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Cefas BEEMs Report TR426 Hinkley Point Equivalent Adult Value (EAV) metrics 2009-2010

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Hinkley Point Equivalent Adult Value (EAV) metrics 2009-2010

Sarah Walmsley

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Executive Summary

Predictions of the impingement of fish and invertebrates by the proposed Hinkley Point C (HPC) nuclear power station are based on the observed numbers of individuals currently impinged by the Hinkley Point B (HPB) station. To evaluate the effects of a new build on local populations, the predicted impingement losses by the new station (by weight or number) are compared with the local population estimate, such as the Stock Spawning Biomass (SSB) or, if such an estimate is not available, with the local fishery landings.

Mortalities of fish caused by power station cooling water intakes chiefly involve the juvenile part of a population because it is that part that is particularly vulnerable due to their presence in inshore nursery areas and their poorer swimming capability compared with adults (Turnpenny et al., 1988). The natural mortality of juveniles is higher than that of the adults of a species, as juveniles are often prey for other species, or simply have a larger proportion of their natural lives to survive. Consequently, the loss of a single juvenile does not equate to the loss of a breeding adult of the same species. The concept of the Equivalent Adult Value Metric (EAV) provides a means to relate the numbers of impinged juveniles to the corresponding number of adults. This allows for a realistic evaluation of the local impact of the station on local populations.

A method of estimating EAV is described in Turnpenny (1989) where the EAV of a juvenile fish is defined as the average lifetime fecundity of an adult that has just reached maturity which is required to replace that juvenile. However, the approach requires the input of several parameters related to female maturity and fecundity, many of which are difficult to estimate with any level of certainty. Consequently, Turnpenny (1989) only estimated EAV's for six fish species (cod, whiting, plaice, Dover sole, dab and herring). Impingement sampling at HPB was carried out between February 2009 and February 2010, during which time 64 species of fish and 15 species of macro-crustacean were recorded (BEEMS Technical Report TR129). These data were used as the basis for impingement predictions for HPC (BEEMS Technical Report TR148 Ed2), and where possible the EAV values of Turnpenny (1989) were used. However, although these EAVs may be applied to other species within similar functional groups, in the absence of an appropriate EAV a precautionary value of 1 was applied for the remaining species, giving rise to an overestimate, often substantial, of the potential impingement losses and therefore impacts on local populations.

In practice, the EAVs for individual species are likely to be site specific and vary with the species life history parameters and local population structure. EAVs may also vary by year dependent upon varying natural mortality or the effect of a particularly strong or weak year class of juvenile fish on the local population structure. All of these factors underline the importance of, where possible, calculating the EAV from data obtained from the specific location and year(s) of interest in the impingement assessment.

To overcome the limitations with the existing EAV data a revised approach for calculating EAVs has been applied by BEEMS based upon well-established fisheries science principles. This approach determines the EAV by the level of natural mortality experienced by an individual in the wild between the age at impingement and the age at which it would have reached maturity (or recruited to the fishery). This is determined by natural mortality and growth. The benefit of this approach is that these two parameters are more readily obtained for a given species, or if they are not available in the literature, could be collected with a moderate amount of effort. Further, the approach allows for EAVs to be calculated for specific geographic areas, reflecting the stock structures of local populations. In the case of the HPC impingement predictions and this report, the EAVs calculated refer to 2009-2010, as this was the year in which the length data were collected. The method has previously been applied at Sizewell (BEEMS Technical Report TR383).

This report summarises the EAV approach and underlying concepts, and presents the data, parameters and calculations used to calculate EAVs for the seven key fish species impinged by number in the Hinkley Point C impingement assessment (BEEMS Technical Report TR409). In addition, in this version 2 report, an EAV for bass has been added to reflect the commercial importance of bass in local landings. The report also takes account of comments on the methodology that the Environment Agency made on the equivalent report for Sizewell (BEEMS Technical Report TR383).

The EAVs calculated in this report are for:

- sprat *Sprattus sprattus*
- whiting *Merlangius merlangus*
- Dover sole *Solea solea*
- cod *Gadus morhua*
- herring *Clupea harrengus*
- plaice *Pleuronectes platessa*
- thornback ray *Raja clavata*
- bass *Dicentrarchus labrax*

The calculated values are shown in the table below. They are given as '2009-2010' as this year represents the year of impingement sampling at HPB and the source of the length distribution data on which the EAVs are calculated. Comparisons with the values calculated for these species at Sizewell using the BEEMS approach, and those given by Turnpenny (1989) are made and discussed, and consideration is given to the impact the life history parameters and local populations have on site-specific EAVs.

	BEEMS method		**PISCES 2009 programme**	
Species	**Hinkley Point (2009-2010)**	**Sizewell (2009-2010)**	**Hinkley Point**	**Sizewell**
Sprat	0.443	0.569	N/A	
Whiting	0.098	0.300	0.137	
Dover sole	0.076	0.120	0.054	0.301
Cod	0.00179	0.335	0.086	0.274
Herring	0.024	0.543	0.495	
Plaice	0.132	0.249	0.092	0.092
Thornback ray (mean value)	0.196	0.026	N/A	
Bass (females)	0.123	0.176	N/A	

Note: For bass only an EAV for females is provided (based upon the availability of maturity data). The male EAV will be lower, and the use of a female EAV will, therefore, result in slightly over estimated adult impingement estimates i.e. will result in a worst-case estimate.

1 Background

Mortalities of fish caused by power station cooling water intakes chiefly involve the juvenile part of a population because it is that part that is particularly vulnerable as a result of its presence in inshore nursery areas and poorer swimming capability than adult fish (Turnpenny et al., 1988). Although commercial fishers may regard these mortalities as a threat to stocks, juvenile fish suffer substantial natural mortality before recruiting to a fishery or an adult fish population. Consequently, the additional mortality attributable to power station intakes may have relatively little extra impact (numerically and in terms of biomass) on the population. In order to evaluate this impact quantitatively, Horst (1975) and Goodyear (1978) developed the concept of the equivalent adult value (EAV) of a juvenile fish, by which a juvenile of given age is ascribed a biological value that represents the proportion of the lifetime reproductive effort of a just-mature pair of adult fish that is required to replace that juvenile. Therefore, the higher the EAV, the greater the proportion of the parents' original reproductive effort the individual has come to represent, so an old juvenile, many of whose siblings have already died because of natural or other causes of mortality, will have a higher EAV than recently hatched larvae of the same species.

For predictions of impingement at Hinkley Point C (HPC) (BEEMS Technical Report TR065; BEEMS Technical Report TR148; BEEMS Technical Report TR409), the BEEMS programme used the method described by Turnpenny (1989) and as implemented in the PISCES 2009 expert system. Turnpenny (1989), defined the EAV of a juvenile fish as "the average lifetime fecundity of an adult that has just reached maturity which is required to replace that juvenile". To calculate average lifetime fecundity many parameters are required (including the proportion of females in each age class, the fraction of females that are mature in each age class, the age at which > 50% of fish become mature, the number of age classes in the population, and the average fecundity of mature females of age class) and consequently Turnpenny (1989) only estimated EAV's for six fish species. However, during impingement sampling at Hinkley Point B (HPB) between 2009 and 2010, 64 fish species were recorded. Although the Turnpenny (1989) EAV values were applied to species within similar functional groups, for many species this was not appropriate and an EAV of 1 was used in the impingement predictions, giving rise to an overestimation of impingement losses.

In BEEMS Technical Report TR243 the Turnpenny EAV method was reviewed and the report concluded that the approach is difficult to apply in practice. This is because of the large number of parameters required and the fact that parameter estimates for many species cannot be determined with any reliability (even to orders of magnitude, in some cases). For many species, the parameters are simply not available, and the collection of suitable data would be costly and time-consuming. Consequently, a generic, broadly applicable, size-based method for estimating EAV for fish losses was developed under the BEEMS programme, using well established international fisheries science approaches.

The rationale for the EAV method is fully described in BEEMS Technical Report TR383, but briefly, the basis of the approach is that in wild fish populations, natural mortality in early life history stages is extremely high due to predation, starvation and disease. If there were no natural mortality in wild fish populations, every egg (larva and juvenile) would grow to become a reproductively effective adult and the EAV for every individual, irrespective of the life-history stage, would be one. Therefore, it is the level of natural mortality experienced by an individual between the age at impingement and the age at which it would have reached maturity (or recruited to the fishery) that determines the EAV. This comes down to natural mortality and growth. This approach uses life history information (growth parameters, natural mortality at size, size at age and age at maturity) along with information of the size distribution of fish caught by the power station to calculate site-specific EAVs.

This report details the data and calculations used to produce the EAV values for the top seven fish species impinged by number in the Hinkley Point C impingement assessment (BEEMS Technical Report TR409). In addition, in this version 2 report an EAV for bass has been added to reflect the commercial importance of bass in local landings. The species for which EAVs are presented are:

- sprat *Sprattus sprattus*
- whiting *Merlangius merlangus*

- Dover sole *Solea solea*
- cod *Gadus morhua*
- herring *Clupea harrengus*
- plaice *Pleuronectes platessa*
- thornback ray *Raja clavata*
- bass *Dicentrarchus labrax*

The reference year of 2009-2010 is given for the EAVs as this represents the year in which the species' length distribution data were obtained from the HPB station during the Comprehensive Impingement Monitoring Programme.

2 Methodology

2.1 Data sources

2.1.1 Lengths of impinged fish

For the teleost species (sprat, whiting, Dover sole, cod, herring, plaice and bass), length data (standard length[1] SL, to the nearest 5 mm) were obtained from sub-samples taken as part of the BEEMS Comprehensive Impingement Monitoring Programme (CIMP) at HPB between February 2009 and February 2010 (BEEMS Technical Report TR129). During each sampling visit a sub-sample (usually the first 100 fish) of each species was measured, giving a measured length distribution for that visit. A raised length distribution representing the number of fish of each size class that would have been impinged during the 24-hour period of the sampling period was obtained by scaling up the measured number at length using the ratio between the total number of fish measured and the total number of fish that were estimated as having been impinged during that 24-hour period. To account for fish growth through the year and changes in seasonal abundance of each species, an annual length distribution was obtained by first summing the length distributions in each quarterly sampling period to give four quarterly length distributions. Each quarterly length distribution was raised by the ratio between the number of sampling visits in that quarter and the number of days in that quarter. For each quarter this provided an estimate of the total number of fish impinged at length. Finally, the four quarterly length distributions were summed to provide an annual number of fish impinged in each size class.

Most length-weight conversions and estimates of length at age or length at maturity are given in relation to Total Length[2] (TL), so a conversion must first be applied to the SL data. During impingement sampling at Sizewell B, data on SL and TL were collected from representatives of several species (BEEMS Technical Report TR120). These data were used to derive regression equations (Eq. 1) that allow TL to be estimated from SL:

Eq. 1

$$TL = (SL * a) + b$$

Where: *a* and *b* are regression coefficients.

The mid-point of each 5 mm SL size category was calculated and then corrected to TL to yield the numbers of fish impinged at length.

For thornback rays, individuals were measured to TL, and no conversion was necessary. Length distributions were raised using the methodology described above.

2.1.2 Fish age data

Typically, mortality estimates are derived on an annual basis, so the impingement data (numbers at TL, above) were allocated to a year-class. For the teleosts, this was achieved using an age-length key. Age at length data were obtained from several Cefas research survey series: The Irish Sea/Bristol Channel beam trawl survey (ISBC), which has been conducted each September since 1988 (Bristol Channel-only data were selected); the Cefas EU Data Collections Regulations Data Collection survey (DCRDC) which was conducted in the western English Channel/Celtic Sea each March between 2005 and 2010; the Cefas fourth quarter International Bottom Trawl Survey (Q4SWIBTS), which was conducted each November in the Irish and Celtic Seas between 2003 and 2011; the PELTIC survey, which is an acoustic survey that has been

[1] *SL* refers to the length of a fish measured from the most anterior tip of the body to the posterior end of the vertebral column, and was used to record the lengths of fish measured between February 2009 and February 2013 during impingement sampling. This measurement does not include the length of the tail.
[2] *TL* is defined as the length from the most anterior point of the body to the tip of the longer lobe of the caudal (tail) fin, usually measured with the lobes compressed along the midline. This is a straight-line measurement and does not measure the curve of the body.

carried out annually in October since 2012 off the coasts of south and north Devon and Cornwall; and the Solent bass survey, which has targeted juvenile bass in the Solent and in Langstone, Chichester and Portsmouth harbours since 1994. The number of age records available determined how many years of data were included, i.e. if there were many records available annually, then only a single survey was used, but if sample levels were low annually, additional years data were included.

For thornback ray, on the advice of Jim Ellis (Cefas), length at age was determined by combining age-length data from several published studies (Brander and Palmer, 1985; Ryland and Ajayi, 1984). These data were then used to apportion the impingement data for each size class to each year class.

2.1.3 Average age at length

In this approach, mortality is assumed to be driven by fish length and is estimated for each year from impingement to the size at maturity. For the year of impingement, the mortality can be estimated separately for each size-class because this is known (from the length distributions). However, for the subsequent years, fish in each year class will have grown by an unknown amount. In this case, a mean length was estimated for the fish in each age class, to calculate a mortality for that age class. For this, average length at age was estimated as:

$$\frac{\sum N_{length\ i} \times Midpoint}{\sum N_{\ i}}$$

Where: $N_{length\ i}$ is the number of fish in each length class in age class *i*, midpoint is the midpoint of the length class, and N_i is the total number of fish in year class *i*.

2.1.4 Maturity data

For sprat, the proportion mature at age were calculated using the maturity data collected during the Cefas PELTIC surveys. For whiting, Dover sole, cod, herring, plaice and bass, the proportion mature in each age was taken from ICES (International Council for the Exploration of the Seas) Working Group reports. For thornback ray, on the advice of Jim Ellis (Cefas), age at maturity was determined from several published studies (Brander and Palmer, 1985; Ryland and Ajayi, 1984).

2.1.5 Estimates of mortality

A number of studies have recently been published that offer general, size-based methods for estimating fish mortality (Charnov et al., 2013; Gislason et al., 2010; Kenchington, 2013). To simplify the methods and demonstrate the utility of this size-based approach, mortality was estimated using the relationship suggested by (Gislason et al., 2010)(Eq. 3). This equation was chosen as the relationships between body size, asymptotic size and natural mortality (M) were based on an analysis of carefully screened data. In addition, the analyses showed that both body size and asymptotic size had a significant effect on natural mortality, resulting in a decline in M with body size that was consistent with expectations from other (multi-species) models (Simon Jennings, Cefas, pers. comm.).

Eq. 3

$$Ln\ (M) = 0.55 - (1.61 \ln L) + (1.44 \ln L_{\infty}) + \ln k)$$

Where: *M* is the annual instantaneous mortality rate (year^{-1}), *L* is the Length, and L_∞ and k are the growth parameters

From this, the annual survival is estimated as (Eq. 4):

Eq. 4

$$N\ year_{i+1} = Nyear_i \times exp(-M)$$

Where: $N\ year_{i+1}$ is the number surviving this year, $N\ year_i$ is the number in the previous year and M is the mortality as estimated in Eq. 3 .

2.2 Calculating the EAV - impingement

2.2.1 Step 1 – Survival following the year of impingement

The impingement EAV calculation begins with the matrix of number of fish by length class (rows), apportioned into age classes (columns) by using a normalized age-length key. Survival to the next year (year of impingement +1) was calculated by applying the natural mortality (at length) to the matrix. This gave a second matrix of the numbers at length that survived to year of impingement +1. Summing the numbers in each age class gave the numbers that survived to year of impingement +1 for each age class.

Impingement catches contain some individuals that are already at the estimated length of maturity for that species. These individuals will have an EAV of 1, and therefore suffer no additional mortality. Their numbers were used in the final EAV calculation.

2.2.2 Step 2 – Survival in subsequent years

In subsequent years, the size distribution of each age class was unknown – each individual fish would have grown, but the exact growth could not be predicted. In this case, individual length-specific natural mortalities could not be applied to the age-at-length distribution; instead a value of natural mortality calculated from the mean length of individuals in the age class was applied. This process was carried out iteratively until each year class had reached the age of maturity, and all surviving individuals would have an EAV of 1.

However, some species mature across several age classes, so that for one or more ages, a proportion of the individuals will have reached maturity and therefore have an EAV of 1. For each subsequent year, the number of mature individuals was first calculated and subtracted from the number to which natural mortality was applied. These mature individuals were later included in the final EAV calculation.

2.2.3 Step 3 – final EAV calculation

The total number of individuals that would have survived was calculated by summing the number of individuals in each age class that survived to the age of maturity, and adding in the numbers of fish that were already mature in the year of impingement.

The EAV is given as a proportion of the number of fish impinged (Eq. 5):

Eq.5

$$EAV = \frac{N_{final} + N_{start} + N_{maturing}}{N_{imp}}$$

Where: N_{final} is the number of fish surviving to maturity through the iterative process, N_{start} is the number of fish that were already mature in the year of impingement, $N_{maturing}$ is the number of fish that would have become mature during the iterative process, and N_{imp} is the total number of fish impinged.

3 Results

3.1 Data sources

3.1.1 Lengths of impinged fish

The numbers of sole, thornback ray, cod, plaice, sprat and bass impinged at length are given in Appendix A. The Standard Length versus Total Length conversions used sprat, whiting, Dover sole, cod, herring, plaice and bass are shown in Table 1. (Note that thornback ray were measured as total length, so no conversion was required).

Table 1 Standard Length (SL) versus Total Length (TL) conversion factors used in the analysis

Species	Conversion	Source
Sprat	TL = (SL x 1.1508) + 2.5026	BEEMS Technical Report TR120
Whiting	TL = (SL x 1.0966) + 0.4569	BEEMS Technical Report TR120
Dover sole	TL = (SL x 1.1331) - 0.494	BEEMS Technical Report TR120
Cod	TL = (SL x 1.0839) + 1.9659	BEEMS Technical Report TR120
Herring	TL = (SL x 1.161) + 2.5591	BEEMS Technical Report TR120
Plaice	TL = SL x 1.264	FishBase
Bass	TL = (SL x 1.1939) + 3.6	BEEMS Technical Report TR120

3.1.2 Age, length and growth length

Age-length keys are given in Appendix B. Age data were extracted from the Cefas Fishing Surveys System (FSS) database. For sprat, data from all Cefas “PELTIC” survey years (2012 – 2016) were used; for sole and plaice sufficient ages were available from the surveys conducted in 2009 only; for whiting and herring data from 2010 and 2011 were used; and for cod, data from all surveys years were used to provide sufficient age data. For bass, age data from 1994-2011 were used, since these data were also used to calculate the corresponding growth parameters.

Mean lengths at age are given in Appendix C. For species where an age length key was available, mean length was calculated from the numbers of aged fish in each age class. For thornback ray, where the age was not known, age was assigned based on observed length, and the mean length per age class was calculated.

The growth parameters used in the analysis are given in Appendix D.

3.1.3 Maturity data

The values of proportion mature at age used in the analysis are given in Appendix E. For sole, cod, plaice and bass, the proportions mature were obtained from the relevant ICES WG report, and were the same proportions that are used by ICES in their international stock assessments. For bass, the WGCSE report only provides the proportion mature at age for females, and this is in the stock assessment. Male bass, however mature at a younger age than females (Armstrong and Walmsley, 2012a). Consequently, the resulting bass EAV is likely to be a slight overestimate, but provides for a ‘worse-case’. For sprat, the proportion mature was calculated using maturity data from the PELTIC surveys.

For thornback rays, the values for males and females given by Holden (1972) were used where. EAVs were calculated separately assuming firstly that all fish were males and secondly that all fish were females, and the average of these two values was the overall EAV (i.e. it assumes a sex ratio of 1:1).

3.2 EAV values

EAV values were calculated for seven key fish species assessed in BEEMS Technical Report TR409 (sprat, whiting, Dover sole, cod, herring, plaice, thornback ra)y together with bass (which is impinged in relatively small numbers at Hinkley Point). An EAV value for thornback ray at Hinkley Point was included in an earlier BEEMS report (BEEMS Technical Report TR383). However, the calculation was based on the measured length distribution from sub-sample data only. To ensure a standardised approach for Hinkley Point EAVs, the calculations was repeated using the raised annual length distribution, which slightly altered the proportion of fish at age, and consequently the EAV value. The calculated EAV values are given in Table 2.

Table 2 Calculated EAV values for fish species caught at Hinkley Point

Species	EAV value 2009-2010† HP
Sprat	0.443
Whiting	0.098
Dover sole	0.076
Cod	0.00179
Herring	0.024
Plaice	0.132
Thornback ray	0.196 (males = 0.184; females = 0.207)
Bass	0.123 (females)

† 2009-2010 refers to the year of source data for individual species' length distributions

Dover sole is used below as an example of the calculation.

Step 1 – survival in the year of impingement is shown in Table 3. The size class and associated natural mortality at length are given (left hand side) along with the apportioned numbers at length and age in the year of impingement (in the center of the table). The Mid-point is the Total Length (TL) calculated from the mid-point of the Standard Length (SL) class, the nominal length, is the TL length class that the mid-point was assigned to. Natural mortality was calculated from the TL mid-point value. (Note that empty cells in the Mid-point and Natural mortality columns arise when SL mid-points are converted to TL mid-points and not all TL classes are used. Thus, no corresponding Natural Mortality can be calculated. The length classes are retained in the table as they appear in the ALK).

The right-hand side of the table shows the number of fish in each length class that would survive to the year of impingement +1. An intermediate step (not shown) calculates and subtracts the number of fish at each length class and age class that would have been mature prior to applying the mortality step. For example:

1. At 6.5 cm, 3833.4 sole were impinged (highlighted in pink in Table 3).
2. At a natural mortality of 4.1 yr^{-1}, only 63.2 fish survived into the year of impingement +1 (3833.4 * EXP-4.1 = 63.2 fish).
3. In total, 126 281 fish at age 0 were impinged and only 16 333 individuals would have survived to the year of impingement +1, because of the high mortality experienced by these juveniles.
4. However, for older age classes, a proportion of the impinged fish were already mature (and have an EAV of 1) and these were removed from the calculation prior to the natural mortality step.
5. For example, at age 3, 44.9 fish of 24.5 cm were impinged (highlighted in green in Table 3). Of these, 45 % would have already been mature (proportion mature at age 3 = 0.45).
6. The first step (not shown) removed the mature individuals ([1 – 0.45] * 44.9 = 24.7 immature fish).
7. The second step applied the natural mortality for that year (24.7 * EXP-0.48 = 15.3 fish).

At the bottom of the table, the summed numbers of fish impinged in age class (light blue shading), the number of fish in each age class that would have already been mature (EAV = 1)(light orange shading) and the numbers of fish in each age class that would have survived to the year of impingement +1 (light green shading) is given.

Table 3 The apportioned number of impinged sole by age and length class at HPB, and the number of survivors by age and length in the year of impingement +1. Pink and green highlighted values are referred to in the text. (Displayed numbers do not add up to totals due to rounding).

Mid point (TL, cm)	Nominal length class	Natural mortality	Number at age – year of impingement								Number of survivors – year of impingement +1						
			0	1	2	3	4	5	6+	Total	0	1	2	3	4	5	6+
0.2	0.0	859.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
0.8	0.5	118.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
1.4	1.0	50.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
1.9	1.5	28.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	2.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
2.5	2.5	19.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
3.1	3.0	13.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
3.6	3.5	10.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
4.2	4.0	8.2	36.6	0.0	0.0	0.0	0.0	0.0	0.0	36.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0
4.8	4.5	6.7	33.2	0.0	0.0	0.0	0.0	0.0	0.0	33.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0
5.3	5.0	5.6	216.6	0.0	0.0	0.0	0.0	0.0	0.0	216.6	0.8	0.0	0.0	0.0	0.0	0.0	0.0
5.9	5.5	4.8	910.8	0.0	0.0	0.0	0.0	0.0	0.0	910.8	7.8	0.0	0.0	0.0	0.0	0.0	0.0
	6.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
6.5	6.5	4.1	3833.4	0.0	0.0	0.0	0.0	0.0	0.0	3833.4	63.2	0.0	0.0	0.0	0.0	0.0	0.0
7.0	7.0	3.6	7312.1	0.0	0.0	0.0	0.0	0.0	0.0	7312.1	202.7	0.0	0.0	0.0	0.0	0.0	0.0
7.6	7.5	3.2	8024.4	0.0	0.0	0.0	0.0	0.0	0.0	8024.4	338.7	0.0	0.0	0.0	0.0	0.0	0.0
8.2	8.0	2.8	10451.7	0.0	0.0	0.0	0.0	0.0	0.0	10451.7	623.6	0.0	0.0	0.0	0.0	0.0	0.0
8.7	8.5	2.5	12418.7	0.0	0.0	0.0	0.0	0.0	0.0	12418.7	988.8	0.0	0.0	0.0	0.0	0.0	0.0
9.3	9.0	2.3	14520.2	0.0	0.0	0.0	0.0	0.0	0.0	14520.2	1475.0	0.0	0.0	0.0	0.0	0.0	0.0
9.9	9.5	2.1	9960.7	0.0	0.0	0.0	0.0	0.0	0.0	9960.7	1245.4	0.0	0.0	0.0	0.0	0.0	0.0
10.4	10.0	1.9	9323.5	0.0	0.0	0.0	0.0	0.0	0.0	9323.5	1393.9	0.0	0.0	0.0	0.0	0.0	0.0
	10.5		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
11.0	11.0	1.7	7731.2	0.0	0.0	0.0	0.0	0.0	0.0	7731.2	1349.8	0.0	0.0	0.0	0.0	0.0	0.0
11.6	11.5	1.6	6866.5	0.0	0.0	0.0	0.0	0.0	0.0	6866.5	1372.9	0.0	0.0	0.0	0.0	0.0	0.0
12.1	12.0	1.5	5647.2	0.0	0.0	0.0	0.0	0.0	0.0	5647.2	1272.2	0.0	0.0	0.0	0.0	0.0	0.0
12.7	12.5	1.4	5254.0	0.0	0.0	0.0	0.0	0.0	0.0	5254.0	1315.4	0.0	0.0	0.0	0.0	0.0	0.0
13.3	13.0	1.3	4037.0	0.0	0.0	0.0	0.0	0.0	0.0	4037.0	1110.3	0.0	0.0	0.0	0.0	0.0	0.0
13.8	13.5	1.2	3832.6	0.0	0.0	0.0	0.0	0.0	0.0	3832.6	1146.6	0.0	0.0	0.0	0.0	0.0	0.0
14.4	14.0	1.1	2754.5	918.2	0.0	0.0	0.0	0.0	0.0	3672.7	888.7	296.2	0.0	0.0	0.0	0.0	0.0
	14.5		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
15.0	15.0	1.1	3872.8	0.0	0.0	0.0	0.0	0.0	0.0	3872.8	1337.6	0.0	0.0	0.0	0.0	0.0	0.0
15.5	15.5	1.0	3958.5	0.0	0.0	0.0	0.0	0.0	0.0	3958.5	1454.3	0.0	0.0	0.0	0.0	0.0	0.0

Mid point (TL, cm)	Nominal length class	Natural mortality	Number at age – year of impingement								Number of survivors – year of impingement +1						
			0	1	2	3	4	5	6+	Total	0	1	2	3	4	5	6+
16.1	16.0	0.9	2787.8	1393.9	0.0	0.0	0.0	0.0	0.0	4181.7	1083.3	541.7	0.0	0.0	0.0	0.0	0.0
16.7	16.5	0.9	2496.7	1248.3	0.0	0.0	0.0	0.0	0.0	3745.0	1021.2	510.6	0.0	0.0	0.0	0.0	0.0
17.2	17.0	0.8	0.0	3113.1	0.0	0.0	0.0	0.0	0.0	3113.1	0.0	1334.4	0.0	0.0	0.0	0.0	0.0
17.8	17.5	0.8	0.0	2346.5	0.0	0.0	0.0	0.0	0.0	2346.5	0.0	1050.0	0.0	0.0	0.0	0.0	0.0
18.4	18.0	0.8	0.0	2701.2	0.0	0.0	0.0	0.0	0.0	2701.2	0.0	1257.4	0.0	0.0	0.0	0.0	0.0
18.9	18.5	0.7	0.0	1820.5	0.0	0.0	0.0	0.0	0.0	1820.5	0.0	879.0	0.0	0.0	0.0	0.0	0.0
	19.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
19.5	19.5	0.7	0.0	1157.2	514.3	0.0	0.0	0.0	0.0	1671.6	0.0	577.9	220.9	0.0	0.0	0.0	0.0
20.1	20.0	0.7	0.0	680.4	408.2	0.0	0.0	0.0	0.0	1088.7	0.0	350.6	180.9	0.0	0.0	0.0	0.0
20.6	20.5	0.6	0.0	505.4	303.2	0.0	0.0	0.0	0.0	808.6	0.0	268.1	138.3	0.0	0.0	0.0	0.0
21.2	21.0	0.6	0.0	193.4	270.7	0.0	0.0	0.0	0.0	464.1	0.0	105.4	126.9	0.0	0.0	0.0	0.0
21.8	21.5	0.6	0.0	126.9	177.6	0.0	0.0	0.0	0.0	304.5	0.0	70.9	85.4	0.0	0.0	0.0	0.0
22.3	22.0	0.6	0.0	50.5	151.6	28.9	0.0	0.0	0.0	231.0	0.0	28.9	74.6	9.1	0.0	0.0	0.0
22.9	22.5	0.5	0.0	34.0	102.0	19.4	0.0	0.0	0.0	155.4	0.0	19.9	51.3	6.3	0.0	0.0	0.0
	23.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
23.5	23.5	0.5	0.0	37.8	105.8	15.1	0.0	0.0	0.0	158.7	0.0	22.6	54.4	5.0	0.0	0.0	0.0
24.0	24.0	0.5	0.0	2.2	19.9	28.7	4.4	4.4	0.0	59.6	0.0	1.3	10.4	9.6	0.3	0.1	0.0
24.6	24.5	0.5	0.0	3.5	31.1	44.9	6.9	6.9	0.0	93.2	0.0	2.1	16.6	15.3	0.5	0.1	0.0
25.2	25.0	0.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
25.7	25.5	0.4	0.0	0.0	12.9	77.3	12.9	0.0	0.0	103.1	0.0	0.0	7.1	27.3	1.0	0.0	0.0
26.3	26.0	0.4	0.0	0.0	8.8	40.9	20.5	8.8	8.8	87.7	0.0	0.0	4.9	14.7	1.6	0.1	0.0
26.9	26.5	0.4	0.0	0.0	1.8	8.5	4.3	1.8	1.8	18.3	0.0	0.0	1.0	3.1	0.3	0.0	0.0
27.4	27.0	0.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	27.5		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
28.0	28.0	0.4	0.0	0.0	2.9	3.7	5.2	5.9	5.2	22.8	0.0	0.0	1.7	1.4	0.4	0.1	0.0
28.6	28.5	0.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
29.1	29.0	0.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
29.7	29.5	0.4	0.0	0.0	0.0	2.3	15.0	8.1	11.5	36.8	0.0	0.0	0.0	0.9	1.3	0.1	0.0
30.3	30.0	0.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
30.8	30.5	0.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
31.4	31.0	0.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	31.5		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
32.0	32.0	0.3	0.0	0.0	0.0	3.4	10.1	6.8	15.8	36.0	0.0	0.0	0.0	1.4	0.9	0.1	0.0
32.5	32.5	0.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
33.1	33.0	0.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

Mid point (TL, cm)	Nominal length class	Natural mortality	Number at age – year of impingement								Number of survivors – year of impingement +1						
			0	1	2	3	4	5	6+	Total	0	1	2	3	4	5	6+
33.7	33.5	0.3	0.0	0.0	0.0	0.1	1.8	3.6	9.5	15.0	0.0	0.0	0.0	0.1	0.2	0.1	0.0
34.2	34.0	0.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
34.8	34.5	0.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
35.4	35.0	0.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
35.9	35.5	0.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	36.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
36.5	36.5	0.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
37.1	37.0	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
37.6	37.5	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
38.2	38.0	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
38.8	38.5	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
39.3	39.0	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
39.9	39.5	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	40.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
40.5	40.5	0.2	0.0	0.0	0.0	0.0	0.0	2.1	23.2	25.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0
41.0	41.0	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
41.6	41.5	0.2	0.0	0.0	0.0	0.0	0.0	0.0	18.9	18.9	0.0	0.0	0.0	0.0	0.0	0.0	0.0
42.2	42.0	0.2	0.0	0.0	0.0	0.0	0.0	0.7	8.4	9.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0
42.7	42.5	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
43.3	43.0	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
43.9	43.5	0.2	0.0	0.0	0.0	0.0	0.0	1.0	12.4	13.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0
44.4	44.0	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
45.0	45.0	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
45.6	45.5	0.2	0.0	0.0	0.0	0.0	0.0	4.8	57.6	62.4	0.0	0.0	0.0	0.0	0.0	0.1	0.0
Number impinged			126281	16333	2111	273	81	55	173	145307	1969	7317	975	94	7	1	0
Number mature			0	0	296	123	71	54	173	7176							

Step 2 (survival in subsequent years) and **Step 3** (final EAV calculation) are show in Table 4. The summed numbers of fish sampled in the year of impingement and the numbers surviving to the year of impingement +1 in each age class (Table 3) were transferred to Table 4. The rows of the table show the progressive survivorship of each starting age class from the year of impingement to the point where that year class becomes 6 years old (age of maturity).

As the fish that were impinged as age 0 individuals (126 281 fish) progressed from age 1 (19 692 fish) to age 2, a single natural mortality value (0.66 yr^{-1}) was applied, based on the mean length of age 1 fish (20.0 cm TL), resulting in the survival of 10 133 fish into age 2. As these fish progressed into the next year, 1 419 individuals would have been mature (proportion mature at age 2 = 0.14). These mature fish were first removed from the total before natural maturity was applied. The process was repeated each year until the age group reached age 6 and all fish would have been mature.

The total number of survivors was made up of three components:

1. the number of individuals that were mature in the year of impingement (N_{mature} - 717 individuals),
2. the number of individuals that became mature during the iterative process ($N_{maturing}$ - 10 342 individuals), and
3. the number that mature in the final year (N_{final} - 5 individuals), giving a total of 11 064 fish. As a proportion of the total number of individuals impinged, this gives an EAV of (11 064/145 307) **= 0.076**.

The corresponding EAV calculations for thornback ray, cod and plaice are given in Appendix F

Table 4 Estimates of the survival of sole by year for each year class, following impingement to year 6 (age at maturity)

Age (yr)	0	1	2	3	4	5	6+
Mean length (cm)	13.6	20.0	23.0	26.4	30.2	32.7	34.0
Natural mortality	1.24	0.66	0.53	0.43	0.34	0.30	0.28
Proportion mature	0.00	0.00	0.14	0.45	0.88	0.98	1.00
Survivors	126281	19692	10133	5125	1841	157	2
		16333	7317	3701	1330	113	2
			2111	975	350	30	0
				273	94	8	0
					81	6.5	0
						55	1
						Total	5
Number that would be mature (and have an EAV of 1)		0	1419	2306	1620	154	
			1024	1665	1170	111	
				439	308	29	
					83	8	
						6	
						Total	10342
Number of fish impinged							145301
Number mature at impingement							717
Number becoming mature up to year 6							10342
Number surviving to year 6							5
Total survivors							11064
EAV							**0.076**

4 Discussion

This report describes the derivation of new EAV values for key fish species impinged at Hinkley Point (BEEMS Technical Report TR409). New EAVs were calculated for eight species, namely sprat, whiting, Dover sole, cod, herring, plaice, thornback ray and bass. EAV values are given in Table 5 below, along with the corresponding values calculated at Sizewell using the BEEMS approach (BEEMS Technical Report TR383), and the EAVs given by Turnpenny (1989) as extracted from PISCES 2009 for Hinkley Point. For comparison, the EAV values given by Turnpenny (1989) for whiting, Dover sole, cod, herring and plaice that are hard-wired into PISCES 2009 are given in Table 6.

For sprat, the value calculated for Hinkley Point (0.443) was smaller than that obtained for Sizewell (0.569). Both sites show similar impinged length distributions (Appendix G), but whereas fish at Sizewell are 100 % mature at age 4 (BEEMS Technical Report TR383), in the Celtic Sea, sprat are only 100 % mature at age 6 (Cefas PELTIC data). Consequently, the fish that were impinged at Hinkley Point spend longer as juveniles and suffer greater natural mortality prior to maturity than their North Sea counterparts.

A similar difference was seen with whiting, where the Hinkley Point EAV (0.098) was smaller than that calculated for Sizewell (0.300), using the BEEMS method. The differences can be attributed to differences in the growth parameters used at the two sites, as well as differences in the observed length distributions. Fish impinged at Hinkley Point were overall smaller than those recorded at Sizewell (Appendix G).

For sole, the PISCES 2009 expert system estimated an EAV value for Hinkley Point (0.054) that was substantially smaller than that at Sizewell (0.301). A similar difference in estimates was seen with the new BEEMS approach, where the value calculated for Hinkley Point (0.076) was smaller than that obtained for Sizewell (0.120). In the case of the BEEMS approach, this is due to the life history characteristics of the species at the two sites. Both sites show similar impinged length distributions (Appendix G), but whereas fish at Sizewell are 100 % mature at age 3 (BEEMS Technical Report TR383), in the Celtic Sea, sole are only 100 % mature at age 6 (ICES, 2016a). Consequently, the fish that were impinged at Hinkley Point spend longer as juveniles and suffer greater natural mortality prior to maturity than their North Sea counterparts.

As with sole, the PISCES 2009 expert system estimated an EAV value for cod at Hinkley Point (0.086) that was notably smaller than that calculated for Sizewell (0.274). However, using the BEEMS method the disparity between the values of the two sites are even more marked (Hinkley Point = 0.00179; Sizewell = 0.335). This difference is largely a result of the differences in impinged length distributions (Appendix G). In 2009, at Hinkley Point, >80 % of the fish impinged were in size classes <13 cm TL, compared with < 3 % of the fish impinged at Sizewell in the same size classes. 2009 saw an extremely large year class of age 0 fish in the Celtic Sea, which, when it recruited to the fishery in 2010 as age 1 fish, was one of the highest recruitments since 1971 (ICES, 2016b). This year was also the highest for cod abundance in routine impingement sampling at Hinkley Point, which has been undertaken since 1981 (BEEMS Technical Report TR-S251).

Calculations for herring also resulted in an EAV at Hinkley Point (0.024) that was smaller than its Sizewell counterpart (0.543). Again, there was a notable difference in the observed length distributions of impinged fish at the two sites (Appendix G). At Hinkley Point, almost 90 % of the fish impinged were <12 cm TL. In contrast, at Sizewell the length distribution was bimodal, with 50 % of the impinged fish in size classes < 22.5 cm TL, and the remainder in larger size classes. Consequently, a greater proportion of the Sizewell catch was composed of mature fish, giving an EAV that was much closer to 1.

Table 5 EAV values calculated for Hinkley Point and Sizewell in 2017 using the BEEMS method, and values derived from the PISCES 2009 expert system.

	BEEMS method		PISCES 2009	
Species	**Hinkley Point**	**Sizewell†**	**Hinkley Point**	**Sizewell**
Sprat	0.443	0.569	N/A	
Whiting	0.098	0.300	0.137	
Dover sole	0.076	0.120	0.054	0.301
Cod	0.00179	0.335	0.086	0.274
Herring	0.024	0.543	0.495	
Plaice	0.132	0.249	0.092	0.092
Thornback ray (mean value)	0.196	0.026	N/A	
Bass (females)	0.123	0.176	N/A	

Note: For bass only an EAV for females is provided (based upon the availability of maturity data). The male EAV will be lower, and the use of a female EAV will, therefore, result in slightly over estimated adult impingement estimates i.e. will result in a worst-case estimate

† values given in BEEMS Technical Report TR383

For plaice, the PISCES 2009 expert system provided the same value of EAV for both sites (0.092). This was presumably because the programme drew on the same datasets to make its impingement calculations at the two locations, but this cannot be confirmed as the programme does not output what datasets have been used to make the impingement calculations. However, using the BEEMS approach, separate values of EAV could be calculated for the two sites, with that at Hinkley Point being less (0.132) than that calculated for Sizewell (0.249). Again, differences were seen in the length distributions of fish impinged at the two sites – at Hinkley Point >80 % of the fish impinged were <7.5 cm TL, compared with only 18 % of fish impinged at Sizewell for the same length classes.

The values of EAV calculated for thornback ray at Hinkley Point (mean = 0.196) and at Sizewell (0.026) using the BEEMS method were also notably different. This is due to the differences in the impinged length distributions at the two sites (the growth parameters and maturity data were the same for both sites). At Sizewell, a greater proportion of the impinged individuals were in the smaller size classes – 75 % of the impinged thornbacks at Sizewell were in size classes <19 cm TL, compared with only 35 % of impinged individuals at Hinkley Point.

Of the eight species for which EAVs have been calculated at both Hinkley Point and Sizewell using the BEEMS approach, the seven teleosts (sprat, whiting Dover sole, cod, herring, plaice and bass) have values that were higher at Sizewell than Hinkley point, while for thornback ray, the value obtained at Hinkley Point was higher than that of Sizewell. These differences highlight the effect that life history parameters and local population structure will have on the impingement impacts of a given power station. Further, they highlight the effect that that a particularly strong year class of juvenile fish, such as cod, may have on the EAV in a given year, even if the remaining life history parameters remain the same, and underline the importance of checking that the EAVs used for an assessment are appropriate for the site and year concerned.

The EAV values derived using PISCES (2009) and the Turnpenny (1989) method are subject to underlying and unknown uncertainties. These uncertainties arise both from the hard-wired EAV curves and the base datasets used in PISCES (2009). Each of the input parameters will have underlying uncertainty around it as many, such as fecundity, cannot be reliably estimated reliability even to an order of magnitude. In addition, the parameters are over 20 years old, and may not reflect biological changes to populations that have risen as a result of change (e.g. environmental change or fishing pressure). The current EAV calculation method was developed to reduce uncertainty, by using

data that should be more readily available, and more recent. The base length data sets are directly applicable to the survey area and to the predictions of impingement, as they come from the same sampling programme. Age data were generally based on long term survey programmes with ages provided by trained experts and have been subject to rigorous quality assurance during collection and processing. The maturity data are largely based on observations made during biological sampling, and again, these data go through a variety of quality assurance processes in different international laboratories and at international working groups prior to publication. There will still be underlying uncertainties in the data and the method, but it is considered that this approach reduces overall uncertainties by being based upon accepted international fisheries assessment practice, the use of quality assured data sets and locally relevant information about fish populations. As such the method provides a means by which EAVs can be calculated for a much greater number of species.

Table 6 Quarterly EAV values by species, as given in Turnpenny (1989)

Age	Quarter	Whiting	Dover sole	Cod	Herring	Plaice
0-group	Q1	-		0.00001	0.0000321	0.000007
	Q2	0.002	0.0004	0.040	0.0126	0.001
	Q3	0.35	0.015	0.047	0.675	0.016
	Q4	0.42	0.082		0.715	0.069
1-group	Q1	0.506	0.022	0.074	0.757	0.122
	Q2	0.595	0.296	0.084	0.775	0.145
	Q3	0.700	0.365	0.010	0.800	0.163
	Q4	0.802	0.460	0.124	0.845	0.193
2-group	Q1	0.932	0.552	0.149	0.900	0.230
	Q2	1.1	0.695	0.167	1.07	0.258
	Q3	1.27	0.850	0.187	1.35	0.289
	Q4	1.68	0.896	0.215	1.69	0.306

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Appendix A Impinged numbers of fish at length

A.1 Sprat

The numbers of sprat per 0.5 cm length class (standard length, SL), impinged at HPB (2009-2010), with the mid-point of the standard length class corrected to total length (TL).

Length class (SL, cm)	Number impinged	Mid-point length (TL, cm)
2.5-2.9	91	3.41
3.0-3.4	245	3.99
3.5-3.9	1353	4.57
4.0-4.4	8656	5.14
4.5-4.9	33524	5.72
5.0-5.4	53412	6.29
5.5-5.9	59933	6.87
6.0-6.4	62570	7.44
6.5-6.9	81240	8.02
7.0-7.4	52358	8.59
7.5-7.9	30380	9.17
8.0-8.4	25478	9.74
8.5-8.9	17361	10.32
9.0-9.4	12133	10.90
9.5-9.9	13207	11.47
10.0-10.4	41631	12.05
10.5-10.9	60601	12.62
11.0-11.4	62454	13.20
11.5-11.9	31734	13.77
12.0-12.4	16202	14.35
12.5-12.9	2834	14.92
13.0-13.4	692	15.50

A.2 Whiting

The numbers of whiting per 0.5 cm length class (standard length, SL), impinged at HPB (2009-2010), with the mid-point of the standard length class corrected to total length (TL).

Length class (SL, cm)	Number impinged	Mid-point length (TL, cm)	Length class (SL, cm)	Number impinged	Mid-point length (TL, cm)
2.0-2.4	19	2.46	19.0-19.4	1019	21.10
2.5-2.9	124	3.01	19.5-19.9	985	21.65
3.0-3.4	0	3.55	20.0-20.4	1167	22.20
3.5-3.9	19	4.10	20.5-20.9	812	22.75
4.0-4.4	68	4.65	21.0-21.4	723	23.29
4.5-4.9	138	5.20	21.5-21.9	640	23.84
5.0-5.4	1991	5.75	22.0-22.4	620	24.39
5.5-5.9	6035	6.30	22.5-22.9	461	24.94
6.0-6.4	17150	6.84	23.0-23.4	293	25.49
6.5-6.9	26681	7.39	23.5-23.9	244	26.04
7.0-7.4	28556	7.94	24.0-24.4	204	26.58
7.5-7.9	23135	8.49	24.5-24.9	292	27.13
8.0-8.4	27924	9.04	25.0-25.4	11	27.68
8.5-8.9	24061	9.59	25.5-25.9	298	28.23
9.0-9.4	30303	10.13	26.0-26.4	119	28.78
9.5-9.9	33574	10.68	26.5-26.9	40	29.32
10.0-10.4	37420	11.23	27.0-27.4	192	29.87
10.5-10.9	39858	11.78	27.5-27.9	11	30.42
11.0-11.4	44140	12.33	28.0-28.4	15	30.97
11.5-11.9	39854	12.88	28.5-28.9	0	31.52
12.0-12.4	36711	13.42	29.0-29.4	40	32.07
12.5-12.9	27231	13.97	29.5-29.9	134	32.61
13.0-13.4	21515	14.52	30.0-30.4	59	33.16
13.5-13.9	15057	15.07	30.5-30.9	223	33.71
14.0-14.4	12140	15.62	31.0-31.4	56	34.26
14.5-14.9	9012	16.17	31.5-31.9	0	34.81
15.0-15.4	6302	16.71	32.0-32.4	0	35.36
15.5-15.9	6572	17.26	32.5-32.9	0	35.90
16.0-16.4	4640	17.81	33.0-33.4	0	36.45
16.5-16.9	3227	18.36	33.5-33.9	80	37.00
17.0-17.4	2744	18.91	34.0-34.4	0	37.55
17.5-17.9	2086	19.46	34.5-34.9	0	38.10
18.0-18.4	1621	20.00	35.0-35.4	145	38.65
18.5-18.9	547	20.55			

A.3 Dover sole

The numbers of sole per 0.5 cm length class (standard length, SL), impinged at HPB (2009-2010), with the mid-point of the standard length class corrected to total length (TL).

Length class (SL, cm)	Number impinged	Mid-point length (TL, cm)	Length class (SL, cm)	Number impinged	Mid-point length (TL, cm)
0.0-0.4	0	0.23	20.5-20.9	159	23.46
0.5-0.9	0	0.80	21.0-21.4	60	24.03
1.0-1.4	0	1.37	21.5-21.9	93	24.60
1.5-1.9	0	1.93	22.0-22.4	0	25.16
2.0-2.4	0	2.50	22.5-22.9	103	25.73
2.5-2.9	0	3.07	23.0-23.4	88	26.30
3.0-3.4	0	3.63	23.5-23.9	18	26.86
3.5-3.9	37	4.20	24.0-24.4	0	27.43
4.0-4.4	33	4.77	24.5-24.9	23	27.99
4.5-4.9	217	5.33	25.0-25.4	0	28.56
5.0-5.4	911	5.90	25.5-25.9	0	29.13
5.5-5.9	3833	6.47	26.0-26.4	37	29.69
6.0-6.4	7312	7.03	26.5-26.9	0	30.26
6.5-6.9	8024	7.60	27.0-27.4	0	30.83
7.0-7.4	10452	8.17	27.5-27.9	0	31.39
7.5-7.9	12419	8.73	28.0-28.4	36	31.96
8.0-8.4	14520	9.30	28.5-28.9	0	32.53
8.5-8.9	9961	9.87	29.0-29.4	0	33.09
9.0-9.4	9324	10.43	29.5-29.9	15	33.66
9.5-9.9	7731	11.00	30.0-30.4	0	34.23
10.0-10.4	6866	11.56	30.5-30.9	0	34.79
10.5-10.9	5647	12.13	31.0-31.4	0	35.36
11.0-11.4	5254	12.70	31.5-31.9	0	35.93
11.5-11.9	4037	13.26	32.0-32.4	0	36.49
12.0-12.4	3833	13.83	32.5-32.9	0	37.06
12.5-12.9	3673	14.40	33.0-33.4	0	37.63
13.0-13.4	3873	14.96	33.5-33.9	0	38.19
13.5-13.9	3959	15.53	34.0-34.4	0	38.76
14.0-14.4	4182	16.10	34.5-34.9	0	39.33
14.5-14.9	3745	16.66	35.0-35.4	0	39.89
15.0-15.4	3113	17.23	35.5-35.9	25	40.46
15.5-15.9	2346	17.80	36.0-36.4	0	41.03
16.0-16.4	2701	18.36	36.5-36.9	19	41.59
16.5-16.9	1820	18.93	37.0-37.4	9	42.16
17.0-17.4	1672	19.50	37.5-37.9	0	42.73
17.5-17.9	1089	20.06	38.0-38.4	0	43.29
18.0-18.4	809	20.63	38.5-38.9	13	43.86
18.5-18.9	464	21.20	39.0-39.4	0	44.42
19.0-19.4	305	21.76	39.5-39.9	0	44.99
19.5-19.9	231	22.33	40.0-40.4	62	45.56
20.0-20.4	155	22.90			

A.5 Cod

The numbers of cod per 0.5 cm length class (standard length, SL), impinged at HPB (2009-2010), with the mid-point of the standard length class corrected to total length (TL).

Length class (SL, cm)	Number impinged	Mid-point length (TL, cm)	Length class (SL, cm)	Number impinged	Mid-point length (TL, cm)
0.0-0.4	0	0.47	21.0-21.4	185	23.23
0.5-0.9	0	1.01	21.5-21.9	156	23.77
1.0-1.4	0	1.55	22.0-22.4	111	24.31
1.5-1.9	0	2.09	22.5-22.9	235	24.86
2.0-2.4	0	2.64	23.0-23.4	267	25.40
2.5-2.9	0	3.18	23.5-23.9	79	25.94
3.0-3.4	31	3.72	24.0-24.4	191	26.48
3.5-3.9	0	4.26	24.5-24.9	70	27.02
4.0-4.4	143	4.80	25.0-25.4	20	27.57
4.5-4.9	817	5.35	25.5-25.9	0	28.11
5.0-5.4	3021	5.89	26.0-26.4	15	28.65
5.5-5.9	10113	6.43	26.5-26.9	25	29.19
6.0-6.4	11838	6.97	27.0-27.4	0	29.73
6.5-6.9	10950	7.51	27.5-27.9	10	30.27
7.0-7.4	6365	8.05	28.0-28.4	0	30.82
7.5-7.9	4574	8.60	28.5-28.9	0	31.36
8.0-8.4	3786	9.14	29.0-29.4	0	31.90
8.5-8.9	3018	9.68	29.5-29.9	10	32.44
9.0-9.4	3300	10.22	30.0-30.4	0	32.98
9.5-9.9	2467	10.76	30.5-30.9	0	33.53
10.0-10.4	2406	11.31	31.0-31.4	0	34.07
10.5-10.9	2293	11.85	31.5-31.9	0	34.61
11.0-11.4	2252	12.39	32.0-32.4	0	35.15
11.5-11.9	1768	12.93	32.5-32.9	0	35.69
12.0-12.4	2159	13.47	33.0-33.4	0	36.24
12.5-12.9	1829	14.02	33.5-33.9	0	36.78
13.0-13.4	1882	14.56	34.0-34.4	0	37.32
13.5-13.9	1533	15.10	34.5-34.9	0	37.86
14.0-14.4	1231	15.64	35.0-35.4	17	38.40
14.5-14.9	1083	16.18	35.5-35.9	0	38.95
15.0-15.4	754	16.73	36.0-36.4	0	39.49
15.5-15.9	804	17.27	36.5-36.9	0	40.03
16.0-16.4	762	17.81	37.0-37.4	0	40.57
16.5-16.9	817	18.35	37.5-37.9	0	41.11
17.0-17.4	548	18.89	38.0-38.4	31	41.66
17.5-17.9	635	19.44	38.5-38.9	0	42.20
18.0-18.4	490	19.98	39.0-39.4	0	42.74
18.5-18.9	662	20.52	39.5-39.9	9	43.28
19.0-19.4	492	21.06	40.0-40.4	0	43.82
19.5-19.9	455	21.60	40.5-40.9	0	44.37
20.0-20.4	419	22.15	41.0-41.4	27	44.91
20.5-20.9	251	22.69	41.5-41.9	31	45.45

The numbers of cod per 0.5 cm length class (standard length, SL), impinged at HPB (2009-2010), with the mid-point of the standard length class corrected to total length (TL), continued.

Length class (SL, cm)	Number impinged	Mid-point length (TL, cm)	Length class (SL, cm)	Number impinged	Mid-point length (TL, cm)
42.0-42.4	0	45.99	63.0-63.4	0	68.75
42.5-42.9	0	46.53	63.5-63.9	0	69.30
43.0-43.4	0	47.08	64.0-64.4	0	69.84
43.5-43.9	0	47.62	64.5-65.9	0	70.38
44.0-44.4	0	48.16	65.0-65.4	15	70.92
44.5-44.9	0	48.70	65.5-65.9	0	71.46
45.0-45.4	15	49.24	66.0-66.4	0	72.00
45.5-45.9	0	49.79	66.5-66.9	0	72.55
46.0-46.4	0	50.33	67.0-67.4	0	73.09
46.5-46.9	0	50.87	67.5-67.9	0	73.63
47.0-47.4	0	51.41	68.0-68.4	0	74.17
47.5-47.9	0	51.95	68.5-68.9	0	74.71
48.0-48.4	0	52.49	69.0-69.4	0	75.26
48.5-48.9	0	53.04	69.5-69.9	0	75.80
49.0-49.4	0	53.58	70.0-70.4	0	76.34
49.5-49.9	0	54.12	70.5-70.9	0	76.88
50.0-50.4	0	54.66	71.0-71.4	0	77.42
50.5-50.9	0	55.20	71.5-71.9	0	77.97
51.0-51.4	0	55.75	72.0-72.4	0	78.51
51.5-51.9	0	56.29	72.5-72.9	0	79.05
52.0-52.4	0	56.83	73.0-73.4	0	79.59
52.5-52.9	0	57.37	73.5-73.9	0	80.13
53.0-53.4	0	57.91	74.0-74.4	0	80.68
53.5-53.9	0	58.46	74.5-74.9	0	81.22
54.0-54.4	0	59.00	75.0-75.4	0	81.76
54.5-54.9	0	59.54	75.5-75.9	0	82.30
55.0-55.4	0	60.08	76.0-76.4	0	82.84
55.5-55.9	0	60.62	76.5-76.9	0	83.39
56.0-56.4	0	61.17	77.0-77.4	0	83.93
56.5-56.9	0	61.71	77.5-77.9	0	84.47
57.0-57.4	0	62.25	78.0-78.4	0	85.01
57.5-57.9	0	62.79	78.5-78.9	0	85.55
58.0-58.4	0	63.33	79.0-79.4	0	86.10
58.5-58.9	0	63.88	79.5-79.9	0	86.64
59.0-59.4	0	64.42	80.0-80.4	0	87.18
59.5-59.9	0	64.96	80.5-80.9	0	87.72
60.0-60.4	0	65.50	81.0-81.4	0	88.26
60.5-60.9	0	66.04	81.5-81.9	0	88.81
61.0-61.4	0	66.59	82.0-82.4	0	89.35
61.5-61.9	0	67.13			
62.0-62.4	0	67.67			
62.5-62.9	0	68.21			

A.6 Herring

The numbers of herring per 0.5 cm length class (standard length, SL), impinged at HPB (2009-2010), with the mid-point of the standard length class corrected to total length (TL).

Length class (SL, cm)	Number impinged	Midpoint length (TL, cm)	Length class (SL, cm)	Number impinged	Midpoint length (TL, cm)
3.5-3.9	283	4.55	13.0-13.4	217	15.58
4.0-4.4	210	5.13	13.5-13.9	16	16.16
4.5-4.9	557	5.71	14.0-14.4	36	16.74
5.0-5.4	438	6.29	14.5-14.9	0	17.32
5.5-5.9	476	6.87	15.0-15.4	0	17.90
6.0-6.4	972	7.45	15.5-15.9	20	18.48
6.5-6.9	1305	8.03	16.0-16.4	25	19.06
7.0-7.4	2040	8.62	16.5-16.9	9	19.64
7.5-7.9	2545	9.20	17.0-17.4	0	20.23
8.0-8.4	4969	9.78	17.5-17.9	0	20.81
8.5-8.9	5170	10.36	18.0-18.4	45	21.39
9.0-9.4	3956	10.94	18.5-18.9	0	21.97
9.5-9.9	2358	11.52	19.0-19.4	0	22.55
10.0-10.4	1202	12.10	19.5-19.9	0	23.13
10.5-10.9	590	12.68	20.0-20.4	0	23.71
11.0-11.4	374	13.26	20.5-20.9	0	24.29
11.5-11.9	250	13.84	21.0-21.4	0	24.87
12.0-12.4	181	14.42	21.5-21.9	0	25.45
12.5-12.9	326	15.00	22.0-22.4	9	26.03

A.7 Plaice

The numbers of plaice per 0.5 cm length class (standard length, SL), impinged at HPB (2009-2010), with the mid-point of the standard length class corrected to total length (TL).

Length class (SL, cm)	Number impinged	Mid-point length (TL, cm)	Length class (SL, cm)	Number impinged	Mid-point length (TL, cm)
0.0-0.4	0	0.32	16.0-16.4	9	20.54
0.5-0.9	0	0.95	16.5-16.9	0	21.17
1.0-1.4	0	1.58	17.0-17.4	0	21.80
1.5-1.9	0	2.21	17.5-17.9	0	22.44
2.0-2.4	0	2.84	18.0-18.4	0	23.07
2.5-2.9	94	3.48	18.5-18.9	0	23.70
3.0-3.4	209	4.11	19.0-19.4	0	24.33
3.5-3.9	359	4.74	19.5-19.9	0	24.96
4.0-4.4	141	5.37	20.0-20.4	0	25.60
4.5-4.9	12	6.00	20.5-20.9	9	26.23
5.0-5.4	104	6.64	21.0-21.4	0	26.86
5.5-5.9	37	7.27	21.5-21.9	0	27.49
6.0-6.4	64	7.90	22.0-22.4	0	28.12
6.5-6.9	18	8.53	22.5-22.9	0	28.76
7.0-7.4	0	9.16	23.0-23.4	15	29.39
7.5-7.9	0	9.80	23.5-23.9	0	30.02
8.0-8.4	27	10.43	24.0-24.4	0	30.65
8.5-8.9	0	11.06	24.5-24.9	12	31.28
9.0-9.4	0	11.69	25.0-25.4	0	31.92
9.5-9.9	0	12.32	25.5-25.9	15	32.55
10.0-10.4	0	12.96	26.0-26.4	0	33.18
10.5-10.9	0	13.59	26.5-26.9	18	33.81
11.0-11.4	0	14.22	27.0-27.4	0	34.44
11.5-11.9	12	14.85	27.5-27.9	0	35.08
12.0-12.4	0	15.48	28.0-28.4	0	35.71
12.5-12.9	9	16.12	28.5-28.9	0	36.34
13.0-13.4	12	16.75	29.0-29.4	0	36.97
13.5-13.9	12	17.38	29.5-29.9	0	37.60
14.0-14.4	37	18.01	30.0-30.4	12	38.24
14.5-14.9	0	18.64	30.5-30.9	0	38.87
15.0-15.4	0	19.28	31.0-31.4	0	39.50
15.5-15.9	18	19.91	31.5-31.9	0	40.13

A.8 Thornback ray

The numbers of thornback ray per 0.5 cm length class (total length, TL), impinged at HPB (2009-2010).

Length class (TL, cm)	Number impinged	Length class (TL, cm)	Number impinged	Length class (TL, cm)	Number impinged
0.0-0.4	0	16.0-16.4	18	32.0-32.4	9
0.5-0.9	0	16.5-16.9	21	32.5-32.9	0
1.0-1.4	0	17.0-17.4	27	33.0-33.4	0
1.5-1.9	0	17.5-17.9	0	33.5-33.9	9
2.0-2.4	0	18.0-18.4	0	34.0-34.4	0
2.5-2.9	0	18.5-18.9	0	34.5-34.9	9
3.0-3.4	0	19.0-19.4	42	35.0-35.4	0
3.5-3.9	0	19.5-19.9	0	35.5-35.9	0
4.0-4.4	0	20.0-20.4	0	36.0-36.4	0
4.5-4.9	0	20.5-20.9	0	36.5-36.9	0
5.0-5.4	0	21.0-21.4	27	37.0-37.4	0
5.5-5.9	0	21.5-21.9	18	37.5-37.9	23
6.0-6.4	0	22.0-22.4	0	38.0-38.4	0
6.5-6.9	0	22.5-22.9	18	38.5-38.9	0
7.0-7.4	0	23.0-23.4	0	39.0-39.4	18
7.5-7.9	0	23.5-23.9	37	39.5-39.9	21
8.0-8.4	0	24.0-24.4	0	40.0-40.4	0
8.5-8.9	0	24.5-24.9	18	40.5-40.9	18
9.0-9.4	0	25.0-25.4	0	41.0-41.4	0
9.5-9.9	0	25.5-25.9	0	41.5-41.9	18
10.0-10.4	0	26.0-26.4	31	42.0-42.4	0
10.5-10.9	0	26.5-26.9	18	42.5-42.9	0
11.0-11.4	0	27.0-27.4	0	43.0-43.4	0
11.5-11.9	0	27.5-27.9	9	43.5-43.9	0
12.0-12.4	0	28.0-28.4	0	44.0-44.4	18
12.5-12.9	0	28.5-28.9	0	44.5-44.9	0
13.0-13.4	48	29.0-29.4	0	45.0-45.4	21
13.5-13.9	45	29.5-29.9	0	45.5-45.9	0
14.0-14.4	33	30.0-30.4	0	46.0-46.4	0
14.5-14.9	9	30.5-30.9	0	46.5-46.9	0
15.0-15.4	0	31.0-31.4	12	47.0-47.4	0
15.5-15.9	80	31.5-31.9	0	47.5-47.9	0

The numbers of thornback ray per 0.5 cm length class (total length, TL), impinged at HPB (2009-2010), continued.

Length class (TL, cm)	Number impinged	Length class (TL, cm)	Number impinged	Length class (TL, cm)	Number impinged
48.0-48.4	12	64.0-64.4	0	80.0-80.4	0
48.5-48.9	0	64.5-65.9	0	80.5-80.9	0
49.0-49.4	0	65.0-65.4	0	81.0-81.4	0
49.5-49.9	0	65.5-65.9	0	81.5-81.9	0
50.0-50.4	0	66.0-66.4	0	82.0-82.4	0
50.5-50.9	21	66.5-66.9	0	82.5-82.9	0
51.0-51.4	0	67.0-67.4	0	83.0-83.4	0
51.5-51.9	0	67.5-67.9	0	83.5-83.9	0
52.0-52.4	0	68.0-68.4	0	84.0-84.4	0
52.5-52.9	9	68.5-68.9	0	84.5-84.9	0
53.0-53.4	0	69.0-69.4	0	85.0-85.4	0
53.5-53.9	0	69.5-69.9	0	85.5-85.9	0
54.0-54.4	0	70.0-70.4	0	86.0-86.4	0
54.5-54.9	0	70.5-70.9	0	86.5-86.9	0
55.0-55.4	0	71.0-71.4	9	87.0-87.4	0
55.5-55.9	0	71.5-71.9	0	87.5-87.9	0
56.0-56.4	0	72.0-72.4	0	88.8-88.4	0
56.5-56.9	0	72.5-72.9	0	88.5-88.9	0
57.0-57.4	0	73.0-73.4	0	89.0-89.4	0
57.5-57.9	0	73.5-73.9	0	89.5-89.9	0
58.0-58.4	0	74.0-74.4	0	90.0-90.4	0
58.5-58.9	0	74.5-74.9	35	90.5-90.9	0
59.0-59.4	0	75.0-75.4	0	91.0-91.4	0
59.5-59.9	0	75.5-75.9	0	91.5-91.9	0
60.0-60.4	0	76.0-76.4	0	92.0-92.4	0
60.5-60.9	0	76.5-76.9	0	92.5-92.9	0
61.0-61.4	0	77.0-77.4	12	93.0-93.4	0
61.5-61.9	0	77.5-77.9	0	93.5-93.9	0
62.0-62.4	0	78.0-78.4	0	94.0-94.4	0
62.5-62.9	0	78.5-78.9	0	94.5-94.9	0
63.0-63.4	0	79.0-79.4	0	95.0-95.4	12
63.5-63.9	0	79.5-79.9	0		

A.9 Bass

The numbers of bass per 0.5 cm length class (standard length, SL), impinged at HPB (2009-2010), with the mid-point of the standard length class corrected to total length (TL).

Length class (SL, cm)	Number impinged	Mid-point length (TL, cm)	Length class (SL, cm)	Number impinged	Mid-point length (TL, cm)
0.0-0.4	0	0.60	16.0-16.4	154	19.70
0.5-0.9	0	1.20	16.5-16.9	137	20.30
1.0-1.4	0	1.79	17.0-17.4	126	20.90
1.5-1.9	0	2.39	17.5-17.9	87	21.49
2.0-2.4	0	2.99	18.0-18.4	38	22.09
2.5-2.9	0	3.58	18.5-18.9	47	22.69
3.0-3.4	0	4.18	19.0-19.4	30	23.28
3.5-3.9	0	4.78	19.5-19.9	111	23.88
4.0-4.4	0	5.37	20.0-20.4	38	24.48
4.5-4.9	64	5.97	20.5-20.9	52	25.07
5.0-5.4	465	6.57	21.0-21.4	31	25.67
5.5-5.9	376	7.17	21.5-21.9	128	26.27
6.0-6.4	840	7.76	22.0-22.4	64	26.86
6.5-6.9	627	8.36	22.5-22.9	82	27.46
7.0-7.4	515	8.96	23.0-23.4	15	28.06
7.5-7.9	569	9.55	23.5-23.9	0	28.66
8.0-8.4	358	10.15	24.0-24.4	0	29.25
8.5-8.9	119	10.75	24.5-24.9	18	29.85
9.0-9.4	70	11.34	25.0-25.4	20	30.45
9.5-9.9	101	11.94	25.5-25.9	36	31.04
10.0-10.4	159	12.54	26.0-26.4	10	31.64
10.5-10.9	129	13.13	26.5-26.9	15	32.24
11.0-11.4	15	13.73	27.0-27.4	0	32.83
11.5-11.9	154	14.33	27.5-27.9	0	33.43
12.0-12.4	176	14.93	28.0-28.4	10	34.03
12.5-12.9	99	15.52	28.5-28.9	9	34.62
13.0-13.4	308	16.12	29.0-29.4	0	35.22
13.5-13.9	464	16.72	29.5-29.9	15	35.82
14.0-14.4	465	17.31	30.0-30.4	15	36.42
14.5-14.9	213	17.91	30.5-30.9	0	37.01
15.0-15.4	257	18.51	31.0-31.4	15	37.61
15.5-15.9	173	19.10	31.5-31.9	18	38.21

The numbers of bass per 0.5 cm length class (standard length, SL), impinged at HPB (2009-2010), with the mid-point of the standard length class corrected to total length (TL), continued.

Length class (SL, cm)	Number impinged	Mid-point length (TL, cm)	Length class (SL, cm)	Number impinged	Mid-point length (TL, cm)
32.0-32.4	25	38.80	43.5-43.9	33	52.53
32.5-32.9	15	39.40	44.0-44.4	15	53.13
33.0-33.4	0	40.00	44.5-44.9	0	53.73
33.5-33.9	0	40.59	45.0-45.4	15	54.32
34.0-34.4	0	41.19	45.5-45.9	0	54.92
34.5-34.9	0	41.79	46.0-46.4	0	55.52
35.0-35.4	0	42.39	46.5-46.9	33	56.12
35.5-35.9	15	42.98	47.0-47.4	36	56.71
36.0-36.4	0	43.58	47.5-47.9	0	57.31
36.5-36.9	15	44.18	48.0-48.4	15	57.91
37.0-37.4	15	44.77	48.5-48.9	0	58.50
37.5-37.9	0	45.37	49.0-49.4	0	59.10
38.0-38.4	0	45.97	49.5-49.9	0	59.70
38.5-38.9	25	46.56	50.0-50.4	0	60.29
39.0-39.4	0	47.16	50.5-50.9	0	60.89
39.5-39.9	0	47.76	51.0-51.4	0	61.49
40.0-40.4	30	48.35	51.5-51.9	0	62.08
40.5-40.9	15	48.95	52.0-52.4	0	62.68
41.0-41.4	0	49.55	52.5-52.9	0	63.28
41.5-41.9	0	50.15	53.0-53.4	0	63.88
42.0-42.4	0	50.74	53.5-53.9	0	64.47
42.5-42.9	0	51.34	54.0-54.4	0	65.07
43.0-43.4	49	51.94	54.5-54.9	9	65.67

Appendix B Age-length keys

B.1 Sprat

	Number at age							Proportion at age					
TL (mm)	0	1	2	3	4	5	Total	0	1	2	3	4	5
40	5						5	1.0					
45	5						5	1.0					
50	9						9	1.0					
55	15						15	1.0					
60	19	3					22	0.9	0.1				
65	25	4					29	0.9	0.1				
70	35	10	1				46	0.8	0.2	0.0			
75	27	16	2				45	0.6	0.4	0.0			
80	37	26	4				67	0.6	0.4	0.1			
85	35	29	2				66	0.5	0.4	0.0			
90	35	32	5				72	0.5	0.4	0.1			
95	26	32	9				67	0.4	0.5	0.1			
100	6	46	9	1			62	0.1	0.7	0.1	0.0		
105	2	37	16	4			59	0.0	0.6	0.3	0.1		
110		29	41	3	1		74		0.4	0.6	0.0	0.0	
115		32	40	4			76		0.4	0.5	0.1		
120		21	55	13	1		90		0.2	0.6	0.1	0.0	
125		12	60	14	1		87		0.1	0.7	0.2	0.0	
130		4	53	25	7		89		0.0	0.6	0.3	0.1	
135		1	42	33	4	3	83		0.0	0.5	0.4	0.0	0.0
140			15	38	9	1	63			0.2	0.6	0.1	0.0
145			8	28	8	1	45			0.2	0.6	0.2	0.0
150			1	19	10	3	33			0.0	0.6	0.3	0.1
155			1	4	1		6			0.2	0.7	0.2	
160				1			1				1.0		
Total	281	334	364	187	42	8	1216						

B.2 Whiting

	Numbers at age									Proportion at age							
TL (mm)	0	1	2	3	4	5	6	7	Total	0	1	2	3	4	5	6	7
70	2	0	0	0	0	0	0	0	2	1.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
80	2	0	0	0	0	0	0	0	2	1.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
90	1	1	0	0	0	0	0	0	2	0.50	0.50	0.00	0.00	0.00	0.00	0.00	0.00
100	2	5	0	0	0	0	0	0	7	0.29	0.71	0.00	0.00	0.00	0.00	0.00	0.00
110	2	10	0	0	0	0	0	0	12	0.17	0.83	0.00	0.00	0.00	0.00	0.00	0.00
120	4	10	0	0	0	0	0	0	14	0.29	0.71	0.00	0.00	0.00	0.00	0.00	0.00
130	4	10	0	0	0	0	0	0	14	0.29	0.71	0.00	0.00	0.00	0.00	0.00	0.00
140	6	13	0	0	0	0	0	0	19	0.32	0.68	0.00	0.00	0.00	0.00	0.00	0.00
150	6	18	1	0	0	0	0	0	25	0.24	0.72	0.04	0.00	0.00	0.00	0.00	0.00
160	21	26	0	0	0	0	0	0	47	0.45	0.55	0.00	0.00	0.00	0.00	0.00	0.00
170	10	31	0	0	0	0	0	0	41	0.24	0.76	0.00	0.00	0.00	0.00	0.00	0.00
180	12	31	2	0	0	0	0	0	45	0.27	0.69	0.04	0.00	0.00	0.00	0.00	0.00
190	7	37	1	0	0	0	0	0	45	0.16	0.82	0.02	0.00	0.00	0.00	0.00	0.00
200	6	26	7	0	0	0	0	0	39	0.15	0.67	0.18	0.00	0.00	0.00	0.00	0.00
210	2	27	13	0	0	0	0	0	42	0.05	0.64	0.31	0.00	0.00	0.00	0.00	0.00
220	0	21	21	0	0	0	0	0	42	0.00	0.50	0.50	0.00	0.00	0.00	0.00	0.00
230	0	13	30	0	0	0	0	0	43	0.00	0.30	0.70	0.00	0.00	0.00	0.00	0.00
240	0	11	22	0	0	0	0	0	33	0.00	0.33	0.67	0.00	0.00	0.00	0.00	0.00
250	0	14	21	3	0	0	0	0	38	0.00	0.37	0.55	0.08	0.00	0.00	0.00	0.00
260	0	8	30	4	3	0	0	0	45	0.00	0.18	0.67	0.09	0.07	0.00	0.00	0.00
270	0	3	28	5	0	0	0	0	36	0.00	0.08	0.78	0.14	0.00	0.00	0.00	0.00
280	0	8	26	16	1	0	0	0	51	0.00	0.16	0.51	0.31	0.02	0.00	0.00	0.00
290	0	1	17	13	0	1	0	0	32	0.00	0.03	0.53	0.41	0.00	0.03	0.00	0.00
300	0	2	12	8	2	0	0	0	24	0.00	0.08	0.50	0.33	0.08	0.00	0.00	0.00
310	0	2	11	11	2	1	0	0	27	0.00	0.07	0.41	0.41	0.07	0.04	0.00	0.00
320	0	0	6	10	0	1	0	0	17	0.00	0.00	0.35	0.59	0.00	0.06	0.00	0.00

	Numbers at age									Proportion at age							
TL (mm)	0	1	2	3	4	5	6	7	Total	0	1	2	3	4	5	6	7
330	0	0	7	6	3	2	1	0	19	0.00	0.00	0.37	0.32	0.16	0.11	0.05	0.00
340	0	0	3	12	3	0	0	0	18	0.00	0.00	0.17	0.67	0.17	0.00	0.00	0.00
350	0	0	5	10	3	1	0	0	19	0.00	0.00	0.26	0.53	0.16	0.05	0.00	0.00
360	0	0	3	5	1	0	0	1	10	0.00	0.00	0.30	0.50	0.10	0.00	0.00	0.10
370	0	0	2	13	5	0	0	0	20	0.00	0.00	0.10	0.65	0.25	0.00	0.00	0.00
380	0	0	4	7	1	0	0	0	12	0.00	0.00	0.33	0.58	0.08	0.00	0.00	0.00
390	0	0	1	14	2	0	0	0	17	0.00	0.00	0.06	0.82	0.12	0.00	0.00	0.00
400	0	0	1	6	5	0	0	0	12	0.00	0.00	0.08	0.50	0.42	0.00	0.00	0.00
410	0	0	0	2	5	1	0	0	8	0.00	0.00	0.00	0.25	0.63	0.13	0.00	0.00
420	0	0	0	1	6	0	1	0	8	0.00	0.00	0.00	0.13	0.75	0.00	0.13	0.00
430	0	0	0	7	3	0	0	0	10	0.00	0.00	0.00	0.70	0.30	0.00	0.00	0.00
440	0	0	0	2	6	1	2	0	11	0.00	0.00	0.00	0.18	0.55	0.09	0.18	0.00
450	0	0	0	3	1	1	0	0	5	0.00	0.00	0.00	0.60	0.20	0.20	0.00	0.00
460	0	0	0	2	4	1	0	0	7	0.00	0.00	0.00	0.29	0.57	0.14	0.00	0.00
470	0	0	0	1	1	0	0	0	2	0.00	0.00	0.00	0.50	0.50	0.00	0.00	0.00
480	0	0	0	2	0	1	0	0	3	0.00	0.00	0.00	0.67	0.00	0.33	0.00	0.00
490	0	0	0	0	3	1	0	0	4	0.00	0.00	0.00	0.00	0.75	0.25	0.00	0.00
500	0	0	0	0	1	1	0	0	2	0.00	0.00	0.00	0.00	0.50	0.50	0.00	0.00
510	0	0	0	0	2	0	0	0	2	0.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00
530	0	0	0	0	0	1	0	0	1	0.00	0.00	0.00	0.00	0.00	1.00	0.00	0.00
550	0	0	0	0	0	1	0	0	1	0.00	0.00	0.00	0.00	0.00	1.00	0.00	0.00
Total	87	328	274	163	63	15	4	1	935	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

B.3 Dover sole

Numbers at age																					
TL (mm)	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	18	19	21	Total
110	3																				3
115	3																				3
120	1																				1
125	1																				1
130	1																				1
135	1																				1
140	3	1																			4
145	3	1																			4
150	3																				3
155	3																				3
160	2	1																			3
165	2	1																			3
170		4																			4
175		4																			4
180		5																			5
185		5																			5
190		9	4																		13
195		9	4																		13
200		10	6																		16
205		10	6																		16
210		10	14																		24
215		10	14																		24
220		7	21	4																	32
225		7	21	4																	32
230		5	14	2																	21
235		5	14	2																	21
240		1	9	13	2	2															27
245		1	9	13	2	2															27
250			3	18	3																24
255			3	18	3																24
260			3	14	7	3	2	1													30
265			3	14	7	3	2	1													30
270			6	18	4	4	2	1	2												37
280			4	5	7	8	5		1			1									31
285			4	5	7	8	5		1			1									31
290				2	13	7	5	2	1		1	1									32
295				2	13	7	5	2	1		1	1									32
300				2	10	6	4	2	2						1		1				28
310			1	2	7	7	6	1	3												27
320				3	9	6	2	2	4	2	1	3									32
330			1	1	3	13	5	1	1		2	5		1		1					34
340				2	6	14	9	3	3			1	1								39
350				1	5	7	5	3	2	1		1									25

Numbers at age																					
TL (mm)	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	18	19	21	Total
360					0	6	8	3	1		1	2		1							22
370					1	4	6	3	6	1		3			2						26
380					2	5	6	5	3	1	2	2									26
385					2	5	6	5	3	1	2	2									26
390						2	2	2	2	2		2	2								14
400						2	5	5	6	1	1	4									24
410						2	2	3	1	2		1									11
420						1	1	1	2	1	2	3	1			1					13
430								1		1	1	1									4
440									1	3	1	4						1	1	1	12
Total	26	106	164	145	113	124	93	47	46	16	15	38	4	2	3	2	1	1	1	1	948

Proportion at age																				
TL (mm)	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	18	19	21
110	1.0																			
115	1.0																			
120	1.0																			
125	1.0																			
130	1.0																			
135	1.0																			
140	0.8	0.3																		
145	0.8	0.3																		
150	1.0																			
155	1.0																			
160	0.7	0.3																		
165	0.7	0.3																		
170		1.0																		
175		1.0																		
180		1.0																		
185		1.0																		
190		0.7	0.3																	
195		0.7	0.3																	
200		0.6	0.4																	
205		0.6	0.4																	
210		0.4	0.6																	
215		0.4	0.6																	
220		0.2	0.7	0.1																
225		0.2	0.7	0.1																
230		0.2	0.7	0.1																
235		0.2	0.7	0.1																
240		0.0	0.3	0.5	0.1	0.1														
245		0.0	0.3	0.5	0.1	0.1														

Proportion at age																				
TL (mm)	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	18	19	21
250			0.1	0.8	0.1															
255			0.1	0.8	0.1															
260			0.1	0.5	0.2	0.1	0.1	0.0												
265			0.1	0.5	0.2	0.1	0.1	0.0												
270			0.2	0.5	0.1	0.1	0.1	0.0	0.1											
280			0.1	0.2	0.2	0.3	0.2		0.0			0.0								
285			0.1	0.2	0.2	0.3	0.2		0.0			0.0								
290				0.1	0.4	0.2	0.2	0.1	0.0		0.0	0.0								
295				0.1	0.4	0.2	0.2	0.1	0.0		0.0	0.0								
300				0.1	0.4	0.2	0.1	0.1	0.1						0.0		0.0			
310			0.0	0.1	0.3	0.3	0.2	0.0	0.1											
320				0.1	0.3	0.2	0.1	0.1	0.1	0.1	0.0	0.1								
330			0.0	0.0	0.1	0.4	0.1	0.0	0.0		0.1	0.1		0.0		0.0				
340				0.1	0.2	0.4	0.2	0.1	0.1			0.0	0.0							
350				0.0	0.2	0.3	0.2	0.1	0.1	0.0		0.0								
360						0.3	0.4	0.1	0.0		0.0	0.1		0.0						
370					0.0	0.2	0.2	0.1	0.2	0.0		0.1			0.1					
380					0.1	0.2	0.2	0.2	0.1	0.0	0.1	0.1								
385					0.1	0.2	0.2	0.2	0.1	0.0	0.1	0.1								
390						0.1	0.1	0.1	0.1	0.1		0.1	0.1							
400						0.1	0.2	0.2	0.3	0.0	0.0	0.2								
410						0.2	0.2	0.3	0.1	0.2		0.1								
420						0.1	0.1	0.1	0.2	0.1	0.2	0.2	0.1			0.1				
430								0.3		0.3	0.3	0.3								
440									0.1	0.3	0.1	0.3						0.1	0.1	0.1

B.4 Cod

Number at age													
TL (mm)	0	1	2	3	4	5	6	7	8	9	10	11	Total
60	1												1
70													0
80	4												4
90	5												5
100	6												6
110	15												15
120	17	1											18
130	19												19
140	20	4											24
150	26	7											33
160	24	2											26
170	37	11											48
180	19	10											29
190	20	16											36
200	18	18											36
210	11	13											24
220	7	22											29
230	5	23											28
240		22											22
250	1	17											18
260	1	18											19
270		16		1									17
280		16											16
290	1	16											17
300		12											12
310		13											13
320		12											12
330		14											14
340		20											20
350		17											17
360		21											21
370		21	1										22
380		22	1										23
390		15											15
400		13	5										18
410		25	4										29
420		15	7										22
430		13	9										22
440		13	6										19
450		11	4										15
460		13	5										18
470		10	9										19
480		8	2										10

Number at age													
TL (mm)	0	1	2	3	4	5	6	7	8	9	10	11	Total
490		6	3										9
500		5	9										14
510		5	11										16
520		5	3										8
530		2	2										4
540		1	7										8
550			6										6
560		3	7										10
570			7										7
580		1	6	1									8
590		1	7	3									11
600			13										13
610			6	1									7
620			3	1									4
630			5	1									6
640			12	3									15
650			4	1									5
660			12										12
670			9	2									11
680			10										10
690			4										4
700			3	1									4
710			2	4									6
720			3	6									9
730			8	4	2								14
740			4	1	2	1							8
750			6	2									8
760			1	4									5
770			1	6	1								8
780			1	2									3
790			1	1									2
800				4			1						5
810			2	4									6
820				8	2	1							11
830				4	1								5
840				4	1	1							6
850				9									9
860				3	3								6
870				5	2								7
880				4	5	2							11
890				8	1	2							11
900				1	6	1							8
910				2	3	3	1						9
920				1	6	4	1						12
930					3	2							5

Number at age													
TL (mm)	0	1	2	3	4	5	6	7	8	9	10	11	Total
940					4								4
950					2	3							5
960					3	1							4
970					1	3							4
980			1		1			1					3
990						2							2
1000							1	2					3
1010					1		3		1				5
1020							2						2
1030								1					1
1040					1							1	2
1050						1							1
1060													0
1080								1					1
1090													0
1100													0
1110							1	1					2
Total	257	549	232	102	51	27	10	6	1	0	0	1	1236

Proportion at age												
TL (mm)	0	1	2	3	4	5	6	7	8	9	10	11
60	1.0											
70												
80	1.0											
90	1.0											
100	1.0											
110	1.0											
120	0.9	0.1										
130	1.0											
140	0.8	0.2										
150	0.8	0.2										
160	0.9	0.1										
170	0.8	0.2										
180	0.7	0.3										
190	0.6	0.4										
200	0.5	0.5										
210	0.5	0.5										
220	0.2	0.8										
230	0.2	0.8										
240		1.0										
250	0.1	0.9										
260	0.1	0.9										

Proportion at age												
TL (mm)	0	1	2	3	4	5	6	7	8	9	10	11
270		0.9		0.1								
280		1.0										
290	0.1	0.9										
300		1.0										
310		1.0										
320		1.0										
330		1.0										
340		1.0										
350		1.0										
360		1.0										
370		1.0	0.0									
380		1.0	0.0									
390		1.0										
400		0.7	0.3									
410		0.9	0.1									
420		0.7	0.3									
430		0.6	0.4									
440		0.7	0.3									
450		0.7	0.3									
460		0.7	0.3									
470		0.5	0.5									
480		0.8	0.2									
490		0.7	0.3									
500		0.4	0.6									
510		0.3	0.7									
520		0.6	0.4									
530		0.5	0.5									
540		0.1	0.9									
550			1.0									
560		0.3	0.7									
570			1.0									
580		0.1	0.8	0.1								
590		0.1	0.6	0.3								
600			1.0									
610			0.9	0.1								
620			0.8	0.3								
630			0.8	0.2								
640			0.8	0.2								
650			0.8	0.2								
660			1.0									
670			0.8	0.2								
680			1.0									
690			1.0									
700			0.8	0.3								
710			0.3	0.7								

Proportion at age												
TL (mm)	0	1	2	3	4	5	6	7	8	9	10	11
720			0.3	0.7								
730			0.6	0.3	0.1							
740			0.5	0.1	0.3	0.1						
750			0.8	0.3								
760			0.2	0.8								
770			0.1	0.8	0.1							
780			0.3	0.7								
790			0.5	0.5								
800				0.8			0.2					
810			0.3	0.7								
820				0.7	0.2	0.1						
830				0.8	0.2	0.0						
840				0.7	0.2	0.2						
850				1.0								
860				0.5	0.5							
870				0.7	0.3							
880				0.4	0.5	0.2						
890				0.7	0.1	0.2						
900				0.1	0.8	0.1						
910				0.2	0.3	0.3	0.1					
920				0.1	0.5	0.3	0.1					
930					0.6	0.4						
940					1.0							
950					0.4	0.6						
960					0.8	0.3						
970					0.3	0.8						
980			0.3		0.3			0.3				
990						1.0						
1000							0.3	0.7				
1010					0.2		0.6		0.2			
1020							1.0					
1030								1.0				
1040					0.5							0.5
1050						1.0						
1060												
1080								1.0				
1090												
1100												
1110							0.5	0.5				

B.5 Herring

TL (mm)	Number at age											Proportion at age									
	0	1	2	3	4	5	6	9	10	12	Total	0	1	2	3	4	5	6	9	10	12
100	1	0	0	0	0	0	0	0	0	0	1	1.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
105	2	0	0	0	0	0	0	0	0	0	2	1.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
110	4	0	0	0	0	0	0	0	0	0	4	1.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
115	3	0	0	0	0	0	0	0	0	0	3	1.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
120	4	0	0	0	0	0	0	0	0	0	4	1.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
125	2	0	0	0	0	0	0	0	0	0	2	1.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
130	2	0	0	0	0	0	0	0	0	0	2	1.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
135	3	0	0	0	0	0	0	0	0	0	3	1.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
140	3	2	0	0	0	0	0	0	0	0	5	0.60	0.40	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
145	4	2	0	0	0	0	0	0	0	0	6	0.67	0.33	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
150	4	3	0	0	0	0	0	0	0	0	7	0.57	0.43	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
155	4	4	0	0	0	0	0	0	0	0	8	0.50	0.50	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
160	3	4	0	0	0	0	0	0	0	0	7	0.43	0.57	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
165	3	4	0	0	0	0	0	0	0	0	7	0.43	0.57	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
170	4	2	0	0	0	0	0	0	0	0	6	0.67	0.33	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
175	0	3	0	0	0	0	0	0	0	0	3	0.00	1.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
180	0	4	0	0	0	0	0	0	0	0	4	0.00	1.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
185	0	2	0	0	0	0	0	0	0	0	2	0.00	1.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
190	0	3	1	0	0	0	0	0	0	0	4	0.00	0.75	0.25	0.00	0.00	0.00	0.00	0.00	0.00	0.00
200	0	3	1	0	0	0	0	0	0	0	4	0.00	0.75	0.25	0.00	0.00	0.00	0.00	0.00	0.00	0.00
205	0	3	2	0	1	0	0	0	0	0	6	0.00	0.50	0.33	0.00	0.17	0.00	0.00	0.00	0.00	0.00
210	0	3	1	0	0	0	0	0	0	0	4	0.00	0.75	0.25	0.00	0.00	0.00	0.00	0.00	0.00	0.00
215	0	1	3	0	0	0	0	0	0	0	4	0.00	0.25	0.75	0.00	0.00	0.00	0.00	0.00	0.00	0.00
220	0	0	2	0	0	0	0	0	0	0	2	0.00	0.00	1.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
225	0	0	4	0	0	0	0	0	0	0	4	0.00	0.00	1.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
230	0	0	3	0	0	0	0	0	0	0	3	0.00	0.00	1.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

TL (mm)	Number at age											Proportion at age									
	0	1	2	3	4	5	6	9	10	12	Total	0	1	2	3	4	5	6	9	10	12
235	0	1	3	0	0	0	0	0	0	1	5	0.00	0.20	0.60	0.00	0.00	0.00	0.00	0.00	0.00	0.20
240	0	0	5	0	0	0	0	0	0	0	5	0.00	0.00	1.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
245	0	0	5	0	0	0	0	0	0	0	5	0.00	0.00	1.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
250	0	0	4	1	0	0	0	0	0	0	5	0.00	0.00	0.80	0.20	0.00	0.00	0.00	0.00	0.00	0.00
255	0	1	2	0	1	0	0	1	0	0	5	0.00	0.20	0.40	0.00	0.20	0.00	0.00	0.20	0.00	0.00
260	0	0	1	2	2	0	0	0	0	0	5	0.00	0.00	0.20	0.40	0.40	0.00	0.00	0.00	0.00	0.00
265	0	0	0	1	1	1	0	0	0	0	3	0.00	0.00	0.00	0.33	0.33	0.33	0.00	0.00	0.00	0.00
270	0	0	0	1	4	0	0	0	0	0	5	0.00	0.00	0.00	0.20	0.80	0.00	0.00	0.00	0.00	0.00
275	0	0	0	0	2	1	1	0	0	0	4	0.00	0.00	0.00	0.00	0.50	0.25	0.25	0.00	0.00	0.00
280	0	0	0	0	2	0	0	0	0	0	2	0.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.00	0.00
295	0	0	0	0	0	0	0	0	1	0	1	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.00	0.00
Total	46	45	37	5	13	2	1	1	1	1	152	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

B.6 Plaice

Number at age																
TL (mm)	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	Total
80			1													1
90	1	2			1											4
100	1	9	4	2	2											18
110		18	3													21
120		4	2	3	3											12
130		5	5	2	1											13
140	1	14	7	6		1										29
150	1	4	2	4	3	2										16
160	1	10	8	9				1								29
170	7	6	9	14	3											39
180	1	13	12	25	5	1										57
190		9	17	31	7	1	2		1							68
200		10	11	23	11	1	1									57
210	1	8	11	31	17	5	2			1						76
220		12	12	21	16	7	3									71
230		8	17	28	20	6	2			1						82
240		3	12	38	14	9	5									81
250		4	15	31	20	12	4		1							87
260		2	10	25	23	13	6	3	1	2	1					86
270		2	13	23	28	12	6	1	2	2						89
280		1	5	33	20	11	3	3	1	1	2					80
290		1	6	23	20	11	5	2		1	1		1			71
300			1	24	11	19	6	3	1					1		66
310			2	19	12	8	7		3							51
320			1	13	16	10	1	1	1	1	1					45
330				12	16	8	3	2								41
340				7	8	4	5	2	2	2	1					31
350				5	9	8	1	1	2							26
360				1	5	6	4	3	1							20
370				4	2	1		3		1						11
380					1	5			2	1						9
390				1	2	2				1						6
400						1	1				1	1				4
410						3	1		1							5
420						2	1									3
430						2										2
440						1		2								3
450						1			1							2
460										1						1
480											1					1
500										1						1
540									1							1
630															1	1

Number at age																
TL (mm)	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	Total
	14	145	186	458	296	173	69	27	21	16	8	1	1	1	1	1417

Proportion at age															
TL (mm)	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14
80			1.0												
90	0.3	0.5			0.3										
100	0.1	0.5	0.2	0.1	0.1										
110		0.9	0.1												
120		0.3	0.2	0.3	0.3										
130		0.4	0.4	0.2	0.1										
140	0.0	0.5	0.2	0.2		0.0									
150	0.1	0.3	0.1	0.3	0.2	0.1									
160	0.0	0.3	0.3	0.3				0.0							
170	0.2	0.2	0.2	0.4	0.1										
180	0.0	0.2	0.2	0.4	0.1	0.0									
190		0.1	0.3	0.5	0.1	0.0	0.0		0.0						
200		0.2	0.2	0.4	0.2	0.0	0.0								
210	0.0	0.1	0.1	0.4	0.2	0.1	0.0			0.0					
220		0.2	0.2	0.3	0.2	0.1	0.0								
230		0.1	0.2	0.3	0.2	0.1	0.0			0.0					
240		0.0	0.1	0.5	0.2	0.1	0.1								
250		0.0	0.2	0.4	0.2	0.1	0.0		0.0						
260		0.0	0.1	0.3	0.3	0.2	0.1	0.0	0.0	0.0	0.0				
270		0.0	0.1	0.3	0.3	0.1	0.1	0.0	0.0	0.0					
280		0.0	0.1	0.4	0.3	0.1	0.0	0.0	0.0	0.0	0.0				
290		0.0	0.1	0.3	0.3	0.2	0.1	0.0		0.0	0.0		0.0		
300			0.0	0.4	0.2	0.3	0.1	0.0	0.0					0.0	
310			0.0	0.4	0.2	0.2	0.1		0.1						
320			0.0	0.3	0.4	0.2	0.0	0.0	0.0	0.0	0.0				
330				0.3	0.4	0.2	0.1	0.0							
340				0.2	0.3	0.1	0.2	0.1	0.1	0.1	0.0				
350				0.2	0.3	0.3	0.0	0.0	0.1						
360				0.1	0.3	0.3	0.2	0.2	0.1						
370				0.4	0.2	0.1		0.3		0.1					
380				0.0	0.1	0.6			0.2	0.1					
390				0.2	0.3	0.3				0.2					
400						0.3	0.3				0.3	0.3			
410						0.6	0.2		0.2						
420						0.7	0.3								
430						1.0									
440						0.3		0.7							
450						0.5			0.5						
460										1.0					

Proportion at age															
TL (mm)	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14
480											1.0				
500										1.0					
540									1.0						
630															1.0

B.7 Bass

Number at age																
TL (mm)	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	Total
50	15															15
60	16	1														17
70	15	6														21
80	14	10														24
90	12	10														22
100	9	12														21
110	9	13														22
120	1	30	2													33
130		54	10													64
140	2	111	40													153
150		140	82													222
160		185	115	2												302
170	2	163	141	2												308
180		140	190	3												333
190		91	214	22												327
200	1	48	249	46												344
210		14	267	109	1											391
220		4	262	154	4											424
230			259	269	1	1										530
240			221	322	8											551
250			156	315	30	3										504
260			81	374	59	2										516
270			27	318	96	2										443
280		1	4	292	159	12										468
290			2	266	186	14										468
300			2	225	246	31										504
310				141	281	61	1									484
320				79	255	83	2									419
330				19	243	141	2									405
340				4	229	162	6									401
350			1		154	203	20									378
360				1	105	226	23									355
370					36	181	39	3								259
380				2	13	126	56	1								198
390				2	2	81	55	6								146
400					1	42	43	8								94
410						32	41	5	2							80
420						9	39	8	2							58
430					1	6	31	20	5							63
440						2	17	9	4	2						34
450						1	14	14	4			1	1			35

Number at age																
TL (mm)	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	Total
460						1	8	13	8							30
470							2	4	5	1						12
480							2	9	7	1			1			20
490								4	4	2			1			11
500								4	4	1	3					12
510						1		3	5	3	2					14
520									5	4	2	1				12
530									1		2					3
540								1	2	1						4
550								1		2						3
560										2						2
570										1						1
580											1			1		2
590													1			1
600															1	1
Total	96	1033	2325	2967	2110	1423	401	113	58	20	10	2	4	1	1	10564

Proportion at age															
TL (mm)	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14
50	1.0														
60	0.9	0.1													
70	0.7	0.3													
80	0.6	0.4													
90	0.5	0.5													
100	0.4	0.6													
110	0.4	0.6													
120	0.0	0.9	0.1												
130		0.8	0.2												
140	0.0	0.7	0.3												
150		0.6	0.4												
160		0.6	0.4	0.0											
170	0.0	0.5	0.5	0.0											
180		0.4	0.6	0.0											
190		0.3	0.7	0.1											
200	0.0	0.1	0.7	0.1											
210		0.0	0.7	0.3	0.0										
220		0.0	0.6	0.4	0.0										
230			0.5	0.5	0.0	0.0									
240			0.4	0.6	0.0										
250			0.3	0.6	0.1	0.0									
260			0.2	0.7	0.1	0.0									

Proportion at age															
TL (mm)	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14
270			0.1	0.7	0.2	0.0									
280		0.0	0.0	0.6	0.3	0.0									
290			0.0	0.6	0.4	0.0									
300			0.0	0.4	0.5	0.1									
310				0.3	0.6	0.1	0.0								
320				0.2	0.6	0.2	0.0								
330				0.0	0.6	0.3	0.0								
340				0.0	0.6	0.4	0.0								
350			0.0		0.4	0.5	0.1								
360				0.0	0.3	0.6	0.1								
370					0.1	0.7	0.2	0.0							
380				0.0	0.1	0.6	0.3	0.0							
390				0.0	0.0	0.6	0.4	0.0							
400					0.0	0.4	0.5	0.1							
410						0.4	0.5	0.1	0.0						
420						0.2	0.7	0.1	0.0						
430					0.0	0.1	0.5	0.3	0.1						
440						0.1	0.5	0.3	0.1	0.1					
450						0.0	0.4	0.4	0.1			0.0	0.0		
460						0.0	0.3	0.4	0.3						
470							0.2	0.3	0.4	0.1					
480							0.1	0.5	0.4	0.1			0.1		
490								0.4	0.4	0.2			0.1		
500								0.3	0.3	0.1	0.3				
510						0.1		0.2	0.4	0.2	0.1				
520									0.4	0.3	0.2	0.1			
530									0.3		0.7				
540								0.3	0.5	0.3					
550								0.3		0.7					
560										1.0					
570										1.0					
580											0.5			0.5	
590													1.0		
600															1.0

Appendix C Mean lengths at age

	Age							
Species	**0**	**1**	**2**	**3**	**4**	**5**	**6**	**Source of age – length data**
Sprat	7.6	9.8	12.1	13.5	14.0	14.3		Cefas PELTIC surveys 2012-2016
Whiting	16.3	19.4	27	34.8	40.1	42.1	41.3	Cefas ISBC, DCRDC and Q4SWIBTS surveys 2010 and 2011
Dover sole	13.6	20.0	23.0	26.4	30.4	32.7	34.0	Cefas DCDRC and Q4SWIBTS surveys 2009
Cod	16.5	33.1	58.6	78.9	89.9	98.6		Cefas DCDRC survey 2005-2010 and Q4SWIBTS survey 2003-2011
Herring	14.1	18.1	23.5	26.4	26.7	27.3	27.8	Cefas Q4SWIBTS 2010 and PELTIC 2011 surveys
Plaice	15.9	17.2	21.2	24.4	26.4	29.3		Cefas DCDRC and Q4SWIBTS surveys 2009
Thornback ray	15.0	23.1	36.6	46.5	52.7	71.3	79.4	Ages 0-4 estimated from Brander & Palmer (1985); Ages 5+ estimated from Ryland & Ajayi (1984)
Bass	8.6	16.5	21.3	26.7	31.9	35.9	40.2	Cefas Solent bass surveys 1994-2011

Appendix D Growth parameters

Growth parameters used in the calculation of EAVs. L_∞ is the theoretical maximum length and k is the growth coefficient.

Species	**L_∞ (cm, total length)**	**k**	**Source**
Sprat	15.1	0.41	Calculated from PELTIC surveys age data
Whiting	38.0	0.38	Hehir, 2003
Dover sole	40.7	0.23	Parameters calculated from 2009 survey ages
Cod	98.5	0.39	FishBase, Irish Sea. Reference given as Jennings et al. (1998)
Herring	33.0	0.61	Thorpe et al., 2015
Plaice	59.4	0.11	FishBase, Irish Sea. Reference given as Jennings et al. (1998)
Thornback ray (female)	107.0	0.13	Holden, 1972
Thornback ray (male)	85.0	0.21	Holden, 1972
Bass	81.8	0.09	(Armstrong and Walmsley, 2012b)

Appendix E Proportion mature

Proportions of fish mature at age and used in the EAV calculations

Species	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	Source
Sprat	0.01	0.26	0.62	0.79	0.74	0.88	1.00									Cefas PELTIC survey data 2012-2016
Whiting	0.00	0.00	1.00													ICES, 2016a (p 906)
Dover sole	0.00	0.00	0.14	0.45	0.88	0.98	1.00									ICES, 2016a (p 880)
Cod	0.00	0.00	0.39	0.87	0.93	1.00										ICES, 2016a (p 561 and stock
Herring	0.00	0.50	1.00													ICES, 2016c (p 297)
Plaice	0.00	0.00	0.26	0.52	0.86	1.00										ICES, 2016a (p 739)
Thornback ray	0.00	0.00	0.00	0.00	0.00	0.50	1.00									Ages 0-4 estimated from Brander & Palmer (1985); Ages 5+ estimated from Ryland & Ajayi (1984)
Bass (females)	0.00	0.00	0.00	0.00	0.19	0.42	0.64	0.79	0.89	0.94	0.97	0.98	0.99	0.99	1.00	(ICES, 2017)

Appendix F Impingement EAV calculations

F.1 Sprat

Mid point (TL, cm)	Nominal length class	Natural mortality	Number at age – year of impingement							Number of survivors – year of impingement +1					
			0	1	2	3	4	5	Total	0	1	2	3	4	5
3.4	3.0-3.4	4.8	91.2	0.0	0.0	0.0	0.0	0.0	91.2	0.7	0.0	0.0	0.0	0.0	0.0
4.0	3.5-3.9	3.8	244.8	0.0	0.0	0.0	0.0	0.0	244.8	5.6	0.0	0.0	0.0	0.0	0.0
	4.0-4.4		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
4.6	4.5-4.9	3.0	1352.8	0.0	0.0	0.0	0.0	0.0	1352.8	64.3	0.0	0.0	0.0	0.0	0.0
5.1	5.0-5.4	2.5	8656.0	0.0	0.0	0.0	0.0	0.0	8656.0	697.5	0.0	0.0	0.0	0.0	0.0
5.7	5.5-5.9	2.1	33524.4	0.0	0.0	0.0	0.0	0.0	33524.4	4006.2	0.0	0.0	0.0	0.0	0.0
6.3	6.0-6.4	1.8	46128.9	7283.5	0.0	0.0	0.0	0.0	53412.4	7461.2	884.2	0.0	0.0	0.0	0.0
6.9	6.5-6.9	1.6	51666.0	8266.6	0.0	0.0	0.0	0.0	59932.6	10605.0	1273.5	0.0	0.0	0.0	0.0
7.4	7.0-7.4	1.4	47607.4	13602.1	1360.2	0.0	0.0	0.0	62569.7	11832.6	2537.3	130.6	0.0	0.0	0.0
	7.5-7.9		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
8.0	8.0-8.4	1.2	44863.7	31525.8	4850.1	0.0	0.0	0.0	81239.6	13037.2	6875.8	544.7	0.0	0.0	0.0
8.6	8.5-8.9	1.1	27765.7	23005.9	1586.6	0.0	0.0	0.0	52358.3	9184.7	5711.6	202.8	0.0	0.0	0.0
9.2	9.0-9.4	1.0	14767.9	13502.1	2109.7	0.0	0.0	0.0	30379.7	5446.4	3737.3	300.7	0.0	0.0	0.0
9.7	9.5-9.9	0.9	9887.0	12168.6	3422.4	0.0	0.0	0.0	25478.0	3998.9	3693.8	534.9	0.0	0.0	0.0
10.3	10.0-10.4	0.8	1680.1	12880.4	2520.1	280.0	0.0	0.0	17360.6	735.4	4231.8	426.3	25.9	0.0	0.0
10.9	10.5-10.9	0.7	411.3	7608.7	3290.3	822.6	0.0	0.0	12132.8	192.8	2676.7	596.0	81.5	0.0	0.0
11.5	11.0-11.4	0.7	0.0	5175.6	7317.2	535.4	178.5	0.0	13206.6	0.0	1932.5	1406.8	56.3	23.5	0.0
	11.5-11.9		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
12.0	12.0-12.4	0.6	0.0	9713.8	25441.0	6013.3	462.6	0.0	41630.7	0.0	3821.5	5153.5	666.7	64.1	0.0
12.6	12.5-12.9	0.6	0.0	8358.7	41793.5	9751.8	696.6	0.0	60600.6	0.0	3443.6	8865.5	1132.2	101.0	0.0
13.2	13.0-13.4	0.6	0.0	2806.9	37191.8	17543.3	4912.1	0.0	62454.1	0.0	1204.7	8219.0	2121.9	742.1	0.0
13.8	13.5-13.9	0.5	0.0	382.3	16058.1	12617.0	1529.3	1147.0	31733.8	0.0	170.2	3680.7	1582.8	239.6	85.8

14.3	14.0-14.4	0.5	0.0	0.0	3857.6	9772.7	2314.6	257.2	16202.1	0.0	0.0	913.7	1266.8	374.8	19.9
14.9	14.5-14.9	0.5	0.0	0.0	503.8	1763.3	503.8	63.0	2833.8	0.0	0.0	122.9	235.4	84.0	5.0
15.5	15.0-15.4	0.4	0.0	0.0	21.0	398.3	209.6	62.9	691.8	0.0	0.0	5.3	54.6	35.9	5.1
	15.5-15.9		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
16.1	16.0-16.4	0.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Number impinged			288647	156281	151323	59498	10807	1530	668086	67268	42194	31103	7224	1665	116
Number mature			2499	40004	93352	47022	7977	1339	192192						

Age (yr)	0	1	2	3	4	5	6
Mean length (cm)	7.6	9.8	12.1	13.5	14.0	14.3	
Natural mortality	1.34	0.88	0.64	0.53	0.50	0.49	
Proportion mature	0.01	0.26	0.62	0.79	0.74	0.88	1.00
Survivors	288647	67268	20680	4197	519	83	6
		156281	42194	8564	1060	168	13
			151323	31103	3849	611	47
				59498	7224	1147	88
					10807	1665	128
						1530	116
						Total	398
Number that would be mature (and have an EAV of 1)		17219	12757	3317	383	72	
			26030	6768	782	147	
				24582	28401	5358	
					5332	1004	
						1457	
						Total	103226
Number of fish impinged							668086
Number mature at impingement							192192
Number becoming mature up to year 6							103226
Number surviving to year 6							398
Total survivors							295817
EAV							**0.443**

F.2 Whiting

Mid point (TL, cm)	Nominal length class	Natural mortality	Number at age – year of impingement				Number of survivors – year of impingement +1		
			0	1	2+	Total	0	1	2+
2.5	2.0-2.4	28.9	19.2	0.0	0.0	19.2	0.0	0.0	0.0
	2.5-2.9		0.0	0.0	0.0	0.0	0.0	0.0	0.0
3.0	3.0-3.4	20.9	124.2	0.0	0.0	124.2	0.0	0.0	0.0
3.6	3.5-3.9	16.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
4.1	4.0-4.4	12.7	19.2	0.0	0.0	19.2	0.0	0.0	0.0
4.7	4.5-4.9	10.4	68.2	0.0	0.0	68.2	0.0	0.0	0.0
5.2	5.0-5.4	8.7	137.7	0.0	0.0	137.7	0.0	0.0	0.0
5.7	5.5-5.9	7.4	1990.7	0.0	0.0	1990.7	1.3	0.0	0.0
6.3	6.0-6.4	6.4	6034.7	0.0	0.0	6034.7	10.4	0.0	0.0
6.8	6.5-6.9	5.6	17149.5	0.0	0.0	17149.5	66.0	0.0	0.0
7.4	7.0-7.4	4.9	26681.5	0.0	0.0	26681.5	196.5	0.0	0.0
7.9	7.5-7.9	4.4	28556.1	0.0	0.0	28556.1	358.8	0.0	0.0
8.5	8.0-8.4	3.9	23135.3	0.0	0.0	23135.3	454.1	0.0	0.0
	8.5-8.9		0.0	0.0	0.0	0.0	0.0	0.0	0.0
9.0	9.0-9.4	3.6	13962.2	13962.2	0.0	27924.4	399.5	399.5	0.0
9.6	9.5-9.9	3.2	12030.7	12030.7	0.0	24061.4	474.7	474.7	0.0
10.1	10.0-10.4	3.0	8658.1	21645.1	0.0	30303.2	450.6	1126.6	0.0
10.7	10.5-10.9	2.7	9592.6	23981.5	0.0	33574.2	635.0	1587.4	0.0
11.2	11.0-11.4	2.5	6236.6	31183.1	0.0	37419.7	509.4	2547.0	0.0
11.8	11.5-11.9	2.3	6643.1	33215.3	0.0	39858.4	652.9	3264.4	0.0
12.3	12.0-12.4	2.2	12611.5	31528.9	0.0	44140.4	1460.2	3650.4	0.0
12.9	12.5-12.9	2.0	11386.8	28466.9	0.0	39853.7	1525.4	3813.6	0.0
13.4	13.0-13.4	1.9	10488.9	26222.2	0.0	36711.1	1601.1	4002.7	0.0
14.0	13.5-13.9	1.8	7780.2	19450.6	0.0	27230.9	1335.4	3338.6	0.0
	14.0-14.4		0.0	0.0	0.0	0.0	0.0	0.0	0.0
14.5	14.5-14.9	1.7	6794.1	14720.6	0.0	21514.7	1296.5	2809.0	0.0
15.1	15.0-15.4	1.6	3613.7	10841.0	602.3	15056.9	759.0	2277.0	0.0
15.6	15.5-15.9	1.5	2913.7	8741.1	485.6	12140.4	667.8	2003.4	0.0
16.2	16.0-16.4	1.4	4026.6	4985.3	0.0	9011.8	999.3	1237.2	0.0
16.7	16.5-16.9	1.3	2815.7	3486.1	0.0	6301.7	751.6	930.6	0.0
17.3	17.0-17.4	1.3	1602.9	4969.1	0.0	6572.0	457.5	1418.2	0.0
17.8	17.5-17.9	1.2	1131.7	3508.1	0.0	4639.8	343.5	1064.8	0.0
18.4	18.0-18.4	1.1	860.5	2223.0	143.4	3226.9	276.5	714.2	0.0
18.9	18.5-18.9	1.1	731.6	1890.1	121.9	2743.6	247.7	640.0	0.0
19.5	19.0-19.4	1.0	324.5	1715.4	46.4	2086.3	115.4	609.8	0.0
	19.5-19.9		0.0	0.0	0.0	0.0	0.0	0.0	0.0
20.0	20.0-20.4	1.0	249.4	1080.7	291.0	1621.1	92.8	402.0	0.0
20.6	20.5-20.9	0.9	84.2	364.9	98.2	547.3	32.7	141.6	0.0
21.1	21.0-21.4	0.9	48.5	655.2	315.5	1019.2	19.6	264.4	0.0
21.6	21.5-21.9	0.9	46.9	633.2	304.9	985.0	19.6	265.1	0.0
22.2	22.0-22.4	0.8	0.0	583.3	583.3	1166.6	0.0	252.7	0.0
22.7	22.5-22.9	0.8	0.0	406.1	406.1	812.3	0.0	181.7	0.0
23.3	23.0-23.4	0.8	0.0	218.5	504.3	722.9	0.0	100.8	0.0

Mid point (TL, cm)	Nominal length class	Natural mortality	Number at age – year of impingement				Number of survivors – year of impingement +1		
			0	1	2+	Total	0	1	2+
23.8	23.5-23.9	0.7	0.0	193.6	446.8	640.4	0.0	91.9	0.0
24.4	24.0-24.4	0.7	0.0	206.8	413.5	620.3	0.0	100.8	0.0
24.9	24.5-24.9	0.7	0.0	153.6	307.3	460.9	0.0	76.8	0.0
25.5	25.0-25.4	0.7	0.0	108.1	185.3	293.3	0.0	55.3	0.0
	25.5-25.9		0.0	0.0	0.0	0.0	0.0	0.0	0.0
26.0	26.0-26.4	0.6	0.0	43.4	200.6	243.9	0.0	22.7	0.0
26.6	26.5-26.9	0.6	0.0	36.3	167.7	204.0	0.0	19.4	0.0
27.1	27.0-27.4	0.6	0.0	24.3	267.7	292.0	0.0	13.3	0.0
27.7	27.5-27.9	0.6	0.0	0.9	10.4	11.3	0.0	0.5	0.0
28.2	28.0-28.4	0.6	0.0	46.7	251.0	297.7	0.0	26.5	0.0
28.8	28.5-28.9	0.6	0.0	18.7	100.3	119.0	0.0	10.8	0.0
29.3	29.0-29.4	0.5	0.0	1.3	38.9	40.2	0.0	0.7	0.0
29.9	29.5-29.9	0.5	0.0	6.0	185.8	191.8	0.0	3.6	0.0
30.4	30.0-30.4	0.5	0.0	0.9	10.4	11.3	0.0	0.6	0.0
31.0	30.5-30.9	0.5	0.0	1.3	13.8	15.0	0.0	0.8	0.0
	31.0-31.4		0.0	0.0	0.0	0.0	0.0	0.0	0.0
31.5	31.5-31.9	0.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0
32.1	32.0-32.4	0.5	0.0	0.0	40.2	40.2	0.0	0.0	0.0
32.6	32.5-32.9	0.5	0.0	0.0	133.9	133.9	0.0	0.0	0.0
33.2	33.0-33.4	0.4	0.0	0.0	59.4	59.4	0.0	0.0	0.0
33.7	33.5-33.9	0.4	0.0	0.0	223.1	223.1	0.0	0.0	0.0
34.3	34.0-34.4	0.4	0.0	0.0	56.0	56.0	0.0	0.0	0.0
34.8	34.5-34.9	0.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0
35.4	35.0-35.4	0.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0
35.9	35.5-35.9	0.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0
36.5	36.0-36.4	0.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	36.5-36.9		0.0	0.0	0.0	0.0	0.0	0.0	0.0
37.0	37.0-37.4	0.4	0.0	0.0	80.4	80.4	0.0	0.0	0.0
37.5	37.5-37.9	0.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0
38.1	38.0-38.4	0.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0
38.6	38.5-38.9	0.3	0.0	0.0	145.0	145.0	0.0	0.0	0.0
Number impinged			228551	303550	7240	539341	16211	39940.8	0.0
Number mature			0	0	7240	7240	0.0	0.0	0.0

Age	0	1	2+
Mean length at age	16.3	19.4	27.0
Mortality at mean length	1.38	1.04	0.61
Proportion mature	0.00	0.00	1.00
Survivors	228552	16212	5738
		303550	39942
		Total	45679
Number that would be mature (and have an EAV of 1)		0	
		Total	0
Number of fish impinged			539341
Number mature at impingement			7240
Number becoming mature up to year 2			0
Number surviving to year 2			45679
Total survivors			52919
EAV			**0.098**

F.3 Cod

Mid point (TL, cm)	Nominal length class (cm)	Natural mortality	Number at age – year of impingement							Number of survivors – year of impingement +1					
			0	1	2	3	4	5+	Total	0	1	2	3	4	5+
	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
0.5	0.5	1706.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
1.0	1.0	494.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
1.6	1.5	247.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
2.1	2.0	152.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
2.6	2.5	105.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
3.2	3.0	78.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
3.7	3.5	60.5	30.6	0.0	0.0	0.0	0.0	0.0	30.6	0.0	0.0	0.0	0.0	0.0	0.0
4.3	4.0	48.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
4.8	4.5	40.1	143.0	0.0	0.0	0.0	0.0	0.0	143.0	0.0	0.0	0.0	0.0	0.0	0.0
5.3	5.0	33.8	816.8	0.0	0.0	0.0	0.0	0.0	816.8	0.0	0.0	0.0	0.0	0.0	0.0
5.9	5.5	28.9	3020.6	0.0	0.0	0.0	0.0	0.0	3020.6	0.0	0.0	0.0	0.0	0.0	0.0
6.4	6.0	25.1	10112.6	0.0	0.0	0.0	0.0	0.0	10112.6	0.0	0.0	0.0	0.0	0.0	0.0
7.0	6.5	22.0	11838.0	0.0	0.0	0.0	0.0	0.0	11838.0	0.0	0.0	0.0	0.0	0.0	0.0
	7.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
7.5	7.5	19.5	10949.9	0.0	0.0	0.0	0.0	0.0	10949.9	0.0	0.0	0.0	0.0	0.0	0.0
8.1	8.0	17.4	6365.2	0.0	0.0	0.0	0.0	0.0	6365.2	0.0	0.0	0.0	0.0	0.0	0.0
8.6	8.5	15.7	4574.0	0.0	0.0	0.0	0.0	0.0	4574.0	0.0	0.0	0.0	0.0	0.0	0.0
9.1	9.0	14.2	3786.2	0.0	0.0	0.0	0.0	0.0	3786.2	0.0	0.0	0.0	0.0	0.0	0.0
9.7	9.5	13.0	3017.8	0.0	0.0	0.0	0.0	0.0	3017.8	0.0	0.0	0.0	0.0	0.0	0.0
10.2	10.0	11.9	3299.5	0.0	0.0	0.0	0.0	0.0	3299.5	0.0	0.0	0.0	0.0	0.0	0.0
10.8	10.5	10.9	2467.2	0.0	0.0	0.0	0.0	0.0	2467.2	0.0	0.0	0.0	0.0	0.0	0.0
11.3	11.0	10.1	2405.6	0.0	0.0	0.0	0.0	0.0	2405.6	0.1	0.0	0.0	0.0	0.0	0.0
11.8	11.5	9.4	2293.0	0.0	0.0	0.0	0.0	0.0	2293.0	0.2	0.0	0.0	0.0	0.0	0.0
12.4	12.0	8.7	2126.5	125.1	0.0	0.0	0.0	0.0	2251.6	0.3	0.0	0.0	0.0	0.0	0.0
12.9	12.5	8.1	1670.1	98.2	0.0	0.0	0.0	0.0	1768.3	0.5	0.0	0.0	0.0	0.0	0.0
13.5	13.0	7.6	2159.2	0.0	0.0	0.0	0.0	0.0	2159.2	1.1	0.0	0.0	0.0	0.0	0.0

Mid point (TL, cm)	Nominal length class (cm)	Natural mortality	Number at age – year of impingement							Number of survivors – year of impingement +1					
			0	1	2	3	4	5+	Total	0	1	2	3	4	5+
	13.5		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
14.0	14.0	7.2	1524.2	304.8	0.0	0.0	0.0	0.0	1829.0	1.2	0.2	0.0	0.0	0.0	0.0
14.6	14.5	6.7	1568.1	313.6	0.0	0.0	0.0	0.0	1881.7	1.9	0.4	0.0	0.0	0.0	0.0
15.1	15.0	6.3	1207.8	325.2	0.0	0.0	0.0	0.0	1533.0	2.1	0.6	0.0	0.0	0.0	0.0
15.6	15.5	6.0	969.6	261.1	0.0	0.0	0.0	0.0	1230.7	2.4	0.7	0.0	0.0	0.0	0.0
16.2	16.0	5.7	999.4	83.3	0.0	0.0	0.0	0.0	1082.7	3.4	0.3	0.0	0.0	0.0	0.0
16.7	16.5	5.4	696.2	58.0	0.0	0.0	0.0	0.0	754.2	3.2	0.3	0.0	0.0	0.0	0.0
17.3	17.0	5.1	619.4	184.2	0.0	0.0	0.0	0.0	803.6	3.7	1.1	0.0	0.0	0.0	0.0
17.8	17.5	4.9	587.2	174.6	0.0	0.0	0.0	0.0	761.7	4.5	1.3	0.0	0.0	0.0	0.0
18.4	18.0	4.6	535.5	281.8	0.0	0.0	0.0	0.0	817.3	5.2	2.7	0.0	0.0	0.0	0.0
18.9	18.5	4.4	358.9	188.9	0.0	0.0	0.0	0.0	547.7	4.3	2.3	0.0	0.0	0.0	0.0
19.4	19.0	4.2	352.6	282.1	0.0	0.0	0.0	0.0	634.8	5.2	4.1	0.0	0.0	0.0	0.0
20.0	19.5	4.0	272.0	217.6	0.0	0.0	0.0	0.0	489.6	4.8	3.8	0.0	0.0	0.0	0.0
	20.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
20.5	20.5	3.9	331.1	331.1	0.0	0.0	0.0	0.0	662.2	6.9	6.9	0.0	0.0	0.0	0.0
21.1	21.0	3.7	225.5	266.5	0.0	0.0	0.0	0.0	492.0	5.5	6.5	0.0	0.0	0.0	0.0
21.6	21.5	3.6	208.6	246.6	0.0	0.0	0.0	0.0	455.2	5.9	7.0	0.0	0.0	0.0	0.0
22.1	22.0	3.4	101.1	317.7	0.0	0.0	0.0	0.0	418.8	3.3	10.3	0.0	0.0	0.0	0.0
22.7	22.5	3.3	60.7	190.7	0.0	0.0	0.0	0.0	251.4	2.3	7.1	0.0	0.0	0.0	0.0
23.2	23.0	3.2	33.1	152.0	0.0	0.0	0.0	0.0	185.1	1.4	6.4	0.0	0.0	0.0	0.0
23.8	23.5	3.1	27.8	127.9	0.0	0.0	0.0	0.0	155.7	1.3	6.0	0.0	0.0	0.0	0.0
24.3	24.0	2.9	0.0	111.4	0.0	0.0	0.0	0.0	111.4	0.0	5.9	0.0	0.0	0.0	0.0
24.9	24.5	2.8	0.0	235.4	0.0	0.0	0.0	0.0	235.4	0.0	13.7	0.0	0.0	0.0	0.0
25.4	25.0	2.7	14.8	252.3	0.0	0.0	0.0	0.0	267.1	1.0	16.2	0.0	0.0	0.0	0.0
25.9	25.5	2.7	4.4	74.7	0.0	0.0	0.0	0.0	79.1	0.3	5.3	0.0	0.0	0.0	0.0
26.5	26.0	2.6	10.0	180.7	0.0	0.0	0.0	0.0	190.7	0.8	13.9	0.0	0.0	0.0	0.0
	26.5		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
27.0	27.0	2.5	0.0	65.5	0.0	4.1	0.0	0.0	69.6	0.0	5.5	0.0	0.0	0.0	0.0

Mid point (TL, cm)	Nominal length class (cm)	Natural mortality	Number at age – year of impingement							Number of survivors – year of impingement +1					
			0	1	2	3	4	5+	Total	0	1	2	3	4	5+
27.6	27.5	2.4	0.0	19.3	0.0	1.2	0.0	0.0	20.5	0.0	1.7	0.0	0.0	0.0	0.0
28.1	28.0	2.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
28.6	28.5	2.3	0.0	15.0	0.0	0.0	0.0	0.0	15.0	0.0	1.6	0.0	0.0	0.0	0.0
29.2	29.0	2.2	1.5	23.8	0.0	0.0	0.0	0.0	25.2	0.2	2.6	0.0	0.0	0.0	0.0
29.7	29.5	2.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
30.3	30.0	2.1	0.0	10.2	0.0	0.0	0.0	0.0	10.2	0.0	1.3	0.0	0.0	0.0	0.0
30.8	30.5	2.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
31.4	31.0	2.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
31.9	31.5	1.9	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
32.4	32.0	1.9	0.0	10.2	0.0	0.0	0.0	0.0	10.2	0.0	1.6	0.0	0.0	0.0	0.0
33.0	32.5	1.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
			0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
33.5	33.5	1.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
34.1	34.0	1.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
34.6	34.5	1.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
35.2	35.0	1.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
35.7	35.5	1.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
36.2	36.0	1.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
36.8	36.5	1.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
37.3	37.0	1.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
37.9	37.5	1.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
38.4	38.0	1.4	0.0	16.0	0.7	0.0	0.0	0.0	16.7	0.0	3.9	0.1	0.0	0.0	0.0
38.9	38.5	1.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
39.5	39.0	1.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	39.5		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
40.0	40.0	1.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
40.6	40.5	1.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
41.1	41.0	1.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

Mid point (TL, cm)	Nominal length class (cm)	Natural mortality	Number at age – year of impingement							Number of survivors – year of impingement +1					
			0	1	2	3	4	5+	Total	0	1	2	3	4	5+
41.7	41.5	1.2	0.0	27.0	4.3	0.0	0.0	0.0	31.3	0.0	7.8	0.8	0.0	0.0	0.0
42.2	42.0	1.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
42.7	42.5	1.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
43.3	43.0	1.2	0.0	5.4	3.8	0.0	0.0	0.0	9.2	0.0	1.7	0.7	0.0	0.0	0.0
43.8	43.5	1.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
44.4	44.0	1.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
44.9	44.5	1.1	0.0	18.5	8.6	0.0	0.0	0.0	27.1	0.0	6.2	1.7	0.0	0.0	0.0
45.4	45.0	1.1	0.0	23.0	8.3	0.0	0.0	0.0	31.3	0.0	7.8	1.7	0.0	0.0	0.0
46.0	45.5	1.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	46.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
46.5	46.5	1.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
47.1	47.0	1.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
47.6	47.5	1.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
48.2	48.0	1.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
48.7	48.5	1.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
49.2	49.0	0.9	0.0	10.0	5.0	0.0	0.0	0.0	15.0	0.0	3.9	1.2	0.0	0.0	0.0
49.8	49.5	0.9	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
50.3	50.0	0.9	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
50.9	50.5	0.9	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
51.4	51.0	0.9	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
52.0	51.5	0.9	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
52.5	52.0	0.9	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	52.5		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
53.0	53.0	0.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
53.6	53.5	0.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
54.1	54.0	0.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
54.7	54.5	0.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
55.2	55.0	0.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

Mid point (TL, cm)	Nominal length class (cm)	Natural mortality	Number at age – year of impingement							Number of survivors – year of impingement +1					
			0	1	2	3	4	5+	Total	0	1	2	3	4	5+
55.7	55.5	0.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
56.3	56.0	0.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
56.8	56.5	0.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
57.4	57.0	0.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
57.9	57.5	0.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
58.5	58.0	0.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	58.5		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
59.0	59.0	0.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
59.5	59.5	0.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
60.1	60.0	0.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
60.6	60.5	0.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
61.2	61.0	0.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
61.7	61.5	0.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
62.2	62.0	0.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
62.8	62.5	0.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
63.3	63.0	0.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
63.9	63.5	0.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
64.4	64.0	0.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
65.0	64.5	0.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	65.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
65.5	65.5	0.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
66.0	66.0	0.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
66.6	66.5	0.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
67.1	67.0	0.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
67.7	67.5	0.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
68.2	68.0	0.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
68.8	68.5	0.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
69.3	69.0	0.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

Mid point (TL, cm)	Nominal length class (cm)	Natural mortality	Number at age – year of impingement							Number of survivors – year of impingement +1					
			0	1	2	3	4	5+	Total	0	1	2	3	4	5+
69.8	69.5	0.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
70.4	70.0	0.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
70.9	70.5	0.5	0.0	0.0	11.3	3.8	0.0	0.0	15.0	0.0	0.0	4.1	0.3	0.0	0.0
71.5	71.0	0.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	71.5		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
72.0	72.0	0.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
72.5	72.5	0.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
73.1	73.0	0.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
73.6	73.5	0.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
74.2	74.0	0.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
74.7	74.5	0.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
75.3	75.0	0.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
75.8	75.5	0.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
76.3	76.0	0.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
76.9	76.5	0.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
77.4	77.0	0.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
78.0	77.5	0.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	78.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
78.5	78.5	0.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
79.1	79.0	0.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
79.6	79.5	0.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
80.1	80.0	0.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
80.7	80.5	0.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
81.2	81.0	0.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
81.8	81.5	0.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
82.3	82.0	0.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
82.8	82.5	0.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
83.4	83.0	0.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

Mid point (TL, cm)	Nominal length class (cm)	Natural mortality	Number at age – year of impingement							Number of survivors – year of impingement +1					
			0	1	2	3	4	5+	Total	0	1	2	3	4	5+
83.9	83.5	0.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
84.5	84.0	0.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	84.5		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
85.0	85.0	0.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
85.6	85.5	0.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
86.1	86.0	0.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
86.6	86.5	0.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
87.2	87.0	0.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
87.7	87.5	0.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
88.3	88.0	0.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
88.8	88.5	0.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
89.3	89.0	0.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Number impinged			81785	5629	42	9	0	0	87466	73	169	10	0	0	0.0
Number mature			0	0	16	8	0	0	24						

Age	0	1	2	3	4	5+
Mean length at age	16.5	33.1	58.6	78.9	89.9	98.6
Mortality at mean length	5.52	1.80	0.71	0.44	0.36	0.31
Proportion mature	0.00	0.00	0.39	0.87	0.93	1.00
Survivors	81785	7	12	4	0	0
		5629	169	50	4	0
			42	10	1	0
				9	0	0.0
					0	0
						0
					Total	3
Number that would be mature (and have an EAV of 1)		0	5	3	0	
			66	44	4	
				9	1	
					0	
					Total	132
Number of fish impinged						87466
Number mature at impingement						24
Number becoming mature up to year 5						132
Number surviving to year 5						0
Total survivors						156
EAV						**0.002**

F.4 Herring

Mid point (TL, cm)	Nominal length class	Natural mortality	Number at age – year of impingement				Number of survivors – year of impingement +1		
			0	1	2+	Total	0	1	2+
4.6	4.5-4.9	14.1	283.4	0.0	0.0	283.4	0.0	0.0	0.0
5.1	5.0-5.4	11.6	210.0	0.0	0.0	210.0	0.0	0.0	0.0
5.7	5.5-5.9	9.8	556.6	0.0	0.0	556.6	0.0	0.0	0.0
6.3	6.0-6.4	8.4	437.5	0.0	0.0	437.5	0.1	0.0	0.0
6.9	6.5-6.9	7.2	476.2	0.0	0.0	476.2	0.3	0.0	0.0
7.5	7.0-7.4	6.4	971.7	0.0	0.0	971.7	1.7	0.0	0.0
0.0	7.5-7.9	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
8.0	8.0-8.4	5.6	1304.5	0.0	0.0	1304.5	4.7	0.0	0.0
8.6	8.5-8.9	5.0	2039.8	0.0	0.0	2039.8	13.2	0.0	0.0
9.2	9.0-9.4	4.5	2545.4	0.0	0.0	2545.4	27.3	0.0	0.0
9.8	9.5-9.9	4.1	4968.9	0.0	0.0	4968.9	81.5	0.0	0.0
10.4	10.0-10.4	3.7	5169.7	0.0	0.0	5169.7	122.1	0.0	0.0
10.9	10.5-10.9	3.4	3956.3	0.0	0.0	3956.3	128.1	0.0	0.0
	11.0-11.4		0.0	0.0	0.0	0.0	0.0	0.0	0.0
11.5	11.5-11.9	3.2	2358.1	0.0	0.0	2358.1	100.4	0.0	0.0
12.1	12.0-12.4	2.9	1201.9	0.0	0.0	1201.9	65.1	0.0	0.0
12.7	12.5-12.9	2.7	590.1	0.0	0.0	590.1	39.5	0.0	0.0
13.3	13.0-13.4	2.5	374.1	0.0	0.0	374.1	30.2	0.0	0.0
13.8	13.5-13.9	2.3	249.8	0.0	0.0	249.8	23.9	0.0	0.0
14.4	14.0-14.4	2.2	108.6	72.4	0.0	181.1	12.1	4.0	0.0
	14.5-14.9		0.0	0.0	0.0	0.0	0.0	0.0	0.0
15.0	15.0-15.4	2.1	186.3	139.7	0.0	326.1	23.7	8.9	0.0
15.6	15.5-15.9	1.9	108.6	108.6	0.0	217.1	15.6	7.8	0.0
16.2	16.0-16.4	1.8	6.7	9.0	0.0	15.7	1.1	0.7	0.0
16.7	16.5-16.9	1.7	15.4	20.5	0.0	35.9	2.7	1.8	0.0
17.3	17.0-17.4	1.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0
17.9	17.5-17.9	1.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0
18.5	18.0-18.4	1.5	0.0	20.3	0.0	20.3	0.0	2.3	0.0
	18.5-18.9		0.0	0.0	0.0	0.0	0.0	0.0	0.0
19.1	19.0-19.4	1.4	0.0	18.7	6.2	24.9	0.0	2.3	0.0
19.6	19.5-19.9	1.3	0.0	6.9	2.3	9.2	0.0	0.9	0.0
20.2	20.0-20.4	1.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0
20.8	20.5-20.9	1.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0
21.4	21.0-21.4	1.2	0.0	33.5	11.2	44.6	0.0	5.2	0.0
22.0	21.5-21.9	1.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	22.0-22.4		0.0	0.0	0.0	0.0	0.0	0.0	0.0
22.5	22.5-22.9	1.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0
23.1	23.0-23.4	1.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
23.7	23.5-23.9	1.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
24.3	24.0-24.4	0.9	0.0	0.0	0.0	0.0	0.0	0.0	0.0
24.9	24.5-24.9	0.9	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	25.0-25.4		0.0	0.0	0.0	0.0	0.0	0.0	0.0
25.4	25.5-25.9	0.9	0.0	0.0	0.0	0.0	0.0	0.0	0.0

Mid point (TL, cm)	Nominal length class	Natural mortality	Number at age – year of impingement				Number of survivors – year of impingement +1		
			0	1	2+	Total	0	1	2+
26.0	26.0-26.4	0.8	0.0	0.0	9.2	9.2	0.0	0.0	0.0
Number impinged			28120	430	29	28578	693	34	0.0
Number mature			0	215	29	244	0	0	0

Age	0	1	2+
Mean length at age	14.1	18.1	23.5
Mortality at mean length	2.28	1.53	1.00
Proportion mature	0.00	0.50	1.00
Survivors	28120	693	75
		430	34
		Total	109
Number that would be mature (and have an EAV of 1)		347	
		Total	347
Number of fish impinged			28578
Number mature at impingement			244
Number becoming mature up to year 2			347
Number surviving to year 2			109
Total survivors			699
EAV			**0.024**

F.5 Plaice

Mid-point (TL, cm)	Nominal length class (cm)	Natural mortality	Number at age – year of impingement							Number of survivors – year of impingement +1					
			0	1	2	3	4	5+	Total	0	1	2	3	4	5+
0.32	0.0	436.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
0.95	0.5	74.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	1.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
1.58	1.5	32.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
2.21	2.0	19.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
2.84	2.5	12.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
3.48	3.0	9.2	93.6	0.0	0.0	0.0	0.0	0.0	93.6	0.0	0.0	0.0	0.0	0.0	0.0
	3.5		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
4.11	4.0	7.0	208.9	0.0	0.0	0.0	0.0	0.0	208.9	0.2	0.0	0.0	0.0	0.0	0.0
4.74	4.5	5.6	358.7	0.0	0.0	0.0	0.0	0.0	358.7	1.4	0.0	0.0	0.0	0.0	0.0
5.37	5.0	4.6	141.3	0.0	0.0	0.0	0.0	0.0	141.3	1.5	0.0	0.0	0.0	0.0	0.0
	5.5		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
6.00	6.0	3.8	12.3	0.0	0.0	0.0	0.0	0.0	12.3	0.3	0.0	0.0	0.0	0.0	0.0
6.64	6.5	3.2	104.3	0.0	0.0	0.0	0.0	0.0	104.3	4.1	0.0	0.0	0.0	0.0	0.0
7.27	7.0	2.8	36.8	0.0	0.0	0.0	0.0	0.0	36.8	2.2	0.0	0.0	0.0	0.0	0.0
7.90	7.5	2.5	63.5	0.0	0.0	0.0	0.0	0.0	63.5	5.5	0.0	0.0	0.0	0.0	0.0
	8.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
8.53	8.5	2.2	0.0	0.0	18.4	0.0	0.0	0.0	18.4	0.0	0.0	1.6	0.0	0.0	0.0
9.16	9.0	1.9	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
9.80	9.5	1.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
10.43	10.0	1.6	1.5	13.4	6.0	3.0	3.0	0.0	26.9	0.3	2.8	0.9	0.3	0.1	0.0
	10.5		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
11.06	11.0	1.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
11.69	11.5	1.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
12.32	12.0	1.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
12.96	12.5	1.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	13.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

Mid-point (TL, cm)	Nominal length class (cm)	Natural mortality	Number at age – year of impingement							Number of survivors – year of impingement +1					
			0	1	2	3	4	5+	Total	0	1	2	3	4	5+
13.59	13.5	1.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
14.22	14.0	1.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
14.85	14.5	0.9	0.4	5.9	3.0	2.5	0.0	0.4	12.3	0.2	2.4	0.9	0.5	0.0	0.0
15.48	15.0	0.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	15.5		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
16.12	16.0	0.8	0.3	3.2	2.5	2.9	0.0	0.3	9.2	0.1	1.5	0.9	0.6	0.0	0.0
16.75	16.5	0.7	0.4	4.2	3.4	3.8	0.0	0.4	12.3	0.2	2.0	1.2	0.9	0.0	0.0
17.38	17.0	0.7	2.2	1.9	2.8	4.4	0.9	0.0	12.3	1.1	0.9	1.1	1.1	0.1	0.0
	17.5		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
18.01	18.0	0.7	0.6	8.4	7.7	16.1	3.2	0.6	36.8	0.3	4.4	3.0	4.0	0.2	0.0
18.64	18.5	0.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
19.28	19.0	0.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
19.91	19.5	0.6	0.0	2.4	4.6	8.4	1.9	1.1	18.4	0.0	1.4	2.0	2.3	0.2	0.0
	20.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
20.54	20.5	0.5	0.0	1.6	1.8	3.7	1.8	0.3	9.2	0.0	1.0	0.8	1.1	0.1	0.0
21.17	21.0	0.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
21.80	21.5	0.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
22.44	22.0	0.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	22.5		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
23.07	23.0	0.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
23.70	23.5	0.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
24.33	24.0	0.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
24.96	24.5	0.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	25.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
25.60	25.5	0.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
26.23	26.0	0.4	0.0	0.2	1.1	2.7	2.5	2.8	9.2	0.0	0.2	0.6	0.9	0.2	0.0
26.86	26.5	0.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
27.49	27.0	0.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

Mid-point (TL, cm)	Nominal length class (cm)	Natural mortality	Number at age – year of impingement							Number of survivors – year of impingement +1					
			0	1	2	3	4	5+	Total	0	1	2	3	4	5+
	27.5		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
28.12	28.0	0.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
28.76	28.5	0.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
29.39	29.0	0.3	0.0	0.2	1.3	4.9	4.2	4.4	15.0	0.0	0.2	0.7	1.7	0.4	0.0
	29.5		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
30.02	30.0	0.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
30.65	30.5	0.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
31.28	31.0	0.3	0.0	0.0	0.5	4.6	2.9	4.3	12.3	0.0	0.0	0.3	1.7	0.3	0.0
31.92	31.5	0.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	32.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
32.55	32.5	0.3	0.0	0.0	0.3	4.4	5.4	5.1	15.3	0.0	0.0	0.2	1.7	0.6	0.0
33.18	33.0	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
33.81	33.5	0.2	0.0	0.0	0.0	5.4	7.2	5.8	18.4	0.0	0.0	0.0	2.0	0.8	0.0
34.44	34.0	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	34.5		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
35.08	35.0	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
35.71	35.5	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
36.34	36.0	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
36.97	36.5	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	37.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
37.60	37.5	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
38.24	38.0	0.2	0.0	0.0	0.0	0.0	1.4	10.9	12.3	0.0	0.0	0.0	0.0	0.2	0.0
38.87	38.5	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	39.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
39.50	39.5	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
40.13	40.0	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Number impinged			1025	42	53	67	34	37	1258	17	17	14	19	3.	0
Number mature			0	0	14	35	30	37	115						

Age	0	1	2	3	4	5+
Mean length at age	15.9	17.2	21.2	24.4	26.4	29.3
Mortality at mean length	0.80	0.70	0.50	0.40	0.35	0.30
Proportion mature	0.00	0.00	0.26	0.52	0.86	1.00
Survivors	1025	17	9	4	1	0
		42	17	8	2	0
			53	14	5	
				34	19	2
					37	3.2
					Total	6
Number that would be mature (and have an EAV of 1)		0	2	2	1	
			4	4	2	
				7	4	
					16	
					Total	43
Number of fish impinged						1258
Number mature at impingement						115
Number becoming mature up to age 5						43
Number surviving to year 5						6
Total survivors						164
EAV						**0.130**

F.6 Thornback ray

For thornback ray, there is no nominal length class, as this species was originally measured to TL, so no SL v TL adjustment was required.

Mid-point (TL, cm)	Natural mortality	Number at age – year of impingement								Number of survivors – year of impingement +1						
		0	1	2	3	4	5	6+	Total	0	1	2	3	4	5	6+
0.25	2035.9	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
0.75	347.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
1.25	152.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
1.75	88.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
2.25	59.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
2.75	42.9	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
3.25	32.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
3.75	26.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
4.25	21.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
4.75	17.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
5.25	15.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
5.75	13.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
6.25	11.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
6.75	10.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
7.25	9.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
7.75	8.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
8.25	7.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
8.75	6.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
9.25	6.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
9.75	5.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
10.25	5.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
10.75	4.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
11.25	4.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
11.75	4.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
12.25	3.9	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
12.75	3.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

Mid-point (TL, cm)	Natural mortality	Number at age – year of impingement								Number of survivors – year of impingement +1						
		0	1	2	3	4	5	6+	Total	0	1	2	3	4	5	6+
13.25	3.4	48.1	0.0	0.0	0.0	0.0	0.0	0.0	48.1	1.6	0.0	0.0	0.0	0.0	0.0	0.0
13.75	3.2	44.6	0.0	0.0	0.0	0.0	0.0	0.0	44.6	1.8	0.0	0.0	0.0	0.0	0.0	0.0
14.25	3.0	33.1	0.0	0.0	0.0	0.0	0.0	0.0	33.1	1.6	0.0	0.0	0.0	0.0	0.0	0.0
14.75	2.9	9.2	0.0	0.0	0.0	0.0	0.0	0.0	9.2	0.5	0.0	0.0	0.0	0.0	0.0	0.0
15.25	2.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
15.75	2.6	79.5	0.0	0.0	0.0	0.0	0.0	0.0	79.5	6.0	0.0	0.0	0.0	0.0	0.0	0.0
16.25	2.5	18.4	0.0	0.0	0.0	0.0	0.0	0.0	18.4	1.6	0.0	0.0	0.0	0.0	0.0	0.0
16.75	2.3	20.8	0.0	0.0	0.0	0.0	0.0	0.0	20.8	2.0	0.0	0.0	0.0	0.0	0.0	0.0
17.25	2.2	27.3	0.0	0.0	0.0	0.0	0.0	0.0	27.3	2.9	0.0	0.0	0.0	0.0	0.0	0.0
17.75	2.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
18.25	2.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
18.75	1.9	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
19.25	1.9	0.0	41.7	0.0	0.0	0.0	0.0	0.0	41.7	0.0	6.4	0.0	0.0	0.0	0.0	0.0
19.75	1.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
20.25	1.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
20.75	1.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
21.25	1.6	0.0	26.9	0.0	0.0	0.0	0.0	0.0	26.9	0.0	5.5	0.0	0.0	0.0	0.0	0.0
21.75	1.5	0.0	18.4	0.0	0.0	0.0	0.0	0.0	18.4	0.0	4.0	0.0	0.0	0.0	0.0	0.0
22.25	1.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
22.75	1.4	0.0	18.4	0.0	0.0	0.0	0.0	0.0	18.4	0.0	4.4	0.0	0.0	0.0	0.0	0.0
23.25	1.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
23.75	1.3	0.0	36.8	0.0	0.0	0.0	0.0	0.0	36.8	0.0	9.7	0.0	0.0	0.0	0.0	0.0
24.25	1.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
24.75	1.2	0.0	18.4	0.0	0.0	0.0	0.0	0.0	18.4	0.0	5.3	0.0	0.0	0.0	0.0	0.0
25.25	1.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
25.75	1.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
26.25	1.1	0.0	30.7	0.0	0.0	0.0	0.0	0.0	30.7	0.0	9.9	0.0	0.0	0.0	0.0	0.0
26.75	1.1	0.0	18.4	0.0	0.0	0.0	0.0	0.0	18.4	0.0	6.1	0.0	0.0	0.0	0.0	0.0
27.25	1.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
27.75	1.0	0.0	9.2	0.0	0.0	0.0	0.0	0.0	9.2	0.0	3.3	0.0	0.0	0.0	0.0	0.0

Mid-point (TL, cm)	Natural mortality	Number at age – year of impingement								Number of survivors – year of impingement +1						
		0	1	2	3	4	5	6+	Total	0	1	2	3	4	5	6+
28.25	1.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
28.75	1.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
29.25	1.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
29.75	0.9	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
30.25	0.9	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
30.75	0.9	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
31.25	0.9	0.0	0.0	12.3	0.0	0.0	0.0	0.0	12.3	0.0	0.0	5.2	0.0	0.0	0.0	0.0
31.75	0.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
32.25	0.8	0.0	0.0	9.2	0.0	0.0	0.0	0.0	9.2	0.0	0.0	4.1	0.0	0.0	0.0	0.0
32.75	0.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
33.25	0.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
33.75	0.8	0.0	0.0	9.2	0.0	0.0	0.0	0.0	9.2	0.0	0.0	4.3	0.0	0.0	0.0	0.0
34.25	0.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
34.75	0.7	0.0	0.0	9.2	0.0	0.0	0.0	0.0	9.2	0.0	0.0	4.5	0.0	0.0	0.0	0.0
35.25	0.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
35.75	0.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
36.25	0.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
36.75	0.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
37.25	0.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
37.75	0.6	0.0	0.0	23.3	0.0	0.0	0.0	0.0	23.3	0.0	0.0	12.4	0.0	0.0	0.0	0.0
38.25	0.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
38.75	0.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
39.25	0.6	0.0	0.0	18.4	0.0	0.0	0.0	0.0	18.4	0.0	0.0	10.2	0.0	0.0	0.0	0.0
39.75	0.6	0.0	0.0	20.8	0.0	0.0	0.0	0.0	20.8	0.0	0.0	11.6	0.0	0.0	0.0	0.0
40.25	0.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
40.75	0.6	0.0	0.0	18.1	0.0	0.0	0.0	0.0	18.1	0.0	0.0	10.4	0.0	0.0	0.0	0.0
41.25	0.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
41.75	0.5	0.0	0.0	0.0	18.4	0.0	0.0	0.0	18.4	0.0	0.0	0.0	10.8	0.0	0.0	0.0
42.25	0.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
42.75	0.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

Mid-point (TL, cm)	Natural mortality	Number at age – year of impingement								Number of survivors – year of impingement +1						
		0	1	2	3	4	5	6+	Total	0	1	2	3	4	5	6+
43.25	0.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
43.75	0.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
44.25	0.5	0.0	0.0	0.0	18.4	0.0	0.0	0.0	18.4	0.0	0.0	0.0	11.3	0.0	0.0	0.0
44.75	0.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
45.25	0.5	0.0	0.0	0.0	20.8	0.0	0.0	0.0	20.8	0.0	0.0	0.0	13.0	0.0	0.0	0.0
45.75	0.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
46.25	0.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
46.75	0.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
47.25	0.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
47.75	0.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
48.25	0.4	0.0	0.0	0.0	12.3	0.0	0.0	0.0	12.3	0.0	0.0	0.0	8.0	0.0	0.0	0.0
48.75	0.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
49.25	0.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
49.75	0.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
50.25	0.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
50.75	0.4	0.0	0.0	0.0	20.8	0.0	0.0	0.0	20.8	0.0	0.0	0.0	14.1	0.0	0.0	0.0
51.25	0.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
51.75	0.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
52.25	0.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
52.75	0.4	0.0	0.0	0.0	0.0	9.2	0.0	0.0	9.2	0.0	0.0	0.0	0.0	6.4	0.0	0.0
53.25	0.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
53.75	0.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
54.25	0.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
54.75	0.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
55.25	0.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
55.75	0.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
56.25	0.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
56.75	0.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
57.25	0.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
57.75	0.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

Mid-point (TL, cm)	Natural mortality	Number at age – year of impingement								Number of survivors – year of impingement +1						
		0	1	2	3	4	5	6+	Total	0	1	2	3	4	5	6+
58.25	0.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
58.75	0.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
59.25	0.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
59.75	0.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
60.25	0.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
60.75	0.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
61.25	0.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
61.75	0.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
62.25	0.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
62.75	0.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
63.25	0.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
63.75	0.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
64.25	0.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
64.75	0.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
65.25	0.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
65.75	0.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
66.25	0.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
66.75	0.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
67.25	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
67.75	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
68.25	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
68.75	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
69.25	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
69.75	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
70.25	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
70.75	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
71.25	0.2	0.0	0.0	0.0	0.0	0.0	8.8	0.0	8.8	0.0	0.0	0.0	0.0	0.0	3.5	0.0
71.75	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
72.25	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
72.75	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

Mid-point (TL, cm)	Natural mortality	Number at age – year of impingement								Number of survivors – year of impingement +1						
		0	1	2	3	4	5	6+	Total	0	1	2	3	4	5	6+
73.25	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
73.75	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
74.25	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
74.75	0.2	0.0	0.0	0.0	0.0	0.0	0.0	34.8	34.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0
75.25	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
75.75	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
76.25	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
76.75	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
77.25	0.2	0.0	0.0	0.0	0.0	0.0	0.0	12.3	12.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0
77.75	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
78.25	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
78.75	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
79.25	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
79.75	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
80.25	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
80.75	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
81.25	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
81.75	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
82.25	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
82.75	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
83.25	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
83.75	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
84.25	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
84.75	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
85.25	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
85.75	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
86.25	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
86.75	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
87.25	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
87.75	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

Mid-point (TL, cm)	Natural mortality	Number at age – year of impingement								Number of survivors – year of impingement +1						
		0	1	2	3	4	5	6+	Total	0	1	2	3	4	5	6+
88.25	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
88.75	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
89.25	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
89.75	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
90.25	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
90.75	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
91.25	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
91.75	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
92.25	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
92.75	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
93.25	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
93.75	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
94.25	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
94.75	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
95.25	0.1	0.0	0.0	0.0	0.0	0.0	0.0	12.1	12.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0
95.75	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
N impinged		281	219	121	91	9	9	59	788	18	55	63	57	6	4	0.0
N mature		0	0	0	0	0	4	59	64							

Age (yr)	0	1	2	3	4	5	6
Mean length (cm)	15.0	23.2	37.2	46.0	52.8	71.3	79.5
Natural mortality	2.78	1.38	0.65	0.46	0.37	0.23	0.19
Proportion mature	0.00	0.00	0.00	0.00	0.00	0.50	1.00
Survivors	281	18	5	2	2	1	0
		219	55	29	18	13	5
			121	63	40	27	11
				91	57	40	16
					9	6	3
						9	4
						Total	38
Number that would be mature (and have an EAV of 1)		0	0	0	0	1	
			0	0	0	6	
				0	0	14	
					0	20	
						3	
						Total	43
Total numbers of fish impinged							788
Number mature at impingement							64
Number becoming mature up to year 6							43
Number surviving to year 6							38
Total survivors							145
EAV							**0.184**

Note: The calculation above is applicable to male thornback ray. When repeated with the same length and age data, but substituting with the female values of L_∞ and k, an EAV of **0.207** results. Assuming is a 1:1 sex ratio for thornback rays, averaging the two EAV values, gives a final EAV value of **0.196**.

F.7 Bass

Mid point (TL, cm)	Nominal length class (cm)	Natural mortality	Number at age – year of impingement															
			0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	Total
	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
0.60	0.5	228.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
1.20	1.0	75.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
1.79	1.5	39.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
2.39	2.0	24.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
2.99	2.5	17.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	3.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
3.58	3.5	12.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
4.18	4.0	10.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
4.78	4.5	8.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
5.37	5.0	6.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
5.97	5.5	5.6	63.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	63.7
	6.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
6.57	6.5	4.8	437.7	27.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	465.0
7.17	7.0	4.2	268.4	107.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	375.7
7.76	7.5	3.7	599.8	239.9	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	839.8
8.36	8.0	3.3	366.0	261.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	627.4
8.96	8.5	2.9	300.4	214.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	515.1
	9.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
9.55	9.5	2.6	310.4	258.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	569.1
10.15	10.0	2.4	153.4	204.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	358.0
10.75	10.5	2.2	51.0	68.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	118.9
11.34	11.0	2.0	28.5	41.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	69.7
11.94	11.5	1.8	41.3	59.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	100.8
	12.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

Mid point (TL, cm)	Nominal length class (cm)	Natural mortality	Number at age – year of impingement															
			0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	Total
12.54	12.5	1.7	4.8	144.9	9.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	159.3
13.13	13.0	1.6	0.0	108.7	20.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	128.9
13.73	13.5	1.5	0.0	12.9	2.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	15.3
14.33	14.0	1.4	2.0	112.0	40.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	154.3
14.93	14.5	1.3	2.3	127.6	46.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	175.9
	15.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
15.52	15.5	1.2	0.0	62.5	36.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	99.1
16.12	16.0	1.1	0.0	188.8	117.4	2.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	308.2
16.72	16.5	1.1	0.0	284.3	176.7	3.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	464.1
17.31	17.0	1.0	3.0	245.9	212.7	3.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	464.6
17.91	17.5	1.0	1.4	112.7	97.5	1.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	213.0
	18.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
18.51	18.5	0.9	0.0	107.9	146.4	2.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	256.7
19.10	19.0	0.9	0.0	48.1	113.2	11.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	172.9
19.70	19.5	0.8	0.0	42.8	100.6	10.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	153.7
20.30	20.0	0.8	0.4	19.1	99.1	18.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	136.9
20.90	20.5	0.8	0.4	17.6	91.4	16.9	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	126.3
21.49	21.0	0.7	0.0	3.1	59.7	24.4	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	87.5
	21.5		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
22.09	22.0	0.7	0.0	0.4	23.5	13.8	0.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	38.1
22.69	22.5	0.7	0.0	0.4	28.9	17.0	0.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	46.8
23.28	23.0	0.6	0.0	0.0	14.7	15.2	0.1	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	30.0
23.88	23.5	0.6	0.0	0.0	54.2	56.3	0.2	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	111.0
24.48	24.0	0.6	0.0	0.0	15.1	22.1	0.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	37.7
	24.5		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
25.07	25.0	0.6	0.0	0.0	16.1	32.6	3.1	0.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	52.1

Mid point (TL, cm)	Nominal length class (cm)	Natural mortality	Number at age – year of impingement															
			0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	Total
25.67	25.5	0.5	0.0	0.0	9.5	19.2	1.8	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	30.7
26.27	26.0	0.5	0.0	0.0	20.1	92.6	14.6	0.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	127.8
26.86	26.5	0.5	0.0	0.0	10.1	46.4	7.3	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	64.1
27.46	27.0	0.5	0.0	0.0	5.0	58.7	17.7	0.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	81.7
	27.5		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
28.06	28.0	0.5	0.0	0.0	0.1	9.4	5.1	0.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	15.0
28.66	28.5	0.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
29.25	29.0	0.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
29.85	29.5	0.4	0.0	0.0	0.1	10.4	7.3	0.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	18.3
30.45	30.0	0.4	0.0	0.0	0.1	9.1	9.9	1.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	20.3
	30.5		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
31.04	31.0	0.4	0.0	0.0	0.0	10.6	21.0	4.6	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	36.2
31.64	31.5	0.4	0.0	0.0	0.0	2.8	5.5	1.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	9.5
32.24	32.0	0.4	0.0	0.0	0.0	2.9	9.3	3.0	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	15.3
32.83	32.5	0.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
33.43	33.0	0.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	33.5		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
34.03	34.0	0.3	0.0	0.0	0.0	0.1	5.4	3.9	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	9.5
34.62	34.5	0.3	0.0	0.0	0.0	0.1	5.0	3.6	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	8.8
35.22	35.0	0.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
35.82	35.5	0.3	0.0	0.0	0.0	0.0	6.1	8.1	0.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	15.0
36.42	36.0	0.3	0.0	0.0	0.0	0.0	4.4	9.5	1.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	15.0
	36.5		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
37.01	37.0	0.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
37.61	37.5	0.3	0.0	0.0	0.0	0.0	2.1	10.5	2.3	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	15.0
38.21	38.0	0.3	0.0	0.0	0.0	0.2	1.2	11.8	5.2	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	18.5

Mid point (TL, cm)	Nominal length class (cm)	Natural mortality	Number at age – year of impingement															
			0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	Total
38.80	38.5	0.3	0.0	0.0	0.0	0.2	1.6	15.6	6.9	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	24.5
39.40	39.0	0.3	0.0	0.0	0.0	0.2	0.2	8.3	5.7	0.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	15.0
	39.5		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
40.00	40.0	0.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
40.59	40.5	0.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
41.19	41.0	0.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
41.79	41.5	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
42.39	42.0	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
42.98	42.5	0.2	0.0	0.0	0.0	0.0	0.0	2.4	10.3	2.1	0.5	0.0	0.0	0.0	0.0	0.0	0.0	15.3
	43.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
43.58	43.5	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
44.18	44.0	0.2	0.0	0.0	0.0	0.0	0.0	0.9	7.5	4.0	1.8	0.9	0.0	0.0	0.0	0.0	0.0	15.0
44.77	44.5	0.2	0.0	0.0	0.0	0.0	0.0	0.9	7.5	4.0	1.8	0.9	0.0	0.0	0.0	0.0	0.0	15.0
45.37	45.0	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
45.97	45.5	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	46.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
46.56	46.5	0.2	0.0	0.0	0.0	0.0	0.0	0.8	6.6	10.6	6.6	0.0	0.0	0.0	0.0	0.0	0.0	24.6
47.16	47.0	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
47.76	47.5	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
48.35	48.0	0.2	0.0	0.0	0.0	0.0	0.0	0.0	3.0	13.6	10.6	1.5	0.0	0.0	1.5	0.0	0.0	30.3
48.95	48.5	0.2	0.0	0.0	0.0	0.0	0.0	0.0	1.5	6.8	5.3	0.8	0.0	0.0	0.8	0.0	0.0	15.0
	49.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
49.55	49.5	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
50.15	50.0	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
50.74	50.5	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
51.34	51.0	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

Mid point (TL, cm)	Nominal length class (cm)	Natural mortality	Number at age – year of impingement															
			0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	Total
51.94	51.5	0.2	0.0	0.0	0.0	0.0	0.0	3.5	0.0	10.5	17.5	10.5	7.0	0.0	0.0	0.0	0.0	49.1
	52.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
52.53	52.5	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	13.9	11.2	5.6	2.8	0.0	0.0	0.0	33.5
53.13	53.0	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	5.0	0.0	10.0	0.0	0.0	0.0	0.0	15.0
53.73	53.5	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
54.32	54.0	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	3.8	7.5	3.8	0.0	0.0	0.0	0.0	0.0	15.0
54.92	54.5	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	55.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
55.52	55.5	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
56.12	56.0	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	33.5	0.0	0.0	0.0	0.0	0.0	33.5
56.71	56.5	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	35.6	0.0	0.0	0.0	0.0	0.0	35.6
57.31	57.0	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
57.91	57.5	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	15.0	0.0	0.0	0.0	0.0	0.0	15.0
	58.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
58.50	58.5	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
59.10	59.0	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
59.70	59.5	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
60.29	60.0	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
60.89	60.5	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
61.49	61.0	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	61.5		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
62.08	62.0	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
62.68	62.5	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
63.28	63.0	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
63.88	63.5	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
64.47	64.0	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

Mid point (TL, cm)	Nominal length class (cm)	Natural mortality	Number at age – year of impingement															
			0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	Total
	64.5		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
65.07	65.0	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
65.67	65.5	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	9.2	9.2
N impinged			2635	3122	1567	513	131	93	59	56	70	114	23	3	2	0	9	8397
N mature			0	0	0	0	25	39	38	45	63	107	22	3	2	0	9	351

Nominal length class (cm)	Number of survivors – year of impingement +1														
	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14
0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
0.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
1.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
1.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
2.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
2.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
3.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
3.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
4.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
4.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
5.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
5.5	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
6.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
6.5	3.5	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
7.0	4.0	1.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
7.5	14.9	6.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

Nominal length class (cm)	Number of survivors – year of impingement +1														
	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14
8.0	13.8	9.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
8.5	16.0	11.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
9.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
9.5	22.0	18.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
10.0	13.9	18.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
10.5	5.7	7.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
11.0	3.8	5.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
11.5	6.5	9.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
12.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
12.5	0.9	26.3	1.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
13.0	0.0	22.3	4.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
13.5	0.0	2.9	0.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
14.0	0.5	28.2	10.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
14.5	0.6	35.1	12.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
15.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
15.5	0.0	18.6	10.9	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
16.0	0.0	60.4	37.5	0.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
16.5	0.0	97.0	60.3	1.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
17.0	1.1	89.0	77.0	1.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
17.5	0.5	43.1	37.3	0.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
18.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
18.5	0.0	43.3	58.8	0.9	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
19.0	0.0	20.2	47.6	4.9	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
19.5	0.0	18.7	44.1	4.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
20.0	0.2	8.7	45.1	8.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
20.5	0.2	8.3	43.2	8.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

Nominal length class (cm)	Number of survivors – year of impingement +1														
	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14
21.0	0.0	1.5	29.2	11.9	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
21.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
22.0	0.0	0.2	11.9	7.0	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
22.5	0.0	0.2	15.0	8.8	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
23.0	0.0	0.0	7.8	8.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
23.5	0.0	0.0	29.6	30.7	0.1	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
24.0	0.0	0.0	8.5	12.3	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
24.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
25.0	0.0	0.0	9.2	18.6	1.4	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
25.5	0.0	0.0	5.5	11.2	0.9	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
26.0	0.0	0.0	11.9	55.1	7.0	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
26.5	0.0	0.0	6.1	28.1	3.6	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
27.0	0.0	0.0	3.1	36.2	8.8	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
27.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
28.0	0.0	0.0	0.1	5.9	2.6	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
28.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
29.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
29.5	0.0	0.0	0.1	6.8	3.9	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
30.0	0.0	0.0	0.1	6.0	5.3	0.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
30.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
31.0	0.0	0.0	0.0	7.1	11.5	1.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
31.5	0.0	0.0	0.0	1.9	3.1	0.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
32.0	0.0	0.0	0.0	2.0	5.2	1.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
32.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
33.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
33.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

Nominal length class (cm)	Number of survivors – year of impingement +1														
	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14
34.0	0.0	0.0	0.0	0.1	3.1	1.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
34.5	0.0	0.0	0.0	0.1	2.9	1.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
35.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
35.5	0.0	0.0	0.0	0.0	3.6	3.4	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
36.0	0.0	0.0	0.0	0.0	2.6	4.1	0.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
36.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
37.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
37.5	0.0	0.0	0.0	0.0	1.3	4.5	0.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
38.0	0.0	0.0	0.0	0.1	0.7	5.1	1.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
38.5	0.0	0.0	0.0	0.2	1.0	6.9	1.9	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
39.0	0.0	0.0	0.0	0.2	0.1	3.7	1.6	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0
39.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
40.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
40.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
41.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
41.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
42.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
42.5	0.0	0.0	0.0	0.0	0.0	1.1	2.9	0.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0
43.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
43.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
44.0	0.0	0.0	0.0	0.0	0.0	0.4	2.2	0.7	0.2	0.0	0.0	0.0	0.0	0.0	0.0
44.5	0.0	0.0	0.0	0.0	0.0	0.4	2.2	0.7	0.2	0.0	0.0	0.0	0.0	0.0	0.0
45.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
45.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
46.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
46.5	0.0	0.0	0.0	0.0	0.0	0.4	1.9	1.8	0.6	0.0	0.0	0.0	0.0	0.0	0.0

Nominal length class (cm)	Number of survivors – year of impingement +1														
	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14
47.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
47.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
48.0	0.0	0.0	0.0	0.0	0.0	0.0	0.9	2.4	1.0	0.1	0.0	0.0	0.0	0.0	0.0
48.5	0.0	0.0	0.0	0.0	0.0	0.0	0.4	1.2	0.5	0.0	0.0	0.0	0.0	0.0	0.0
49.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
49.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
50.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
50.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
51.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
51.5	0.0	0.0	0.0	0.0	0.0	1.7	0.0	1.9	1.6	0.5	0.2	0.0	0.0	0.0	0.0
52.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
52.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.3	0.6	0.1	0.0	0.0	0.0	0.0
53.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.5	0.0	0.3	0.0	0.0	0.0	0.0
53.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
54.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.7	0.7	0.2	0.0	0.0	0.0	0.0	0.0
54.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
55.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
55.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
56.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.7	0.0	0.0	0.0	0.0	0.0
56.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.8	0.0	0.0	0.0	0.0	0.0
57.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
57.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.8	0.0	0.0	0.0	0.0	0.0
58.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
58.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
59.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
59.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

Nominal length class (cm)	Number of survivors – year of impingement +1														
	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14
60.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
60.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
61.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
61.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
62.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
62.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
63.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
63.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
64.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
64.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
65.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
65.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	108	613	629	288	69	40	17	10	6	6	1	0	0	0	0

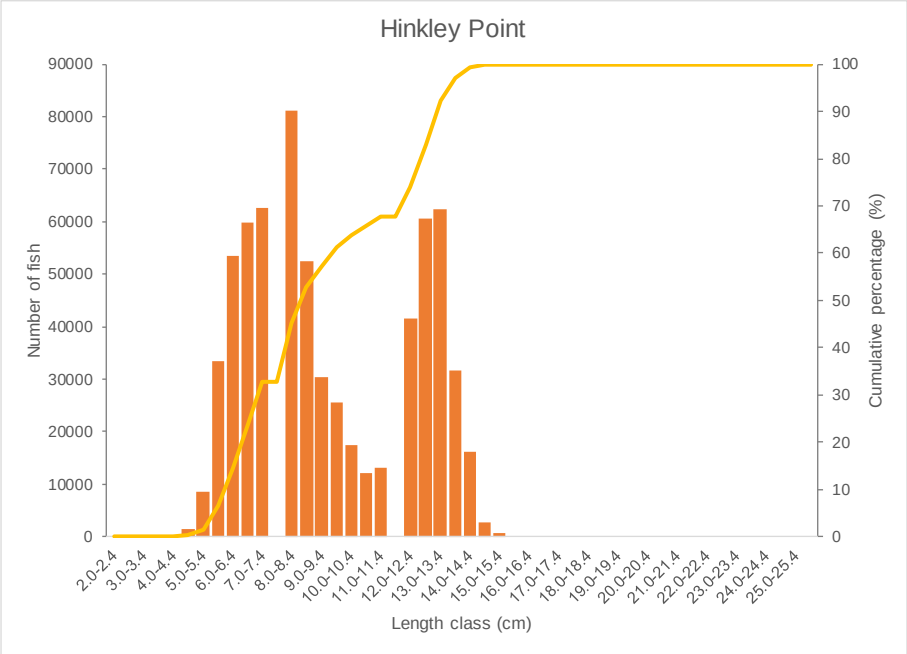
Age (yr)	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14+
Mean length (cm)	8.6	16.5	21.3	26.7	31.9	35.9	40.2	44.8	47.9	51.8	52.5	49.0	50.8	58.5	60.5
Natural mortality	3.13	1.10	0.73	0.51	0.38	0.31	0.26	0.22	0.20	0.17	0.17	0.19	0.18	0.14	0.14
Proportion mature	0.00	0.00	0.00	0.00	0.19	0.42	0.64	0.79	0.89	0.94	0.97	0.98	0.99	0.99	1.00
	2635	108	36	17	11	6	2	1	0	0	0	0	0	0	0
		3122	613	295	178	99	42	12	2	0	0	0	0	0	0
			1567	629	379	210	89	25	4	0	0	0	0	0	0
				513	288	160	68	19	3	0	0	0	0	0	0
					131	69	29	8	1	0	0	0	0	0	0
Survivors						93	40	11	2	0	0	0	0	0	0

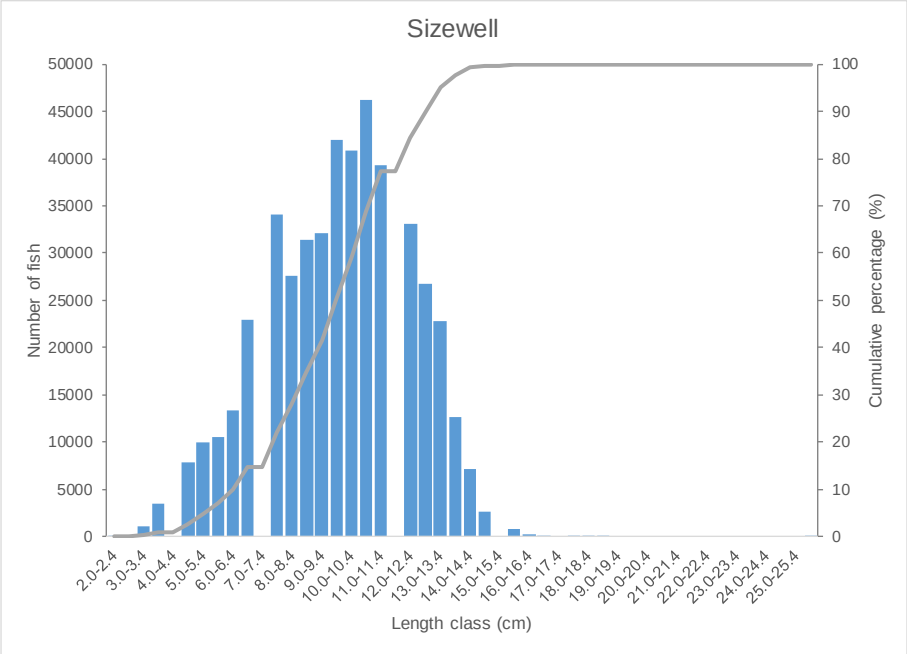
Age (yr)	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14+
Mean length (cm)	8.6	16.5	21.3	26.7	31.9	35.9	40.2	44.8	47.9	51.8	52.5	49.0	50.8	58.5	60.5
Natural mortality	3.13	1.10	0.73	0.51	0.38	0.31	0.26	0.22	0.20	0.17	0.17	0.19	0.18	0.14	0.14
Proportion mature	0.00	0.00	0.00	0.00	0.19	0.42	0.64	0.79	0.89	0.94	0.97	0.98	0.99	0.99	1.00
							59	17	3	0	0	0	0	0	0
								56	10	1	0	0	0	0	0
									70	6	0	0	0	0	0
										114	6	0	0	0	0
											23	1	0	0	0
												3	0	0	0
													2	0	0
														0	0
															9
														Total	9
		0	0	0	2	2	2	1	0	0	0	0	0	0	
			0	0	34	41	27	9	2	0	0	0	0	0	
				0	72	88	57	19	4	0	0	0	0	0	
					55	67	43	15	3	0	0	0	0	0	
						29	19	6	1	0	0	0	0	0	
							25	9	2	0	0	0	0	0	
								13	2	0	0	0	0	0	
									9	1	0	0	0	0	
										6	0	0	0	0	
											6	0	0	0	
												1	0	0	
													0	0	
Number that would be mature (and have an EAV of 1														0	
														Total	674
Number of fish impinged															8397

Age (yr)	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14+
Mean length (cm)	8.6	16.5	21.3	26.7	31.9	35.9	40.2	44.8	47.9	51.8	52.5	49.0	50.8	58.5	60.5
Natural mortality	3.13	1.10	0.73	0.51	0.38	0.31	0.26	0.22	0.20	0.17	0.17	0.19	0.18	0.14	0.14
Proportion mature	0.00	0.00	0.00	0.00	0.19	0.42	0.64	0.79	0.89	0.94	0.97	0.98	0.99	0.99	1.00
Number mature at impingement															351
Number becoming mature up to year 14															674
Number surviving to year 14															9
Total survivors															1034
EAV															**0.123**

Appendix G Impinged length distributions – Hinkley Point and Sizewell

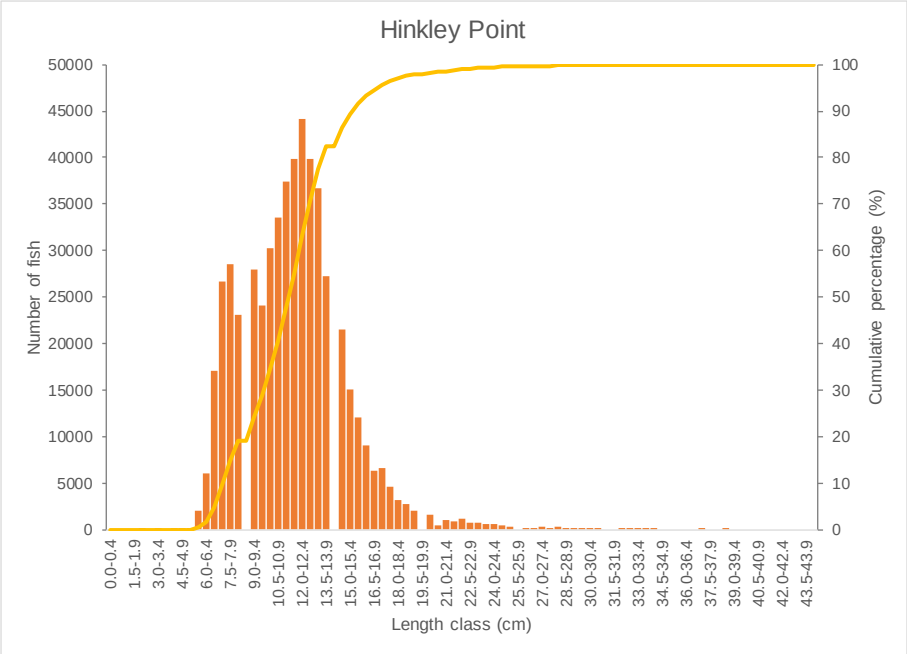
G.1 Sprat

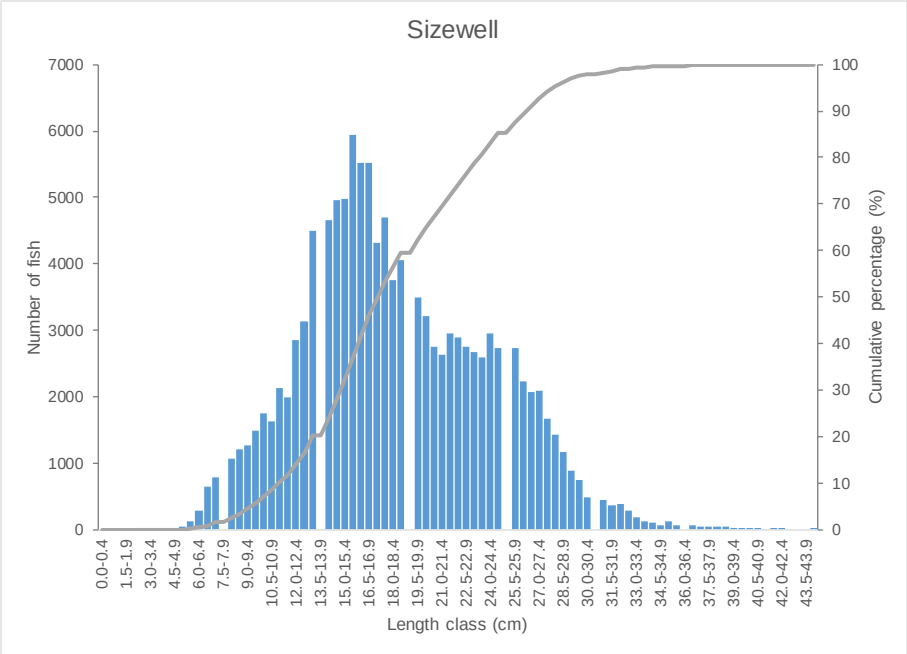




Note: for Hinkley Point the raised annual length distribution is given, but for Sizewell, only the sampled length distribution is currently available.

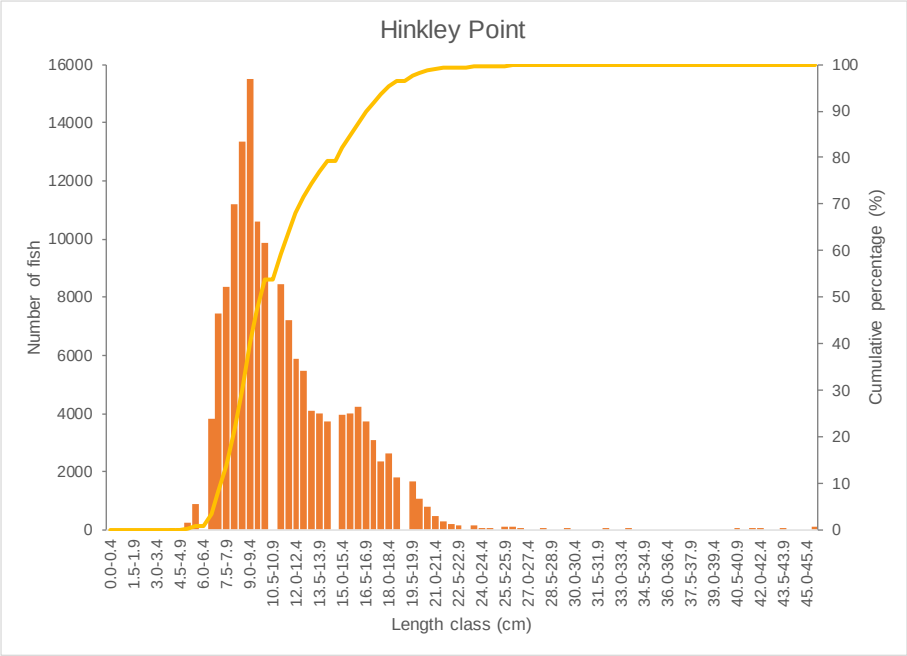
G.2 Whiting

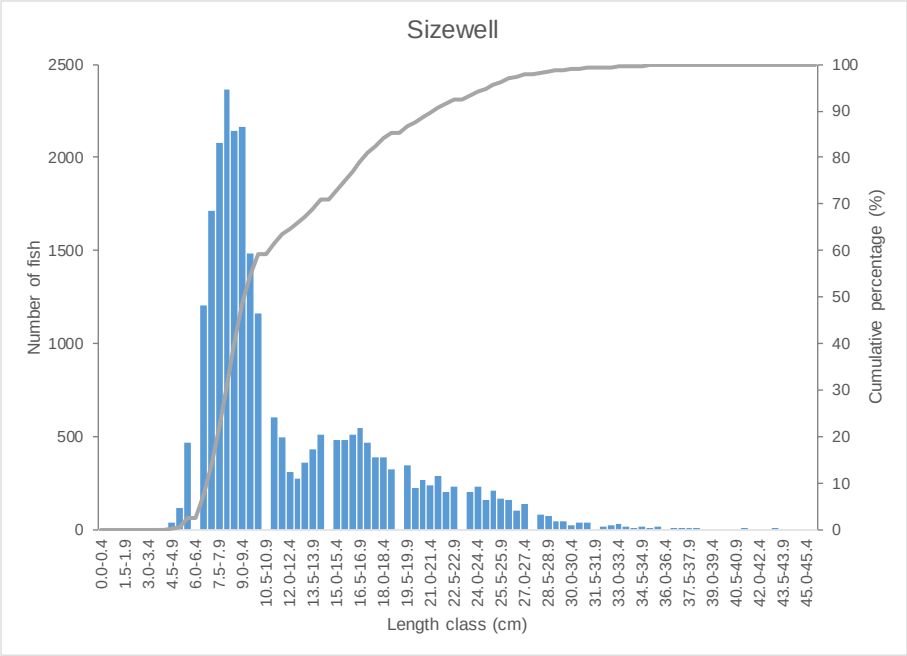




Note: for Hinkley Point the raised annual length distribution is given, but for Sizewell, only the sampled length distribution is currently available.

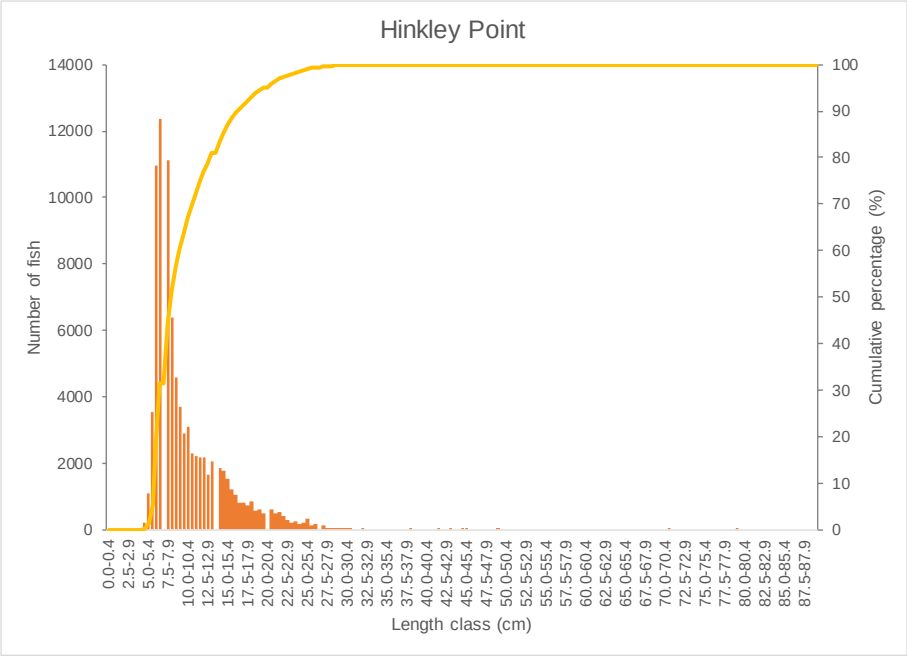
G.3 Dover sole

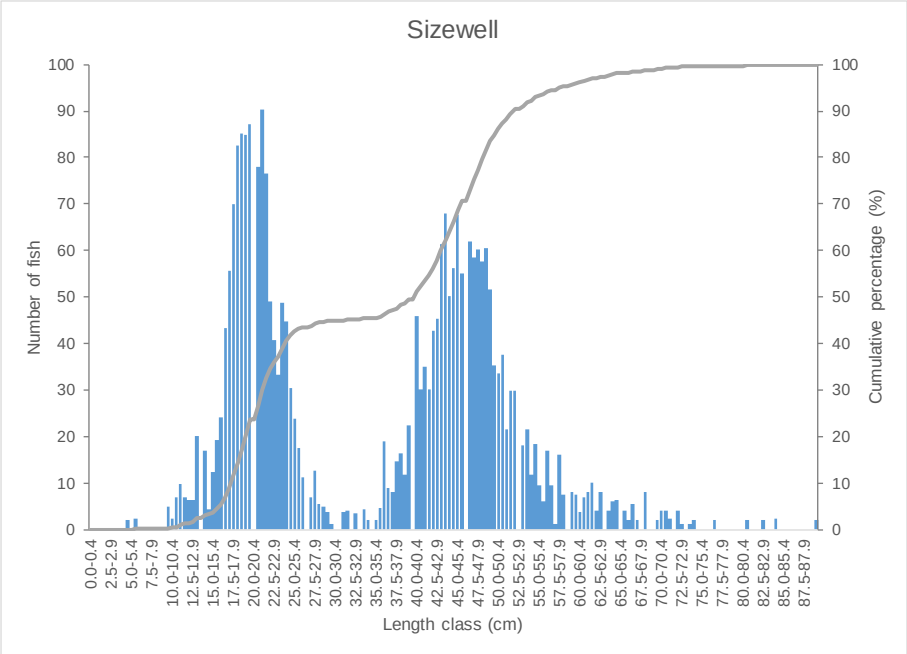




Note: for Hinkley Point the raised annual length distribution is given, but for Sizewell, only the sampled length distribution is currently available.

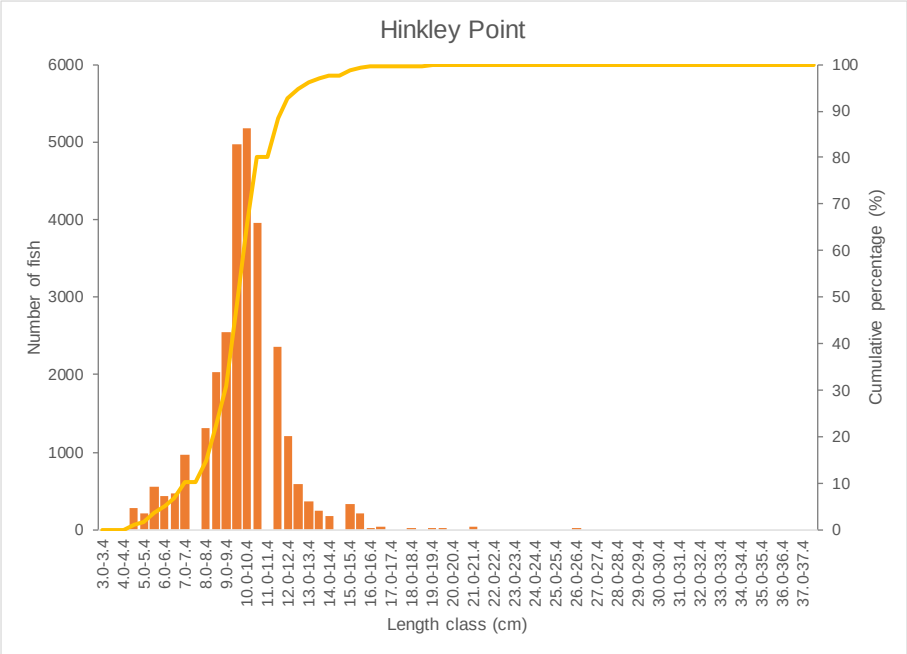
G.4 Cod

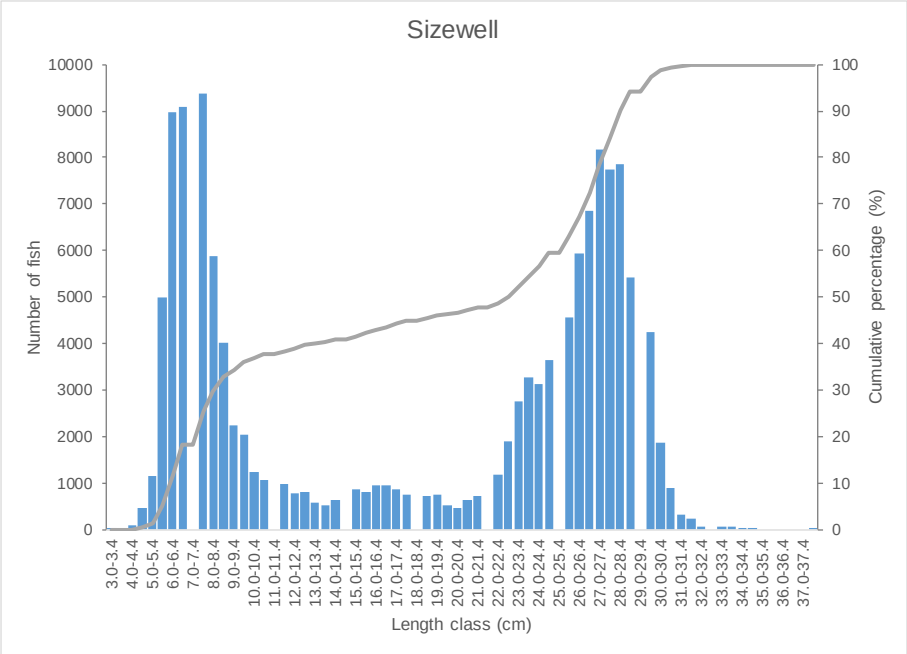




Note: for Hinkley Point the raised annual length distribution is given, but for Sizewell, only the sampled length distribution is currently available.

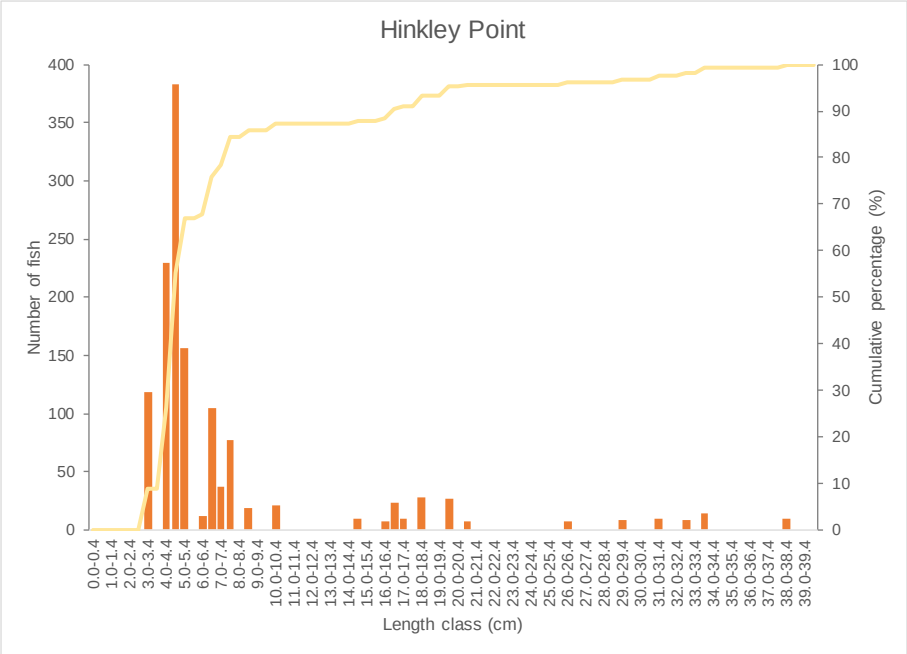
G.5 Herring

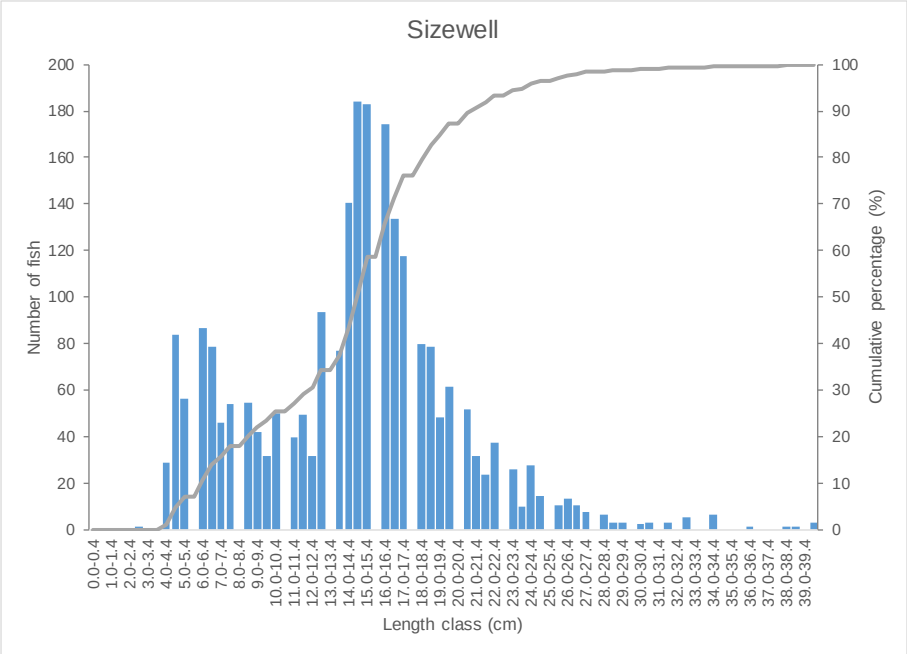




Note: for Hinkley Point the raised annual length distribution is given, but for Sizewell, only the sampled length distribution is currently available.

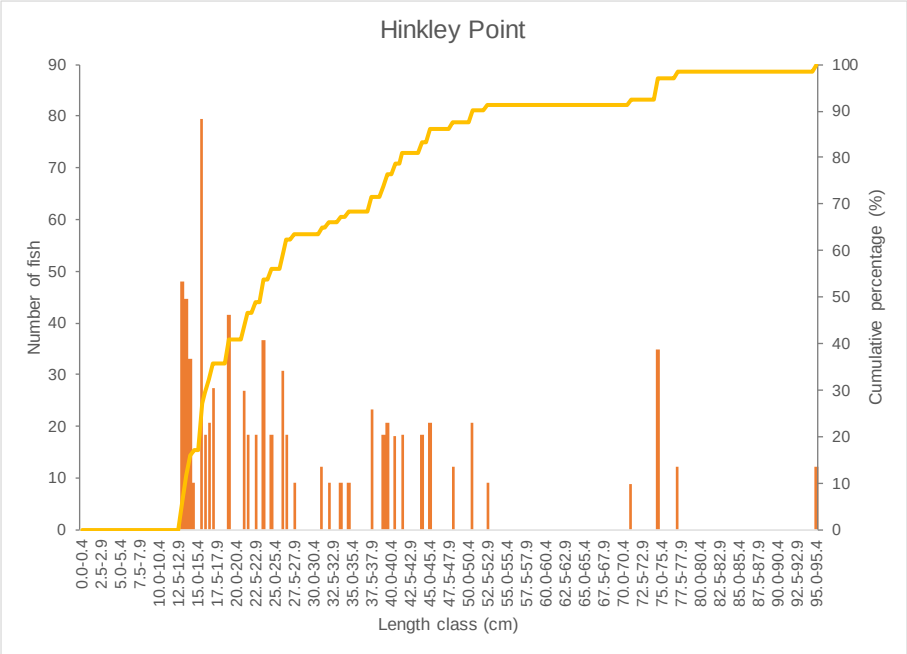
G.6 Plaice

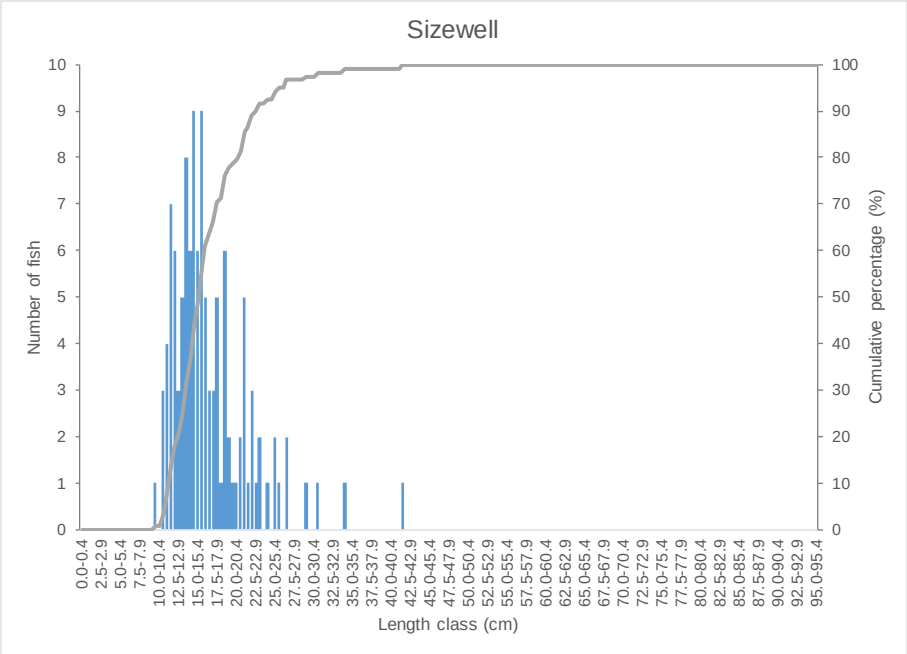




Note: for Hinkley Point the raised annual length distribution is given, but for Sizewell, only the sampled length distribution is currently available.

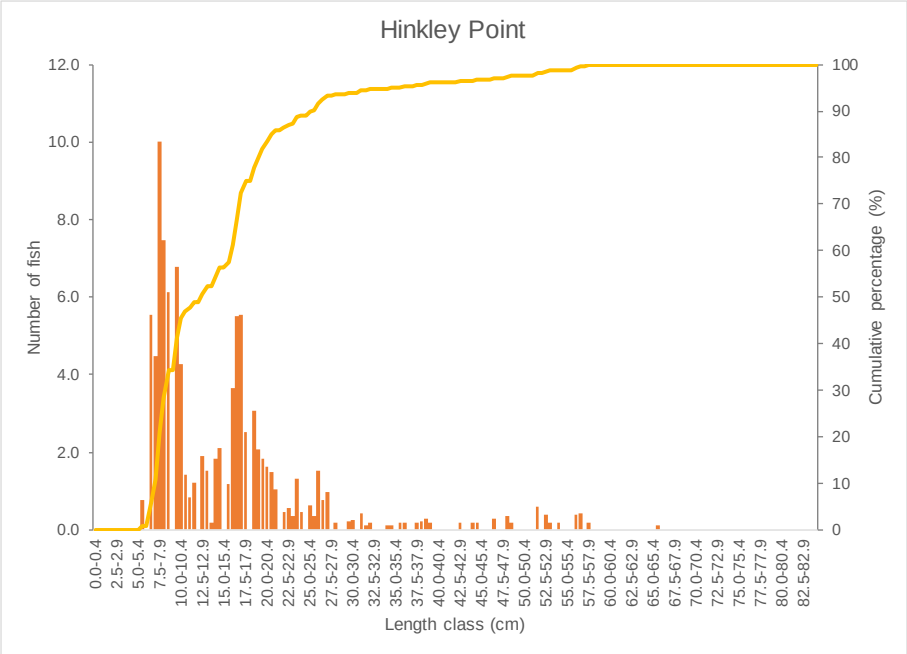
G.7 Thornback ray

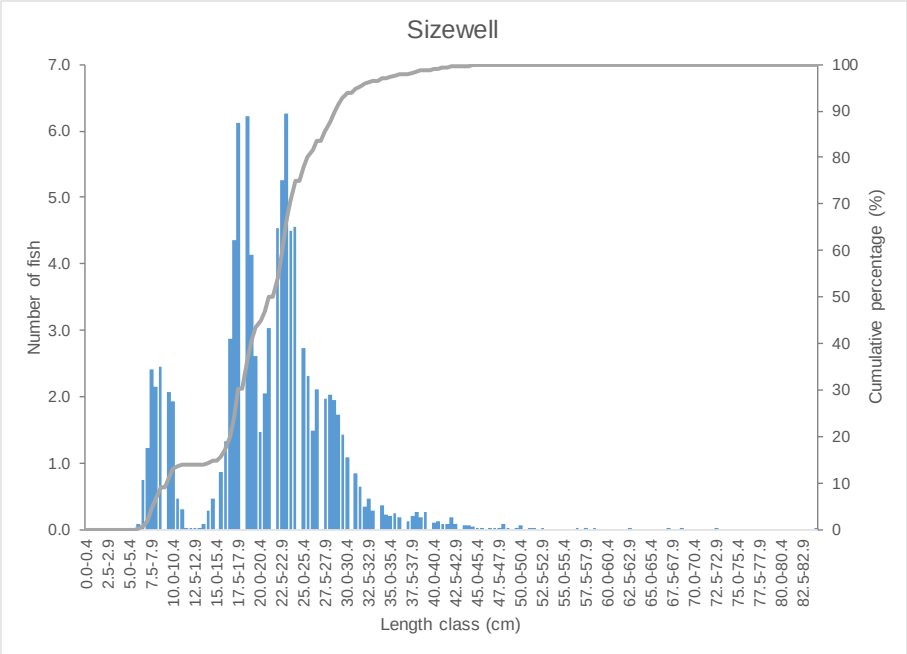




Note: for Hinkley Point the raised annual length distribution is given, but for Sizewell, only the sampled length distribution is currently available.

G.8 Bass





Note: for Hinkley Point the raised annual length distribution is given, but for Sizewell, only the sampled length distribution is currently available.