | 0.15688084 | 0.50826311 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 |
| 2006 | 1 | 3          | 0          | 0          | 5          | 22.0       | 22.5       | 0.32       | 0.00000000 | 0.00000000 | 0.00000000 |
|      |   | 0.14380492 | 0.61156791 | 0.00000000 | 0.00000000 | 0.12231358 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 |
| 2006 | 1 | 3          | 0          | 0          | 5          | 23.0       | 23.5       | 0.52       | 0.00000000 | 0.00000000 | 0.00000000 |
|      |   | 0.05102799 | 0.32632300 | 0.05102799 | 0.27081202 | 0.24529802 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 |
| 2006 | 1 | 3          | 0          | 0          | 5          | 24.0       | 24.5       | 0.64       | 0.00000000 | 0.00000000 | 0.00000000 |
|      |   | 0.22881018 | 0.04759812 | 0.07557884 | 0.02379906 | 0.09519624 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 |
| 2006 | 1 | 3          | 0          | 0          | 5          | 25.0       | 25.5       | 0.20       | 0.00000000 | 0.00000000 | 0.00000000 |
|      |   | 0.00000000 | 0.85825403 | 0.04463446 | 0.04463446 | 0.05247705 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 |
| 2006 | 1 | 3          | 0          | 0          | 5          | 26.0       | 26.5       | 0.04       | 0.00000000 | 0.00000000 | 0.00000000 |
|      |   | 0.00000000 | 0.00000000 | 1.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 |
| 2007 | 1 | 3          | 0          | 0          | 5          | 16.0       | 16.5       | 0.04       | 0.00000000 | 0.00000000 | 1.00000000 |
|      |   | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 |
| 2007 | 1 | 3          | 0          | 0          | 5          | 17.0       | 17.5       | 2.16       | 0.00000000 | 0.00000000 | 0.23740467 |
|      |   | 0.45780179 | 0.27618093 | 0.02861261 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 |

|      |   |            |            |            |   |      |            |            |            |            |            |
|------|---|------------|------------|------------|---|------|------------|------------|------------|------------|------------|
| 2007 | 1 | 3          | 0          | 0          | 5 | 18.0 | 18.5       | 18.56      | 0.00000000 | 0.00000000 | 0.07683540 |
|      |   | 0.57588439 | 0.31802187 | 0.02626425 |   |      | 0.00299409 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 |
| 2007 | 1 | 3          | 0          | 0          | 5 | 19.0 | 19.5       | 41.00      | 0.00000000 | 0.00000000 | 0.03081318 |
|      |   | 0.50919315 | 0.39309440 | 0.05765305 |   |      | 0.00637106 | 0.00287516 | 0.00000000 | 0.00000000 | 0.00000000 |
| 2007 | 1 | 3          | 0          | 0          | 5 | 20.0 | 20.5       | 23.36      | 0.00000000 | 0.00000000 | 0.00437021 |
|      |   | 0.32889907 | 0.48632183 | 0.14330941 |   |      | 0.02698247 | 0.00772495 | 0.00239205 | 0.00000000 | 0.00000000 |
| 2007 | 1 | 3          | 0          | 0          | 5 | 21.0 | 21.5       | 2.84       | 0.00000000 | 0.00000000 | 0.01790312 |
|      |   | 0.06248941 | 0.60674578 | 0.22974585 |   |      | 0.08311583 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 |
| 2007 | 1 | 3          | 0          | 0          | 5 | 22.0 | 22.5       | 0.36       | 0.00000000 | 0.00000000 | 0.00000000 |
|      |   | 0.21943393 | 0.48478081 | 0.10971697 |   |      | 0.18606829 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 |
| 2007 | 1 | 3          | 0          | 0          | 5 | 23.0 | 23.5       | 0.64       | 0.00000000 | 0.00000000 | 0.00000000 |
|      |   | 0.00000000 | 0.09044068 | 0.34236015 |   |      | 0.31113120 | 0.12166964 | 0.13439832 | 0.00000000 | 0.00000000 |
| 2007 | 1 | 3          | 0          | 0          | 5 | 24.0 | 24.5       | 0.28       | 0.00000000 | 0.00000000 | 0.00000000 |
|      |   | 0.00000000 | 0.23026346 | 0.26146231 |   |      | 0.00000000 | 0.09267026 | 0.41560397 | 0.00000000 | 0.00000000 |
| 2007 | 1 | 3          | 0          | 0          | 5 | 25.0 | 25.5       | 0.12       | 0.00000000 | 0.00000000 | 0.00000000 |
|      |   | 0.00000000 | 0.00000000 | 0.00000000 |   |      | 0.00000000 | 0.00000000 | 0.37093453 | 0.00000000 | 0.00000000 |
| 2007 | 1 | 3          | 0          | 0          | 5 | 27.0 | 27.5       | 0.04       | 0.00000000 | 0.00000000 | 0.00000000 |
|      |   | 0.00000000 | 0.00000000 | 0.00000000 |   |      | 0.00000000 | 0.00000000 | 1.00000000 | 0.00000000 | 0.00000000 |
| 2008 | 1 | 3          | 0          | 0          | 5 | 17.0 | 17.5       | 0.88       | 0.00000000 | 0.00000000 | 0.08076731 |
|      |   | 0.45003422 | 0.35683235 | 0.11236612 |   |      | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 |
| 2008 | 1 | 3          | 0          | 0          | 5 | 18.0 | 18.5       | 13.12      | 0.00000000 | 0.00000000 | 0.01184838 |
|      |   | 0.32043582 | 0.46529163 | 0.19547765 |   |      | 0.00694651 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 |
| 2008 | 1 | 3          | 0          | 0          | 5 | 19.0 | 19.5       | 32.08      | 0.00000000 | 0.00000000 | 0.00088424 |
|      |   | 0.15493135 | 0.57736237 | 0.24563050 |   |      | 0.01859373 | 0.00259781 | 0.00000000 | 0.00000000 | 0.00000000 |
| 2008 | 1 | 3          | 0          | 0          | 5 | 20.0 | 20.5       | 32.48      | 0.00000000 | 0.00000000 | 0.00000000 |
|      |   | 0.05859962 | 0.53023043 | 0.34778716 |   |      | 0.05769815 | 0.00246186 | 0.00322279 | 0.00000000 | 0.00000000 |
| 2008 | 1 | 3          | 0          | 0          | 5 | 21.0 | 21.5       | 10.88      | 0.00000000 | 0.00000000 | 0.00000000 |
|      |   | 0.01475106 | 0.36452259 | 0.47038098 |   |      | 0.10796971 | 0.02632704 | 0.01604862 | 0.00000000 | 0.00000000 |
| 2008 | 1 | 3          | 0          | 0          | 5 | 22.0 | 22.5       | 2.80       | 0.00000000 | 0.00000000 | 0.00000000 |
|      |   | 0.03766021 | 0.19998154 | 0.35594165 |   |      | 0.24583760 | 0.12291880 | 0.03766021 | 0.00000000 | 0.00000000 |
| 2008 | 1 | 3          | 0          | 0          | 5 | 23.0 | 23.5       | 1.28       | 0.00000000 | 0.00000000 | 0.00000000 |
|      |   | 0.00000000 | 0.19731636 | 0.34757381 |   |      | 0.22868898 | 0.19401355 | 0.03240729 | 0.00000000 | 0.00000000 |
| 2008 | 1 | 3          | 0          | 0          | 5 | 24.0 | 24.5       | 0.40       | 0.00000000 | 0.00000000 | 0.00000000 |
|      |   | 0.00000000 | 0.00000000 | 0.07480361 |   |      | 0.14173213 | 0.17913393 | 0.60433033 | 0.00000000 | 0.00000000 |
| 2008 | 1 | 3          | 0          | 0          | 5 | 25.0 | 25.5       | 0.08       | 0.00000000 | 0.00000000 | 0.00000000 |
|      |   | 0.00000000 | 0.00000000 | 0.00000000 |   |      | 0.79120760 | 0.00000000 | 0.20879240 | 0.00000000 | 0.00000000 |
| 2009 | 1 | 3          | 0          | 0          | 5 | 15.0 | 15.5       | 0.04       | 0.00000000 | 0.00000000 | 1.00000000 |
|      |   | 0.00000000 | 0.00000000 | 0.00000000 |   |      | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 |
| 2009 | 1 | 3          | 0          | 0          | 5 | 17.0 | 17.5       | 0.68       | 0.00000000 | 0.00000000 | 0.00000000 |
|      |   | 0.42804400 | 0.48314281 | 0.03371438 |   |      | 0.00000000 | 0.05509881 | 0.00000000 | 0.00000000 | 0.00000000 |
| 2009 | 1 | 3          | 0          | 0          | 5 | 18.0 | 18.5       | 11.68      | 0.00000000 | 0.00000000 | 0.02050733 |
|      |   | 0.12037526 | 0.46365604 | 0.31060975 |   |      | 0.08018280 | 0.00466882 | 0.00000000 | 0.00000000 | 0.00000000 |
| 2009 | 1 | 3          | 0          | 0          | 5 | 19.0 | 19.5       | 41.76      | 0.00000000 | 0.00000000 | 0.00226916 |
|      |   | 0.03590519 | 0.36741479 | 0.37324927 |   |      | 0.18827612 | 0.02953106 | 0.00335441 | 0.00000000 | 0.00000000 |
| 2009 | 1 | 3          | 0          | 0          | 5 | 20.0 | 20.5       | 31.56      | 0.00000000 | 0.00000000 | 0.00219593 |
|      |   | 0.01342498 | 0.21422056 | 0.43913111 |   |      | 0.25999418 | 0.06078386 | 0.01024938 | 0.00000000 | 0.00000000 |
| 2009 | 1 | 3          | 0          | 0          | 5 | 21.0 | 21.5       | 6.80       | 0.00000000 | 0.00000000 | 0.00212453 |
|      |   | 0.00568681 | 0.10318651 | 0.44777766 |   |      | 0.31985777 | 0.10280451 | 0.01856221 | 0.00000000 | 0.00000000 |
| 2009 | 1 | 3          | 0          | 0          | 5 | 22.0 | 22.5       | 0.56       | 0.00000000 | 0.00000000 | 0.00000000 |
|      |   | 0.00000000 | 0.04893710 | 0.22695408 |   |      | 0.46075579 | 0.08550180 | 0.17785124 | 0.00000000 | 0.00000000 |
| 2009 | 1 | 3          | 0          | 0          | 5 | 23.0 | 23.5       | 0.12       | 0.00000000 | 0.00000000 | 0.00000000 |
|      |   | 0.00000000 | 0.00000000 | 0.83888941 |   |      | 0.00000000 | 0.16111059 | 0.00000000 | 0.00000000 | 0.00000000 |
| 2009 | 1 | 3          | 0          | 0          | 5 | 24.0 | 24.5       | 0.04       | 0.00000000 | 0.00000000 | 0.00000000 |
|      |   | 0.00000000 | 0.00000000 | 0.00000000 |   |      | 0.00000000 | 0.00000000 | 1.00000000 | 0.00000000 | 0.00000000 |
| 2010 | 1 | 3          | 0          | 0          | 5 | 16.0 | 16.5       | 0.20       | 0.00000000 | 0.00000000 | 0.76934528 |
|      |   | 0.23065472 | 0.00000000 | 0.00000000 |   |      | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 |
| 2010 | 1 | 3          | 0          | 0          | 5 | 17.0 | 17.5       | 0.20       | 0.00000000 | 0.00000000 | 0.00000000 |
|      |   | 0.38467264 | 0.46130945 | 0.15401791 |   |      | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 |
| 2010 | 1 | 3          | 0          | 0          | 5 | 18.0 | 18.5       | 1.84       | 0.00000000 | 0.00000000 | 0.00000000 |
|      |   | 0.16788478 | 0.16797029 | 0.46967550 |   |      | 0.17677483 | 0.01769459 | 0.00000000 | 0.00000000 | 0.00000000 |
| 2010 | 1 | 3          | 0          | 0          | 5 | 19.0 | 19.5       | 12.44      | 0.00000000 | 0.00000000 | 0.00000000 |
|      |   | 0.04896287 | 0.27875690 | 0.38697070 |   |      | 0.18333172 | 0.08992043 | 0.01205738 | 0.00000000 | 0.00000000 |
| 2010 | 1 | 3          | 0          | 0          | 5 | 20.0 | 20.5       | 14.44      | 0.00000000 | 0.00000000 | 0.00000000 |
|      |   | 0.01016532 | 0.16180590 | 0.40427576 |   |      | 0.30760341 | 0.09572334 | 0.02042628 | 0.00000000 | 0.00000000 |
| 2010 | 1 | 3          | 0          | 0          | 5 | 21.0 | 21.5       | 4.28       | 0.00000000 | 0.00000000 | 0.00000000 |
|      |   | 0.00000000 | 0.17346526 | 0.35308184 |   |      | 0.28013074 | 0.16224575 | 0.03107640 | 0.00000000 | 0.00000000 |
| 2010 | 1 | 3          | 0          | 0          | 5 | 22.0 | 22.5       | 0.32       | 0.00000000 | 0.00000000 | 0.00000000 |
|      |   | 0.00000000 | 0.20110753 | 0.39240600 |   |      | 0.07009449 | 0.26629749 | 0.07009449 | 0.00000000 | 0.00000000 |
| 2010 | 1 | 3          | 0          | 0          | 5 | 23.0 | 23.5       | 0.04       | 0.00000000 | 0.00000000 | 0.00000000 |
|      |   | 0.00000000 | 0.00000000 | 0.00000000 |   |      | 0.00000000 | 1.00000000 | 0.00000000 | 0.00000000 | 0.00000000 |
| 2011 | 1 | 3          | 0          | 0          | 5 | 14.0 | 14.5       | 0.04       | 0.00000000 | 0.00000000 | 1.00000000 |
|      |   | 0.00000000 | 0.00000000 | 0.00000000 |   |      | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 |
| 2011 | 1 | 3          | 0          | 0          | 5 | 15.0 | 15.5       | 0.04       | 0.00000000 | 0.00000000 | 1.00000000 |
|      |   | 0.00000000 | 0.00000000 | 0.00000000 |   |      | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 |

|      |   |   |            |            |            |            |            |            |            |            |            |
|------|---|---|------------|------------|------------|------------|------------|------------|------------|------------|------------|
| 2011 | 1 | 3 | 0          | 0          | 5          | 17.0       | 17.5       | 0.36       | 0.00000000 | 0.51810763 | 0.21835447 |
|      |   |   | 0.00000000 | 0.00000000 | 0.08820160 | 0.17533631 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 |
| 2011 | 1 | 3 | 0          | 0          | 5          | 18.0       | 18.5       | 0.88       | 0.00000000 | 0.00000000 | 0.50596905 |
|      |   |   | 0.21929168 | 0.19223208 | 0.06856094 | 0.00000000 | 0.00000000 | 0.00000000 | 0.01394624 | 0.00000000 | 0.00000000 |
| 2011 | 1 | 3 | 0          | 0          | 5          | 19.0       | 19.5       | 3.40       | 0.00000000 | 0.00000000 | 0.15072866 |
|      |   |   | 0.26068154 | 0.13777478 | 0.16189115 | 0.23719457 | 0.03802670 | 0.01370261 | 0.00000000 | 0.00000000 | 0.00000000 |
| 2011 | 1 | 3 | 0          | 0          | 5          | 20.0       | 20.5       | 18.40      | 0.00000000 | 0.00000000 | 0.00859330 |
|      |   |   | 0.03904601 | 0.13922408 | 0.33680258 | 0.27486556 | 0.15650820 | 0.04496027 | 0.00000000 | 0.00000000 | 0.00000000 |
| 2011 | 1 | 3 | 0          | 0          | 5          | 21.0       | 21.5       | 16.08      | 0.00000000 | 0.00000000 | 0.00422339 |
|      |   |   | 0.01197875 | 0.10077749 | 0.31338103 | 0.33280820 | 0.20914405 | 0.02768709 | 0.00000000 | 0.00000000 | 0.00000000 |
| 2011 | 1 | 3 | 0          | 0          | 5          | 22.0       | 22.5       | 3.12       | 0.00000000 | 0.00000000 | 0.00000000 |
|      |   |   | 0.00000000 | 0.14846829 | 0.30437049 | 0.28564527 | 0.18671576 | 0.07480019 | 0.00000000 | 0.00000000 | 0.00000000 |
| 2011 | 1 | 3 | 0          | 0          | 5          | 23.0       | 23.5       | 0.56       | 0.00000000 | 0.00000000 | 0.00000000 |
|      |   |   | 0.00000000 | 0.03268375 | 0.34533842 | 0.27886041 | 0.34311741 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 |
| 2012 | 1 | 3 | 0          | 0          | 5          | 17.0       | 17.5       | 0.04       | 0.00000000 | 0.00000000 | 1.00000000 |
|      |   |   | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 |
| 2012 | 1 | 3 | 0          | 0          | 5          | 18.0       | 18.5       | 5.48       | 0.00000000 | 0.00000000 | 0.74304840 |
|      |   |   | 0.23730442 | 0.01964719 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 |
| 2012 | 1 | 3 | 0          | 0          | 5          | 19.0       | 19.5       | 30.96      | 0.00000000 | 0.00094202 | 0.66082840 |
|      |   |   | 0.26778733 | 0.03782638 | 0.00983471 | 0.00554848 | 0.00428623 | 0.01294645 | 0.00000000 | 0.00000000 | 0.00000000 |
| 2012 | 1 | 3 | 0          | 0          | 5          | 20.0       | 20.5       | 35.76      | 0.00000000 | 0.00116550 | 0.38557432 |
|      |   |   | 0.33735691 | 0.11024423 | 0.04944098 | 0.03141783 | 0.04173074 | 0.04306948 | 0.00000000 | 0.00000000 | 0.00000000 |
| 2012 | 1 | 3 | 0          | 0          | 5          | 21.0       | 21.5       | 26.64      | 0.00000000 | 0.00000000 | 0.03900776 |
|      |   |   | 0.12680052 | 0.08678037 | 0.08175227 | 0.18143254 | 0.19322295 | 0.28507335 | 0.00593025 | 0.00000000 | 0.00000000 |
| 2012 | 1 | 3 | 0          | 0          | 5          | 22.0       | 22.5       | 16.44      | 0.00000000 | 0.00000000 | 0.01068538 |
|      |   |   | 0.00799751 | 0.04921246 | 0.06488152 | 0.15952159 | 0.27504714 | 0.41065066 | 0.02200375 | 0.00000000 | 0.00000000 |
| 2012 | 1 | 3 | 0          | 0          | 5          | 23.0       | 23.5       | 2.84       | 0.00000000 | 0.00000000 | 0.00000000 |
|      |   |   | 0.00000000 | 0.02087101 | 0.05696684 | 0.12747367 | 0.23738363 | 0.51556203 | 0.04174203 | 0.00000000 | 0.00000000 |
| 2012 | 1 | 3 | 0          | 0          | 5          | 24.0       | 24.5       | 0.04       | 0.00000000 | 0.00000000 | 0.00000000 |
|      |   |   | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 1.00000000 | 0.00000000 | 0.00000000 |
| 2012 | 1 | 3 | 0          | 0          | 5          | 25.0       | 25.5       | 0.04       | 0.00000000 | 0.00000000 | 0.00000000 |
|      |   |   | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 1.00000000 | 0.00000000 | 0.00000000 | 0.00000000 |
| 2013 | 1 | 3 | 0          | 0          | 5          | 18.0       | 18.5       | 0.04       | 0.00000000 | 0.00000000 | 0.00000000 |
|      |   |   | 1.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 |
| 2013 | 1 | 3 | 0          | 0          | 5          | 19.0       | 19.5       | 6.08       | 0.00000000 | 0.00000000 | 0.12580305 |
|      |   |   | 0.70740520 | 0.14079934 | 0.01929854 | 0.00669386 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 |
| 2013 | 1 | 3 | 0          | 0          | 5          | 20.0       | 20.5       | 54.16      | 0.00000000 | 0.00000000 | 0.07877190 |
|      |   |   | 0.69238663 | 0.17782469 | 0.03788546 | 0.00625276 | 0.00378112 | 0.00309744 | 0.00000000 | 0.00000000 | 0.00000000 |
| 2013 | 1 | 3 | 0          | 0          | 5          | 21.0       | 21.5       | 55.68      | 0.00000000 | 0.00000000 | 0.04586018 |
|      |   |   | 0.56265888 | 0.19516410 | 0.04987227 | 0.04529655 | 0.03792234 | 0.06322569 | 0.00000000 | 0.00000000 | 0.00000000 |
| 2013 | 1 | 3 | 0          | 0          | 5          | 22.0       | 22.5       | 16.64      | 0.00000000 | 0.00000000 | 0.02385550 |
|      |   |   | 0.19097627 | 0.13967064 | 0.08448812 | 0.13023383 | 0.21638642 | 0.21438922 | 0.00000000 | 0.00000000 | 0.00000000 |
| 2013 | 1 | 3 | 0          | 0          | 5          | 23.0       | 23.5       | 3.4        | 0.00000000 | 0.00000000 | 0.00000000 |
|      |   |   | 0.05034323 | 0.04198009 | 0.04425185 | 0.23421065 | 0.31509757 | 0.29986697 | 0.01424965 | 0.00000000 | 0.00000000 |
| 2013 | 1 | 3 | 0          | 0          | 5          | 24.0       | 24.5       | 0.32       | 0.00000000 | 0.00000000 | 0.00000000 |
|      |   |   | 0.18999225 | 0.00000000 | 0.00000000 | 0.24963505 | 0.00000000 | 0.56037269 | 0.00000000 | 0.00000000 | 0.00000000 |
| 2005 | 2 | 8 | 0          | 0          | 6          | 11.0       | 11.5       | 0.04       | 1.00000000 | 0.00000000 | 0.00000000 |
|      |   |   | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 |
| 2005 | 2 | 8 | 0          | 0          | 6          | 13.0       | 13.5       | 0.04       | 1.00000000 | 0.00000000 | 0.00000000 |
|      |   |   | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 |
| 2005 | 2 | 8 | 0          | 0          | 6          | 15.0       | 15.5       | 0.12       | 0.00000000 | 1.00000000 | 0.00000000 |
|      |   |   | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 |
| 2005 | 2 | 8 | 0          | 0          | 6          | 16.0       | 16.5       | 1.60       | 0.35000000 | 0.65000000 | 0.00000000 |
|      |   |   | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 |
| 2005 | 2 | 8 | 0          | 0          | 6          | 17.0       | 17.5       | 1.80       | 0.08888889 | 0.62222222 | 0.24444444 |
|      |   |   | 0.04444444 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 |
| 2005 | 2 | 8 | 0          | 0          | 6          | 18.0       | 18.5       | 2.40       | 0.00000000 | 0.68333333 | 0.31666667 |
|      |   |   | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 |
| 2005 | 2 | 8 | 0          | 0          | 6          | 19.0       | 19.5       | 3.24       | 0.00000000 | 0.56790123 | 0.40740741 |
|      |   |   | 0.02469136 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 |
| 2005 | 2 | 8 | 0          | 0          | 6          | 20.0       | 20.5       | 1.92       | 0.02083333 | 0.45833333 | 0.47916667 |
|      |   |   | 0.02083333 | 0.02083333 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 |
| 2005 | 2 | 8 | 0          | 0          | 6          | 21.0       | 21.5       | 0.56       | 0.00000000 | 0.50000000 | 0.42857143 |
|      |   |   | 0.00000000 | 0.07142857 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 |
| 2005 | 2 | 8 | 0          | 0          | 6          | 22.0       | 22.5       | 0.12       | 0.00000000 | 0.66666667 | 0.33333333 |
|      |   |   | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 |
| 2005 | 2 | 8 | 0          | 0          | 6          | 24.0       | 24.5       | 0.08       | 0.00000000 | 0.50000000 | 0.50000000 |
|      |   |   | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.50000000 | 0.00000000 | 0.00000000 | 0.00000000 |
| 2005 | 2 | 8 | 0          | 0          | 6          | 25.0       | 25.5       | 0.16       | 0.00000000 | 0.25000000 | 0.00000000 |
|      |   |   | 0.25000000 | 0.50000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 |
| 2005 | 2 | 8 | 0          | 0          | 6          | 26.0       | 26.5       | 0.04       | 0.00000000 | 0.00000000 | 0.00000000 |
|      |   |   | 0.00000000 | 0.00000000 | 1.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 |
| 2007 | 2 | 8 | 0          | 0          | 6          | 16.0       | 16.5       | 0.12       | 0.00000000 | 0.33333333 | 0.66666667 |
|      |   |   | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 |

|      |   |            |            |            |            |            |            |            |            |            |            |
|------|---|------------|------------|------------|------------|------------|------------|------------|------------|------------|------------|
| 2007 | 2 | 8          | 0          | 0          | 6          | 17.0       | 17.5       | 0.40       | 0.00000000 | 0.00000000 | 0.80000000 |
|      |   | 0.20000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 |
| 2007 | 2 | 8          | 0          | 0          | 6          | 18.0       | 18.5       | 0.96       | 0.00000000 | 0.08333333 | 0.70833333 |
|      |   | 0.20833333 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 |
| 2007 | 2 | 8          | 0          | 0          | 6          | 19.0       | 19.5       | 1.00       | 0.00000000 | 0.00000000 | 0.36000000 |
|      |   | 0.52000000 | 0.08000000 | 0.04000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 |
| 2007 | 2 | 8          | 0          | 0          | 6          | 20.0       | 20.5       | 2.84       | 0.00000000 | 0.00000000 | 0.16901408 |
|      |   | 0.66197183 | 0.14084507 | 0.02816901 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 |
| 2007 | 2 | 8          | 0          | 0          | 6          | 21.0       | 21.5       | 4.96       | 0.00000000 | 0.00000000 | 0.08870968 |
|      |   | 0.73387097 | 0.16935484 | 0.00806452 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 |
| 2007 | 2 | 8          | 0          | 0          | 6          | 22.0       | 22.5       | 3.40       | 0.00000000 | 0.00000000 | 0.00000000 |
|      |   | 0.77647059 | 0.21176471 | 0.01176471 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 |
| 2007 | 2 | 8          | 0          | 0          | 6          | 23.0       | 23.5       | 0.80       | 0.00000000 | 0.00000000 | 0.00000000 |
|      |   | 0.75000000 | 0.20000000 | 0.05000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 |
| 2007 | 2 | 8          | 0          | 0          | 6          | 24.0       | 24.5       | 0.24       | 0.00000000 | 0.00000000 | 0.00000000 |
|      |   | 0.50000000 | 0.50000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 |
| 2007 | 2 | 8          | 0          | 0          | 6          | 25.0       | 25.5       | 0.08       | 0.00000000 | 0.00000000 | 0.00000000 |
|      |   | 0.00000000 | 0.50000000 | 0.50000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 |
| 2009 | 2 | 8          | 0          | 0          | 6          | 12.0       | 12.5       | 0.04       | 0.00000000 | 1.00000000 | 0.00000000 |
|      |   | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 |
| 2009 | 2 | 8          | 0          | 0          | 6          | 14.0       | 14.5       | 0.04       | 0.00000000 | 1.00000000 | 0.00000000 |
|      |   | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 |
| 2009 | 2 | 8          | 0          | 0          | 6          | 15.0       | 15.5       | 0.12       | 0.00000000 | 0.66666667 | 0.33333333 |
|      |   | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 |
| 2009 | 2 | 8          | 0          | 0          | 6          | 16.0       | 16.5       | 0.24       | 0.16666667 | 0.50000000 | 0.33333333 |
|      |   | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 |
| 2009 | 2 | 8          | 0          | 0          | 6          | 17.0       | 17.5       | 0.32       | 0.00000000 | 0.62500000 | 0.37500000 |
|      |   | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 |
| 2009 | 2 | 8          | 0          | 0          | 6          | 18.0       | 18.5       | 0.16       | 0.00000000 | 0.00000000 | 0.50000000 |
|      |   | 0.50000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 |
| 2009 | 2 | 8          | 0          | 0          | 6          | 19.0       | 19.5       | 0.36       | 0.00000000 | 0.11111111 | 0.11111111 |
|      |   | 0.44444444 | 0.11111111 | 0.22222222 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 |
| 2009 | 2 | 8          | 0          | 0          | 6          | 20.0       | 20.5       | 2.72       | 0.00000000 | 0.00000000 | 0.01470588 |
|      |   | 0.39705882 | 0.42647059 | 0.16176471 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 |
| 2009 | 2 | 8          | 0          | 0          | 6          | 21.0       | 21.5       | 8.12       | 0.00000000 | 0.00000000 | 0.01970443 |
|      |   | 0.25123153 | 0.44827586 | 0.25123153 | 0.02955665 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 |
| 2009 | 2 | 8          | 0          | 0          | 6          | 22.0       | 22.5       | 9.72       | 0.00000000 | 0.00411523 | 0.01646091 |
|      |   | 0.18518519 | 0.45679012 | 0.25514403 | 0.07818930 | 0.00411523 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 |
| 2009 | 2 | 8          | 0          | 0          | 6          | 23.0       | 23.5       | 4.16       | 0.00000000 | 0.00000000 | 0.00000000 |
|      |   | 0.17307692 | 0.46153846 | 0.30769231 | 0.05769231 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 |
| 2009 | 2 | 8          | 0          | 0          | 6          | 24.0       | 24.5       | 0.96       | 0.00000000 | 0.00000000 | 0.00000000 |
|      |   | 0.12500000 | 0.37500000 | 0.41666667 | 0.04166667 | 0.04166667 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 |
| 2009 | 2 | 8          | 0          | 0          | 6          | 25.0       | 25.5       | 0.08       | 0.00000000 | 0.00000000 | 0.00000000 |
|      |   | 0.50000000 | 0.00000000 | 0.50000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 |
| 2009 | 2 | 8          | 0          | 0          | 6          | 26.0       | 26.5       | 0.16       | 0.00000000 | 0.00000000 | 0.00000000 |
|      |   | 0.00000000 | 0.50000000 | 0.00000000 | 0.25000000 | 0.25000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 |
| 2010 | 2 | 8          | 0          | 0          | 6          | 14.0       | 14.5       | 0.08       | 0.00000000 | 0.50000000 | 0.50000000 |
|      |   | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 |
| 2010 | 2 | 8          | 0          | 0          | 6          | 15.0       | 15.5       | 0.12       | 0.33333333 | 0.33333333 | 0.33333333 |
|      |   | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 |
| 2010 | 2 | 8          | 0          | 0          | 6          | 16.0       | 16.5       | 1.28       | 0.00000000 | 0.65625000 | 0.31250000 |
|      |   | 0.03125000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 |
| 2010 | 2 | 8          | 0          | 0          | 6          | 17.0       | 17.5       | 3.76       | 0.01063830 | 0.51063830 | 0.42553191 |
|      |   | 0.04255319 | 0.01063830 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 |
| 2010 | 2 | 8          | 0          | 0          | 6          | 18.0       | 18.5       | 5.60       | 0.02142857 | 0.37142857 | 0.50000000 |
|      |   | 0.10000000 | 0.00714286 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 |
| 2010 | 2 | 8          | 0          | 0          | 6          | 19.0       | 19.5       | 2.24       | 0.00000000 | 0.23214286 | 0.50000000 |
|      |   | 0.25000000 | 0.01785714 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 |
| 2010 | 2 | 8          | 0          | 0          | 6          | 20.0       | 20.5       | 0.48       | 0.00000000 | 0.00000000 | 0.75000000 |
|      |   | 0.25000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 |
| 2010 | 2 | 8          | 0          | 0          | 6          | 21.0       | 21.5       | 1.56       | 0.00000000 | 0.00000000 | 0.05128205 |
|      |   | 0.25641026 | 0.33333333 | 0.28205128 | 0.07692308 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 |
| 2010 | 2 | 8          | 0          | 0          | 6          | 22.0       | 22.5       | 4.92       | 0.00000000 | 0.00000000 | 0.04878049 |
|      |   | 0.15447154 | 0.36585366 | 0.27642276 | 0.12195122 | 0.03252033 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 |
| 2010 | 2 | 8          | 0          | 0          | 6          | 23.0       | 23.5       | 4.16       | 0.00000000 | 0.00961538 | 0.03846154 |
|      |   | 0.17307692 | 0.33653846 | 0.32692308 | 0.09615385 | 0.01923077 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 |
| 2010 | 2 | 8          | 0          | 0          | 6          | 24.0       | 24.5       | 0.84       | 0.00000000 | 0.00000000 | 0.00000000 |
|      |   | 0.04761905 | 0.52380952 | 0.23809524 | 0.19047619 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 |
| 2010 | 2 | 8          | 0          | 0          | 6          | 25.0       | 25.5       | 0.28       | 0.00000000 | 0.00000000 | 0.00000000 |
|      |   | 0.00000000 | 0.28571429 | 0.42857143 | 0.28571429 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 |
| 2010 | 2 | 8          | 0          | 0          | 6          | 26.0       | 26.5       | 0.16       | 0.00000000 | 0.00000000 | 0.00000000 |
|      |   | 0.00000000 | 0.75000000 | 0.00000000 | 0.25000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 |
| 2011 | 2 | 8          | 0          | 0          | 6          | 17.0       | 17.5       | 0.04       | 0.00000000 | 1.00000000 | 0.00000000 |
|      |   | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 |

|      |   |   |   |   |   |      |      |      |            |            |            |
|------|---|---|---|---|---|------|------|------|------------|------------|------------|
| 2011 | 2 | 8 | 0 | 0 | 6 | 18.0 | 18.5 | 0.08 | 0.00000000 | 0.50000000 | 0.50000000 |
|      |   |   |   |   |   |      |      |      | 0.00000000 | 0.00000000 | 0.00000000 |
| 2011 | 2 | 8 | 0 | 0 | 6 | 19.0 | 19.5 | 1.84 | 0.00000000 | 0.17391304 | 0.58695652 |
|      |   |   |   |   |   |      |      |      | 0.00000000 | 0.00000000 | 0.00000000 |
| 2011 | 2 | 8 | 0 | 0 | 6 | 20.0 | 20.5 | 3.20 | 0.00000000 | 0.13750000 | 0.62500000 |
|      |   |   |   |   |   |      |      |      | 0.00000000 | 0.00000000 | 0.00000000 |
| 2011 | 2 | 8 | 0 | 0 | 6 | 21.0 | 21.5 | 2.00 | 0.00000000 | 0.16000000 | 0.40000000 |
|      |   |   |   |   |   |      |      |      | 0.00000000 | 0.00000000 | 0.00000000 |
| 2011 | 2 | 8 | 0 | 0 | 6 | 22.0 | 22.5 | 1.60 | 0.00000000 | 0.00000000 | 0.27500000 |
|      |   |   |   |   |   |      |      |      | 0.02500000 | 0.00000000 | 0.00000000 |
| 2011 | 2 | 8 | 0 | 0 | 6 | 23.0 | 23.5 | 3.72 | 0.00000000 | 0.00000000 | 0.03225806 |
|      |   |   |   |   |   |      |      |      | 0.05376344 | 0.00000000 | 0.00000000 |
| 2011 | 2 | 8 | 0 | 0 | 6 | 24.0 | 24.5 | 1.56 | 0.00000000 | 0.00000000 | 0.02564103 |
|      |   |   |   |   |   |      |      |      | 0.00000000 | 0.00000000 | 0.00000000 |
| 2011 | 2 | 8 | 0 | 0 | 6 | 25.0 | 25.5 | 0.24 | 0.00000000 | 0.00000000 | 0.16666667 |
|      |   |   |   |   |   |      |      |      | 0.33333333 | 0.00000000 | 0.00000000 |
| 2011 | 2 | 8 | 0 | 0 | 6 | 26.0 | 26.5 | 0.04 | 0.00000000 | 0.00000000 | 0.00000000 |
|      |   |   |   |   |   |      |      |      | 0.00000000 | 0.00000000 | 0.00000000 |
| 2012 | 2 | 8 | 0 | 0 | 6 | 18.0 | 18.5 | 0.12 | 0.00000000 | 0.33333333 | 0.33333333 |
|      |   |   |   |   |   |      |      |      | 0.00000000 | 0.00000000 | 0.00000000 |
| 2012 | 2 | 8 | 0 | 0 | 6 | 20.0 | 20.5 | 0.84 | 0.00000000 | 0.00000000 | 0.47619048 |
|      |   |   |   |   |   |      |      |      | 0.00000000 | 0.00000000 | 0.00000000 |
| 2012 | 2 | 8 | 0 | 0 | 6 | 21.0 | 21.5 | 3.12 | 0.00000000 | 0.00000000 | 0.20512821 |
|      |   |   |   |   |   |      |      |      | 0.05128205 | 0.00000000 | 0.00000000 |
| 2012 | 2 | 8 | 0 | 0 | 6 | 22.0 | 22.5 | 2.64 | 0.00000000 | 0.00000000 | 0.25757576 |
|      |   |   |   |   |   |      |      |      | 0.01515152 | 0.01515152 | 0.00000000 |
| 2012 | 2 | 8 | 0 | 0 | 6 | 23.0 | 23.5 | 1.04 | 0.00000000 | 0.00000000 | 0.03846154 |
|      |   |   |   |   |   |      |      |      | 0.30769231 | 0.15384615 | 0.00000000 |
| 2012 | 2 | 8 | 0 | 0 | 6 | 24.0 | 24.5 | 0.76 | 0.00000000 | 0.00000000 | 0.00000000 |
|      |   |   |   |   |   |      |      |      | 0.26315789 | 0.15789474 | 0.00000000 |
| 2012 | 2 | 8 | 0 | 0 | 6 | 25.0 | 25.5 | 0.12 | 0.00000000 | 0.00000000 | 0.00000000 |
|      |   |   |   |   |   |      |      |      | 0.66666667 | 0.00000000 | 0.00000000 |
| 2008 | 1 | 9 | 0 | 0 | 6 | 9.0  | 9.5  | 0.40 | 1.00000000 | 0.00000000 | 0.00000000 |
|      |   |   |   |   |   |      |      |      | 0.00000000 | 0.00000000 | 0.00000000 |
| 2008 | 1 | 9 | 0 | 0 | 6 | 10.0 | 10.5 | 0.52 | 1.00000000 | 0.00000000 | 0.00000000 |
|      |   |   |   |   |   |      |      |      | 0.00000000 | 0.00000000 | 0.00000000 |
| 2008 | 1 | 9 | 0 | 0 | 6 | 11.0 | 11.5 | 0.16 | 1.00000000 | 0.00000000 | 0.00000000 |
|      |   |   |   |   |   |      |      |      | 0.00000000 | 0.00000000 | 0.00000000 |
| 2008 | 1 | 9 | 0 | 0 | 6 | 16.0 | 16.5 | 0.16 | 0.00000000 | 0.00000000 | 0.75000000 |
|      |   |   |   |   |   |      |      |      | 0.00000000 | 0.00000000 | 0.00000000 |
| 2008 | 1 | 9 | 0 | 0 | 6 | 17.0 | 17.5 | 0.48 | 0.00000000 | 0.00000000 | 0.41666667 |
|      |   |   |   |   |   |      |      |      | 0.00000000 | 0.00000000 | 0.00000000 |
| 2008 | 1 | 9 | 0 | 0 | 6 | 18.0 | 18.5 | 0.88 | 0.00000000 | 0.00000000 | 0.27272727 |
|      |   |   |   |   |   |      |      |      | 0.00000000 | 0.00000000 | 0.00000000 |
| 2008 | 1 | 9 | 0 | 0 | 6 | 19.0 | 19.5 | 4.76 | 0.00000000 | 0.00840336 | 0.25210084 |
|      |   |   |   |   |   |      |      |      | 0.00000000 | 0.00000000 | 0.00000000 |
| 2008 | 1 | 9 | 0 | 0 | 6 | 20.0 | 20.5 | 7.60 | 0.00000000 | 0.00526316 | 0.11578947 |
|      |   |   |   |   |   |      |      |      | 0.00000000 | 0.00000000 | 0.00000000 |
| 2008 | 1 | 9 | 0 | 0 | 6 | 21.0 | 21.5 | 9.32 | 0.00000000 | 0.00000000 | 0.05150215 |
|      |   |   |   |   |   |      |      |      | 0.00000000 | 0.00000000 | 0.00000000 |
| 2008 | 1 | 9 | 0 | 0 | 6 | 22.0 | 22.5 | 3.52 | 0.00000000 | 0.00000000 | 0.03409091 |
|      |   |   |   |   |   |      |      |      | 0.00000000 | 0.00000000 | 0.00000000 |
| 2008 | 1 | 9 | 0 | 0 | 6 | 23.0 | 23.5 | 0.68 | 0.00000000 | 0.00000000 | 0.00000000 |
|      |   |   |   |   |   |      |      |      | 0.00000000 | 0.00000000 | 0.00000000 |
| 2008 | 1 | 9 | 0 | 0 | 6 | 24.0 | 24.5 | 0.32 | 0.00000000 | 0.00000000 | 0.12500000 |
|      |   |   |   |   |   |      |      |      | 0.00000000 | 0.00000000 | 0.00000000 |
| 2008 | 1 | 9 | 0 | 0 | 6 | 25.0 | 25.5 | 0.08 | 0.00000000 | 0.00000000 | 0.00000000 |
|      |   |   |   |   |   |      |      |      | 0.00000000 | 0.00000000 | 0.00000000 |
| 2012 | 1 | 9 | 0 | 0 | 6 | 17.0 | 17.5 | 0.04 | 0.00000000 | 0.00000000 | 1.00000000 |
|      |   |   |   |   |   |      |      |      | 0.00000000 | 0.00000000 | 0.00000000 |
| 2012 | 1 | 9 | 0 | 0 | 6 | 19.0 | 19.5 | 0.80 | 0.00000000 | 0.10000000 | 0.45000000 |
|      |   |   |   |   |   |      |      |      | 0.00000000 | 0.00000000 | 0.00000000 |
| 2012 | 1 | 9 | 0 | 0 | 6 | 20.0 | 20.5 | 6.80 | 0.00000000 | 0.03529412 | 0.44705882 |
|      |   |   |   |   |   |      |      |      | 0.00000000 | 0.00000000 | 0.00000000 |
| 2012 | 1 | 9 | 0 | 0 | 6 | 21.0 | 21.5 | 8.12 | 0.00000000 | 0.00492611 | 0.28571429 |
|      |   |   |   |   |   |      |      |      | 0.02955665 | 0.00000000 | 0.00000000 |
| 2012 | 1 | 9 | 0 | 0 | 6 | 22.0 | 22.5 | 3.04 | 0.00000000 | 0.00000000 | 0.07894737 |
|      |   |   |   |   |   |      |      |      | 0.10526316 | 0.02631579 | 0.00000000 |
| 2012 | 1 | 9 | 0 | 0 | 6 | 23.0 | 23.5 | 2.40 | 0.00000000 | 0.00000000 | 0.00000000 |
|      |   |   |   |   |   |      |      |      | 0.23333333 | 0.10000000 | 0.00000000 |
| 2012 | 1 | 9 | 0 | 0 | 6 | 24.0 | 24.5 | 1.28 | 0.00000000 | 0.00000000 | 0.00000000 |
|      |   |   |   |   |   |      |      |      | 0.21875000 | 0.25000000 | 0.00000000 |
| 2012 | 1 | 9 | 0 | 0 | 6 | 25.0 | 25.5 | 0.40 | 0.00000000 | 0.00000000 | 0.00000000 |
|      |   |   |   |   |   |      |      |      | 0.50000000 | 0.30000000 | 0.00000000 |

|      |   |            |            |            |            |            |            |            |            |            |            |
|------|---|------------|------------|------------|------------|------------|------------|------------|------------|------------|------------|
| 2013 | 1 | 9          | 0          | 0          | 6          | 20.0       | 20.5       | 0.16       | 0.00000000 | 0.00000000 | 0.00000000 |
|      |   | 0.75000000 | 0.25000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 |
| 2013 | 1 | 9          | 0          | 0          | 6          | 21.0       | 21.5       | 3.40       | 0.00000000 | 0.00000000 | 0.35294118 |
|      |   | 0.51764706 | 0.11764706 | 0.00000000 | 0.01176471 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 |
| 2013 | 1 | 9          | 0          | 0          | 6          | 22.0       | 22.5       | 6.00       | 0.00000000 | 0.00000000 | 0.32666667 |
|      |   | 0.52000000 | 0.12666667 | 0.01333333 | 0.00666667 | 0.00666667 | 0.00666667 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 |
| 2013 | 1 | 9          | 0          | 0          | 6          | 23.0       | 23.5       | 3.24       | 0.00000000 | 0.00000000 | 0.22222222 |
|      |   | 0.43209877 | 0.11111111 | 0.14814815 | 0.04938272 | 0.01234568 | 0.02469136 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 |
| 2013 | 1 | 9          | 0          | 0          | 6          | 24.0       | 24.5       | 1.08       | 0.00000000 | 0.00000000 | 0.00000000 |
|      |   | 0.07407407 | 0.03703704 | 0.37037037 | 0.37037037 | 0.03703704 | 0.11111111 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 |
| 2013 | 1 | 9          | 0          | 0          | 6          | 25.0       | 25.5       | 0.28       | 0.00000000 | 0.00000000 | 0.00000000 |
|      |   | 0.00000000 | 0.00000000 | 0.14285714 | 0.57142857 | 0.14285714 | 0.14285714 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 |
| 1993 | 1 | -1         | 0          | 0          | 1          | 9.0        | 28.0       | 2.72       | 0.00000000 | 0.00000000 | 0.11764706 |
|      |   | 0.76470588 | 0.10294118 | 0.01470588 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 |
| 1994 | 1 | -1         | 0          | 0          | 1          | 9.0        | 28.0       | 11.76      | 0.02233392 | 0.46921325 | 0.31997955 |
|      |   | 0.15950127 | 0.02897201 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 |
| 1995 | 1 | -1         | 0          | 0          | 1          | 9.0        | 28.0       | 4.76       | 0.11764706 | 0.56302521 | 0.25210084 |
|      |   | 0.06722689 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 |
| 1996 | 1 | -1         | 0          | 0          | 1          | 9.0        | 28.0       | 89.28      | 0.00000000 | 0.05567822 | 0.57869148 |
|      |   | 0.31936116 | 0.04119642 | 0.00460375 | 0.00000000 | 0.00046897 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 |
| 1997 | 1 | -1         | 0          | 0          | 1          | 9.0        | 28.0       | 54.92      | 0.00393055 | 0.41526377 | 0.48143507 |
|      |   | 0.08999595 | 0.00760341 | 0.00177125 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 |
| 1998 | 1 | -1         | 0          | 0          | 1          | 9.0        | 28.0       | 75.32      | 0.08752419 | 0.65178011 | 0.20556040 |
|      |   | 0.02738368 | 0.02185746 | 0.00530475 | 0.00058942 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 |
| 1999 | 1 | -1         | 0          | 0          | 1          | 9.0        | 28.0       | 6.96       | 0.12068966 | 0.51724138 | 0.35632184 |
|      |   | 0.00574713 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 |
| 2000 | 1 | -1         | 0          | 0          | 1          | 9.0        | 28.0       | 22.64      | 0.05612282 | 0.21594669 | 0.47409550 |
|      |   | 0.23739199 | 0.01419224 | 0.00225076 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 |
| 2001 | 1 | -1         | 0          | 0          | 1          | 9.0        | 28.0       | 37.24      | 0.19498424 | 0.24032396 | 0.10821490 |
|      |   | 0.29193947 | 0.11194383 | 0.03989310 | 0.00899338 | 0.00370711 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 |
| 2002 | 1 | -1         | 0          | 0          | 1          | 9.0        | 28.0       | 30.32      | 0.17079894 | 0.53308456 | 0.23318285 |
|      |   | 0.04302452 | 0.01864624 | 0.00126289 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 |
| 2003 | 1 | -1         | 0          | 0          | 1          | 9.0        | 28.0       | 17.76      | 0.56513500 | 0.22899483 | 0.18990839 |
|      |   | 0.01273176 | 0.00323001 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 |
| 2004 | 1 | -1         | 0          | 0          | 1          | 9.0        | 28.0       | 33.52      | 0.00300111 | 0.90375628 | 0.06959324 |
|      |   | 0.00743078 | 0.01147566 | 0.00000000 | 0.00474293 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 |
| 2005 | 1 | -1         | 0          | 0          | 1          | 9.0        | 28.0       | 35.24      | 0.09102697 | 0.26552164 | 0.59466314 |
|      |   | 0.04284618 | 0.00412282 | 0.00121284 | 0.00060642 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 |
| 2006 | 1 | -1         | 0          | 0          | 1          | 9.0        | 28.0       | 69.76      | 0.00908783 | 0.64539166 | 0.30295669 |
|      |   | 0.04256381 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 |
| 2007 | 1 | -1         | 0          | 0          | 2          | 9.0        | 28.0       | 86.00      | 0.01357889 | 0.16055166 | 0.64593872 |
|      |   | 0.17061145 | 0.00931929 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 |
| 2008 | 1 | -1         | 0          | 0          | 3          | 9.0        | 28.0       | 30.84      | 0.06153622 | 0.26350954 | 0.58776778 |
|      |   | 0.07218948 | 0.01499698 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 |
| 2009 | 1 | -1         | 0          | 0          | 3          | 9.0        | 28.0       | 22.88      | 0.00349661 | 0.21120316 | 0.63114846 |
|      |   | 0.14041369 | 0.01373808 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 |
| 2010 | 1 | -1         | 0          | 0          | 4          | 9.0        | 28.0       | 12.68      | 0.01577287 | 0.79179811 | 0.16719243 |
|      |   | 0.02523659 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 |
| 2011 | 1 | -1         | 0          | 0          | 4          | 9.0        | 28.0       | 21.64      | 0.00000000 | 0.32278273 | 0.47187076 |
|      |   | 0.19905465 | 0.00629186 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 |
| 2012 | 1 | -1         | 0          | 0          | 4          | 9.0        | 28.0       | 22.32      | 0.00335775 | 0.10053293 | 0.44773547 |
|      |   | 0.37325638 | 0.05790999 | 0.01147166 | 0.00573583 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 |
| 2013 | 1 | -1         | 0          | 0          | 4          | 9.0        | 28.0       | 15.84      | 0.01132400 | 0.02443363 | 0.25675788 |
|      |   | 0.29354382 | 0.33484537 | 0.04608165 | 0.01688430 | 0.00806468 | 0.00806468 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 |
| 1993 | 2 | -2         | 0          | 0          | 1          | 9.0        | 28.0       | 30.44      | 0.21106902 | 0.38434172 | 0.30704382 |
|      |   | 0.06010656 | 0.02088125 | 0.01089044 | 0.00566720 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 |
| 1994 | 2 | -2         | 0          | 0          | 1          | 9.0        | 28.0       | 120.96     | 0.36945499 | 0.45924059 | 0.11019804 |
|      |   | 0.05280057 | 0.00706495 | 0.00093579 | 0.00030505 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 |
| 1995 | 2 | -2         | 0          | 0          | 1          | 9.0        | 28.0       | 58.84      | 0.24589769 | 0.44769841 | 0.28115147 |
|      |   | 0.02299743 | 0.00194198 | 0.00031302 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 |
| 1996 | 2 | -2         | 0          | 0          | 1          | 9.0        | 28.0       | 45.92      | 0.29892120 | 0.35526509 | 0.28407353 |
|      |   | 0.05385728 | 0.00380762 | 0.00407529 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 |
| 1997 | 2 | -2         | 0          | 0          | 1          | 9.0        | 28.0       | 47.44      | 0.16769604 | 0.44927048 | 0.17462436 |
|      |   | 0.14077280 | 0.05754727 | 0.00731508 | 0.00277398 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 |
| 1998 | 2 | -2         | 0          | 0          | 1          | 9.0        | 28.0       | 72.48      | 0.26761762 | 0.27815789 | 0.21604073 |
|      |   | 0.02580353 | 0.00936489 | 0.00301533 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 |
| 1999 | 2 | -2         | 0          | 0          | 1          | 9.0        | 28.0       | 55.32      | 0.27314763 | 0.51943459 | 0.18108008 |
|      |   | 0.01831521 | 0.00686090 | 0.00095133 | 0.00021026 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 |
| 2000 | 2 | -2         | 0          | 0          | 1          | 9.0        | 28.0       | 48.04      | 0.27341328 | 0.37293108 | 0.27881477 |
|      |   | 0.06382949 | 0.01091465 | 0.00000000 | 0.00000000 | 0.00009674 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 |
| 2001 | 2 | -2         | 0          | 0          | 1          | 9.0        | 28.0       | 71.04      | 0.67276346 | 0.18270578 | 0.09872123 |
|      |   | 0.03669650 | 0.00653717 | 0.00257586 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 | 0.00000000 |
| 2002 | 2 | -2         | 0          | 0          | 1          | 9.0        | 28.0       | 76.48      | 0.18899176 | 0.59397851 | 0.16841782 |
|      |   | 0.03741263 | 0.00773647 | 0.00329546 | 0.00008367 | 0.00000000 | 0.00008367 | 0.00000000 | 0.00008367 | 0.00000000 | 0.00000000 |

|                             |        |              |            |            |            |       |                         |            |            |               |            |      |      |
|-----------------------------|--------|--------------|------------|------------|------------|-------|-------------------------|------------|------------|---------------|------------|------|------|
| 2003                        | 2      | -2           | 0          | 0          | 1          | 9.0   | 28.0                    | 74.64      | 0.83351604 | 0.04116990    | 0.06930792 |      |      |
|                             |        |              | 0.03300254 | 0.01468797 | 0.00389736 |       | 0.00353461              | 0.00088365 | 0.00000000 | 0.00000000    | 0.00000000 |      |      |
| 2004                        | 2      | -2           | 0          | 0          | 1          | 9.0   | 28.0                    | 59.16      | 0.04238489 | 0.87005119    | 0.07242785 |      |      |
|                             |        |              | 0.01265237 | 0.00145970 | 0.00102400 |       | 0.00000000              | 0.00000000 | 0.00000000 | 0.00000000    | 0.00000000 |      |      |
| 2005                        | 2      | -2           | 0          | 0          | 1          | 9.0   | 28.0                    | 89.04      | 0.53994582 | 0.36702223    | 0.08416083 |      |      |
|                             |        |              | 0.00500806 | 0.00132284 | 0.00090732 |       | 0.00072560              | 0.00045366 | 0.00045366 | 0.00000000    | 0.00000000 |      |      |
| 2006                        | 2      | -2           | 0          | 0          | 1          | 9.0   | 28.0                    | 105.16     | 0.20172661 | 0.63015996    | 0.15000726 |      |      |
|                             |        |              | 0.01740041 | 0.00070577 | 0.00000000 |       | 0.00000000              | 0.00000000 | 0.00000000 | 0.00000000    | 0.00000000 |      |      |
| 2007                        | 2      | -2           | 0          | 0          | 2          | 9.0   | 28.0                    | 67.44      | 0.42021952 | 0.43386305    | 0.10589809 |      |      |
|                             |        |              | 0.03396340 | 0.00544372 | 0.00061223 |       | 0.00000000              | 0.00000000 | 0.00000000 | 0.00000000    | 0.00000000 |      |      |
| 2008                        | 2      | -2           | 0          | 0          | 3          | 9.0   | 28.0                    | 39.76      | 0.19862191 | 0.52834154    | 0.21532639 |      |      |
|                             |        |              | 0.05558720 | 0.00212296 | 0.00000000 |       | 0.00000000              | 0.00000000 | 0.00000000 | 0.00000000    | 0.00000000 |      |      |
| 2009                        | 2      | -2           | 0          | 0          | 3          | 9.0   | 28.0                    | 98.08      | 0.44090117 | 0.44149224    | 0.11209083 |      |      |
|                             |        |              | 0.00372405 | 0.00179171 | 0.00000000 |       | 0.00000000              | 0.00000000 | 0.00000000 | 0.00000000    | 0.00000000 |      |      |
| 2010                        | 2      | -2           | 0          | 0          | 4          | 9.0   | 28.0                    | 31.40      | 0.50304830 | 0.32470002    | 0.01757707 |      |      |
|                             |        |              | 0.02625377 | 0.05345083 | 0.06594583 |       | 0.00763583              | 0.00069417 | 0.00069417 | 0.00000000    | 0.00000000 |      |      |
| 2011                        | 2      | -2           | 0          | 0          | 4          | 9.0   | 28.0                    | 54.88      | 0.20910019 | 0.35249163    | 0.22419952 |      |      |
|                             |        |              | 0.08833225 | 0.04648802 | 0.03648118 |       | 0.03009719              | 0.01083858 | 0.00197145 | 0.00000000    | 0.00000000 |      |      |
| 2012                        | 2      | -2           | 0          | 0          | 4          | 9.0   | 28.0                    | 8.92       | 0.01286056 | 0.18465132    | 0.56709595 |      |      |
|                             |        |              | 0.19900628 | 0.03408414 | 0.00153450 |       | 0.00076725              | 0.00000000 | 0.00000000 | 0.00000000    | 0.00000000 |      |      |
| 1999                        | 1      | -3           | 0          | 0          | 5          | 9.0   | 28.0                    | 2.96       | 0.00000000 | 0.00000000    | 0.59151581 |      |      |
|                             |        |              | 0.20074375 | 0.04758623 | 0.12952271 |       | 0.03063150              | 0.00000000 | 0.00000000 | 0.00000000    | 0.00000000 |      |      |
| 2000                        | 1      | -3           | 0          | 0          | 5          | 9.0   | 28.0                    | 66.64      | 0.00000000 | 0.00661920    | 0.20664268 |      |      |
|                             |        |              | 0.39154056 | 0.21333728 | 0.10964756 |       | 0.05159158              | 0.01292370 | 0.00769745 | 0.00000000    | 0.00000000 |      |      |
| 2001                        | 1      | -3           | 0          | 0          | 5          | 9.0   | 28.0                    | 81.28      | 0.00000000 | 0.01319829    | 0.09882524 |      |      |
|                             |        |              | 0.43321579 | 0.28807345 | 0.09650734 |       | 0.05247704              | 0.01444472 | 0.00325813 | 0.00000000    | 0.00000000 |      |      |
| 2002                        | 1      | -3           | 0          | 0          | 5          | 9.0   | 28.0                    | 110.32     | 0.00000000 | 0.00376606    | 0.02888569 |      |      |
|                             |        |              | 0.14173143 | 0.37497785 | 0.24597782 |       | 0.11747427              | 0.05690067 | 0.02950284 | 0.00078337    | 0.00078337 |      |      |
| 2003                        | 1      | -3           | 0          | 0          | 5          | 9.0   | 28.0                    | 92.32      | 0.00000000 | 0.02102307    | 0.16425121 |      |      |
|                             |        |              | 0.15811910 | 0.10310171 | 0.18273199 |       | 0.16023280              | 0.09892235 | 0.09975931 | 0.01185845    | 0.01185845 |      |      |
| 2004                        | 1      | -3           | 0          | 0          | 5          | 9.0   | 28.0                    | 66.56      | 0.00000000 | 0.18029041    | 0.09935404 |      |      |
|                             |        |              | 0.14911095 | 0.11148963 | 0.14727065 |       | 0.15776410              | 0.06809703 | 0.07147469 | 0.01514850    | 0.01514850 |      |      |
| 2005                        | 1      | -3           | 0          | 0          | 5          | 9.0   | 28.0                    | 40.84      | 0.00000000 | 0.01355483    | 0.68729690 |      |      |
|                             |        |              | 0.14494663 | 0.04909713 | 0.02077143 |       | 0.01635392              | 0.01781254 | 0.03540648 | 0.01476013    | 0.01476013 |      |      |
| 2006                        | 1      | -3           | 0          | 0          | 5          | 9.0   | 28.0                    | 26.92      | 0.00000000 | 0.00000000    | 0.01497099 |      |      |
|                             |        |              | 0.60873284 | 0.20905176 | 0.07984672 |       | 0.04903877              | 0.00985519 | 0.02477402 | 0.00372971    | 0.00372971 |      |      |
| 2007                        | 1      | -3           | 0          | 0          | 5          | 9.0   | 28.0                    | 89.40      | 0.00000000 | 0.00000000    | 0.03684181 |      |      |
|                             |        |              | 0.45391632 | 0.40243125 | 0.08105161 |       | 0.01657055              | 0.00464352 | 0.00366742 | 0.00087752    | 0.00087752 |      |      |
| 2008                        | 1      | -3           | 0          | 0          | 5          | 9.0   | 28.0                    | 94.00      | 0.00000000 | 0.00000000    | 0.00238411 |      |      |
|                             |        |              | 0.12188750 | 0.50241139 | 0.30400027 |       | 0.05113905              | 0.01114247 | 0.00703520 | 0.00000000    | 0.00000000 |      |      |
| 2009                        | 1      | -3           | 0          | 0          | 5          | 9.0   | 28.0                    | 93.24      | 0.00000000 | 0.00000000    | 0.00497725 |      |      |
|                             |        |              | 0.03834955 | 0.30673956 | 0.39095629 |       | 0.20858215              | 0.04278986 | 0.00760533 | 0.00000000    | 0.00000000 |      |      |
| 2010                        | 1      | -3           | 0          | 0          | 5          | 9.0   | 28.0                    | 33.76      | 0.00000000 | 0.00000000    | 0.00486375 |      |      |
|                             |        |              | 0.03556323 | 0.20782114 | 0.39064640 |       | 0.24531203              | 0.09814472 | 0.01764872 | 0.00000000    | 0.00000000 |      |      |
| 2011                        | 1      | -3           | 0          | 0          | 5          | 9.0   | 28.0                    | 42.88      | 0.00000000 | 0.00357123    | 0.03311394 |      |      |
|                             |        |              | 0.04935194 | 0.12486830 | 0.30299646 |       | 0.28571874              | 0.16388915 | 0.03649023 | 0.00000000    | 0.00000000 |      |      |
| 2012                        | 1      | -3           | 0          | 0          | 5          | 9.0   | 28.0                    | 118.24     | 0.00000000 | 0.00058319    | 0.34026869 |      |      |
|                             |        |              | 0.21053451 | 0.06934004 | 0.04548403 |       | 0.07671303              | 0.10090398 | 0.15072623 | 0.00544631    | 0.00544631 |      |      |
| 2013                        | 1      | -3           | 0          | 0          | 5          | 9.0   | 28.0                    | 136.32     | 0.00000000 | 0.00000000    | 0.06121362 |      |      |
|                             |        |              | 0.57620490 | 0.17484725 | 0.04635577 |       | 0.03963695              | 0.04575317 | 0.05567494 | 0.00031340    | 0.00031340 |      |      |
| 2005                        | 2      | -8           | 0          | 0          | 6          | 9.0   | 28.0                    | 12.12      | 0.06930693 | 0.58085809    | 0.31023102 |      |      |
|                             |        |              | 0.01980198 | 0.01320132 | 0.00330033 |       | 0.00000000              | 0.00000000 | 0.00330033 | 0.00000000    | 0.00000000 |      |      |
| 2007                        | 2      | -8           | 0          | 0          | 6          | 9.0   | 28.0                    | 14.80      | 0.00000000 | 0.00810811    | 0.15945946 |      |      |
|                             |        |              | 0.65405405 | 0.15945946 | 0.01891892 |       | 0.00000000              | 0.00000000 | 0.00000000 | 0.00000000    | 0.00000000 |      |      |
| 2009                        | 2      | -8           | 0          | 0          | 6          | 9.0   | 28.0                    | 27.20      | 0.00147059 | 0.02058824    | 0.02647059 |      |      |
|                             |        |              | 0.22205882 | 0.42794118 | 0.24852941 |       | 0.04852941              | 0.00441176 | 0.00000000 | 0.00000000    | 0.00000000 |      |      |
| 2010                        | 2      | -8           | 0          | 0          | 6          | 9.0   | 28.0                    | 25.48      | 0.00784929 | 0.21507064    | 0.26844584 |      |      |
|                             |        |              | 0.13186813 | 0.17582418 | 0.13657771 |       | 0.05494505              | 0.00941915 | 0.00000000 | 0.00000000    | 0.00000000 |      |      |
| 2011                        | 2      | -8           | 0          | 0          | 6          | 9.0   | 28.0                    | 14.32      | 0.00000000 | 0.08100559    | 0.31843575 |      |      |
|                             |        |              | 0.16759777 | 0.18435754 | 0.13687151 |       | 0.09497207              | 0.01675978 | 0.00000000 | 0.00000000    | 0.00000000 |      |      |
| 2012                        | 2      | -8           | 0          | 0          | 6          | 9.0   | 28.0                    | 8.64       | 0.00000000 | 0.00462963    | 0.20833333 |      |      |
|                             |        |              | 0.43518519 | 0.13888889 | 0.06018519 |       | 0.07407407              | 0.04166667 | 0.03703704 | 0.00000000    | 0.00000000 |      |      |
| 2008                        | 1      | -9           | 0          | 0          | 6          | 9.0   | 28.0                    | 28.88      | 0.03739612 | 0.00277008    | 0.11357341 |      |      |
|                             |        |              | 0.43628809 | 0.38919668 | 0.02077562 |       | 0.00000000              | 0.00000000 | 0.00000000 | 0.00000000    | 0.00000000 |      |      |
| 2012                        | 1      | -9           | 0          | 0          | 6          | 9.0   | 28.0                    | 22.88      | 0.00000000 | 0.01573427    | 0.26223776 |      |      |
|                             |        |              | 0.30419580 | 0.14160839 | 0.10489510 |       | 0.06818182              | 0.06993007 | 0.03321678 | 0.00000000    | 0.00000000 |      |      |
| 2013                        | 1      | -9           | 0          | 0          | 6          | 9.0   | 28.0                    | 14.16      | 0.00000000 | 0.00000000    | 0.27401130 |      |      |
|                             |        |              | 0.45762712 | 0.11299435 | 0.07062147 |       | 0.05649718              | 0.01129944 | 0.01694915 | 0.00000000    | 0.00000000 |      |      |
| 65 # N_mean size-at-age_obs |        |              |            |            |            |       |                         |            |            |               |            |      |      |
| # Year                      | Season | Fleet/Survey | Gender     | Part       | Ageerr     | Nsamp | datavector(female-male) |            | Nfish      | (female-male) |            |      |      |
| 1993                        | 1      | 1            | 0          | 0          | 1          | 2.72  | -1.0                    | -1.0       | 18.0       | 18.8          | 19.3       | -1.0 | -1.0 |
|                             |        | -1.0         | -1.0       | 0.00       | 0.00       | 0.32  | 2.08                    | 0.00       | 0.00       | 0.00          | 0.00       | 0.00 | 0.00 |
| 1994                        | 1      | 1            | 0          | 0          | 1          | 11.76 | 17.8                    | -1.0       | 18.4       | 18.9          | 19.0       | -1.0 | -1.0 |
|                             |        | -1.0         | -1.0       | 0.32       | 0.00       | 3.80  | 2.00                    | 0.32       | 0.00       | 0.00          | 0.00       | 0.00 | 0.00 |

|      |      |      |       |       |       |        |      |      |      |      |      |      |      |      |
|------|------|------|-------|-------|-------|--------|------|------|------|------|------|------|------|------|
| 1995 | 1    | 1    | 0     | 0     | 1     | 4.76   | 15.0 | 16.5 | 16.9 | 17.7 | -1.0 | -1.0 | -1.0 | -1.0 |
|      | -1.0 | -1.0 | 0.56  | 2.68  | 1.20  | 0.32   | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 1996 | 1    | 1    | 0     | 0     | 1     | 89.28  | -1.0 | 17.5 | 18.5 | 19.2 | 19.6 | 20.2 | -1.0 | 26.6 |
|      | -1.0 | -1.0 | 0.00  | 5.12  | 52.28 | 27.72  | 3.68 | 0.44 | 0.00 | 0.04 | 0.00 | 0.00 | 0.00 | 0.00 |
| 1997 | 1    | 1    | 0     | 0     | 1     | 54.92  | 13.5 | 16.4 | 18.3 | 19.6 | 21.6 | 22.0 | -1.0 | -1.0 |
|      | -1.0 | -1.0 | 0.12  | 25.80 | 24.68 | 3.92   | 0.32 | 0.08 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 1998 | 1    | 1    | 0     | 0     | 1     | 75.32  | 12.7 | 14.5 | 17.0 | 19.6 | 20.8 | 21.9 | 22.4 | -1.0 |
|      | -1.0 | -1.0 | 3.56  | 53.52 | 14.84 | 1.76   | 1.24 | 0.36 | 0.04 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 1999 | 1    | 1    | 0     | 0     | 1     | 6.96   | 13.7 | 15.1 | 15.7 | 17.9 | -1.0 | -1.0 | -1.0 | -1.0 |
|      | -1.0 | -1.0 | 0.84  | 3.60  | 2.48  | 0.04   | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 2000 | 1    | 1    | 0     | 0     | 1     | 22.64  | 14.1 | 16.7 | 17.1 | 17.1 | 18.1 | 22.2 | -1.0 | -1.0 |
|      | -1.0 | -1.0 | 1.08  | 3.92  | 10.64 | 6.56   | 0.36 | 0.08 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 2001 | 1    | 1    | 0     | 0     | 1     | 37.24  | 11.6 | 17.3 | 18.8 | 21.3 | 22.1 | 23.3 | 23.5 | 23.8 |
|      | -1.0 | -1.0 | 8.36  | 7.68  | 4.28  | 10.68  | 4.24 | 1.52 | 0.36 | 0.12 | 0.00 | 0.00 | 0.00 | 0.00 |
| 2002 | 1    | 1    | 0     | 0     | 1     | 30.32  | 16.1 | 16.3 | 17.6 | 18.4 | 20.8 | 22.8 | -1.0 | -1.0 |
|      | -1.0 | -1.0 | 5.36  | 16.48 | 6.84  | 1.16   | 0.44 | 0.04 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 2003 | 1    | 1    | 0     | 0     | 1     | 17.76  | 12.0 | 16.9 | 18.2 | 20.0 | 20.7 | -1.0 | -1.0 | -1.0 |
|      | -1.0 | -1.0 | 8.56  | 4.48  | 4.36  | 0.32   | 0.04 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 2004 | 1    | 1    | 0     | 0     | 1     | 33.52  | 13.9 | 15.6 | 16.9 | 18.5 | 18.5 | -1.0 | 23.7 | -1.0 |
|      | -1.0 | -1.0 | 0.16  | 30.12 | 2.72  | 0.20   | 0.24 | 0.00 | 0.08 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 2005 | 1    | 1    | 0     | 0     | 1     | 35.24  | 13.4 | 14.3 | 16.4 | 18.3 | 21.8 | 23.3 | 24.5 | -1.0 |
|      | -1.0 | -1.0 | 4.72  | 12.56 | 16.48 | 1.20   | 0.16 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 2006 | 1    | 1    | 0     | 0     | 1     | 69.76  | 14.5 | 15.4 | 16.9 | 18.2 | -1.0 | -1.0 | -1.0 | -1.0 |
|      | -1.0 | -1.0 | 0.92  | 47.36 | 18.60 | 2.88   | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 2007 | 1    | 1    | 0     | 0     | 2     | 86.00  | 12.9 | 15.2 | 16.7 | 17.6 | 18.1 | -1.0 | -1.0 | -1.0 |
|      | -1.0 | -1.0 | 2.24  | 16.16 | 52.00 | 14.80  | 0.80 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 2008 | 1    | 1    | 0     | 0     | 3     | 30.84  | 14.1 | 16.9 | 17.4 | 18.9 | 21.2 | -1.0 | -1.0 | -1.0 |
|      | -1.0 | -1.0 | 1.60  | 8.56  | 18.08 | 2.24   | 0.36 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 2009 | 1    | 1    | 0     | 0     | 3     | 22.88  | 16.1 | 16.4 | 17.4 | 17.9 | -1.0 | -1.0 | -1.0 | -1.0 |
|      | -1.0 | -1.0 | 0.08  | 5.40  | 13.20 | 3.92   | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 2010 | 1    | 1    | 0     | 0     | 4     | 12.68  | 15.8 | 16.0 | 16.3 | 17.8 | -1.0 | -1.0 | -1.0 | -1.0 |
|      | -1.0 | -1.0 | 0.20  | 10.04 | 2.12  | 0.32   | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 2011 | 1    | 1    | 0     | 0     | 4     | 21.64  | -1.0 | 17.4 | 17.7 | 17.9 | 19.4 | -1.0 | -1.0 | -1.0 |
|      | -1.0 | -1.0 | 0.00  | 5.64  | 10.76 | 5.12   | 0.12 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 2012 | 1    | 1    | 0     | 0     | 4     | 22.32  | 14.3 | 16.4 | 18.9 | 19.9 | 20.7 | 21.3 | 21.3 | -1.0 |
|      | -1.0 | -1.0 | 0.04  | 1.60  | 10.44 | 8.52   | 1.36 | 0.24 | 0.12 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 2013 | 1    | 1    | 0     | 0     | 4     | 15.84  | 11.5 | 14.0 | 20.1 | 20.9 | 21.8 | 22.4 | 22.9 | 23.7 |
|      | 22.7 | -1.0 | 0.60  | 0.52  | 2.44  | 5.72   | 5.40 | 0.96 | 0.12 | 0.04 | 0.04 | 0.00 | 0.00 | 0.00 |
| 1993 | 2    | 2    | 0     | 0     | 1     | 30.44  | 15.8 | 17.5 | 18.4 | 20.6 | 22.1 | 23.6 | -1.0 | -1.0 |
|      | -1.0 | -1.0 | 6.44  | 11.52 | 9.24  | 1.96   | 0.72 | 0.40 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 1994 | 2    | 2    | 0     | 0     | 1     | 120.96 | 15.0 | 16.7 | 18.0 | 18.6 | 19.1 | -1.0 | 21.0 | -1.0 |
|      | -1.0 | -1.0 | 47.44 | 54.28 | 12.08 | 6.24   | 0.76 | 0.00 | 0.04 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 1995 | 2    | 2    | 0     | 0     | 1     | 58.84  | 15.5 | 16.6 | 17.3 | 18.1 | 20.5 | -1.0 | -1.0 | -1.0 |
|      | -1.0 | -1.0 | 13.20 | 29.12 | 14.96 | 1.36   | 0.16 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 1996 | 2    | 2    | 0     | 0     | 1     | 45.92  | 13.9 | 15.9 | 18.5 | 19.2 | 22.2 | -1.0 | -1.0 | -1.0 |
|      | -1.0 | -1.0 | 14.00 | 15.16 | 13.80 | 2.60   | 0.16 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 1997 | 2    | 2    | 0     | 0     | 1     | 47.44  | 13.2 | 16.6 | 19.5 | 21.0 | 21.5 | 21.8 | 23.8 | -1.0 |
|      | -1.0 | -1.0 | 8.36  | 15.04 | 9.64  | 9.84   | 3.76 | 0.64 | 0.16 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 1998 | 2    | 2    | 0     | 0     | 1     | 72.48  | 13.4 | 15.1 | 17.1 | 19.6 | 20.8 | 21.2 | -1.0 | -1.0 |
|      | -1.0 | -1.0 | 23.24 | 33.12 | 13.80 | 1.52   | 0.60 | 0.20 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 1999 | 2    | 2    | 0     | 0     | 1     | 55.32  | 15.0 | 15.3 | 16.0 | 16.1 | -1.0 | -1.0 | 20.5 | -1.0 |
|      | -1.0 | -1.0 | 16.72 | 26.68 | 10.44 | 1.04   | 0.00 | 0.00 | 0.04 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 2000 | 2    | 2    | 0     | 0     | 1     | 48.04  | 14.1 | 15.2 | 17.2 | 17.6 | 17.7 | -1.0 | -1.0 | 22.6 |
|      | -1.0 | -1.0 | 13.04 | 19.12 | 12.76 | 2.60   | 0.48 | 0.00 | 0.00 | 0.04 | 0.00 | 0.00 | 0.00 | 0.00 |
| 2001 | 2    | 2    | 0     | 0     | 1     | 71.04  | 13.1 | 15.4 | 17.7 | 19.3 | 20.3 | 21.1 | -1.0 | -1.0 |
|      | -1.0 | -1.0 | 49.60 | 13.44 | 5.28  | 2.20   | 0.40 | 0.12 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 2002 | 2    | 2    | 0     | 0     | 1     | 76.48  | 15.5 | 16.7 | 17.8 | 18.9 | 20.0 | 22.8 | 24.8 | -1.0 |
|      | -1.0 | -1.0 | 12.88 | 43.52 | 14.92 | 3.92   | 0.92 | 0.24 | 0.04 | 0.00 | 0.04 | 0.00 | 0.00 | 0.00 |
| 2003 | 2    | 2    | 0     | 0     | 1     | 74.64  | 13.4 | 15.7 | 18.5 | 19.8 | 22.1 | -1.0 | 23.9 | -1.0 |
|      | -1.0 | -1.0 | 63.08 | 2.76  | 4.60  | 2.16   | 1.24 | 0.00 | 0.32 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 2004 | 2    | 2    | 0     | 0     | 1     | 59.16  | 14.2 | 15.4 | 17.6 | 19.7 | 21.7 | 23.4 | -1.0 | -1.0 |
|      | -1.0 | -1.0 | 3.32  | 50.76 | 4.36  | 0.60   | 0.08 | 0.04 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 2005 | 2    | 2    | 0     | 0     | 1     | 89.04  | 13.0 | 14.8 | 16.9 | 19.2 | 20.0 | 23.4 | 24.6 | -1.0 |
|      | -1.0 | -1.0 | 44.68 | 31.32 | 11.56 | 0.80   | 0.16 | 0.16 | 0.20 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 2006 | 2    | 2    | 0     | 0     | 1     | 105.16 | 14.0 | 15.8 | 18.2 | 19.3 | 21.2 | -1.0 | -1.0 | -1.0 |
|      | -1.0 | -1.0 | 17.08 | 61.52 | 23.04 | 3.40   | 0.12 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 2007 | 2    | 2    | 0     | 0     | 2     | 67.44  | 13.4 | 14.8 | 17.3 | 20.1 | 21.7 | -1.0 | -1.0 | -1.0 |
|      | -1.0 | -1.0 | 22.96 | 27.76 | 10.64 | 5.12   | 0.84 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 2008 | 2    | 2    | 0     | 0     | 3     | 39.76  | 13.1 | 16.2 | 17.6 | 19.0 | 21.8 | -1.0 | -1.0 | -1.0 |
|      | -1.0 | -1.0 | 7.16  | 21.88 | 8.44  | 2.08   | 0.20 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 2009 | 2    | 2    | 0     | 0     | 3     | 98.08  | 14.2 | 15.0 | 15.6 | 18.0 | 20.1 | -1.0 | -1.0 | -1.0 |
|      | -1.0 | -1.0 | 49.52 | 37.36 | 10.56 | 0.48   | 0.16 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 2010 | 2    | 2    | 0     | 0     | 4     | 31.40  | 14.2 | 15.5 | 19.1 | 20.8 | 21.5 | 22.1 | 23.0 | 25.1 |
|      | -1.0 | -1.0 | 13.84 | 7.96  | 0.68  | 1.52   | 3.08 | 3.80 | 0.44 | 0.04 | 0.00 | 0.00 | 0.00 | 0.00 |

|      |      |      |      |       |       |        |       |       |       |       |       |      |      |      |
|------|------|------|------|-------|-------|--------|-------|-------|-------|-------|-------|------|------|------|
| 2011 | 2    | 2    | 0    | 0     | 4     | 54.88  | 13.4  | 15.9  | 18.2  | 19.8  | 21.0  | 21.7 | 22.0 | 22.5 |
|      | 23.0 | -1.0 | 9.40 | 18.92 | 14.96 | 5.24   | 2.44  | 2.08  | 1.28  | 0.48  | 0.08  | 0.00 |      |      |
| 2012 | 2    | 2    | 0    | 0     | 4     | 8.92   | 15.5  | 18.2  | 19.1  | 20.1  | 20.9  | 22.8 | 23.1 | -1.0 |
|      | -1.0 | -1.0 | 0.08 | 1.36  | 4.72  | 2.32   | 0.32  | 0.08  | 0.04  | 0.00  | 0.00  | 0.00 |      |      |
| 1999 | 1    | 3    | 0    | 0     | 5     | 2.96   | -1.0  | -1.0  | 17.8  | 19.7  | 21.0  | 22.5 | 24.2 | -1.0 |
|      | -1.0 | -1.0 | 0.00 | 0.00  | 1.56  | 0.60   | 0.20  | 0.52  | 0.08  | 0.00  | 0.00  | 0.00 |      |      |
| 2000 | 1    | 3    | 0    | 0     | 5     | 66.64  | -1.0  | 19.9  | 19.1  | 20.7  | 21.5  | 22.1 | 22.3 | 22.7 |
|      | -1.0 | -1.0 | 0.00 | 0.44  | 12.40 | 25.16  | 14.76 | 8.16  | 4.00  | 1.12  | 0.00  | 0.00 |      |      |
| 2001 | 1    | 3    | 0    | 0     | 5     | 81.28  | -1.0  | 16.3  | 20.4  | 20.8  | 21.2  | 22.1 | 22.8 | -1.0 |
|      | 23.4 | -1.0 | 0.00 | 1.76  | 8.68  | 34.96  | 22.88 | 7.56  | 4.08  | 0.00  | 0.00  | 0.00 |      |      |
| 2002 | 1    | 3    | 0    | 0     | 5     | 110.32 | -1.0  | 19.5  | 20.7  | 21.7  | 22.0  | 22.3 | 22.8 | 23.2 |
|      | 23.5 | 24.1 | 0.00 | 0.96  | 4.28  | 15.36  | 39.76 | 26.68 | 12.80 | 6.64  | 3.72  | 0.12 |      |      |
| 2003 | 1    | 3    | 0    | 0     | 5     | 92.32  | -1.0  | 18.9  | 19.6  | 20.4  | 21.8  | 22.5 | 22.7 | 22.9 |
|      | 23.5 | 23.8 | 0.00 | 1.80  | 15.12 | 14.40  | 10.40 | 17.80 | 14.88 | 8.08  | 8.72  | 1.12 |      |      |
| 2004 | 1    | 3    | 0    | 0     | 5     | 66.56  | -1.0  | 16.9  | 19.7  | 21.2  | 22.5  | 23.1 | 23.4 | 23.5 |
|      | 23.6 | 23.8 | 0.00 | 18.80 | 8.80  | 9.76   | 6.44  | 7.64  | 8.04  | 3.12  | 3.32  | 0.64 |      |      |
| 2005 | 1    | 3    | 0    | 0     | 5     | 40.84  | -1.0  | 17.0  | 17.5  | 17.9  | 19.6  | 21.9 | 22.9 | 24.0 |
|      | 24.0 | 24.3 | 0.00 | 0.96  | 22.12 | 5.48   | 2.72  | 1.76  | 1.52  | 1.64  | 3.20  | 1.44 |      |      |
| 2006 | 1    | 3    | 0    | 0     | 5     | 26.92  | -1.0  | -1.0  | 19.1  | 19.5  | 19.8  | 20.4 | 20.7 | 23.5 |
|      | -1.0 | -1.0 | 0.00 | 0.00  | 0.48  | 17.64  | 5.40  | 1.80  | 0.76  | 0.32  | 0.48  | 0.04 |      |      |
| 2007 | 1    | 3    | 0    | 0     | 5     | 89.40  | -1.0  | -1.0  | 18.6  | 19.3  | 19.7  | 20.1 | 20.8 | 21.1 |
|      | 24.1 | 25.5 | 0.00 | 0.00  | 3.00  | 38.36  | 37.80 | 7.76  | 1.68  | 0.40  | 0.32  | 0.08 |      |      |
| 2008 | 1    | 3    | 0    | 0     | 5     | 94.00  | -1.0  | -1.0  | 18.5  | 19.2  | 19.9  | 20.3 | 21.0 | 21.8 |
|      | 22.8 | -1.0 | 0.00 | 0.00  | 0.24  | 11.76  | 45.96 | 29.12 | 5.24  | 1.08  | 0.60  | 0.00 |      |      |
| 2009 | 1    | 3    | 0    | 0     | 5     | 93.24  | -1.0  | -1.0  | 19.1  | 19.1  | 19.5  | 19.9 | 20.1 | 20.4 |
|      | 20.9 | -1.0 | 0.00 | 0.00  | 0.64  | 4.16   | 28.68 | 35.48 | 19.56 | 4.00  | 0.72  | 0.00 |      |      |
| 2010 | 1    | 3    | 0    | 0     | 5     | 33.76  | -1.0  | -1.0  | 16.4  | 19.0  | 19.9  | 20.0 | 20.2 | 20.3 |
|      | 20.4 | -1.0 | 0.00 | 0.00  | 0.16  | 1.12   | 6.88  | 13.04 | 8.40  | 3.48  | 0.68  | 0.00 |      |      |
| 2011 | 1    | 3    | 0    | 0     | 5     | 42.88  | -1.0  | 17.4  | 19.0  | 20.0  | 20.7  | 20.9 | 21.0 | 21.1 |
|      | 21.0 | -1.0 | 0.00 | 0.12  | 1.24  | 2.12   | 5.16  | 13.08 | 12.60 | 7.04  | 1.52  | 0.00 |      |      |
| 2012 | 1    | 3    | 0    | 0     | 5     | 118.24 | -1.0  | 19.9  | 19.8  | 20.1  | 20.8  | 21.4 | 21.7 | 21.8 |
|      | 21.9 | 22.4 | 0.00 | 0.12  | 41.72 | 25.04  | 8.12  | 5.44  | 8.92  | 11.76 | 16.52 | 0.60 |      |      |
| 2013 | 1    | 3    | 0    | 0     | 5     | 136.32 | -1.0  | -1.0  | 20.8  | 20.9  | 21.1  | 21.3 | 22.1 | 22.2 |
|      | 22.2 | 23.1 | 0.00 | 0.00  | 7.48  | 77.12  | 24.32 | 6.52  | 5.88  | 6.72  | 8.24  | 0.04 |      |      |
| 2005 | 2    | 8    | 0    | 0     | 6     | 12.12  | 16.4  | 18.6  | 19.4  | 20.1  | 23.3  | 26.8 | -1.0 | -1.0 |
|      | -1.0 | -1.0 | 0.84 | 7.04  | 3.76  | 0.24   | 0.16  | 0.04  | 0.00  | 0.00  | 0.04  | 0.00 |      |      |
| 2007 | 2    | 8    | 0    | 0     | 6     | 14.80  | -1.0  | 17.7  | 19.4  | 21.4  | 21.8  | 22.0 | -1.0 | -1.0 |
|      | -1.0 | -1.0 | 0.00 | 0.12  | 2.36  | 9.68   | 2.36  | 0.28  | 0.00  | 0.00  | 0.00  | 0.00 |      |      |
| 2009 | 2    | 8    | 0    | 0     | 6     | 27.20  | 16.6  | 16.9  | 19.7  | 21.8  | 22.1  | 22.3 | 22.7 | 24.3 |
|      | -1.0 | -1.0 | 0.04 | 0.56  | 0.72  | 6.04   | 11.64 | 6.76  | 1.32  | 0.12  | 0.00  | 0.00 |      |      |
| 2010 | 2    | 8    | 0    | 0     | 6     | 25.48  | 17.7  | 17.9  | 18.6  | 21.0  | 22.9  | 23.0 | 23.1 | -1.0 |
|      | -1.0 | -1.0 | 0.20 | 5.48  | 6.84  | 3.36   | 4.48  | 3.48  | 1.40  | 0.24  | 0.00  | 0.00 |      |      |
| 2011 | 2    | 8    | 0    | 0     | 6     | 14.32  | -1.0  | 20.3  | 20.7  | 21.9  | 23.0  | -1.0 | 23.3 | 23.3 |
|      | -1.0 | -1.0 | 0.00 | 1.16  | 4.56  | 2.40   | 2.64  | 0.00  | 1.36  | 0.00  | 0.00  | 0.00 |      |      |
| 2012 | 2    | 8    | 0    | 0     | 6     | 8.64   | -1.0  | 18.1  | 21.5  | 21.8  | 22.2  | 23.3 | -1.0 | 24.3 |
|      | -1.0 | -1.0 | 0.00 | 0.04  | 1.80  | 3.76   | 1.20  | 0.52  | 0.00  | 0.36  | 0.32  | 0.00 |      |      |
| 2008 | 1    | 9    | 0    | 0     | 6     | 28.88  | 10.2  | 19.7  | 19.9  | 20.7  | 21.2  | 21.5 | -1.0 | -1.0 |
|      | -1.0 | -1.0 | 1.08 | 0.08  | 3.28  | 12.60  | 11.24 | 0.60  | 0.00  | 0.00  | 0.00  | 0.00 |      |      |
| 2012 | 1    | 9    | 0    | 0     | 6     | 22.88  | -1.0  | 20.4  | 20.8  | 21.1  | 21.5  | 22.6 | 23.3 | 23.3 |
|      | 24.0 | -1.0 | 0.00 | 0.36  | 6.00  | 6.96   | 3.24  | 2.40  | 1.56  | 1.60  | 0.76  | 0.00 |      |      |
| 2013 | 1    | 9    | 0    | 0     | 6     | 14.16  | -1.0  | -1.0  | 22.3  | 22.4  | 22.4  | 23.7 | -1.0 | -1.0 |
|      | 24.1 | -1.0 | 0.00 | 0.00  | 3.88  | 6.48   | 1.60  | 1.00  | 0.00  | 0.00  | 0.24  | 0.00 |      |      |

0 # N\_environment variables  
0 # N\_environment obs  
0 # N\_sizefreq methods to read in  
0 # No tag data  
0 # No morph composition data  
999 # End of file