Frequencies of J-stock haplotypes also changed over time in markets of both countries, perhaps indicting serial depletion of coastal stocks. These findings are incompatible with the assumption that bycatch in either country is derived from a single coastal stock.

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Appendix 10

NORTH PACIFIC MINKE WHALE *IMPLEMENTATION SIMULATION TRIAL* SPECIFICATIONS

A. Basic concepts and stock structure

The objective of these trials is to examine the performance of the RMP in scenarios that relate to the actual problem of managing a likely fishery for minke whales in the North Pacific. The trials attempt to bound the range of plausible hypotheses regarding the number of minke whale stocks in the North Pacific, how they feed (by sex and age) and recruit and how surveys index them. The underlying dynamics model is age- and sex-structured and allows for multiple stocks. Allowance is made for possible dispersal (permanent transfer of animals between stocks).

The region to be managed (the western North Pacific) is divided into 18 sub-areas (see Fig. 1). Future surveys are unlikely to cover sub-areas 1, 2, 3, 4, 5, 6, 9N, 10 and 13 (see Table 1) so for these trials, these sub-areas are taken to be *Residual Areas* (although allowance is made for future incidental catches from some of these sub-areas – see section D). The term 'stock' refers to a group of whales from the same breeding ground. The model assumes there is a 'J' stock ('home' area – Sea of Japan and perhaps also the Yellow Sea and East China Sea) and considers three classes of hypothesis in regard to the stock(s) whose 'home' area is to the east of Japan:

(1) those based on the results of hypothesis testing, which primarily imply the possibility of some 'W' stock animals in sub-area 9[1] but no additional stock structure ('J' stock apart) to the east of Japan (henceforth referred to as '3 stocks with 2 in sub-area 9');
(2) those based on the results of the boundary rank method, which suggest that there are three stocks ('O_W', 'O_E' and 'W') in addition to the 'J' stock to the east of Japan (henceforth referred to as '4 stocks'); and
(3) those based on two stocks to the east of Japan (excluding the 'J' stock), which allow mixing of these stocks across most of sub-areas 7-9 during April-September (henceforth referred to as '3 stocks with mixing gradient').

[1] Some of the sub-areas identified in earlier versions of these trials have since been sub-divided. For ease of presentation, the original sub-areas (e.g. 9) have been retained in some of the specifications and refer to all of their sub-components (e.g. 9W, 9E and 9N in the case of sub-area 9).

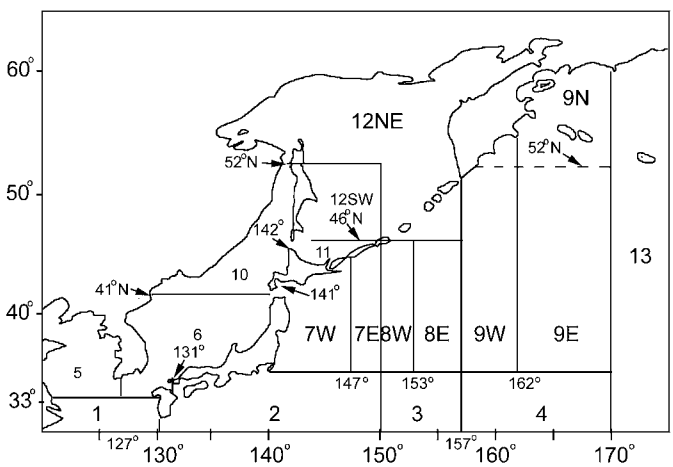

Fig. 1. The 18 sub-areas used for the *Implementation Simulation Trials* for North Pacific minke whales (Note: sub-area 9N is only used in Baseline D).

Table 1

Plan for future sighting surveys of minke whales in the western North Pacific in August/September.

	Sub-area								
Season	7W	7E	8W	8E	9W	9E	11	12SW	12NE
2000							(Yes)[1]	Yes	Yes
2001							Yes	Yes	Yes
2002					Yes	Yes			
2003	Yes	Yes	Yes	Yes					
2004							Yes	Yes	Yes
2005					Yes	Yes			
2006	Yes	Yes	Yes	Yes					
				continuing in this pattern					

[1]Abundance estimate already available. See Table 5a.

Four baseline trials are considered to account for patterns observed in the results from the genetic analyses. The four 'baseline' trials and their key features are:

Baseline-A: 'W' stock in sub-area 9 each year with 60% probability. In a year when the 'W' stock is in sub-area 9, 50% of the animals in sub-area 9W are from the 'W' stock

(see section F(e)). The fraction of 1+ non-'J' stock animals in sub-area 12 in August-September in a pristine state that are from the 'W' stock is determined from the relative abundance of such animals in sub-areas 7, 8, 9W and 9E at that time (see section F(d)). As a sensitivity test to allow for the concern that sample sizes may have been too small for genetic tests to distinguish further stock structure, a trial is to be conducted for this scenario which includes some 'W' stock animals in sub-area 8 (sensitivity trial 14: in years when the 'W' stock is in sub-area 9, 25% of the animals in sub-area 8 are from the 'W' stock – see section F(i)).

Baseline-B: A 2-stock trial (no 'W' stock) reflects a limiting case of the Baseline A trial with no 'W' stock whales present in sub-areas 8, 9 or 12.

Baseline-C: A 4 stock model of which three non-'J' stocks ('O_W', 'O_E' and 'W') occur to the east of Japan. The divisions between the 'O_W' and 'O_E' and 'W' stocks occur at 147°E and 157°E respectively. These boundaries are 'hard' (no mixing across them). The fraction of 1+ non-'J' stock animals in sub-area 12 in August-September in a pristine state that are from the 'W' stock is determined from the relative abundance of such animals in sub-areas 7, 8, 9W and 9E at that time (see section F(d)). Variants of this hypothesis first place the 'O_W'/'O_E' boundary at 153°E (see sensitivity trial 17), then allow 'O_W' and 'O_E' mixing between 147^0E and 153°E (sensitivity trial 18), further allow intrusion of the 'O_E' stock into sub-area 9E (sensitivity trial 19), and finally allow for some mixing of the 'O_W' and 'O_E' stocks throughout sub-areas 7 and 8 (sensitivity trial 20).

Baseline-D: 2 stocks ('O' and 'W') to the east of Japan that mix across the area 147°E to 162°E. The highest densities of 'O' stock animals occur in sub-area 7W and decline to the east, while the highest densities of 'W' stock animals occur in sub-area 9E and decline to the west. This Baseline assumes an additional sub-area, 9N, (see Fig. 1) which is defined by a line of latitude at 52°N, this being the northernmost point of any strata used for survey abundance estimates in sub-areas 9W and 9E. The relative proportion of the 'W' and 'O' stock animals in sub-areas 12SW+12NE and 9N is computed using the same model which provides the relative proportion of 'W' and 'O' animals in sub-areas 7W, 7E, 8W, 8E, 9W and 9E. Further details of this hypothesis are given in Smith (2003).

B. Basic dynamics

Further details of the underlying age-structured model and its parameters can be found in IWC (1991, p.112), except that the model has been extended to take sex-structure and dispersal into account. The 1+ population of a stock is governed by Equations B.1(a) for the 'J' stock for which there is no dispersal (permanent movement between stocks) and by Equations B.1(b) for the 'O' and 'W' stocks ('O_W' and 'O_E' stocks for the '4 stocks' case).

$$R^{m/f,s}_{t+1,a+1} = \tilde{R}^{m/f,s}_{t,a} + \tilde{U}^{m/f,s}_{t,a}\ \delta_{a+1} \qquad 0 \le a \le x-2$$
$$R^{m/f,s}_{t+1,x} = \tilde{R}^{m/f,s}_{t,x} + \tilde{R}^{m/f,s}_{t,x-1} \qquad \text{(B.1a)}$$
$$U^{m/f,s}_{t+1,a+1} = \tilde{U}^{m/f,s}_{t,a}\,(1-\delta_{a+1}) \qquad 0 \le a \le x-2$$

$$R^{m/f,s}_{t+1,a+1} = (1-D^{s,s'})\tilde{R}^{m/f,s}_{t,a} + D^{s',s}\tilde{R}^{m/f,s'}_{t,a} + \left((1-D^{s,s'})\tilde{U}^{m/f,s}_{t,a} + D^{s',s}\tilde{U}^{m/f,s'}_{t,a}\right)\delta_{a+1} \qquad 0 \le a \le x-2$$
$$R^{m/f,s}_{t+1,x} = (1-D^{s,s'})(\tilde{R}^{m/f,s}_{t,x} + \tilde{R}^{m/f,s}_{t,x-1}) + D^{s',s}\left(\tilde{R}^{m/f,s'}_{t,x} + \tilde{R}^{m/f,s'}_{t,x-1}\right) \qquad \text{(B.1b)}$$
$$U^{m/f,s}_{t+1,a+1} = \left((1-D^{s,s'})\tilde{U}^{m/f,s}_{t,a} + D^{s',s}\tilde{U}^{m/f,s'}_{t,a}\right)(1-\delta_{a+1}) \qquad 0 \le a \le x-2$$

$R^{m/f,s}_{t,a}$ is the number of recruited males/females of age a in stock s at the start of year t;

$U^{m/f,s}_{t,a}$ is the number of unrecruited males/females of age a in stock s at the start of year t;

δ_a is the fraction of unrecruited animals of age a-1 which recruit at age a (assumed to be independent of stock and sex);

x is the maximum (lumped) age-class (all animals in this and the x-1 class are assumed to be recruited and to have reached the age of first parturition);

$\tilde{R}^{m/f,s}_{t,a}$ is the number of recruited males/females of age a in stock s at the start of year t that survive to the end of the year:

$$\tilde{R}^{m/f,s}_{t,a} = \left(R^{m/f,s}_{t,a} - C^{m/f,s}_{t,a}\right) S_a \qquad \text{(B.1c)}$$

$\tilde{U}^{m/f,s}_{t,a}$ is the number of unrecruited males/females of age a in stock s at the start of year t that survive to the end of the year:

$$\tilde{U}^{m/f,s}_{t,a} = U^{m/f,s}_{t,a}\, S_a \qquad \text{(B.1d)}$$

S_a is the instantaneous survival rate for animals of age a, and is equal to exp($-M_a$) where M_a is the instantaneous natural mortality rate for animals of age a (assumed to be independent of stock, sex and whether or not an animal is recruited);

$C^{m/f,s}_{t,a}$ is the catch of males/females of age a from stock s during year t; and

$D^{s,s'}$ is the dispersal rate (i.e. the probability of an animal moving permanently) from stock s to s'.

Note that year $t = 0$, for which catch limits might first be set, corresponds to 2000.

For computational ease, the numbers-at-age and by sex are updated at the end of each year only, even though catching is assumed to occur from April to September. This simplification is unlikely to affect the results substantially for two reasons: (1) catches are at most only a few percent of the size of the recruited stock; and (2) sightings survey estimates are subject to high variability so that the resultant slight positive bias in abundance estimates is almost certainly inconsequential.

C. Births

Density-dependence is assumed to act on the female component of the mature population. The convention of referring to the mature population is used here, although this actually refers to animals that have reached the age of first parturition.

$$U^{m/f,s}_{t,0} = 0.5\,(1-\alpha_0)\,B^s\,N^{f,s}_t\,\{1 + A^s(1-(N^{f,s}_t/K^{f,s})^{z^s})\}$$
$$R^{m/f,s}_{t,0} = 0.5\,\alpha_0\,B^s\,N^{f,s}_t\,\{1 + A^s(1-(N^{f,s}_t/K^{f,s})^{z^s})\} \qquad \text{(C.1)}$$

B^s is the average number of live births (both sexes) per year for mature females in stock s in the pristine population;

A^s is the resilience parameter for stock s;

z^s is the degree of compensation for stock s;

$N_t^{f,s}$ is the number of mature females in stock s at the start of year t:

$$N_t^{f,s} = \sum_{a=1}^{x} \beta_a (R_{t,a}^{f,s} + U_{t,a}^{f,s}) \qquad \text{(C.2)}$$

a_0 is the proportion of animals of age 0 which are recruited (assumed to be zero for this case);

β_a is the proportion of females of age a which are mature (assumed to be independent of stock, year and whether or not an animal is recruited); and

$K^{f,s}$ is the number of mature females in stock s in the pristine (pre-exploitation, denoted by $t = -\infty$) population:

$$K^{f,s} = \sum_{a=1}^{x} \beta_a (R_{-\infty,a}^{f,s} + U_{-\infty,a}^{f,s}) \qquad \text{(C.3)}$$

The values for the parameters A^s and z^s for each stock are calculated from pre-specified values for $MSYL^s$ and $MSYR^s$ as detailed in IWC (1991, p.112). Their calculation ignores the impact of dispersal and assumes harvesting equal proportions of males and females.

D. Catches

The operating model considers two sources for non-natural mortality (incidental catches and commercial catches). In future ($t \geq 2000$), the former are pre-specified, while the latter are set by the RMP. In cases in which the catch limit set by the RMP is less than the (pre-specified) level of incidental catch, the total removals are taken to be the incidental catch only whereas if the RMP catch limit exceeds the incidental catch, the level of the commercial removals is taken to be the difference between the RMP catch limit and the incidental catch. In trials when future incidental catches are misreported (sensitivity trial 11 — see Section G) the level of the commercial removals is set by subtracting the *reported* incidental catch from the catch limit set by the RMP.

Catch limits are set by *Small Area*. (Catches are always reported by *Small Area*, i.e. the RMP is not provided with catches by sub-area for cases in which sub-areas are smaller than *Small Areas*.) As it is assumed that whales are homogeneously distributed across a sub-area, the catch limit for a sub-area is allocated to stocks by sex and age relative to their true density within that sub-area, and a catch mixing matrix V that depends on sex, age and time of the year (and may also depend on year), i.e.

$$C_{t,a}^{m/f,s} = \sum_k \sum_q C_{t,a}^{m/f,s,k,q} \qquad \text{(D.1)}$$

$$C_{t,a}^{m/f,s,k,q} = C_t^{m/f,k,q} \{ V_{t,a}^{m/f,s,k,q} R_{t,a}^{m/f,s} / \sum_j \sum_{a'=1}^{x} V_{t,a'}^{m/f,j,k,q} R_{t,a'}^{m/f,j} \}$$

$C_{t,a}^{m/f,s,k,q}$ is the catch of males/females of age a from stock s in sub-area k during month q of year t; and

$C_t^{m/f,k,q}$ is the catch of males/females from sub-area k during month q of year t.

Each entry in the catch mixing matrix, $V_{t,a}^{m/f,s,k,q}$, is the fraction of males/females of age a from stock s which are found in sub-area k during month q of year t. The catch mixing matrix is different for each month to reflect the effects of migration between the breeding and the feeding grounds. Adjunct 1 gives the catch mixing matrices considered. The rationale for the values used is given in IWC (1997a, p.225) and IWC (2003b, pp.459-61). The catch mixing matrices give the relative fraction of an age-class in each of the sub-areas during the months April-September. Once the values of the mixing rate parameters $\gamma_1 - \gamma_{30}$ and $\eta_1 - \eta_4$ are specified (these are estimated separately for each trial in the conditioning process), the catch mixing matrices can be converted to fractions of each age-class in each sub-area. The values for the γ and η parameters are selected to mimic available data (see Section F). In many trials, the catch mixing matrix for each of the 100 simulations and for each of the years of the associated pre-management and 100-year management periods is selected at random from two possibilities (e.g. matrices A and B for the 'J' stock). In this case, a random number is generated for each year from U[0,1]; if this number is larger than a given proportion (0.5 unless otherwise specified), then the catch mixing matrix used for stock 'J' is matrix A, otherwise it is matrix B. In sensitivity trial 27 the catch mixing matrix is selected at random from three possibilities.

Catch mixing matrices are specified for ages 4 and 10 (these being three years below and above the assumed age-at-50%-maturity). Few animals of age 4 are mature while most of age 10 are. The catch mixing matrices for ages 0-3 are assumed to be the same as that for age 4, and those for ages 11+ the same as that for age 10. The catch mixing matrices for ages 5-9 are calculated by interpolating linearly between those for ages 4 and 10.

The model considers a future six-month whaling season (April-September). In order to account for historical catches outside these months, all catches in January-March are added to those in April and the catches after September are assumed to have been taken in September. The historic commercial and scientific catches by sex, sub-area, month and year are given in Adjunct 2.

The trials are conducted assuming that the sub-areas for which future catch limits might be set are:

7W, 7E, 8W, 8E, 9W, 9E	(April) [2]
7W, 7E, 8W, 8E, 9W, 9E, 11, 12SW, 12NE	(May-June + August-September)
7W, 7E, 8W, 8E, 9W, 9E, 12SW, 12NE	(July)

For sensitivity test 24, sub-area 11 is closed in all months, together with sub-area 12SW in June to investigate whether more stringent spatial closures to further reduce catches of 'J' stock whales would provide any substantial additional benefit.

The future ($t \geq 2000$) commercial catches by sex, sub-area, month and year are calculated using the equation:

$$C_t^{m/f,k,q} = C_t^k \, Q^{m/f,k,q} \qquad \text{(D.2)}$$

$Q^{m/f,k,q}$ is the fraction of the commercial catch in sub-area k which is taken during month q and are males/females, the values of which are given in

[2] Note: the Q matrix is zero for sub-areas 7E, 8 and 9 in April so no catches will be allocated to these sub-areas in April. The elements in Q for these sub-areas are based on a very small number of catches. In practice, the split by month will be dictated by operational factors as well as by the numbers of whales available (which the historic catches are intended to represent).

Table 2; and

C_t^k is the commercial catch limit for sub-area k and year t ($t \geq 2000$). Note that C_t^k is equal to the catch limit set by the RMP less the reported incidental catch (constrained to be non-negative).

Some of the entries in the Q matrix are determined by the options related to the sub-areas for which catch limits might be set (i.e. Q is zero in April for sub-areas 11 and 12). The non-zero entries in the Q matrix (see Table 2) reflect the historical breakdown of catches over the last 10 years of commercial whaling (1978-87) within each sub-area. In sub-areas for which there was no catch between 1978-87 (7E, 8, 9 and 12), the entries in the Q matrix are set using the entire historic commercial and scientific catch in these sub-areas. For the trials based on *Small Areas* that are combinations of sub-area 11 and other sub-areas, the entire catch is assumed to be taken from sub-area 11 (except for management variant (6) – see section H) as this should reflect the highest risk to the J stock. For trials based on *Small Areas* that are combinations of sub-areas including sub-area 7W but not sub-area 11, the entire catch is assumed to be taken from sub-area 7W.

In order to comply with RMP specifications regarding the sex ratio in catches (IWC, 1999, p.251-9) which state that if the proportion, P_f, of females in the total catch taken from a *Small Area* in the five years prior to the catch limit calculation exceeds 50%, the catch limit is reduced by the ratio $0.5/P_f$. On this event occurring in the trials the quota is reduced.

Incidental catches of minke whales are known to occur off the Republic of Korea and Japan but the level of such catches is uncertain (IWC, 2000, p.84). Two options are considered for both the incidental catch off Korea and off Japan. The incidental catches are apportioned to stock and age class in the same way as for the commercial catches (i.e. using Equation D.1).

Incidental catch off the Republic of Korea

OPTION (K*i*)

The incidental catch off the Republic of Korea in sub-area 6 is assumed to be zero until 1988 after which it increases linearly to 78 in 1995. (The rationale for this linear increase is a comment by Kim that minke whales returned to inshore areas only gradually after the end of commercial whaling in 1986). It is 129 in 1996, 78 in 1997, 45 in 1998, 56 in 1999, 77 in 2000 and 148 in 2001 (this last figure excludes 12 drifting and stranded animals). The catch in each year is apportioned to month according to the average of the proportions of the annual incidental catch by month taken in 1996-99 (Table 3(a)) and is apportioned by sex according to the incidental catches in 1998 and 1999 (the only years for which the sexes of the incidental catches are known). These values are also given in Table 3(a). In future years the incidental catch in year t is set at $P_t^{k=6}/P_{1997/8}^{k=6}$ where 89 is the mean catch in 1996-2001 (excluding drifting and stranded animals) and $P_t^{k=6}$ is the mean 1+ population size (over the period April-September) in year t in sub-area 6. The catch is apportioned by month and sex as for the historic catch above. The K*i* option is used in conjunction with the J*i* option used to specify the catches off Japan.

Table 3(a)

Table of incidental catches by the Republic of Korea by month, provided by Kim. (The catches for Jan-Apr and for Sep-Dec are combined for input to the trials).

Month	Monthly catch in 1996	Monthly catch in 1997	Monthly catch in 1998 M : F	Monthly catch in 1999 M : F
Jan	7	18	1 : 5	0 : 2
Feb	2	5	0 : 4	1 : 4
Mar	2	1	0 : 5	1 : 2
Apr	8	11	1 : 5	2 : 3
May	11	11	2 : 2	0 : 2
Jun	7	7	3 : 5	0 : 2
Jul	8	3	1 : 0	1 : 1
Aug	6	3	0 : 1	3 : 6
Sep	7	6	0 : 2	2 : 3
Oct	26	6	0 : 2	3 : 7
Nov	11	4	1 : 2	1 : 1
Dec	34	3	0 : 3	3 : 6
Total	**129**	**78**	**9 : 36**	**17 : 39**

OPTION (K*ii*)

The historic catch is the same as for option K*i*. In future years the incidental catch in year t is set at 148 $P_t^{k=6}/P_{1997/8}^{k=6}$ where 148 is the maximum of the actual annual reported bycatch in 1996-2001. The catch is apportioned by month and sex as for Option K*i*. The K*ii* option is used in conjunction with the J*ii* option.

Sensitivity trial 12 sets the level of Korean incidental catch in the future to a constant (= 89), independent of population size.

Incidental catch off Japan

OPTION (J*i*)

The incidental catches off Japan between 1955-1999 are given in Table 3(b) where the catches from 1979-99 are taken to be the reported catches as listed in Japanese progress

Table 2

Q matrix: the fraction of the catch in sub-area k that is taken by sex and month for sub-areas other than *Residual Areas*. Dashes indicate sub-areas/months for which catch limits are defined to be zero.

	Jan-Apr	May	Jun	Jul	Aug	Sep- Dec	Sample size	Jan -Apr	May	Jun	Jul	Aug	Sep- Dec	Sample size
Sub-area	Males							Females						
7W	0.127	0.118	0.097	0.108	0.083	0.127	1,760	0.121	0.088	0.043	0.042	0.019	0.028	909
7E	0.0	0.472	0.038	0.0	0.0	0.264	41	0.0	0.075	0.0	0.0	0.0	0.151	12
8W	0.0	0.161	0.429	0.0	0.018	0.143	42	0.0	0.036	0.036	0.054	0.036	0.089	14
8E	0.0	0.0	0.118	0.603	0.074	0.118	62	0.0	0.0	0.029	0.015	0.0	0.044	6
9W	0.0	0.016	0.216	0.512	0.080	0.008	104	0.0	0.016	0.048	0.080	0.024	0.0	21
9E	0.0	0.170	0.226	0.038	0.302	0.047	83	0.0	0.047	0.028	0.009	0.132	0.0	23
11	-	0.124	0.108	-	0.034	0.068	186	-	0.351	0.245	-	0.022	0.047	369
12SW	-	0.0	0.015	0.118	0.118	0.0	17	-	0.0	0.074	0.235	0.368	0.074	51
12NE	-	0.0	0.008	0.301	0.073	0.098	59	-	0.024	0.041	0.260	0.122	0.073	64

reports. Future catches are taken in proportion to the population size in the sub-area and are given by $C_t^k = \tilde{C}^k P_t^k / \tilde{P}^k$ where $\tilde{P}^k$ is the mean 1+ population size (over the period April-September) in sub-area *k* from 1996-98 and $\tilde{C}^k$ is the reference incidental catch as given in Table 3(c). The reference catch is 25 whales and it is allocated to sub-areas in the ratio of the 1996-98 catch. The sex and timing within the year of both historic and future catches are selected according to the historic ratio of catches off Japan within the relevant sub-area since 1979, or if there was none then the entire historic catch.

The RMP is given the actual historic and future catch series, except in sensitivity trial 11 (see Section G) when both the historic and future catch reported to the RMP is over-reported at a level equal to 4 times (= 100/25) the actual values.

In sensitivity trial 13 the reference catch is changed to 50 whales, to test the extent to which interpolation can be achieved reliably (the RMP is given the actual catch values for this trial).

Table 3(b)

Table of incidental catches off Japan Option (J*i*).

Year/Sub-area	1	2	6	7W	10	11	Total
1955-1978[1]	0	0.1	2.2	1.1	0.2	0.2	3.8
1979	0	0	0	0	0	0	0
1980	0	0	1	2	0	0	3
1981	0	0	0	0	0	0	0
1982	0	0	0	0	0	0	0
1983[2]	0	0	5	1.7	0.7	0.7	8
1984	0	0	0	2	1	1	4
1985	0	0	2	0	0	0	2
1986	0	1	9	3	0	0	13
1987	0	0	3	1	0	0	4
1988[3]	0	1.6	4.8	1.6	0	0	8
1989[4]	0	2.7	4	1.3	0	0	8
1990	0	1	4	15	0	0	20
1991	0	2	2	1	0	0	5
1992	0	1	7	0	0	0	8
1993	0	4	9	1	0	0	14
1994	0	9	6	1	0	0	16
1995	0	8	12	0	0	0	20
1996[2]	1	11	13	1.3	0.3	0.3	27
1997	0	18	8	1	0	0	27
1998	0	9	15	0	0	0	24
1999	1	4	13	1	0	0	19
Total (1979-1999)	2	72.3	117.8	33.9	2	2	230

[1]Catches are assumed to begin in 1955 when fishery nets were substantially improved. Catches are taken to equal the mean values from 1979 to 1987 (years of commercial whaling). [2]Catches off Hokkaido are allocated evenly to sub-areas 7W, 10 and 11. [3]Catches in 1988 are allocated to sub-areas using information from 1987 and 1989. [4]Two individuals in 1989 whose catch position is unknown, were allocated in proportion to the composition of the 6 of known position.

OPTION (J*ii*)

An incidental catch of 100 animals (IWC, 2003a, p.116-7) is assumed to have been taken in each year from 1900 to the present (Table 3(d)). Future catches are taken in proportion to the population size in the sub-area and are given by $C_t^k = \tilde{C}^k P_t^k / \tilde{P}^k$ where $\tilde{P}^k$ is the mean 1+ population size (over the period April-September) in sub-area *k* from 1979-99 and $\tilde{C}^k$ is the reference incidental catch as given in Table 3(d). Catches (both historic and future) are allocated among sub-areas in the same ratio as the 1979-99 catches listed in Table 3(b), and the sex and timing within years as for option J*i*.

For the J*ii* option, the RMP is not given the true historic catch series, but is rather given the smaller Japanese catches listed for Option J*i*. The RMP is given the actual future catches, except in sensitivity trial 11 when the future catch reported to the RMP is under-reported at a level equal to 1/4 times (= 25/100) the actual values.

In sensitivity trial 13, both the annual historic catch and the reference catch are changed to 150 whales, to test the extent to which extrapolation can be achieved reliably (the RMP is given the true catches for this trial).

Table 3(c)

Table of reference catches $\tilde{C}^k$ used in setting future incidental catches off Japan, Option (J*i*). The division of numbers by sub-area are taken from the incidental catch in years 1996-98 (Table 3(b)).

Year/Sub-area	1	2	6	7W	10	11	Total
Reference catch $\tilde{C}^k$	0.3	12.2	11.6	0.7	0.1	0.1	25

Table 3(d)

Table of historic incidental catches and the reference catches $\tilde{C}^k$ used in setting future incidental catches off Japan, Option (J*ii*). The division of numbers by sub-area are taken from the reported incidental catch in years 1979-99 (Table 3(b)).

Year/Sub-area	1	2	6	7W	10	11	Total
1900 – present	0.9	31.4	51.2	14.7	0.9	0.9	100
Reference catch $\tilde{C}^k$	0.9	31.4	51.2	14.7	0.9	0.9	100

Some of the incidental catch off Japan is taken from sub-areas for which a catch limit is set. For all trials the total catch (commercial + incidental) from the sub-areas is taken as equal to the catch limit set by the RMP if the RMP catch limit exceeds the incidental catch.

E. Generation of data

The estimates of absolute abundance (and their associated CVs) for the years prior to 1999 provided to the *CLA* are identical to the actual estimates and CVs for North Pacific minke whales from surveys conducted in August/September (see Table 5(a)). To allow for results of surveys already conducted, but for which the results are not yet available, estimates of abundance are generated for sub-area 12 in 2000 using the same method as for future estimates.

The sightings mixing matrix for a year in which a survey takes place is the average of the catch mixing matrices for August and September for that year. The values for the parameters of the various distributions have been selected to achieve CVs for *Small Areas* comparable to those for the surveys in Table 5(a). The future estimates of abundance for a *Small Area* (say *Small Area E*) are generated using the formula:

$$\hat{P} = P\,Y\,w / \mu = P^* \beta^2 Y w \qquad \text{(E1)}$$

Y is a lognormal random variable $Y = e^{\varepsilon}$ where $\varepsilon \sim N[0,\sigma^2]$ and $\sigma^2 = Ln(\alpha^2 + 1)$;

w is a Poisson random variable with $E(w) = \text{var}(w) = \mu = (P/P^*)/\beta^2$;

Y and w are independent;

P is the average current total (1+) population size in *Small Area* (*E*) over August-September:

$$P = P_t^E = \frac{1}{2} \sum_{k \in F} \sum_{q \in Aug/Sept} \sum_{s} \sum_{a=1}^{x} \begin{pmatrix} V_{t,a}^{m,s,k,q}(R_{t,a}^{m,s} + U_{t,a}^{m,s}) \\ + V_{t,a}^{f,s,k,q}(R_{t,a}^{f,s} + U_{t,a}^{f,s}) \end{pmatrix} \qquad \text{(E2)}$$

P^* is the reference population level, and is equal to the mean total (1+) population size in the *Small Area* prior to the commencement of exploitation in the area being surveyed; and

F is the set of sub-areas making up *Small Area E*.

Note that under the approximation $CV^2(ab) = CV^2(a) + CV^2(b)$: $E(\hat{P}) = P$ and $CV^2(\hat{P}) = \alpha^2 + \beta^2 P^*/P$

For consistency with the first stage screening trials for a single stock (IWC, 1991, p.109; IWC, 1994, pp.85-6), the ratio $\alpha^2:\beta^2 = 0.12:0.025$, so that:

$$CV(\hat{P}) = \tau(0.12 + 0.025P^*/P)^{1/2} \qquad \text{(E3)}$$

and the CV of a survey estimate prior to the commencement of exploitation in the area being surveyed would be:

$$\sqrt{(\alpha^2 + \beta^2)} = 0.38\tau \qquad \text{(E4)}$$

The value of τ is calculated from the equation defining the true value of the CV by substituting the value of the CV for each abundance estimate and the depletion to which it corresponds (Equation E.3), and solving for τ. If more than one abundance estimate exists for a particular sub-area, the value assumed for τ is calculated taking the true CV to be the root mean square of the values obtained from the abundance estimates for that sub-area, and the depletion to be the mean value over the corresponding years. The values of τ applicable to each sub-area are calculated separately for each replicate once the conditioning has been accomplished.

An estimate of the *CV*, X_t is also generated for each sightings estimate, $\hat{P}_t$:

$$X_t = \sqrt{(\sigma_t^2 \chi^2 / n)} \qquad \text{(E5)}$$

where $\sigma_t^2 = Ln(1+\alpha^2 + \beta^2 P^*/\hat{P}_t)$, and χ^2 is a random number from a Chi-square distribution with $n = 10$ degrees of freedom. The value 10 is chosen to roughly indicate the number of trackline segments in a sightings survey in a *Small Area*.

Sensitivity trial 10 considers the case where $g(0) = 0.5$. To implement this, the observed P is taken to be half of its actual value (Equation E.2). In sensitivity trial 23, an additional coefficient of variance of 0.4^2 is added to the CV used to generate the abundance estimate. This is implemented by changing equation E.4 to:

$$\alpha^2 + \beta^2 = 0.38^2\tau^2 + 0.4^2 \qquad \text{(E6)}$$

The CV supplied to CLA ignores the additional variance.

The trials assume that it takes two years for the results of a sighting survey to become available to be used by the management procedure, i.e. a survey conducted in 2000 would first be used for setting the catch limit in 2002. Table 4 lists the pattern for future surveys and also shows how results of surveys from different sub-areas are combined. In trials in which *Small Areas* are comprised of sub-areas that are surveyed in different years, the abundance estimate is taken to be a summation of the estimates of abundance in the sub-areas over the years and taken to refer to the mean year (where the mean year is defined as the centre year in the set, or the later of two if this yields a half-integral year) (IWC, 1999). In cases in which the combined survey used more than one abundance estimate from the same sub-area, the abundance estimates are pooled using inverse variance weighting.

F. Parameter values and Conditioning

Following the decision by the sub-committee on North Pacific minke whales (IWC, 1992a, p.160), the values of the biological and technological parameters are taken to be equal to those for the North Atlantic minke *Implementation Simulation Trials* (IWC, 1992b, p.249), i.e.:

$r_{50} = 4 \quad \sigma_r = 1.2$ where r is recruitment

$m_{50} = 7 \quad \sigma_m = 1.2$ where m is maturity

$MSYL = 0.6$

The maturity ogive is modified so that the first age at which a female can be mature is three, i.e. $\beta_0 = \beta_1 = \beta_2 = 0$.

Natural mortality is age-dependent, and identical to that for the North Atlantic minke trials:

$$M_a = \begin{cases} 0.085 & \text{if } a \le 4 \\ 0.0775 + 0.001875a & \text{if } 4 < a < 20 \\ 0.115 & \text{if } a \ge 20 \end{cases}$$

Table 4

Years and sub-areas for which survey estimates are available or expected. For areas that are combinations of sub-areas, the last five columns specify how the survey estimates for the component sub-areas are combined (see also Table 5a and notes thereto). 0=No survey, 1=survey.

	Sub-area									Sub-area Combination				
Year	7W	7E	8W	8E	9W	9E	11	12SW	12NE	C1 = 7+8	C2=7+8+11+12	C3=7E+8+12	C4=9	C5=12
1990	0	1	1	1	1	1	1	1	1				1	
1991	1	0	0	0	0	0	0	0	0	1 = 90+91	1 = 90+91+92	1 = 90+91+92		1 = 90+92
1992	0	0	0	0	0	0	0	0	1					
1999	0	0	0	0	0	0	1	0	0					
2000	0	0	0	0	0	0	0	1	1					1
2001	0	0	0	0	0	0	1	1	1		1 = 99-03			1
2002	0	0	0	0	1	1	0	0	0			1 = 00-03	1	
2003	1	1	1	1	0	0	0	0	0	1				
2004	0	0	0	0	0	0	1	1	1					1
2005	0	0	0	0	1	1	0	0	0		1 = 04+05+06	1 = 04+05+06	1	
2006	1	1	1	1	0	0	0	0	0	1				
2007	0	0	0	0	0	0	1	1	1					1
2008	0	0	0	0	1	1	0	0	0		1 = 07+08+09	1 = 07+08+09	1	
2009	1	1	1	1	0	0	0	0	0	1				
										and so on in this pattern				

Table 5(a)

The abundance data used to condition the trials. Note: the data for sub-areas 7-9 were provided by Miyashita following the 2002 Workshop (IWC, 2003b, pp.455-88). The Working Group on abundance estimates (IWC, 2003b, pp.470-2) reported that the abundance estimate used previously for sub-area 7 in 1990 was not acceptable for conditioning as the same data were used again in making the 1991 estimate. This is not the case in the revised estimates below.

Sub-area	Timing	Estimate	*CV*	Estimate also used by CLA?	Source
6	Aug-Sep 1992	893[1]	0.670	No	Miyashita and Shimada (1994)
7W	Aug-Sep 1991	1,164	0.183	Yes	Miyashita (inverse-variance weighted average of 1990, 91 and 92 estimates)
7E	Aug-Sep 1990	791	1.848	Yes	Miyashita (pro-rata to fraction of area from 1990 estimate)
8W	Aug-Sep 1990	472	0.855	Yes	Miyashita (pro-rata to fraction of area surveyed)
8E	Aug-Sep 1990	585	1.071	Yes	Miyashita (pro-rata to fraction of area surveyed)
9W	Aug-Sep 1990	3,226	0.538	Yes	Miyashita (pro-rata to fraction of area surveyed)
9E	Aug-Sep 1990	5,038	0.405	Yes	Miyashita (pro-rata to fraction of area surveyed)
10	Aug-Sep 1992	707[1]	0.570	No	Miyashita and Shimada (1994)
11	Aug-Sep 1990	2,120	0.449	Yes	Buckland *et al.* (1992); IWC (1997 p.211)
11	Aug-Sep 1999[2]	1,456	0.565	Yes	IWC (2003b, pp.470-2)
12SW	Aug-Sep 1990	5,244	0.806	Yes	Miyashita (CV recalculated after the Workshop, Jan 02)
12NE	Aug-Sep 1990	10,397	0.364	Yes	Miyashita (CV recalculated after the Workshop, Jan 02)
12NE	Aug-Sep 1992	11,544	0.380	Yes	Miyashita (CV recalculated after the Workshop, Jan 02)

[1]Minimum estimates. Value to be used in trials is 1 standard error less (=295 sub-area 6 and 304 sub-area 10). [2]Estimate is based on pooling data from 1999 and 2000 surveys (see IWC, 2003b, pp.470-2). Although the estimate is labelled as relating to year 2000 in IWC, 2003b, pp.470-2 it is labelled here as 1999 as management is considered to begin in year 2000 and other data from year 2000 are not available.

The MSYR scenarios are specified in Section G. The *MSYR* used does not apply to the recruited populations defined for this model, but rather applies to the rates that would apply if the age at recruitment were equal to the age at maturity.

The process used to select the initial (pre-exploitation) sizes of each of the stocks and the values for the γ and η parameters used to define the catch mixing matrices is known as the conditioning process. This process involves first generating the target data, as detailed in steps (a) to (i) below, that will be 'fitted' to the above model. Values for the initial population sizes and the γs and η s are then selected by minimising the negative of a log-likelihood which contains terms related to the target data generated in steps (a) to (i). The number of animals in sub-area *k* at the start of year *t* is calculated starting with guessed values of the initial population sizes and projecting the operating model forward to 2000 in order to obtain values of abundance etc. for comparison with the generated data[3]. (When performing the projections, mixing is stochastic, and the catches from each sub-area are set to their historic values – Adjunct 2 and Table 3.) In order to avoid using datasets containing incompatible data, the following algorithm is used:

(1) Generate a number (200) of pseudo datasets based on the data in Tables 5a and 5b.
(2) Fit the operating model to each and record the value of the objective function.
(3) Select the 100 simulations with the lowest objective function values for use in the trials.

The information used in the conditioning process is as follows.

(a) The target values for the historical abundance by sub-area (excepting for the minimum values, which are taken to be one standard error less than the corresponding best estimate – see below) are generated using the formula:

$$P_t^k = O_t^k \exp[\mu_t^k - (\sigma_t^k)^2/2] \qquad \mu_t^k \sim N[0;(\sigma_t^k)^2] \quad \text{(F1)}$$

P_t^k is the abundance for sub-area *k* in year *t*;
O_t^k is the actual survey estimate for sub-area *k* in year *t* (see Table 5a)); and
σ_t^k is the CV of O_t^k.

The levels of abundance listed in Table 5(a) for sub-areas 6 and 10 are assumed to be minima – in the conditioning process the terms for those sub-areas/years are not added to the log-likelihood but the 'true' abundance in those sub-areas must exceed the specified values.

(b) Estimates of the proportion of recruited 'J' stock whales in sub-areas 7W, 11 and 12SW are generated from appropriately truncated normal distributions that correspond to the observed data and are based on mtDNA, conception date and flipper colour information (see Table 5(b)). It was suggested that the posterior distributions for the mixing proportions from the Bayesian approach might be better approximated by beta distributions fitted to the posterior distributions (IWC, 2003b, p.482) but this suggestion was never implemented. Although data do exist for sub-areas other than those listed in Table 5(b), the sample sizes are so low that their information content is effectively nil. Some of the mixing proportions are based on data from several years so the model estimates to which these proportions are fitted during conditioning are sample size-weighted year-specific proportions.

The data for sub-area 12SW is limited and so a trial (sensitivity trial 6) has been added to simulate a higher proportion of 'J' stock animals in this sub-area. In sensitivity trial 6 the proportion estimates for sub-area 12SW are replaced by the highest value for the 1973-75 average proportion of recruited 'J' stock whales in sub-area 12(SW+NE) June-August which is ≤20% and consistent with the other data used in conditioning, and which does not lead to more than 50% (median value over the 100 simulations) of mature 'J' stock females being in sub-area 12SW in June-August 1973-75.

[3] In order to check that the conditioning exercise has been successfully achieved, plots such as those shown in IWC (2003b, pp.473-80) are examined, together with time-trajectories of the fraction of each stock in the sub-areas/months for which information is available.

Table 5(b)

Estimates of the proportion of recruited 'J' whales used to condition the trials (see text re combining estimates)

Sub-area (months)	Sex	Years	Estimate	SE	Data used	Source
2 (Apr.-Sep.)	Both	1996–2000	0.705	0.120	mtDNA	IWC (2003b), p.455-88
7W (Apr.-Sep.)	Both	1983–87, 1996-99	0.028	0.012	mtDNA	IWC (2003b), p.455-88
11 (Apr.)	Females	1984-87	0.623	0.069	mtDNA	IWC (2003b), p.455-88
11 (May)	Females	1984-87	0.081	0.047	mtDNA	IWC (2003b), p.455-88
11 (May-June)	Males	1984-87	0.054	0.051	mtDNA	IWC (2003b), p.455-88
11 (Jun.)	Females	1984-87	0.224	0.101	mtDNA	IWC (2003b), p.455-88
11 (Jul.)	Females	1984-87, 1999	0.443	0.106	mtDNA	IWC (2003b), p.455-88
11 (Jul.)	Males	1986, 1999	0.201	0.079	mtDNA	IWC (2003b), p.455-88
11 (Aug.)	Females	1986-87, 1996	0.087	0.071	mtDNA	IWC (2003b), p.455-88
11 (Aug.)	Males	1986-87, 1996	0.363	0.109	mtDNA	IWC (2003b), p.455-88
12SW (Jun.)	Both	1973-75	0.278	0.159	Conception/ flipper colour	IWC (1997c), p215[2]
12SW (Jul.)	Both	1973-75	0.041[1]	0.025	Conception/ flipper colour	IWC (1997c), p215[2]
12SW (Aug.)	Both	1973-75	0.046[1]	0.028	Conception/ flipper colour	IWC (1997c), p215[2]

[1] Based on the centre of the confidence interval. [2] The values for area 12SW are taken to equal those sampled in 12S (IWC, 1997, p.215).

(c) The trials are conditioned by fixing the depletion level of the mature female component of the 'J' stock to a certain percentage of its pre-exploitation size at the start of 2000. Four values for this depletion are used in the trials: 15%, 30%, 50% and 70%.

(d) **Baselines A and C:** The fraction of the 'O' (or 'O_W' and 'O_E') stock in sub-area 12 is fixed by setting the fraction of 1+ non-'J' stock animals in sub-area 12 (SW+NE) in August-September in the pristine state that are from the 'W' stock to equal the relative abundance of such animals in sub-areas 7, 8, 9W and 9E at that time.

In sensitivity trial 8 the fraction of 'W' animals in sub-area 12 is set equal to the relative abundance of such animals in sub-areas 7, 8 and 9W at that time.

(e) The definition of this condition depends on the underlying stock model —see Section G. This condition is not used in Baseline D.

Baseline A: The fraction of the 'O' stock (1+ animals) in sub-area 9W is fixed by specifying the percentage that the 'O' stock comprises of the combined 'O'-'W' abundance in that sub-area in August-September 1995 (a year when the 'W' stock is defined to enter sub-area 9W). In Baseline A, the value for this fraction is taken to be 50%. (A value of 100% is used in Baseline B i.e. no 'W' stock). The value of 50% is based on the genetic differences found between sub-areas 7, 8 and 9E and sub-area 9W in 1995, 2000 and 2001.

Baseline C: The fractions of 'O_W' and 'O_E' stocks in sub-areas 7, 11 and 12SW are defined such that the pristine ratio of 'O_W':'O_E' 1+ abundance in August/September in each of the sub-areas 7 (W+E), 11 and 12SW are equal i.e. the ratio of such animals in sub-area 7 (W+E) is equal both to the ratio in sub-area 11 and to the ratio in sub-area 12SW, which are themselves equal. In addition, the pristine ratio of 'O_W':'O_E' 1+ abundance in August/September in sub-areas 7 (W+E) and 8 (W+E) combined is set equal to the ratio of such animals in sub-areas 11 and 12 (SW+NE) combined.

See also sensitivity trials 15, 16 and 18 in section G.

(f) For sensitivity trial 10 (case for which $g(0) = 0.5$) the values of the operating model abundances are halved for comparison with the conditioning targets. See also sensitivity trial 30 in Section G.

(g) Dispersal rate. The model allows dispersal between two stocks. To ensure equilibrium in the pristine population:

$$K^{1+,O} D^{O,W} = K^{1+,W} D^{W,O} \tag{F2}$$

$$\text{where} \qquad K^{1+,s} = \sum_{a=1}^{x} R^{f,s}_{-\infty,a} + U^{f,s}_{-\infty,a} \tag{F3}$$

$D^{O,W}$ and $D^{W,O}$ are evaluated by setting the mean dispersal rate D equal to the pertinent value above, where the mean dispersal rate is defined by the formula:

$$D = \left(K^{1+,W} D^{W,O} + K^{1+,O} D^{O,W}\right) / \left(K^{1+,W} + K^{1+,O}\right) \tag{F4}$$

For Baseline A the level of dispersal between the 'O' and 'W' stocks is estimated to be extremely small (best estimate $\sim 0.018 \text{yr}^{-1}$ – see Adjunct 3), so the Baseline A trials are conducted under the assumption of no 'O'-'W' dispersal. For Baseline C the 'best' and 'low' estimates of the dispersal rate between the 'O_W' and 'O_E' stocks were calculated as 0.0045 and 0.001 from the F_{st} estimate of 0.0018 (see Adjunct 3), but the 'high' estimate of dispersal rate between these stocks (corresponding to the observed F_{st} value being the upper 5%ile of the distribution for such values when the rate of dispersal is equal to the 'high' estimate) was essentially infinite. Two 'high dispersal' trials are conducted for Baseline C: Sensitivity trial 2a in which the 'O_E' and 'O_W' stocks are merged into a single 'O' stock (reflecting an infinite dispersal rate); and Sensitivity trial 2 in which a dispersal rate of 0.01 between the 'O_E' and 'O_W' stocks is assumed. Dispersal is ignored for Baseline D.

(h) The historic catch is specified by month and sub-area (see Adjunct 2). In some simulation runs conducted in the iterative conditioning process, the modelled population size in a particular sub-area and month may not be sufficient to support the specified catch, in which case the population model amends the modelled catch to be smaller than the specified catch to prevent negatives occurring for some population components. However, to ensure that any final population trajectory output from the conditioning process is consistent with the historic catch series, a penalty term is added to the likelihood function to ensure that the entire recorded historic catch is taken.

(i) For sensitivity trial 14 (the case in which some 'W' animals are found in sub-area 8 in years when they are also in sub-area 9), the fraction of the 'O' stock (1+ animals) in sub-area 8 to the combined 'O'-'W'

abundance in that sub-area in August-September 1995 (a year when the 'W' stock is defined to enter sub-area 8) is set at 75% (see Pastene *et al*., 2002).

(j) For Baseline C the pristine ratio of 1+ animals from the 'J' to 'O_E' stocks in Aug/September in sub-area 7E is set equal to the ratio of 'J' to 'O_W' stocks in sub-area 7W. This condition was added by the steering group after it was realised that without this condition the proportion of 'J' stock animals could increase with distance eastward from Japan. (An alternative solution was to require the ratio in 7W to be lower than that in 7E but has the disadvantage that the solution is not unique.) This restriction is not needed in Baseline A as the 'J':'O' stock ratios in 7W and 7E are defined by means of the η_1 parameter in the B and F mixing matrices.

(k) **Baseline D.** Further details of this hypothesis are given in IWC (2003b, pp.483-6). The distribution of the 'O' and 'W' stocks across the sub-areas defined for the western North Pacific are determined by catch-mixing matrices. The relative density of the 'O' and 'W' stocks in sub-area *k*, is determined by evaluating the functions f^O and f^W at a representative point in sub-area *k* (see Table 6). The function f^O is evaluated as follows:

$$f^O(lat,long) = \begin{cases} 1 & \text{if } long < \lambda(lat) \\ \min\{1, \exp[s(lat)(long - \lambda(lat))]\} & \text{otherwise} \end{cases} \quad \text{(F5)}$$

where $\lambda(lat)$ is a threshold that defines the latitude at which *f* equals 1, i.e.

$$\lambda(lat) = \begin{cases} 140 + \frac{7}{17}(lat - 30) & \text{if } lat < 47 \\ 147 & \text{otherwise} \end{cases} \quad \text{(F6)}$$

$s(lat)$ is a function that determines how rapidly 'O' stock density drops with increasing longitude, i.e.:

$$s(lat) = \begin{cases} \dfrac{\ell n[p_2 + (p_1 - p_2)(lat - 30)/17]}{155 - \lambda(lat)} & \text{if } lat < 47 \\ \ell n(p_1)/(155 - \lambda(lat)) & \text{otherwise} \end{cases} \quad \text{(F7)}$$

p_1 is the relative density of the 'O' stock at the point (155°E, 47°N), and

p_2 is the relative density of the 'O' stock at the point (155°E, 30°N).

The base-case value for p_1 is specified for males aged 10 years, females aged 10 years, and juveniles aged 4 years (0.35, 0.15 and 0.15 respectively) while the value for p_2 is assumed equal to 0.01.

The function f^W is evaluated as follows:

$$f^W(k) = \begin{cases} \exp\left[-p_{153}\left(162 - long(k)\right)/\left(162 - 153\right)\right] \\ \text{if } long(k) < 153 \\ \text{otherwise } 1 \end{cases} \quad \text{(F8)}$$

The base-case value for p_{153} is specified for males aged 10 years, females aged 10 years, and juveniles aged 4 years (0.35, 0.15 and 0.15 respectively).

The information on which conditioning is based is the relative fraction in groups of sub-areas (see Table 7). Let $\Omega^{G,q,s}$ denote the relative density of whales of sex *s* (all stocks) in sub-area group *G* during month *q* (see Table 7). The raw catch-mixing matrices (i.e. before any γ's are added, i.e. $V^{s,j,k,q}$) is given by:

$$V^{s,j,k,q} = \Omega^{G(k),q,s} \frac{f^{s,j}(k)\, A^k}{\sum_{k'} f^{s,j}(k')\, A^{k'}} \quad \text{(F9)}$$

where $G(k)$ denotes the sub-area group to which sub-area *k* has been assigned, and

A^k is the area of sub-area *k* (see Table 6).

The density of 4-year-olds in sub-area 11 is increased by a factor of four compared to that for age 10 animals to reflect the observation that juveniles do not migrate as far as adults.

Table 8 lists the entries in the catch-mixing matrices for which γ-factors are used to adjust the raw catch-mixing matrices. The values used in the mixing matrices are given in Adjunct 1 (see matrices P and Q).

G. Trials

The full set of trials is given in Table 9. The sensitivity trials are variants of the Baseline trials NPM-A, C and D (see section A).

The full set of trials is based on longitudinal boundaries at 147°E, 150°E, 153°E, 157°E and 162°E although all of the trials merge at least one of the longitudinal sectors defined by these boundaries when defining sub-areas. If a trial is specified in terms of a sub-area that is a combination of two of these longitudinal sectors, the relative fraction of each stock in each sector is the same (with the ratio of the abundances in the two sectors given by an η parameter in the catch mixing matrices).

In Baseline A, the 'W' stock occurs in sub-area 9 (and 12) each year with 60% probability, determined by random selection, except that the simulations will always ensure they are present in these sub-areas in 1995, 2000 and 2001 and absent in 1994 and 1997. There is no genetic data regarding the 'J':'O' ratio in 7E, but it has been assumed to be the same as that in 7W for Baselines A, B and C.

The figures in IWC (2003b, pp.459-60) illustrate the baseline trials and sensitivity trials 17, 18 and 19.

Rationale and further details for some of the sensitivity trials:

Table 6

Areas and representative points for each of the sub-areas (note that sub-area 9N is divided into two for the purposes of this table).

	Sub-area													
	2	3	4	7W	7E	8W	8E	9W	9E	11	12SW	12NE	9NW	9NE
Area	672,903	331,509	622,289	63,871	58,272	69,410	93,134	118,972	192,923	59,564	111,260	469,018	95,033	273,060
Longitude	142.1	153.5	163.5	144.5	148.6	151.5	154.9	159.5	166	145.8	146.7	150.1	159.8	166.1
Latitude	33	33.9	34	41.8	42.7	43.6	43.5	43.6	43.6	45.8	49.6	54.8	50.2	53.2

Table 7

The relative number of animals (all stocks) by sub-area group in various months. The values for juveniles (age 4) are set to the averages of the values for males and females.

Sub-area group	Month					
	April	May	June	July	August	Sept
Males (age 10)						
2-4	0.7	0.3	0.0	0.0	0.0	0.1
7W-9E	0.2	0.3	0.4	0.4	0.5	0.5
9N,11,12	0.0	0.4	0.6	0.6	0.5	0.4
Females (age 10)						
2-4	0.7	0.1	0.0	0.0	0.0	0.1
7W-9E	0.1	0.3	0.2	0.2	0.2	0.2
9N,11,12	0.2	0.6	0.8	0.8	0.8	0.7

Table 8

The adjustment factors estimated for the 'O' and 'W' stocks (the adjustment factors are assumed to be independent of sex, age and month).

Stock	Sub-area									
	1-6	7W	7E	8W-8E	9E-9W	10	11	12SW	12NE	9N
'O'	0	0	0	γ_6	γ_6	0	γ_{15}	γ_7	γ_{24}	0
'W'	0	-	γ_6	γ_6	0	0	-	0	0	γ_{25}

Trial 8

The objective of this sensitivity trial is that animals in sub-area 9E migrate to sub-area 9N rather than to sub-area 12. The constraint F(d) is modified to 'the fraction of 'W' animals in sub-area 12 is set equal to the relative abundance of such animals in sub-areas 7, 8 and 9W'. The catch mixing matrices are unchanged except that estimable parameters are added to allow the animals in 9E to migrate to 9N (see matrices F_2 and E_2 for Baselines A and C respectively).

Trial 9

In 50% of years some 'O' stock animals are found in sub-area 10 (see catch mixing matrices H and C_2 for Baselines A and C respectively).

Trial 15 (C trial)

In the base-case trials, animals migrate due north, so none of the animals from sub-area 8 go into sub-area 12SW. In trial C1-15, some animals from sub-area 8W veer west into sub-area 12SW. This is implemented by modifying constraint F(e) above, so that the the pristine ratio of 'O_W':'O_E' 1+ abundance (August/September) in sub-areas 7 (W+E) and 8W combined is set equal to the ratio of such animals in sub-areas 11 and 12 SW combined.

Trial 16 (C trial)

This sensitivity trial involves the most extreme assumption regarding the extent to which 'O_E' animals veer east by excluding 'O_E' animals from sub-areas 11 and 12SW (see matrix D_2). The first condition in section F(e) above (that the pristine ratio of 'O_W':'O_E' 1+ abundance in each of the sub-areas 7, 11 and 12SW are equal) is not applicable for this trial.

Trial 17 (C trial)

This sensitivity trial involves moving the boundary between the 'O_W' and 'O_E' stocks from 147^0E to 153^0E. It is implemented by modifying the catch mixing matrices for the 'O_W' and 'O_E' stocks so that no 'O_E' animals are found in sub-areas 7E, 8W, 11 and 12SW and so that 'O_W' animals are found in sub-areas 7E and 8W (see catch mixing matrices C_3 and D_3). A dispersal rate of 0.01 between the 'O_W':'O_E' is assumed (see Adjunct 3).

Trial 18 (C trial)

This sensitivity trial is implemented by replacing the base-case catch-mixing matrix for the 'O_W' stock by one in which the 'O_W' stock is also found in sub-areas 7E and 8W (see catch mixing matrix C_3). The two extra constraints needed to implement this sensitivity trial are that the pre-exploitation split of 1+ animals (August-September) between the 'O_W' and 'O_E' stocks in sub-areas 7E and 8W are 2:1 and 1:2 respectively. An 'O_W':'O_E' dispersal rate of 0.00725 is assumed for this trial (being the average of the base-case 'O_W': 'O_E' dispersal rate and that used for trial C1-17).

Trial 19 (C trial)

This trial is designed to reflect the possibility that the 'W' stock is restricted to sub-area 9W and that sub-area 9E is comprised entirely of 'O_E' animals. It is implemented by excluding the 'W' stock from sub-area 9E and modifying the catch-mixing matrix for the 'O_E' stock to allow 'O_E' animals in sub-area 9E (see catch mixing matrices D_4 and E_3). A dispersal rate of 0.00725 between the 'O_W':'O_E' is assumed (see Adjunct 3).

Trial 21 (D trial)

More rapid decline in 'O' relative density with longitude. This sensitivity trial involves changing the p_1 parameters to (0.2, 0.069 and 0.069) for males, females and juveniles respectively, and changing the p_{153} parameters to (0.5, 0.21 and 0.21) for males, females and juveniles respectively.

Trial 22 (D trial)

Less rapid decline in 'O' relative density with longitude. This sensitivity trial involves changing the p_1 parameters to (0.5, 0.21 and 0.21) for males, females and juveniles respectively, and changing the p_{153} parameters to (0.2, 0.069 and 0.069) for males, females and juveniles respectively.

Trial 25 (D trial)

Increased proportion of both sexes in mixing matrix N. This sensitivity trial involves increasing the elements of Table 7 for the 9N, 11 and 12 sub-area groups by 0.1 and re-scaling the elements for the 2-4 and 7W-8E sub-area groups so that the sum over all sub-area groups equals 1.

Trial 26 (D trial)

Decreased proportion of both sexes in mixing matrix N. This sensitivity trial involves decreasing the elements of Table 7 for the 9N, 11 and 12 sub-area groups by 0.1 and re-scaling the elements for the 2-4 and 7W-8E sub-area groups so that the sum over 100 sub-area groups equals 1.

Trial 27 (D trial)

Random selection of mixing matrices. This sensitivity trial involves selecting the values for (p_1, p_2) at random and with equal probability from (0.35, 0.15, 0.15), (0.2, 0.069, 0.069) and (0.5, 0.21, 0.21) each year.

Trial 28 (D trial)

Increase 'O' : 'W' ratio in 12 – differential migration. This sensitivity trial involves increasing the entries for the 9N, 11 and 12 sub-area groups for the 'O' (but not 'W') stock until the ratio of 'O' to 'W' animals in sub-area 12 is 0.8. The change to the mixing matrix will be based on fitting the operating model to the actual data (i.e. a 'deterministic' fit).

Trial 29 (D trial)

Increase 'O' : 'W' ratio in 12 – 'O' stock in sub-area 9. This sensitivity trial involves changing the relative density of 'O' animals in sub-areas 9W and 9E until the ratio of 'O' to 'W'

Table 9

Implementation Simulation Trials for North Pacific minke whales. All trials are run using both the J1 and J2 incidental catch options.

6a: Baseline trials.

Trial No. NPM-	*MSYR*	No. of stocks	Mixing Matrices	'J' status in 2000	Description
A	1% & 4%	3	A/B F K/L(60:40)	30% *K*	3 stocks with 2 in sub-area 9
B	1% & 4%	2	A/B G	30% *K*	2 stock variant
C	1% & 4%	4	A/B C D E	30% *K*	4 stocks with hard boundary at 147°
D	1% & 4%	3	A/B P Q	30% *K*	3 stocks with mixing gradient (all moving left)

6b: Sensitivity trials. *** not run §: trial added during SC 2003 meeting

Baseline	Sensitivity trial no.	*MSYR*	Mixing matrices	'J' status in 2000	Description
A1	3	1%	A/B F K/L(60:40)	15% *K*	15% 'J' stock depletion
A1	4	1%	A/B F K/L(60:40)	50% *K*	50% 'J' stock depletion
A1	5	1%	A/B F K/L(60:40)	70% *K*	70% 'J' stock depletion
A4	5	4%	A/B F K/L(60:40)	70% *K*	70% 'J' stock depletion
A1	6	1%	A/B F K/L(60:40)	30% *K*	20% 'J' in sub-area 12SW (or maximum achievable)
A1	7	1%	A/B F K/L(60:40)	15% *K*	15% 'J' stock depletion + 20% 'J' in 12SW (or maximum achievable)
A1	8	1%	A/B $\mathbf{F_2}$ K/L(60:40)	30% *K*	Some whales from 9 go east of Kamchatka (162° line). See Item F.d.
A1	9	1%	A/B **F/H** K/L(60:40)	30% *K*	Some 'O' animals in sub-area 10
A1	10	1%	A/B F K/L(60:40)	30% *K*	*g*(0) = 0.5 (see item F.f)
A1	11	1%	A/B F K/L(60:40)	30% *K*	Misreport Japan incidental catch (*4 in opt Ji and /4 in opt Jii)
A1	12	1%	A/B F K/L(60:40)	30% *K*	Different Korean bycatch model (constant future catch = 89)
A1	13	1%	A/B F K/L(60:40)	30% *K*	Different Japanese incidental catch level (50 in opt J*i* and 150 in J*ii*)
A1	14	1%	A/B F **M**/L(60:40)	30% *K*	Sensitivity to A: some 'W' in 8 (see Item F.i)
A1	23	1%	A/B F K/L(60:40)	30% *K*	40% additional variance in CV supplied to *CLA* (see item 10.1)
A1	24	1%	A/B F K/L(60:40)	30% *K*	Sub-area 11 closed in all months + sub-area 12SW closed in June
A1	30 §	1%	A/B F K/L(60:40)	30% *K*	As for trial A10 except the abundance estimates used by the RMP are unbiased
C1	1	1%	A/B C D E	30% *K*	Lower dispersal rate
C4	1	4%	A/B C D E	30% *K*	Lower dispersal rate
C1	2	1%	A/B C D E	30% *K*	Higher dispersal rate
C1	2 a	1%	A/B **N** E	30% *K*	Single O stock i.e. infinite dispersal rate
C1	3	1%	A/B C D E	15% *K*	15% 'J' stock depletion
C1	4	1%	A/B C D E	50% *K*	50% 'J' stock depletion
C1	5	1%	A/B C D E	70% *K*	70% 'J' stock depletion
C4	5	4%	A/B C D E	70% *K*	70% 'J' stock depletion
C1	6	1%	A/B C D E	30% *K*	20% 'J' in sub-area 12SW (or maximum achievable)
C1	7 ***	1%	A/B C D E	15% *K*	15% 'J' stock depletion + 20% 'J' in 12SW (or maximum achievable)
C1	8	1%	A/B C D $\mathbf{E_2}$	30% *K*	Some whales from 9 go east of Kamchatka (162° line). See Item F.d.
C1	9	1%	A/B $\mathbf{C/C_2}$ D E	30% *K*	Some 'O_W' animals in sub-area 10
C1	10	1%	A/B C D E	30% *K*	*g*(0) = 0.5 (see item F.f)
C1	11	1%	A/B C D E	30% *K*	Misreport Japan incidental catch (*4 in opt J*i* and /4 in opt J*ii*)
C1	12	1%	A/B C D E	30% *K*	Different Korean bycatch model (constant future catch = 89)
C1	13	1%	A/B C D E	30% *K*	Different Japanese incidental catch level (50 in opt J*i* and 150 in J*ii*)
C1	15	1%	A/B C D E	30% *K*	More 'O_E' in 12 SW. See Item F(e).
C1	16 ***	1%	A/B C $\mathbf{D_2}$ E	30% *K*	No 'O_E' in 11 or 12 SW.
C1	17	1%	A/B $\mathbf{C_3}$ $\mathbf{D_3}$ E	30% *K*	Hard 'O_W'/'O_E' boundary at 153°
C1	18 ***	1%	A/B $\mathbf{C_3}$ D E	30% *K*	'O_W' and 'O_E' mixing between 147ºE and 153ºE. See Item F.e
C1	19	1%	A/B C $\mathbf{D_4}$ $\mathbf{E_3}$	30% *K*	Further intrusion of 'O_E' into sub-area 9
C1	20	1%	A/B **I J** E	30% *K*	Intrusion with mixing: 'O_W' and 'O_E' mixing in 7 and 8
C4	20	4%	A/B **I J** E	30% *K*	Intrusion with mixing: 'O_W' and 'O_E' mixing in 7 and 8
C1	23	1%	A/B C D E	30% *K*	40% additional variance in CV supplied to *CLA* (IWC, 2003, pp.463-5)
C1	24	1%	A/B C D E	30% *K*	Sub-area 11 closed in all months + sub-area 12SW closed in June
C1	30 §	1%	A/B C D E	30% *K*	As for trial C10 except the abundance estimates used by the RMP are unbiased
D1	3	1%	A/B P Q	15% *K*	15% 'J' stock depletion
D1	4	1%	A/B P Q	50% *K*	50% 'J' stock depletion
D1	5	1%	A/B P Q	70% *K*	70% 'J' stock depletion
D4	5	4%	A/B P Q	70% *K*	70% 'J' stock depletion
D1	6	1%	A/B P Q	30% *K*	20% 'J' in sub-area 12SW (or maximum achievable)
D1	7	1%	A/B P Q	15% *K*	15% 'J' stock depletion + 20% 'J' in 12SW (or maximum achievable)
D1	10	1%	A/B P Q	30% *K*	*g*(0) = 0.5 (see item F.f)
D1	11	1%	A/B P Q	30% *K*	Misreport Japan incidental catch (*4 in opt J*i* and /4 in opt J*ii*)
D1	12	1%	A/B P Q	30% *K*	Different Korean bycatch model (constant future catch = 89)
D1	13	1%	A/B P Q	30% *K*	Different Japanese incidental catch level (50 in opt J*i* and 150 in J*ii*)
D1	21	1%	A/B $\mathbf{P_2}$ $\mathbf{Q_2}$	30% *K*	More rapid decline in O relative density with longitude
D1	22	1%	A/B $\mathbf{P_3}$ $\mathbf{Q_3}$	30% *K*	Less rapid decline in O relative density with longitude
D1	23	1%	A/B P Q	30% *K*	40% additional variance in CV supplied to *CLA* (see item 10.1)
D1	24	1%	A/B P Q	30% *K*	Sub-area 11 closed in all months + sub-area 12SW closed in June
D1	25	1%	A/B $\mathbf{P_4}$ $\mathbf{Q_4}$	30% *K*	Increased proportion of both sexes in N
D1	26	1%	A/B $\mathbf{P_4}$ $\mathbf{Q_4}$	30% *K*	Decreased proportion of both sexes in N
D1	27	1%	A/B $\mathbf{P/P_2/P_3}$ $\mathbf{Q/Q_2/Q_3}$	30% *K*	Random selection of mixing matrices
D1	28	1%	A/B P Q	30% *K*	Increase O:W ratio in 12 with differential migration
D1	29	1%	A/B $\mathbf{P_5}$ $\mathbf{Q_5}$	30% *K*	Increase O:W ratio in 12 with O stock in sub-area 9
D1	30 §	1%	A/B P Q	30% *K*	As for trial D10 except the abundance estimates used by the RMP are unbiased

animals in sub-area 12 is 0.8. The change to the mixing matrix is based on fitting the operating model to the actual data (i.e. a 'deterministic' fit).

Trial 30

Trial 30 was added at the June 2003 meeting to test a second variation of the $g(0) = 0.5$ case, in which the past and future survey estimates of abundance are not adjusted for $g(0) = 0.5$ when implementing the RMP but the trials are conditioned assuming that the past abundance estimates are negatively biased by 50%. (See also section F(f)).

H. Management options

Two issues relate to specifying the management options: (a) the designation of *Areas* (*Small*, *Medium* and *Large*); and (b) the management procedure variants to consider. The selections listed below may be reconsidered once the results of the trials specified in this Appendix have been carried out.

Designation of areas

SMALL AND RESIDUAL AND COMBINATION AREAS

Sub-areas 1, 2, 3, 4, 5, 6, 9N, 10 and 13 are *Residual Areas*. There are four alternative *Small Area* definitions and two other management variants:

(1) *Small Areas* equal sub-areas. For this option, the *Small Areas* for which catch limits would be set are 7W, 7E, 8W, 8E, 9W, 9E, 11, 12SW and 12NE.
(2) 7+8, 9, 11 and 12 are *Small Areas* and catches are taken from sub-areas 7W, 9W, 11 and 12SW.
(3) 7+8+11+12 and 9 are *Small Areas* and catches are taken from sub-areas 11 and 9W.
(4) 7W, 7E+8+12, 9 and 11 are *Small Areas* and catches are taken from sub-areas 7W, 9W, 11 and 12SW.
(5) 7+8+11+12 and 9 are combination areas and catches are cascaded to the sub-areas within each combination area.
(6) As (3) except that the catches from the 7+8+11+12 *Small Area* are taken from sub-areas 7W and 11 using catch cascading across those two sub-areas.

Note: in cases where a *Small Area* consists of more than one sub-area, the general approach followed above is to assume the extreme that all catches are taken from the sub-area that would lead to the highest risk to the 'J' stock.

MEDIUM AREAS

Medium Areas are not used in this set of variants (previous trials having shown this feature to have only a slight impact on performance).

LARGE AREA

There is no *Large Area*.

I. Output statistics

Population-size and continuing catch statistics are produced for each stock, and catch-related statistics for each sub-area. Catch related statistics are produced both for the total catches (commercial and incidental) and for the commercial catches alone.

(1) Total catch (TC) distribution: (a) median; (b) 5th value; (c) 95th value.
(2) Initial mature female population size (P_{2000}) distribution: (a) median; (b) 5th value; (c) 95th value.
(3) Final mature female population size (P_f) distribution: (a) median; (b) 5th value; (c) 95th value.
(4) Lowest mature female population over 100 years (P_{low}) distribution: (a) median; (b) 5th value; (c) 95th value.
(5) Average catch over the last 10 years of the 100-year management period: (a) median; (b) 5th value; (c) 95th value.
(6) Catch by sub-area, stock and catch-type (incidental or commercial): (a) median; (b) 5th value; (c) 95th value.
(7) The median percentage of mature 'J' stock females in sub-area 12 in June-August 1973-75.
(8) The median annual rate of decline in the number of whales assumed recruited to the Korean fishery over the period 1973-1986.
(9) The median 1+ population size for animals in sub-areas 6 and 10 in August-September in 1992 and in 2000 (corresponding to Sea of Japan surveys).
(10) The mean proportion of 'J' whales in the total (scientific, commercial and incidental) catch taken by Japan from 1993-98 is output in trials, for comparison with results obtained from market samples.

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Adjunct 1

The catch mixing matrices (the sightings mixing matrices are calculated from the catch mixing matrices for August and September).

The values of the γ and η parameters are estimated during conditioning. Differences from the basecase matrices are shown shaded. Note: except in Baseline D, all of the 'J' stock animals in sub-areas 12SW+12NE occur in sub-area 12SW whilst all of the 'W' stock animals in sub-areas 12SW+12NE occur in sub-area 12NE. The specification regarding the proportion of 'J' stock animals in sub-area 12SW is based on the analyses of the flipper colour information which indicates a high proportion of 'J' stock animals in that sub-area in June (see Table 7b). The shaded columns highlight differences from the base case.

Matrix A: 'J' Stock used in all Baselines (in 50% of years)

$\gamma_{12}= ½(\gamma_{11}+2\gamma_{16})$ $\gamma_{18}=½(\gamma_2+\gamma_{14})$ $\gamma_{19}=½(\gamma_4+\gamma_{14})$ $\gamma_{20}=½(\gamma_{11}+\gamma_{16})$ $\gamma_{23}=½(\gamma_8+\gamma_{22})$

Month /Age-class	Sub-area 1	2	3	4	5	6	7W	7E	8W	8E	9W	9E	10	11	12SW	12NE	13
Age 4																	
Apr	1	$\mathbf{2\gamma_{17}}$	0	0	1	1	0	0	0	0	0	0	1	γ_1	0	0	0
May	0	$\mathbf{\gamma_{17}}$	0	0	1	1	0	0	0	0	0	0	2	γ_{18}^1	0	0	0
Jun	0	0	0	0	1	1	0	0	0	0	0	0	2	γ_{19}^1	0	0	0
Jul	0	0	0	0	1	1	0	0	0	0	0	0	1	γ_{23}	0	0	0
Aug	0	0	0	0	1	1	0	0	0	0	0	0	1	γ_{12}^1	0	0	0
Sept	1	0	0	0	1	2	0	0	0	0	0	0	1	γ_{20}^1	0	0	0
Age 10 – male																	
Apr	1	$\mathbf{2\gamma_{17}}$	0	0	1	1	0	0	0	0	0	0	1	γ_1	0	0	0
May	0	$\mathbf{\gamma_{17}}$	0	0	1	1	0	0	0	0	0	0	2	γ_{14}	0	0	0
Jun	0	0	0	0	1	1	0	0	0	0	0	0	2	γ_{14}	0	0	0
Jul	0	0	0	0	1	1	0	0	0	0	0	0	1	γ_{22}	0	0	0
Aug	0	0	0	0	1	1	0	0	0	0	0	0	1	γ_{11}	0	0	0
Sept	1	0	0	0	1	2	0	0	0	0	0	0	1	γ_{11}	0	0	0
Age 10 – female																	
Apr	1	$\mathbf{2\gamma_{17}}$	0	0	1	1	0	0	0	0	0	0	1	γ_1	0	0	0
May	0	$\mathbf{\gamma_{17}}$	0	0	1	1	0	0	0	0	0	0	2	γ_2	0	0	0
Jun	0	0	0	0	1	1	0	0	0	0	0	0	2	γ_4	0	0	0
Jul	0	0	0	0	1	1	0	0	0	0	0	0	1	γ_8	0	0	0
Aug	0	0	0	0	1	1	0	0	0	0	0	0	1	$2\gamma_{16}$	0	0	0
Sept	1	0	0	0	1	2	0	0	0	0	0	0	1	γ_{16}	0	0	0

Matrix B: 'J' Stock used in all Baselines (in 50% of years) $\gamma_{12}= ½(\gamma_{11}+2\gamma_{16})$

$\gamma_{18}= ½(\gamma_2+\gamma_{14})$ $\gamma_{19}= ½(\gamma_4+\gamma_{14})$ $\gamma_{20}= ½(\gamma_{11}+\gamma_{16})$ $\gamma_{23}=½(\gamma_8+\gamma_{22})$

Month /Age-class	Sub-area 1	2	3	4	5	6	7W	7E	8W	8E	9W	9E	10	11	12SW	12NE	13
Age 4																	
Apr	1	$\mathbf{2\gamma_{17}}$	0	0	1	1	γ_{13}	$\eta_1\gamma_{13}$	0	0	0	0	1	γ_1	0	0	0
May	0	$\mathbf{\gamma_{17}}$	0	0	1	1	γ_{13}	$\eta_1\gamma_{13}$	0	0	0	0	2	γ_{18}^1	0	0	0
Jun	0	0	0	0	1	1	γ_{13}	$\eta_1\gamma_{13}$	0	0	0	0	2	γ_{19}^1	0	0	0
Jul	0	0	0	0	1	1	γ_{13}	$\eta_1\gamma_{13}$	0	0	0	0	1	γ_{23}	0	0	0
Aug	0	0	0	0	1	1	γ_{13}	$\eta_1\gamma_{13}$	0	0	0	0	1	γ_{12}^1	0	0	0
Sept	1	0	0	0	1	2	γ_{13}	$\eta_1\gamma_{13}$	0	0	0	0	1	γ_{20}^1	0	0	0
Age 10 – male																	
Apr	1	$\mathbf{2\gamma_{17}}$	0	0	1	1	γ_{13}	$\eta_1\gamma_{13}$	0	0	0	0	1	γ_1	0	0	0
May	0	$\mathbf{\gamma_{17}}$	0	0	1	1	γ_{13}	$\eta_1\gamma_{13}$	0	0	0	0	2	γ_{14}	γ_3	0	0
Jun	0	0	0	0	1	1	γ_{13}	$\eta_1\gamma_{13}$	0	0	0	0	2	γ_{14}	γ_3	0	0
Jul	0	0	0	0	1	1	γ_{13}	$\eta_1\gamma_{13}$	0	0	0	0	1	γ_{22}	γ_5	0	0
Aug	0	0	0	0	1	1	γ_{13}	$\eta_1\gamma_{13}$	0	0	0	0	1	γ_{11}	γ_5	0	0
Sept	1	0	0	0	1	2	γ_{13}	$\eta_1\gamma_{13}$	0	0	0	0	1	γ_{11}	0	0	0
Age 10 – female																	
Apr	1	$\mathbf{2\gamma_{17}}$	0	0	1	1	γ_{13}	$\eta_1\gamma_{13}$	0	0	0	0	1	γ_1	0	0	0
May	0	$\mathbf{\gamma_{17}}$	0	0	1	1	γ_{13}	$\eta_1\gamma_{13}$	0	0	0	0	2	γ_2	γ_3	0	0
Jun	0	0	0	0	1	1	γ_{13}	$\eta_1\gamma_{13}$	0	0	0	0	2	γ_4	γ_3	0	0
Jul	0	0	0	0	1	1	γ_{13}	$\eta_1\gamma_{13}$	0	0	0	0	1	γ_8	γ_5	0	0
Aug	0	0	0	0	1	1	γ_{13}	$\eta_1\gamma_{13}$	0	0	0	0	1	$2\gamma_{16}$	γ_5	0	0
Sept	1	0	0	0	1	2	γ_{13}	$\eta_1\gamma_{13}$	0	0	0	0	1	γ_{16}	0	0	0

Matrix F: 'O' Stock used in Baseline A (all years)

Month /Age-class	Sub-area 1	2	3	4	5	6	7W	7E	8W	8E	9W	9E	10	11	12SW	12NE	13
Age 4																	
Apr	0	2	0	0	0	0	4	$4\eta_1$	$4\gamma_9$	$4\eta_2\gamma_9$	γ_{15}	$\eta_3\gamma_{15}$	0	γ_7	0	0	0
May	0	1	0	0	0	0	4	$4\eta_1$	$4\gamma_9$	$4\eta_2\gamma_9$	γ_{15}	$\eta_3\gamma_{15}$	0	γ_7	γ_6	$\eta_4\gamma_6$	0
Jun	0	0	0	0	0	0	4	$4\eta_1$	$4\gamma_9$	$4\eta_2\gamma_9$	γ_{15}	$\eta_3\gamma_{15}$	0	γ_7	γ_6	$\eta_4\gamma_6$	0
Jul	0	0	0	0	0	0	4	$4\eta_1$	$4\gamma_9$	$4\eta_2\gamma_9$	γ_{15}	$\eta_3\gamma_{15}$	0	γ_7	γ_6	$\eta_4\gamma_6$	0
Aug	0	0	0	0	0	0	4	$4\eta_1$	$4\gamma_9$	$4\eta_2\gamma_9$	γ_{15}	$\eta_3\gamma_{15}$	0	γ_7	γ_6	$\eta_4\gamma_6$	0
Sept	0	0	0	0	0	0	4	$4\eta_1$	$4\gamma_9$	$4\eta_2\gamma_9$	γ_{15}	$\eta_3\gamma_{15}$	0	γ_7	0	0	0
Age 10 – male																	
Apr	0	2	0	0	0	0	4	$4\eta_1$	$4\gamma_9$	$4\eta_2\gamma_9$	$2\gamma_{15}$	$2\eta_3\gamma_{15}$	0	γ_7	γ_6	$\eta_4\gamma_6$	0
May	0	1	0	0	0	0	4	$4\eta_1$	$4\gamma_9$	$4\eta_2\gamma_9$	$3\gamma_{15}$	$3\eta_3\gamma_{15}$	0	γ_7	γ_6	$\eta_4\gamma_6$	0
Jun	0	0	0	0	0	0	4	$4\eta_1$	$4\gamma_9$	$4\eta_2\gamma_9$	$4\gamma_{15}$	$4\eta_3\gamma_{15}$	0	γ_7	γ_6	$\eta_4\gamma_6$	0
Jul	0	0	0	0	0	0	4	$4\eta_1$	$4\gamma_9$	$4\eta_2\gamma_9$	$4\gamma_{15}$	$4\eta_3\gamma_{15}$	0	γ_7	γ_6	$\eta_4\gamma_6$	0
Aug	0	0	0	0	0	0	4	$4\eta_1$	$4\gamma_9$	$4\eta_2\gamma_9$	$4\gamma_{15}$	$4\eta_3\gamma_{15}$	0	γ_7	γ_6	$\eta_4\gamma_6$	0
Sept	0	0	0	0	0	0	4	$4\eta_1$	$4\gamma_9$	$4\eta_2\gamma_9$	$3\gamma_{15}$	$3\eta_3\gamma_{15}$	0	γ_7	γ_6	$\eta_4\gamma_6$	0
Age 10 – female																	
Apr	0	2	0	0	0	0	4	$4\eta_1$	$4\gamma_9$	$4\eta_2\gamma_9$	$2\gamma_{15}$	$2\eta_3\gamma_{15}$	0	$2\gamma_7$	$2\gamma_6$	$2\eta_4\gamma_6$	0
May	0	1	0	0	0	0	2	$2\eta_1$	$2\gamma_9$	$2\eta_2\gamma_9$	γ_{15}	$\eta_3\gamma_{15}$	0	$2\gamma_7$	$3\gamma_6$	$3\eta_4\gamma_6$	0
Jun	0	0	0	0	0	0	1	η_1	γ_9	$\eta_2\gamma_9$	γ_{15}	$\eta_3\gamma_{15}$	0	$2\gamma_7$	$3\gamma_6$	$3\eta_4\gamma_6$	0
Jul	0	0	0	0	0	0	1	η_1	γ_9	$\eta_2\gamma_9$	γ_{15}	$\eta_3\gamma_{15}$	0	$2\gamma_7$	$3\gamma_6$	$3\eta_4\gamma_6$	0
Aug	0	0	0	0	0	0	1	η_1	γ_9	$\eta_2\gamma_9$	γ_{15}	$\eta_3\gamma_{15}$	0	$2\gamma_7$	$2\gamma_6$	$2\eta_4\gamma_6$	0
Sept	0	0	0	0	0	0	1	η_1	γ_9	$\eta_2\gamma_9$	γ_{15}	$\eta_3\gamma_{15}$	0	γ_7	γ_6	$\eta_4\gamma_6$	0

Matrix K: 'W' Stock used in Baseline A (in 60% of years)

Month /Age-class	Sub-area 1	2	3	4	5	6	7W	7E	8W	8E	9W	9E	10	11	12SW	12NE	13
Age 4																	
Apr	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0
May	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0
Jun	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0
Jul	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0
Aug	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0
Sept	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0
Age 10 - male																	
Apr	0	0	2	2	0	0	0	0	0	0	2	0	0	0	0	γ_{10}	0
May	0	0	1	1	0	0	0	0	0	0	3	0	0	0	0	γ_{10}	0
Jun	0	0	0	0	0	0	0	0	0	0	4	0	0	0	0	$2\gamma_{10}$	0
Jul	0	0	0	0	0	0	0	0	0	0	4	0	0	0	0	$2\gamma_{10}$	0
Aug	0	0	0	0	0	0	0	0	0	0	4	0	0	0	0	γ_{10}	0
Sept	0	0	0	0	0	0	0	0	0	0	3	0	0	0	0	γ_{10}	0
Age 10 - female																	
Apr	0	0	2	2	0	0	0	0	0	0	2	0	0	0	0	γ_{10}	0
May	0	0	1	1	0	0	0	0	0	0	1	0	0	0	0	$2\gamma_{10}$	0
Jun	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	$2\gamma_{10}$	0
Jul	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	$3\gamma_{10}$	0
Aug	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	$3\gamma_{10}$	0
Sept	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	$2\gamma_{10}$	0

Cont.

Matrix L: 'W' Stock used in Baseline A (in 40% of years)

Month /Age-class	1	2	3	4	5	6	7W	7E	8W	8E	9W	9E	10	11	12SW	12NE	13
Age 4																	
Apr	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
May	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
Jun	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
Jul	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
Aug	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
Sept	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
Age 10 – male																	
Apr	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
May	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
Jun	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
Jul	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
Aug	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
Sept	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
Age 10 – female																	
Apr	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
May	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
Jun	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
Jul	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
Aug	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
Sept	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1

Matrix M: 'W' Stock. As Matrix K but allowing 'W' stock into sub-area 8 and 9E (Sensitivity trial 14, 60% of years)

Month /Age-class	1	2	3	4	5	6	7W	7E	8W	8E	9W	9E	10	11	12SW	12NE	13
Apr	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0
May	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0
Jun	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0
Jul	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0
Aug	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0
Sept	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0
Age 10 – male																	
Apr	0	0	2	2	0	0	0	0	$4\gamma_{30}$	$4\eta_2\gamma_{30}$	2	$2\eta_3$	0	0	0	γ_{10}	0
May	0	0	1	1	0	0	0	0	$4\gamma_{30}$	$4\eta_2\gamma_{30}$	3	$3\eta_3$	0	0	0	γ_{10}	0
Jun	0	0	0	0	0	0	0	0	$4\gamma_{30}$	$4\eta_2\gamma_{30}$	4	$4\eta_3$	0	0	0	$2\gamma_{10}$	0
Jul	0	0	0	0	0	0	0	0	$4\gamma_{30}$	$4\eta_2\gamma_{30}$	4	$4\eta_3$	0	0	0	$2\gamma_{10}$	0
Aug	0	0	0	0	0	0	0	0	$4\gamma_{30}$	$4\eta_2\gamma_{30}$	4	$4\eta_3$	0	0	0	γ_{10}	0
Sept	0	0	0	0	0	0	0	0	$4\gamma_{30}$	$4\eta_2\gamma_{30}$	3	$3\eta_3$	0	0	0	γ_{10}	0
Age 10 – female																	
Apr	0	0	2	2	0	0	0	0	$4\gamma_{30}$	$4\eta_2\gamma_{30}$	2	$2\eta_3$	0	0	0	γ_{10}	0
May	0	0	1	1	0	0	0	0	$2\gamma_{30}$	$2\eta_2\gamma_{30}$	1	η_3	0	0	0	$2\gamma_{10}$	0
Jun	0	0	0	0	0	0	0	0	γ_{30}	$\eta_2\gamma_{30}$	1	η_3	0	0	0	$2\gamma_{10}$	0
Jul	0	0	0	0	0	0	0	0	γ_{30}	$\eta_2\gamma_{30}$	1	η_3	0	0	0	$3\gamma_{10}$	0
Aug	0	0	0	0	0	0	0	0	γ_{30}	$\eta_2\gamma_{30}$	1	η_3	0	0	0	$3\gamma_{10}$	0
Sept	0	0	0	0	0	0	0	0	γ_{30}	$\eta_2\gamma_{30}$	1	η_3	0	0	0	$2\gamma_{10}$	0

Matrix F_2: 'O' Stock used in Baseline A sensitivity trial 8: 9E animals migrate into 9N (all years)

Month /Age-class	1	2	3	4	5	6	7W	7E	8W	8E	9W	9E	10	11	12SW	12NE	13/9N
Age 4																	
Apr	0	2	0	0	0	0	4	$4\eta_1$	$4\gamma_9$	$4\eta_2\gamma_9$	γ_{15}	$\eta_3\gamma_{15}$	0	γ_7	0	0	0
May	0	1	0	0	0	0	4	$4\eta_1$	$4\gamma_9$	$4\eta_2\gamma_9$	γ_{15}	$\eta_3\gamma_{15}$	0	γ_7	γ_6	$\eta_4\gamma_6$	γ_{24}
Jun	0	0	0	0	0	0	4	$4\eta_1$	$4\gamma_9$	$4\eta_2\gamma_9$	γ_{15}	$\eta_3\gamma_{15}$	0	γ_7	γ_6	$\eta_4\gamma_6$	γ_{24}
Jul	0	0	0	0	0	0	4	$4\eta_1$	$4\gamma_9$	$4\eta_2\gamma_9$	γ_{15}	$\eta_3\gamma_{15}$	0	γ_7	γ_6	$\eta_4\gamma_6$	γ_{24}
Aug	0	0	0	0	0	0	4	$4\eta_1$	$4\gamma_9$	$4\eta_2\gamma_9$	γ_{15}	$\eta_3\gamma_{15}$	0	γ_7	γ_6	$\eta_4\gamma_6$	γ_{24}
Sept	0	0	0	0	0	0	4	$4\eta_1$	$4\gamma_9$	$4\eta_2\gamma_9$	γ_{15}	$\eta_3\gamma_{15}$	0	γ_7	0	0	0
Age 10 – male																	
Apr	0	2	0	0	0	0	4	$4\eta_1$	$4\gamma_9$	$4\eta_2\gamma_9$	$2\gamma_{15}$	$2\eta_3\gamma_{15}$	0	γ_7	γ_6	$\eta_4\gamma_6$	γ_{24}
May	0	1	0	0	0	0	4	$4\eta_1$	$4\gamma_9$	$4\eta_2\gamma_9$	$3\gamma_{15}$	$3\eta_3\gamma_{15}$	0	γ_7	γ_6	$\eta_4\gamma_6$	γ_{24}
Jun	0	0	0	0	0	0	4	$4\eta_1$	$4\gamma_9$	$4\eta_2\gamma_9$	$4\gamma_{15}$	$4\eta_3\gamma_{15}$	0	γ_7	γ_6	$\eta_4\gamma_6$	γ_{24}
Jul	0	0	0	0	0	0	4	$4\eta_1$	$4\gamma_9$	$4\eta_2\gamma_9$	$4\gamma_{15}$	$4\eta_3\gamma_{15}$	0	γ_7	γ_6	$\eta_4\gamma_6$	γ_{24}
Aug	0	0	0	0	0	0	4	$4\eta_1$	$4\gamma_9$	$4\eta_2\gamma_9$	$4\gamma_{15}$	$4\eta_3\gamma_{15}$	0	γ_7	γ_6	$\eta_4\gamma_6$	γ_{24}
Sept	0	0	0	0	0	0	4	$4\eta_1$	$4\gamma_9$	$4\eta_2\gamma_9$	$3\gamma_{15}$	$3\eta_3\gamma_{15}$	0	γ_7	γ_6	$\eta_4\gamma_6$	γ_{24}
Age 10 – female																	
Apr	0	2	0	0	0	0	4	$4\eta_1$	$4\gamma_9$	$4\eta_2\gamma_9$	$2\gamma_{15}$	$2\eta_3\gamma_{15}$	0	$2\gamma_7$	$2\gamma_6$	$2\eta_4\gamma_6$	$2\gamma_{24}$
May	0	1	0	0	0	0	2	$2\eta_1$	$2\gamma_9$	$2\eta_2\gamma_9$	γ_{15}	$\eta_3\gamma_{15}$	0	$2\gamma_7$	$3\gamma_6$	$3\eta_4\gamma_6$	$3\gamma_{24}$
Jun	0	0	0	0	0	0	1	η_1	γ_9	$\eta_2\gamma_9$	γ_{15}	$\eta_3\gamma_{15}$	0	$2\gamma_7$	$3\gamma_6$	$3\eta_4\gamma_6$	$3\gamma_{24}$
Jul	0	0	0	0	0	0	1	η_1	γ_9	$\eta_2\gamma_9$	γ_{15}	$\eta_3\gamma_{15}$	0	$2\gamma_7$	$3\gamma_6$	$3\eta_4\gamma_6$	$3\gamma_{24}$
Aug	0	0	0	0	0	0	1	η_1	γ_9	$\eta_2\gamma_9$	γ_{15}	$\eta_3\gamma_{15}$	0	$2\gamma_7$	$2\gamma_6$	$2\eta_4\gamma_6$	$2\gamma_{24}$
Sept	0	0	0	0	0	0	1	η_1	γ_9	$\eta_2\gamma_9$	γ_{15}	$\eta_3\gamma_{15}$	0	γ_7	γ_6	$\eta_4\gamma_6$	γ_{24}

Matrix G: 'O' Stock used in Baseline B (2 stock model, in all years)

Month /Age-class	1	2	3	4	5	6	7W	7E	8W	8E	9W	9E	10	11	12SW	12NE	13
Age 4																	
Apr	0	2	1	1	0	0	4	$4\eta_1$	$4\gamma_9$	$4\eta_2\gamma_9$	γ_{15}	$\eta_3\gamma_{15}$	0	γ_7	0	0	0
May	0	1	1	1	0	0	4	$4\eta_1$	$4\gamma_9$	$4\eta_2\gamma_9$	γ_{15}	$\eta_3\gamma_{15}$	0	γ_7	γ_6	$\eta_4\gamma_6$	0
Jun	0	0	1	1	0	0	4	$4\eta_1$	$4\gamma_9$	$4\eta_2\gamma_9$	γ_{15}	$\eta_3\gamma_{15}$	0	γ_7	γ_6	$\eta_4\gamma_6$	0
Jul	0	0	1	1	0	0	4	$4\eta_1$	$4\gamma_9$	$4\eta_2\gamma_9$	γ_{15}	$\eta_3\gamma_{15}$	0	γ_7	γ_6	$\eta_4\gamma_6$	0
Aug	0	0	1	1	0	0	4	$4\eta_1$	$4\gamma_9$	$4\eta_2\gamma_9$	γ_{15}	$\eta_3\gamma_{15}$	0	γ_7	γ_6	$\eta_4\gamma_6$	0
Sept	0	0	1	1	0	0	4	$4\eta_1$	$4\gamma_9$	$4\eta_2\gamma_9$	γ_{15}	$\eta_3\gamma_{15}$	0	γ_7	0	0	0
Age 10 – male																	
Apr	0	2	2	2	0	0	4	$4\eta_1$	$4\gamma_9$	$4\eta_2\gamma_9$	$2\gamma_{15}$	$2\eta_3\gamma_{15}$	0	γ_7	γ_6	$\eta_4\gamma_6$	0
May	0	1	1	1	0	0	4	$4\eta_1$	$4\gamma_9$	$4\eta_2\gamma_9$	$3\gamma_{15}$	$3\eta_3\gamma_{15}$	0	γ_7	γ_6	$\eta_4\gamma_6$	0
Jun	0	0	0	0	0	0	4	$4\eta_1$	$4\gamma_9$	$4\eta_2\gamma_9$	$4\gamma_{15}$	$4\eta_3\gamma_{15}$	0	γ_7	γ_6	$\eta_4\gamma_6$	0
Jul	0	0	0	0	0	0	4	$4\eta_1$	$4\gamma_9$	$4\eta_2\gamma_9$	$4\gamma_{15}$	$4\eta_3\gamma_{15}$	0	γ_7	γ_6	$\eta_4\gamma_6$	0
Aug	0	0	0	0	0	0	4	$4\eta_1$	$4\gamma_9$	$4\eta_2\gamma_9$	$4\gamma_{15}$	$4\eta_3\gamma_{15}$	0	γ_7	γ_6	$\eta_4\gamma_6$	0
Sept	0	0	0	0	0	0	4	$4\eta_1$	$4\gamma_9$	$4\eta_2\gamma_9$	$3\gamma_{15}$	$3\eta_3\gamma_{15}$	0	γ_7	γ_6	$\eta_4\gamma_6$	0
Age 10 – female																	
Apr	0	2	2	2	0	0	4	$4\eta_1$	$4\gamma_9$	$4\eta_2\gamma_9$	$2\gamma_{15}$	$2\eta_3\gamma_{15}$	0	$2\gamma_7$	$2\gamma_6$	$2\eta_4\gamma_6$	0
May	0	1	1	1	0	0	2	$2\eta_1$	$2\gamma_9$	$2\eta_2\gamma_9$	γ_{15}	$\eta_3\gamma_{15}$	0	$2\gamma_7$	$3\gamma_6$	$3\eta_4\gamma_6$	0
Jun	0	0	0	0	0	0	1	η_1	γ_9	$\eta_2\gamma_9$	γ_{15}	$\eta_3\gamma_{15}$	0	$2\gamma_7$	$3\gamma_6$	$3\eta_4\gamma_6$	0
Jul	0	0	0	0	0	0	1	η_1	γ_9	$\eta_2\gamma_9$	γ_{15}	$\eta_3\gamma_{15}$	0	$2\gamma_7$	$3\gamma_6$	$3\eta_4\gamma_6$	0
Aug	0	0	0	0	0	0	1	η_1	γ_9	$\eta_2\gamma_9$	γ_{15}	$\eta_3\gamma_{15}$	0	$2\gamma_7$	$2\gamma_6$	$2\eta_4\gamma_6$	0
Sept	0	0	0	0	0	0	1	η_1	γ_9	$\eta_2\gamma_9$	γ_{15}	$\eta_3\gamma_{15}$	0	γ_7	γ_6	$\eta_4\gamma_6$	0

Matrix H: 'O' Stock. As matrix F but allowing 'O' stock into sub-area 10 (Sensitivity trial 9, all years) $\gamma_{21}=\frac{1}{2}\gamma_7$

Month /Age-class	1	2	3	4	5	6	7W	7E	8W	8E	9W	9E	10	11	12SW	12NE	13
Age 4																	
Apr	0	2	0	0	0	0	4	$4\eta_1$	$4\gamma_9$	$4\eta_2\gamma_9$	γ_{15}	$\eta_3\gamma_{15}$	0	γ_7	0	0	0
May	0	1	0	0	0	0	4	$4\eta_1$	$4\gamma_9$	$4\eta_2\gamma_9$	γ_{15}	$\eta_3\gamma_{15}$	γ_{21}	γ_7	γ_6	$\eta_4\gamma_6$	0
Jun	0	0	0	0	0	0	4	$4\eta_1$	$4\gamma_9$	$4\eta_2\gamma_9$	γ_{15}	$\eta_3\gamma_{15}$	γ_{21}	γ_7	γ_6	$\eta_4\gamma_6$	0
Jul	0	0	0	0	0	0	4	$4\eta_1$	$4\gamma_9$	$4\eta_2\gamma_9$	γ_{15}	$\eta_3\gamma_{15}$	γ_{21}	γ_7	γ_6	$\eta_4\gamma_6$	0
Aug	0	0	0	0	0	0	4	$4\eta_1$	$4\gamma_9$	$4\eta_2\gamma_9$	γ_{15}	$\eta_3\gamma_{15}$	0	γ_7	γ_6	$\eta_4\gamma_6$	0
Sept	0	0	0	0	0	0	4	$4\eta_1$	$4\gamma_9$	$4\eta_2\gamma_9$	γ_{15}	$\eta_3\gamma_{15}$	0	γ_7	0	0	0
Age 10 – male																	
Apr	0	2	0	0	0	0	4	$4\eta_1$	$4\gamma_9$	$4\eta_2\gamma_9$	$2\gamma_{15}$	$2\eta_3\gamma_{15}$	0	γ_7	γ_6	$\eta_4\gamma_6$	0
May	0	1	0	0	0	0	4	$4\eta_1$	$4\gamma_9$	$4\eta_2\gamma_9$	$3\gamma_{15}$	$3\eta_3\gamma_{15}$	γ_{21}	γ_7	γ_6	$\eta_4\gamma_6$	0
Jun	0	0	0	0	0	0	4	$4\eta_1$	$4\gamma_9$	$4\eta_2\gamma_9$	$4\gamma_{15}$	$4\eta_3\gamma_{15}$	γ_{21}	γ_7	γ_6	$\eta_4\gamma_6$	0
Jul	0	0	0	0	0	0	4	$4\eta_1$	$4\gamma_9$	$4\eta_2\gamma_9$	$4\gamma_{15}$	$4\eta_3\gamma_{15}$	γ_{21}	γ_7	γ_6	$\eta_4\gamma_6$	0
Aug	0	0	0	0	0	0	4	$4\eta_1$	$4\gamma_9$	$4\eta_2\gamma_9$	$4\gamma_{15}$	$4\eta_3\gamma_{15}$	0	γ_7	γ_6	$\eta_4\gamma_6$	0
Sept	0	0	0	0	0	0	4	$4\eta_1$	$4\gamma_9$	$4\eta_2\gamma_9$	$3\gamma_{15}$	$3\eta_3\gamma_{15}$	0	γ_7	γ_6	$\eta_4\gamma_6$	0
Age 10 – female																	
Apr	0	2	0	0	0	0	4	$4\eta_1$	$4\gamma_9$	$4\eta_2\gamma_9$	$2\gamma_{15}$	$2\eta_3\gamma_{15}$	0	$2\gamma_7$	$2\gamma_6$	$2\eta_4\gamma_6$	0
May	0	1	0	0	0	0	2	$2\eta_1$	$2\gamma_9$	$2\eta_2\gamma_9$	γ_{15}	$\eta_3\gamma_{15}$	$2\gamma_{21}$	$2\gamma_7$	$3\gamma_6$	$3\eta_4\gamma_6$	0
Jun	0	0	0	0	0	0	1	η_1	γ_9	$\eta_2\gamma_9$	γ_{15}	$\eta_3\gamma_{15}$	$2\gamma_{21}$	$2\gamma_7$	$3\gamma_6$	$3\eta_4\gamma_6$	0
Jul	0	0	0	0	0	0	1	η_1	γ_9	$\eta_2\gamma_9$	γ_{15}	$\eta_3\gamma_{15}$	$2\gamma_{21}$	$2\gamma_7$	$3\gamma_6$	$3\eta_4\gamma_6$	0
Aug	0	0	0	0	0	0	1	η_1	γ_9	$\eta_2\gamma_9$	γ_{15}	$\eta_3\gamma_{15}$	0	$2\gamma_7$	$2\gamma_6$	$2\eta_4\gamma_6$	0
Sept	0	0	0	0	0	0	1	η_1	γ_9	$\eta_2\gamma_9$	γ_{15}	$\eta_3\gamma_{15}$	0	γ_7	γ_6	$\eta_4\gamma_6$	0

Matrix C: 'Ow' Stock used in Baseline C (all years)

Month /Age-class	1	2	3	4	5	6	7W	7E	8W	8E	9W	9E	10	11	12SW	12NE	13
Age 4																	
Apr	0	2	0	0	0	0	4	0	0	0	0	0	0	γ_7	0	0	0
May	0	1	0	0	0	0	4	0	0	0	0	0	0	γ_7	γ_6	γ_{24}	0
Jun	0	0	0	0	0	0	4	0	0	0	0	0	0	γ_7	γ_6	γ_{24}	0
Jul	0	0	0	0	0	0	4	0	0	0	0	0	0	γ_7	γ_6	γ_{24}	0
Aug	0	0	0	0	0	0	4	0	0	0	0	0	0	γ_7	γ_6	γ_{24}	0
Sept	0	0	0	0	0	0	4	0	0	0	0	0	0	γ_7	0	0	0
Age 10 – male																	
Apr	0	2	0	0	0	0	4	0	0	0	0	0	0	γ_7	γ_6	γ_{24}	0
May	0	1	0	0	0	0	4	0	0	0	0	0	0	γ_7	γ_6	γ_{24}	0
Jun	0	0	0	0	0	0	4	0	0	0	0	0	0	γ_7	γ_6	γ_{24}	0
Jul	0	0	0	0	0	0	4	0	0	0	0	0	0	γ_7	γ_6	γ_{24}	0
Aug	0	0	0	0	0	0	4	0	0	0	0	0	0	γ_7	γ_6	γ_{24}	0
Sept	0	0	0	0	0	0	4	0	0	0	0	0	0	γ_7	0	0	0
Age 10 – female																	
Apr	0	2	0	0	0	0	4	0	0	0	0	0	0	$2\gamma_7$	$2\gamma_6$	$2\gamma_{24}$	0
May	0	1	0	0	0	0	2	0	0	0	0	0	0	$2\gamma_7$	$3\gamma_6$	$3\gamma_{24}$	0
Jun	0	0	0	0	0	0	1	0	0	0	0	0	0	$2\gamma_7$	$3\gamma_6$	$3\gamma_{24}$	0
Jul	0	0	0	0	0	0	1	0	0	0	0	0	0	$2\gamma_7$	$3\gamma_6$	$3\gamma_{24}$	0
Aug	0	0	0	0	0	0	1	0	0	0	0	0	0	$2\gamma_7$	$2\gamma_6$	$2\gamma_{24}$	0
Sept	0	0	0	0	0	0	1	0	0	0	0	0	0	γ_7	γ_6	γ_{24}	0

Cont.

Matrix D : ‘O_E’ Stock used in Baseline C (all years)

Month /Age-class	1	2	3	4	5	6	7W	7E	8W	8E	9W	9E	10	11	12SW	12NE	13
Age 4																	
Apr	0	2	4	0	0	0	0	4	$4\gamma_9$	$4\eta_2\gamma_9$	0	0	0	γ_{25}	0	0	0
May	0	1	2	0	0	0	0	4	$4\gamma_9$	$4\eta_2\gamma_9$	0	0	0	γ_{25}	γ_{26}	γ_{29}	0
Jun	0	0	0	0	0	0	0	4	$4\gamma_9$	$4\eta_2\gamma_9$	0	0	0	γ_{25}	γ_{26}	γ_{29}	0
Jul	0	0	0	0	0	0	0	4	$4\gamma_9$	$4\eta_2\gamma_9$	0	0	0	γ_{25}	γ_{26}	γ_{29}	0
Aug	0	0	0	0	0	0	0	4	$4\gamma_9$	$4\eta_2\gamma_9$	0	0	0	γ_{25}	γ_{26}	γ_{29}	0
Sept	0	0	0	0	0	0	0	4	$4\gamma_9$	$4\eta_2\gamma_9$	0	0	0	γ_{25}	0	0	0
Age 10 – male																	
Apr	0	2	4	0	0	0	0	4	$4\gamma_9$	$4\eta_2\gamma_9$	0	0	0	γ_{25}	γ_{26}	γ_{29}	0
May	0	1	2	0	0	0	0	4	$4\gamma_9$	$4\eta_2\gamma_9$	0	0	0	γ_{25}	γ_{26}	γ_{29}	0
Jun	0	0	0	0	0	0	0	4	$4\gamma_9$	$4\eta_2\gamma_9$	0	0	0	γ_{25}	γ_{26}	γ_{29}	0
Jul	0	0	0	0	0	0	0	4	$4\gamma_9$	$4\eta_2\gamma_9$	0	0	0	γ_{25}	γ_{26}	γ_{29}	0
Aug	0	0	0	0	0	0	0	4	$4\gamma_9$	$4\eta_2\gamma_9$	0	0	0	γ_{25}	γ_{26}	γ_{29}	0
Sept	0	0	0	0	0	0	0	4	$4\gamma_9$	$4\eta_2\gamma_9$	0	0	0	γ_{25}	γ_{26}	γ_{29}	0
Age 10 – female																	
Apr	0	2	4	0	0	0	0	4	$4\gamma_9$	$4\eta_2\gamma_9$	0	0	0	$2\gamma_{25}$	$2\gamma_{26}$	$2\gamma_{29}$	0
May	0	1	2	0	0	0	0	2	$2\gamma_9$	$2\eta_2\gamma_9$	0	0	0	$2\gamma_{25}$	$3\gamma_{26}$	$3\gamma_{29}$	0
Jun	0	0	0	0	0	0	0	1	γ_9	$\eta_2\gamma_9$	0	0	0	$2\gamma_{25}$	$3\gamma_{26}$	$3\gamma_{29}$	0
Jul	0	0	0	0	0	0	0	1	γ_9	$\eta_2\gamma_9$	0	0	0	$2\gamma_{25}$	$3\gamma_{26}$	$3\gamma_{29}$	0
Aug	0	0	0	0	0	0	0	1	γ_9	$\eta_2\gamma_9$	0	0	0	$2\gamma_{25}$	$2\gamma_{26}$	$2\gamma_{29}$	0
Sept	0	0	0	0	0	0	0	1	γ_9	$\eta_2\gamma_9$	0	0	0	γ_{25}	γ_{26}	γ_{29}	0

Matrix C$_3$: ‘O_w’ Stock used in Baseline C sensitivity trials 17+18: O_W stock boundary moved from 147º to 153º (all years)

Month/ Age-class	1	2	3	4	5	6	7W	7E	8W	8E	9W	9E	10	11	12SW	12NE	13
Age 4																	
Apr	0	2	0	0	0	0	4	$\mathbf{4\eta_1}$	$\mathbf{4\eta_5}$	0	0	0	0	γ_7	0	0	0
May	0	1	0	0	0	0	4	$\mathbf{4\eta_1}$	$\mathbf{4\eta_5}$	0	0	0	0	γ_7	γ_6	γ_{24}	0
Jun	0	0	0	0	0	0	4	$\mathbf{4\eta_1}$	$\mathbf{4\eta_5}$	0	0	0	0	γ_7	γ_6	γ_{24}	0
Jul	0	0	0	0	0	0	4	$\mathbf{4\eta_1}$	$\mathbf{4\eta_5}$	0	0	0	0	γ_7	γ_6	γ_{24}	0
Aug	0	0	0	0	0	0	4	$\mathbf{4\eta_1}$	$\mathbf{4\eta_5}$	0	0	0	0	γ_7	γ_6	γ_{24}	0
Sept	0	0	0	0	0	0	4	$\mathbf{4\eta_1}$	$\mathbf{4\eta_5}$	0	0	0	0	γ_7	0	0	0
Age 10 – male																	
Apr	0	2	0	0	0	0	4	$\mathbf{4\eta_1}$	$\mathbf{4\eta_5}$	0	0	0	0	γ_7	γ_6	γ_{24}	0
May	0	1	0	0	0	0	4	$\mathbf{4\eta_1}$	$\mathbf{4\eta_5}$	0	0	0	0	γ_7	γ_6	γ_{24}	0
Jun	0	0	0	0	0	0	4	$\mathbf{4\eta_1}$	$\mathbf{4\eta_5}$	0	0	0	0	γ_7	γ_6	γ_{24}	0
Jul	0	0	0	0	0	0	4	$\mathbf{4\eta_1}$	$\mathbf{4\eta_5}$	0	0	0	0	γ_7	γ_6	γ_{24}	0
Aug	0	0	0	0	0	0	4	$\mathbf{4\eta_1}$	$\mathbf{4\eta_5}$	0	0	0	0	γ_7	γ_6	γ_{24}	0
Sept	0	0	0	0	0	0	4	$\mathbf{4\eta_1}$	$\mathbf{4\eta_5}$	0	0	0	0	γ_7	γ_6	γ_{24}	0
Age 10 – female																	
Apr	0	2	0	0	0	0	4	$\mathbf{4\eta_1}$	$\mathbf{4\eta_5}$	0	0	0	0	$2\gamma_7$	$2\gamma_6$	$2\gamma_{24}$	0
May	0	1	0	0	0	0	2	$\mathbf{2\eta_1}$	$\mathbf{2\eta_5}$	0	0	0	0	$2\gamma_7$	$3\gamma_6$	$3\gamma_{24}$	0
Jun	0	0	0	0	0	0	1	$\mathbf{\eta_1}$	$\mathbf{\eta_5}$	0	0	0	0	$2\gamma_7$	$3\gamma_6$	$3\gamma_{24}$	0
Jul	0	0	0	0	0	0	1	$\mathbf{\eta_1}$	$\mathbf{\eta_5}$	0	0	0	0	$2\gamma_7$	$3\gamma_6$	$3\gamma_{24}$	0
Aug	0	0	0	0	0	0	1	$\mathbf{\eta_1}$	$\mathbf{\eta_5}$	0	0	0	0	$2\gamma_7$	$2\gamma_6$	$2\gamma_{24}$	0
Sept	0	0	0	0	0	0	1	$\mathbf{\eta_1}$	$\mathbf{\eta_5}$	0	0	0	0	γ_7	γ_6	γ_{24}	0

Matrix E: ‘W’ Stock used in Baseline C (all years)

Month /Age-class	1	2	3	4	5	6	7W	7E	8W	8E	9W	9E	10	11	12SW	12NE	13
Age 4																	
Apr	0	0	0	1	0	0	0	0	0	0	1	η_3	0	0	0	0	0
May	0	0	0	1	0	0	0	0	0	0	1	η_3	0	0	0	0	0
Jun	0	0	0	1	0	0	0	0	0	0	1	η_3	0	0	0	0	0
Jul	0	0	0	1	0	0	0	0	0	0	1	η_3	0	0	0	0	0
Aug	0	0	0	1	0	0	0	0	0	0	1	η_3	0	0	0	0	0
Sept	0	0	0	1	0	0	0	0	0	0	1	η_3	0	0	0	0	0
Age 10 – male																	
Apr	0	0	0	2	0	0	0	0	0	0	2	$2\eta_3$	0	0	0	γ_{10}	0
May	0	0	0	1	0	0	0	0	0	0	3	$3\eta_3$	0	0	0	γ_{10}	0
Jun	0	0	0	0	0	0	0	0	0	0	4	$4\eta_3$	0	0	0	$2\gamma_{10}$	0
Jul	0	0	0	0	0	0	0	0	0	0	4	$4\eta_3$	0	0	0	$2\gamma_{10}$	0
Aug	0	0	0	0	0	0	0	0	0	0	4	$4\eta_3$	0	0	0	γ_{10}	0
Sept	0	0	0	0	0	0	0	0	0	0	3	$3\eta_3$	0	0	0	γ_{10}	0
Age 10 – female																	
Apr	0	0	0	2	0	0	0	0	0	0	2	$2\eta_3$	0	0	0	γ_{10}	0
May	0	0	0	1	0	0	0	0	0	0	1	η_3	0	0	0	$2\gamma_{10}$	0
Jun	0	0	0	0	0	0	0	0	0	0	1	η_3	0	0	0	$2\gamma_{10}$	0
Jul	0	0	0	0	0	0	0	0	0	0	1	η_3	0	0	0	$3\gamma_{10}$	0
Aug	0	0	0	0	0	0	0	0	0	0	1	η_3	0	0	0	$3\gamma_{10}$	0
Sept	0	0	0	0	0	0	0	0	0	0	1	η_3	0	0	0	$2\gamma_{10}$	0

Matrix D$_2$: ‘O_E’ Stock used in Baseline C sensitivity trial 16: No O_E animals in 11 or 12SW (all years)

Month/ Age-class	1	2	3	4	5	6	7W	7E	8W	8E	9W	9E	10	11	12SW	12NE	13
Age 4																	
Apr	0	2	4	0	0	0	0	4	$4\gamma_9$	$4\eta_2\gamma_9$	0	0	0	**0**	**0**	0	0
May	0	1	2	0	0	0	0	4	$4\gamma_9$	$4\eta_2\gamma_9$	0	0	0	**0**	**0**	γ_{29}	0
Jun	0	0	0	0	0	0	0	4	$4\gamma_9$	$4\eta_2\gamma_9$	0	0	0	**0**	**0**	γ_{29}	0
Jul	0	0	0	0	0	0	0	4	$4\gamma_9$	$4\eta_2\gamma_9$	0	0	0	**0**	**0**	γ_{29}	0
Aug	0	0	0	0	0	0	0	4	$4\gamma_9$	$4\eta_2\gamma_9$	0	0	0	**0**	**0**	γ_{29}	0
Sept	0	0	0	0	0	0	0	4	$4\gamma_9$	$4\eta_2\gamma_9$	0	0	0	**0**	**0**	0	0
Age 10 – male																	
Apr	0	2	4	0	0	0	0	4	$4\gamma_9$	$4\eta_2\gamma_9$	0	0	0	**0**	**0**	γ_{29}	0
May	0	1	2	0	0	0	0	4	$4\gamma_9$	$4\eta_2\gamma_9$	0	0	0	**0**	**0**	γ_{29}	0
Jun	0	0	0	0	0	0	0	4	$4\gamma_9$	$4\eta_2\gamma_9$	0	0	0	**0**	**0**	γ_{29}	0
Jul	0	0	0	0	0	0	0	4	$4\gamma_9$	$4\eta_2\gamma_9$	0	0	0	**0**	**0**	γ_{29}	0
Aug	0	0	0	0	0	0	0	4	$4\gamma_9$	$4\eta_2\gamma_9$	0	0	0	**0**	**0**	γ_{29}	0
Sept	0	0	0	0	0	0	0	4	$4\gamma_9$	$4\eta_2\gamma_9$	0	0	0	**0**	**0**	γ_{29}	0
Age 10 – female																	
Apr	0	2	4	0	0	0	0	4	$4\gamma_9$	$4\eta_2\gamma_9$	0	0	0	**0**	**0**	$2\gamma_{29}$	0
May	0	1	2	0	0	0	0	2	$2\gamma_9$	$2\eta_2\gamma_9$	0	0	0	**0**	**0**	$3\gamma_{29}$	0
Jun	0	0	0	0	0	0	0	1	γ_9	$\eta_2\gamma_9$	0	0	0	**0**	**0**	$3\gamma_{29}$	0
Jul	0	0	0	0	0	0	0	1	γ_9	$\eta_2\gamma_9$	0	0	0	**0**	**0**	$3\gamma_{29}$	0
Aug	0	0	0	0	0	0	0	1	γ_9	$\eta_2\gamma_9$	0	0	0	**0**	**0**	$2\gamma_{29}$	0
Sept	0	0	0	0	0	0	0	1	γ_9	$\eta_2\gamma_9$	0	0	0	**0**	**0**	γ_{29}	0

Matrix C$_2$: ‘O_w’ Stock used in Baseline C sensitivity trial 9: some ‘O_w’ animals in sub-area 10. (50% of years) $\gamma_{21}=\frac{1}{2}\gamma_7$

Month /Age-class	1	2	3	4	5	6	7W	7E	8W	8E	9W	9E	10	11	12SW	12NE	13
Age 4																	
Apr	0	2	0	0	0	0	4	0	0	0	0	0	0	γ_7	0	0	0
May	0	1	0	0	0	0	4	0	0	0	0	0	$\mathbf{\gamma_{21}}$	γ_7	γ_6	γ_{24}	0
Jun	0	0	0	0	0	0	4	0	0	0	0	0	$\mathbf{\gamma_{21}}$	γ_7	γ_6	γ_{24}	0
Jul	0	0	0	0	0	0	4	0	0	0	0	0	$\mathbf{\gamma_{21}}$	γ_7	γ_6	γ_{24}	0
Aug	0	0	0	0	0	0	4	0	0	0	0	0	0	γ_7	γ_6	γ_{24}	0
Sept	0	0	0	0	0	0	4	0	0	0	0	0	0	γ_7	0	0	0
Age 10 – male																	
Apr	0	2	0	0	0	0	4	0	0	0	0	0	0	γ_7	γ_6	γ_{24}	0
May	0	1	0	0	0	0	4	0	0	0	0	0	$\mathbf{\gamma_{21}}$	γ_7	γ_6	γ_{24}	0
Jun	0	0	0	0	0	0	4	0	0	0	0	0	$\mathbf{\gamma_{21}}$	γ_7	γ_6	γ_{24}	0
Jul	0	0	0	0	0	0	4	0	0	0	0	0	$\mathbf{\gamma_{21}}$	γ_7	γ_6	γ_{24}	0
Aug	0	0	0	0	0	0	4	0	0	0	0	0	0	γ_7	γ_6	γ_{24}	0
Sept	0	0	0	0	0	0	4	0	0	0	0	0	0	γ_7	γ_6	γ_{24}	0
Age 10 – female																	
Apr	0	2	0	0	0	0	4	0	0	0	0	0	0	$2\gamma_7$	$2\gamma_6$	$2\gamma_{24}$	0
May	0	1	0	0	0	0	2	0	0	0	0	0	$\mathbf{2\gamma_{21}}$	$2\gamma_7$	$3\gamma_6$	$3\gamma_{24}$	0
Jun	0	0	0	0	0	0	1	0	0	0	0	0	$\mathbf{2\gamma_{21}}$	$2\gamma_7$	$3\gamma_6$	$3\gamma_{24}$	0
Jul	0	0	0	0	0	0	1	0	0	0	0	0	$\mathbf{2\gamma_{21}}$	$2\gamma_7$	$3\gamma_6$	$3\gamma_{24}$	0
Aug	0	0	0	0	0	0	1	0	0	0	0	0	0	$2\gamma_7$	$2\gamma_6$	$2\gamma_{24}$	0
Sept	0	0	0	0	0	0	1	0	0	0	0	0	0	γ_7	γ_6	γ_{24}	0

Matrix D$_3$: ‘O_E’ Stock used in Baseline C sensitivity trial 17: O_W and O_E stock boundary is moved to 153º (all years)

Month /Age-class	1	2	3	4	5	6	7W	7E	8W	8E	9W	9E	10	11	12SW	12NE	13
Age 4																	
Apr	0	2	4	0	0	0	0	**0**	**0**	$4\gamma_9$	0	0	0	**0**	**0**	0	0
May	0	1	2	0	0	0	0	**0**	**0**	$4\gamma_9$	0	0	0	**0**	**0**	γ_{29}	0
Jun	0	0	0	0	0	0	0	**0**	**0**	$4\gamma_9$	0	0	0	**0**	**0**	γ_{29}	0
Jul	0	0	0	0	0	0	0	**0**	**0**	$4\gamma_9$	0	0	0	**0**	**0**	γ_{29}	0
Aug	0	0	0	0	0	0	0	**0**	**0**	$4\gamma_9$	0	0	0	**0**	**0**	γ_{29}	0
Sept	0	0	0	0	0	0	0	**0**	**0**	$4\gamma_9$	0	0	0	**0**	**0**	0	0
Age 10 – male																	
Apr	0	2	4	0	0	0	0	**0**	**0**	$4\gamma_9$	0	0	0	**0**	**0**	γ_{29}	0
May	0	1	2	0	0	0	0	**0**	**0**	$4\gamma_9$	0	0	0	**0**	**0**	γ_{29}	0
Jun	0	0	0	0	0	0	0	**0**	**0**	$4\gamma_9$	0	0	0	**0**	**0**	γ_{29}	0
Jul	0	0	0	0	0	0	0	**0**	**0**	$4\gamma_9$	0	0	0	**0**	**0**	γ_{29}	0
Aug	0	0	0	0	0	0	0	**0**	**0**	$4\gamma_9$	0	0	0	**0**	**0**	γ_{29}	0
Sept	0	0	0	0	0	0	0	**0**	**0**	$4\gamma_9$	0	0	0	**0**	**0**	γ_{29}	0
Age 10 – female																	
Apr	0	2	4	0	0	0	0	**0**	**0**	$4\gamma_9$	0	0	0	**0**	**0**	$2\gamma_{29}$	0
May	0	1	2	0	0	0	0	**0**	**0**	$2\gamma_9$	0	0	0	**0**	**0**	$3\gamma_{29}$	0
Jun	0	0	0	0	0	0	0	**0**	**0**	γ_9	0	0	0	**0**	**0**	$3\gamma_{29}$	0
Jul	0	0	0	0	0	0	0	**0**	**0**	γ_9	0	0	0	**0**	**0**	$3\gamma_{29}$	0
Aug	0	0	0	0	0	0	0	**0**	**0**	γ_9	0	0	0	**0**	**0**	$2\gamma_{29}$	0
Sept	0	0	0	0	0	0	0	**0**	**0**	γ_9	0	0	0	**0**	**0**	γ_{29}	0

Cont.

Matrix D_4 : 'O$_E$' Stock used in Baseline C sensitivity trial 19: 'W' stock in 9W only and 'O$_E$' only in 9E (all years)

Month /Age-class	1	2	3	4	5	6	7W	7E	8W	8E	9W	9E	10	11	12SW	12NE	13
Age 4																	
Apr	0	2	4	0	0	0	0	4	$4\gamma_9$	$4\eta_2\gamma_9$	**0**	$\mathbf{4\gamma_{30}}$	0	γ_{25}	0	0	0
May	0	1	2	0	0	0	0	4	$4\gamma_9$	$4\eta_2\gamma_9$	**0**	$\mathbf{4\gamma_{30}}$	0	γ_{25}	γ_{26}	γ_{29}	0
Jun	0	0	0	0	0	0	0	4	$4\gamma_9$	$4\eta_2\gamma_9$	**0**	$\mathbf{4\gamma_{30}}$	0	γ_{25}	γ_{26}	γ_{29}	0
Jul	0	0	0	0	0	0	0	4	$4\gamma_9$	$4\eta_2\gamma_9$	**0**	$\mathbf{4\gamma_{30}}$	0	γ_{25}	γ_{26}	γ_{29}	0
Aug	0	0	0	0	0	0	0	4	$4\gamma_9$	$4\eta_2\gamma_9$	**0**	$\mathbf{4\gamma_{30}}$	0	γ_{25}	γ_{26}	γ_{29}	0
Sept	0	0	0	0	0	0	0	4	$4\gamma_9$	$4\eta_2\gamma_9$	**0**	$\mathbf{4\gamma_{30}}$	0	γ_{25}	0	0	0
Age 10 – male																	
Apr	0	2	4	0	0	0	0	4	$4\gamma_9$	$4\eta_2\gamma_9$	**0**	$\mathbf{4\gamma_{30}}$	0	γ_{25}	γ_{26}	γ_{29}	0
May	0	1	2	0	0	0	0	4	$4\gamma_9$	$4\eta_2\gamma_9$	**0**	$\mathbf{4\gamma_{30}}$	0	γ_{25}	γ_{26}	γ_{29}	0
Jun	0	0	0	0	0	0	0	4	$4\gamma_9$	$4\eta_2\gamma_9$	**0**	$\mathbf{4\gamma_{30}}$	0	γ_{25}	γ_{26}	γ_{29}	0
Jul	0	0	0	0	0	0	0	4	$4\gamma_9$	$4\eta_2\gamma_9$	**0**	$\mathbf{4\gamma_{30}}$	0	γ_{25}	γ_{26}	γ_{29}	0
Aug	0	0	0	0	0	0	0	4	$4\gamma_9$	$4\eta_2\gamma_9$	**0**	$\mathbf{4\gamma_{30}}$	0	γ_{25}	γ_{26}	γ_{29}	0
Sept	0	0	0	0	0	0	0	4	$4\gamma_9$	$4\eta_2\gamma_9$	**0**	$\mathbf{4\gamma_{30}}$	0	γ_{25}	γ_{26}	γ_{29}	0
Age 10 – female																	
Apr	0	2	4	0	0	0	0	4	$4\gamma_9$	$4\eta_2\gamma_9$	**0**	$\mathbf{4\gamma_{30}}$	0	$2\gamma_{25}$	$2\gamma_{26}$	$2\gamma_{29}$	0
May	0	1	2	0	0	0	0	2	$2\gamma_9$	$2\eta_2\gamma_9$	**0**	$\mathbf{2\gamma_{30}}$	0	$2\gamma_{25}$	$3\gamma_{26}$	$3\gamma_{29}$	0
Jun	0	0	0	0	0	0	0	1	γ_9	$\eta_2\gamma_9$	**0**	$\mathbf{\gamma_{30}}$	0	$2\gamma_{25}$	$3\gamma_{26}$	$3\gamma_{29}$	0
Jul	0	0	0	0	0	0	0	1	γ_9	$\eta_2\gamma_9$	**0**	$\mathbf{\gamma_{30}}$	0	$2\gamma_{25}$	$3\gamma_{26}$	$3\gamma_{29}$	0
Aug	0	0	0	0	0	0	0	1	γ_9	$\eta_2\gamma_9$	**0**	$\mathbf{\gamma_{30}}$	0	$2\gamma_{25}$	$2\gamma_{26}$	$2\gamma_{29}$	0
Sept	0	0	0	0	0	0	0	1	γ_9	$\eta_2\gamma_9$	**0**	$\mathbf{\gamma_{30}}$	0	γ_{25}	γ_{26}	γ_{29}	0

Matrix N : 'O' Stock used in Baseline C sensitivity trial 2a: infinite dispersal between O$_W$ and O$_E$ stocks. (all years)

Month/ Age-class	1	2	3	4	5	6	7W	7E	8W	8E	9W	9E	10	11	12SW	12NE	13
Age 4																	
Apr	0	2	4	0	0	0	4	$4\eta_1$	$4\gamma_9$	$4\eta_2\gamma_9$	0	0	0	γ_{25}	0	0	0
May	0	1	2	0	0	0	4	$4\eta_1$	$4\gamma_9$	$4\eta_2\gamma_9$	0	0	0	γ_{25}	γ_{26}	γ_{29}	0
Jun	0	0	0	0	0	0	4	$4\eta_1$	$4\gamma_9$	$4\eta_2\gamma_9$	0	0	0	γ_{25}	γ_{26}	γ_{29}	0
Jul	0	0	0	0	0	0	4	$4\eta_1$	$4\gamma_9$	$4\eta_2\gamma_9$	0	0	0	γ_{25}	γ_{26}	γ_{29}	0
Aug	0	0	0	0	0	0	4	$4\eta_1$	$4\gamma_9$	$4\eta_2\gamma_9$	0	0	0	γ_{25}	γ_{26}	γ_{29}	0
Sept	0	0	0	0	0	0	4	$4\eta_1$	$4\gamma_9$	$4\eta_2\gamma_9$	0	0	0	γ_{25}	0	0	0
Age 10 – male																	
Apr	0	2	4	0	0	0	4	$4\eta_1$	$4\gamma_9$	$4\eta_2\gamma_9$	0	0	0	γ_{25}	γ_{26}	γ_{29}	0
May	0	1	2	0	0	0	4	$4\eta_1$	$4\gamma_9$	$4\eta_2\gamma_9$	0	0	0	γ_{25}	γ_{26}	γ_{29}	0
Jun	0	0	0	0	0	0	4	$4\eta_1$	$4\gamma_9$	$4\eta_2\gamma_9$	0	0	0	γ_{25}	γ_{26}	γ_{29}	0
Jul	0	0	0	0	0	0	4	$4\eta_1$	$4\gamma_9$	$4\eta_2\gamma_9$	0	0	0	γ_{25}	γ_{26}	γ_{29}	0
Aug	0	0	0	0	0	0	4	$4\eta_1$	$4\gamma_9$	$4\eta_2\gamma_9$	0	0	0	γ_{25}	γ_{26}	γ_{29}	0
Sept	0	0	0	0	0	0	4	$4\eta_1$	$4\gamma_9$	$4\eta_2\gamma_9$	0	0	0	γ_{25}	γ_{26}	γ_{29}	0
Age 10 – female																	
Apr	0	2	4	0	0	0	4	$4\eta_1$	$4\gamma_9$	$4\eta_2\gamma_9$	0	0	0	$2\gamma_{25}$	$2\gamma_{26}$	$2\gamma_{29}$	0
May	0	1	2	0	0	0	2	$2\eta_1$	$2\gamma_9$	$2\eta_2\gamma_9$	0	0	0	$2\gamma_{25}$	$3\gamma_{26}$	$3\gamma_{29}$	0
Jun	0	0	0	0	0	0	1	1η	γ_9	$\eta_2\gamma_9$	0	0	0	$2\gamma_{25}$	$3\gamma_{26}$	$3\gamma_{29}$	0
Jul	0	0	0	0	0	0	1	$1\eta_1$	γ_9	$\eta_2\gamma_9$	0	0	0	$2\gamma_{25}$	$3\gamma_{26}$	$3\gamma_{29}$	0
Aug	0	0	0	0	0	0	1	$1\eta_1$	γ_9	$\eta_2\gamma_9$	0	0	0	$2\gamma_{25}$	$2\gamma_{26}$	$2\gamma_{29}$	0
Sept	0	0	0	0	0	0	1	$1\eta_1$	γ_9	$\eta_2\gamma_9$	0	0	0	γ_{25}	γ_{26}	γ_{29}	0

Matrix E_2: 'W' Stock used in Baseline C sensitivity trial 8: 9E animals migrate into 9N (all years)

Month /Age-class	1	2	3	4	5	6	7W	7E	8W	8E	9W	9E	10	11	12SW	12NE	13/9N
Age 4																	
Apr	0	0	0	1	0	0	0	0	0	0	1	η_3	0	0	0	0	0
May	0	0	0	1	0	0	0	0	0	0	1	η_3	0	0	0	0	0
Jun	0	0	0	1	0	0	0	0	0	0	1	η_3	0	0	0	0	0
Jul	0	0	0	1	0	0	0	0	0	0	1	η_3	0	0	0	0	0
Aug	0	0	0	1	0	0	0	0	0	0	1	η_3	0	0	0	0	0
Sept	0	0	0	1	0	0	0	0	0	0	1	η_3	0	0	0	0	0
Age 10 – male																	
Apr	0	0	0	2	0	0	0	0	0	0	2	$2\eta_3$	0	0	0	γ_{10}	$\mathbf{\gamma_{15}}$
May	0	0	0	1	0	0	0	0	0	0	3	$3\eta_3$	0	0	0	γ_{10}	$\mathbf{\gamma_{15}}$
Jun	0	0	0	0	0	0	0	0	0	0	4	$4\eta_3$	0	0	0	$2\gamma_{10}$	$\mathbf{2\gamma_{15}}$
Jul	0	0	0	0	0	0	0	0	0	0	4	$4\eta_3$	0	0	0	$2\gamma_{10}$	$\mathbf{2\gamma_{15}}$
Aug	0	0	0	0	0	0	0	0	0	0	4	$4\eta_3$	0	0	0	γ_{10}	$\mathbf{\gamma_{15}}$
Sept	0	0	0	0	0	0	0	0	0	0	3	$3\eta_3$	0	0	0	γ_{10}	$\mathbf{\gamma_{15}}$
Age 10 – female																	
Apr	0	0	0	2	0	0	0	0	0	0	2	$2\eta_3$	0	0	0	γ_{10}	$\mathbf{\gamma_{15}}$
May	0	0	0	1	0	0	0	0	0	0	1	η_3	0	0	0	$2\gamma_{10}$	$\mathbf{2\gamma_{15}}$
Jun	0	0	0	0	0	0	0	0	0	0	1	η_3	0	0	0	$2\gamma_{10}$	$\mathbf{2\gamma_{15}}$
Jul	0	0	0	0	0	0	0	0	0	0	1	η_3	0	0	0	$3\gamma_{10}$	$\mathbf{3\gamma_{15}}$
Aug	0	0	0	0	0	0	0	0	0	0	1	η_3	0	0	0	$3\gamma_{10}$	$\mathbf{3\gamma_{15}}$
Sept	0	0	0	0	0	0	0	0	0	0	1	η_3	0	0	0	$2\gamma_{10}$	$\mathbf{2\gamma_{15}}$

Matrix I: 'O$_w$' Stock used in sensitivity trial 20 (all years)
γ_{28}= (0.7/0.3) * (1+γ_9+$\eta_2\gamma_9$)

Month /Age-class	1	2	3	4	5	6	7W	7E	8W	8E	9W	9E	10	11	12SW	12NE	13
Age 4																	
Apr	0	2	0	0	0	0	$\mathbf{4\gamma_{28}}$	**4**	$\mathbf{4\gamma_9}$	$\mathbf{4\eta_2\gamma_9}$	0	0	0	γ_7	0	0	0
May	0	1	0	0	0	0	$\mathbf{4\gamma_{28}}$	**4**	$\mathbf{4\gamma_9}$	$\mathbf{4\eta_2\gamma_9}$	0	0	0	γ_7	γ_6	γ_{24}	0
Jun	0	0	0	0	0	0	$\mathbf{4\gamma_{28}}$	**4**	$\mathbf{4\gamma_9}$	$\mathbf{4\eta_2\gamma_9}$	0	0	0	γ_7	γ_6	γ_{24}	0
Jul	0	0	0	0	0	0	$\mathbf{4\gamma_{28}}$	**4**	$\mathbf{4\gamma_9}$	$\mathbf{4\eta_2\gamma_9}$	0	0	0	γ_7	γ_6	γ_{24}	0
Aug	0	0	0	0	0	0	$\mathbf{4\gamma_{28}}$	**4**	$\mathbf{4\gamma_9}$	$\mathbf{4\eta_2\gamma_9}$	0	0	0	γ_7	γ_6	γ_{24}	0
Sept	0	0	0	0	0	0	$\mathbf{4\gamma_{28}}$	**4**	$\mathbf{4\gamma_9}$	$\mathbf{4\eta_2\gamma_9}$	0	0	0	γ_7	0	0	0
Age 10 – male																	
Apr	0	2	0	0	0	0	$\mathbf{4\gamma_{28}}$	**4**	$\mathbf{4\gamma_9}$	$\mathbf{4\eta_2\gamma_9}$	0	0	0	γ_7	γ_6	γ_{24}	0
May	0	1	0	0	0	0	$\mathbf{4\gamma_{28}}$	**4**	$\mathbf{4\gamma_9}$	$\mathbf{4\eta_2\gamma_9}$	0	0	0	γ_7	γ_6	γ_{24}	0
Jun	0	0	0	0	0	0	$\mathbf{4\gamma_{28}}$	**4**	$\mathbf{4\gamma_9}$	$\mathbf{4\eta_2\gamma_9}$	0	0	0	γ_7	γ_6	γ_{24}	0
Jul	0	0	0	0	0	0	$\mathbf{4\gamma_{28}}$	**4**	$\mathbf{4\gamma_9}$	$\mathbf{4\eta_2\gamma_9}$	0	0	0	γ_7	γ_6	γ_{24}	0
Aug	0	0	0	0	0	0	$\mathbf{4\gamma_{28}}$	**4**	$\mathbf{4\gamma_9}$	$\mathbf{4\eta_2\gamma_9}$	0	0	0	γ_7	γ_6	γ_{24}	0
Sept	0	0	0	0	0	0	$\mathbf{4\gamma_{28}}$	**4**	$\mathbf{4\gamma_9}$	$\mathbf{4\eta_2\gamma_9}$	0	0	0	γ_7	γ_6	γ_{24}	0
Age 10 – female																	
Apr	0	2	0	0	0	0	$\mathbf{4\gamma_{28}}$	**4**	$\mathbf{4\gamma_9}$	$\mathbf{4\eta_2\gamma_9}$	0	0	0	$2\gamma_7$	$2\gamma_6$	$2\gamma_{24}$	0
May	0	1	0	0	0	0	$\mathbf{2\gamma_{28}}$	**2**	$\mathbf{2\gamma_9}$	$\mathbf{2\eta_2\gamma_9}$	0	0	0	$2\gamma_7$	$3\gamma_6$	$3\gamma_{24}$	0
Jun	0	0	0	0	0	0	$\mathbf{\gamma_{28}}$	**1**	$\mathbf{\gamma_9}$	$\mathbf{\eta_2\gamma_9}$	0	0	0	$2\gamma_7$	$3\gamma_6$	$3\gamma_{24}$	0
Jul	0	0	0	0	0	0	$\mathbf{\gamma_{28}}$	**1**	$\mathbf{\gamma_9}$	$\mathbf{\eta_2\gamma_9}$	0	0	0	$2\gamma_7$	$3\gamma_6$	$3\gamma_{24}$	0
Aug	0	0	0	0	0	0	$\mathbf{\gamma_{28}}$	**1**	$\mathbf{\gamma_9}$	$\mathbf{\eta_2\gamma_9}$	0	0	0	$2\gamma_7$	$2\gamma_6$	$2\gamma_{24}$	0
Sept	0	0	0	0	0	0	$\mathbf{\gamma_{28}}$	**1**	$\mathbf{\gamma_9}$	$\mathbf{\eta_2\gamma_9}$	0	0	0	γ_7	γ_6	γ_{24}	0

Matrix E_3: 'W' Stock used in Baseline C sensitivity trial 19: 'W' stock in 9W only and 'O$_E$' only in 9E (all years)

Month /Age-class	1	2	3	4	5	6	7W	7E	8W	8E	9W	9E	10	11	12SW	12NE	13
Age 4																	
Apr	0	0	0	1	0	0	0	0	0	0	1	**0**	0	0	0	0	0
May	0	0	0	1	0	0	0	0	0	0	1	**0**	0	0	0	0	0
Jun	0	0	0	1	0	0	0	0	0	0	1	**0**	0	0	0	0	0
Jul	0	0	0	1	0	0	0	0	0	0	1	**0**	0	0	0	0	0
Aug	0	0	0	1	0	0	0	0	0	0	1	**0**	0	0	0	0	0
Sept	0	0	0	1	0	0	0	0	0	0	1	**0**	0	0	0	0	0
Age 10 – male																	
Apr	0	0	0	2	0	0	0	0	0	0	2	**0**	0	0	0	γ_{10}	0
May	0	0	0	1	0	0	0	0	0	0	3	**0**	0	0	0	γ_{10}	0
Jun	0	0	0	0	0	0	0	0	0	0	4	**0**	0	0	0	$2\gamma_{10}$	0
Jul	0	0	0	0	0	0	0	0	0	0	4	**0**	0	0	0	$2\gamma_{10}$	0
Aug	0	0	0	0	0	0	0	0	0	0	4	**0**	0	0	0	γ_{10}	0
Sept	0	0	0	0	0	0	0	0	0	0	3	**0**	0	0	0	γ_{10}	0
Age 10 – female																	
Apr	0	0	0	2	0	0	0	0	0	0	2	**0**	0	0	0	γ_{10}	0
May	0	0	0	1	0	0	0	0	0	0	1	**0**	0	0	0	$2\gamma_{10}$	0
Jun	0	0	0	0	0	0	0	0	0	0	1	**0**	0	0	0	$2\gamma_{10}$	0
Jul	0	0	0	0	0	0	0	0	0	0	1	**0**	0	0	0	$3\gamma_{10}$	0
Aug	0	0	0	0	0	0	0	0	0	0	1	**0**	0	0	0	$3\gamma_{10}$	0
Sept	0	0	0	0	0	0	0	0	0	0	1	**0**	0	0	0	$2\gamma_{10}$	0

Matrix J : 'O$_E$' Stock used in sensitivity trial 20 (all years) where
γ_{27}=(0.3/0.7) * (1+γ_9+$\eta_2\gamma_9$)

Month /Age-class	1	2	3	4	5	6	7W	7E	8W	8E	9W	9E	10	11	12SW	12NE	13
Age 4																	
Apr	0	2	4	0	0	0	$\mathbf{4\gamma_{27}}$	4	$4\gamma_9$	$4\eta_2\gamma_9$	0	0	0	γ_{25}	0	0	0
May	0	1	2	0	0	0	$\mathbf{4\gamma_{27}}$	4	$4\gamma_9$	$4\eta_2\gamma_9$	0	0	0	γ_{25}	γ_{26}	γ_{29}	0
Jun	0	0	0	0	0	0	$\mathbf{4\gamma_{27}}$	4	$4\gamma_9$	$4\eta_2\gamma_9$	0	0	0	γ_{25}	γ_{26}	γ_{29}	0
Jul	0	0	0	0	0	0	$\mathbf{4\gamma_{27}}$	4	$4\gamma_9$	$4\eta_2\gamma_9$	0	0	0	γ_{25}	γ_{26}	γ_{29}	0
Aug	0	0	0	0	0	0	$\mathbf{4\gamma_{27}}$	4	$4\gamma_9$	$4\eta_2\gamma_9$	0	0	0	γ_{25}	γ_{26}	γ_{29}	0
Sept	0	0	0	0	0	0	$\mathbf{4\gamma_{27}}$	4	$4\gamma_9$	$4\eta_2\gamma_9$	0	0	0	γ_{25}	0	0	0
Age 10 – male																	
Apr	0	2	4	0	0	0	$\mathbf{4\gamma_{27}}$	4	$4\gamma_9$	$4\eta_2\gamma_9$	0	0	0	γ_{25}	γ_{26}	γ_{29}	0
May	0	1	2	0	0	0	$\mathbf{4\gamma_{27}}$	4	$4\gamma_9$	$4\eta_2\gamma_9$	0	0	0	γ_{25}	γ_{26}	γ_{29}	0
Jun	0	0	0	0	0	0	$\mathbf{4\gamma_{27}}$	4	$4\gamma_9$	$4\eta_2\gamma_9$	0	0	0	γ_{25}	γ_{26}	γ_{29}	0
Jul	0	0	0	0	0	0	$\mathbf{4\gamma_{27}}$	4	$4\gamma_9$	$4\eta_2\gamma_9$	0	0	0	γ_{25}	γ_{26}	γ_{29}	0
Aug	0	0	0	0	0	0	$\mathbf{4\gamma_{27}}$	4	$4\gamma_9$	$4\eta_2\gamma_9$	0	0	0	γ_{25}	γ_{26}	γ_{29}	0
Sept	0	0	0	0	0	0	$\mathbf{4\gamma_{27}}$	4	$4\gamma_9$	$4\eta_2\gamma_9$	0	0	0	γ_{25}	γ_{26}	γ_{29}	0
Age 10 – female																	
Apr	0	2	4	0	0	0	$\mathbf{4\gamma_{27}}$	4	$4\gamma_9$	$4\eta_2\gamma_9$	0	0	0	$2\gamma_{25}$	$2\gamma_{26}$	$2\gamma_{29}$	0
May	0	1	2	0	0	0	$\mathbf{2\gamma_{27}}$	2	$2\gamma_9$	$2\eta_2\gamma_9$	0	0	0	$2\gamma_{25}$	$3\gamma_{26}$	$3\gamma_{29}$	0
Jun	0	0	0	0	0	0	$\mathbf{\gamma_{27}}$	1	γ_9	$\eta_2\gamma_9$	0	0	0	$2\gamma_{25}$	$3\gamma_{26}$	$3\gamma_{29}$	0
Jul	0	0	0	0	0	0	$\mathbf{\gamma_{27}}$	1	γ_9	$\eta_2\gamma_9$	0	0	0	$2\gamma_{25}$	$3\gamma_{26}$	$3\gamma_{29}$	0
Aug	0	0	0	0	0	0	$\mathbf{\gamma_{27}}$	1	γ_9	$\eta_2\gamma_9$	0	0	0	$2\gamma_{25}$	$2\gamma_{26}$	$2\gamma_{29}$	0
Sept	0	0	0	0	0	0	$\mathbf{\gamma_{27}}$	1	γ_9	$\eta_2\gamma_9$	0	0	0	γ_{25}	γ_{26}	γ_{29}	0

Cont.

Matrix P : 'O' Stock used in Baseline D

Month /Age-class	1	2	3	4	5	6	7W	7E	8W	8E	9W	9E	10	11	12SW	12NE	9N
Age 4																	
Apr	0	10	89	1	0	0	74	32	22γ_6	13γ_6	6γ_6	2γ_6	0	61γ_{15}	29γ_7	58γ_{24}	2
May	0	10	89	1	0	0	149	64	43γ_6	27γ_6	12γ_6	5γ_6	0	205γ_{15}	96γ_7	193γ_{24}	6
Jun	0	10	89	1	0	0	149	64	43γ_6	27γ_6	12γ_6	5γ_6	0	287γ_{15}	134γ_7	271γ_{24}	9
Jul	0	10	89	1	0	0	149	64	43γ_6	27γ_6	12γ_6	5γ_6	0	287γ_{15}	134γ_7	271γ_{24}	9
Aug	0	10	89	1	0	0	173	75	50γ_6	31γ_6	14γ_6	5γ_6	0	266γ_{15}	124γ_7	251γ_{24}	8
Sept	0	10	89	1	0	0	173	75	50γ_6	31γ_6	14γ_6	5γ_6	0	225γ_{15}	105γ_7	213γ_{24}	7
Age 10 – male																	
Apr	0	10	89	1	0	0	68	39	33γ_6	28γ_6	19γ_6	13γ_6	0	11γ_{15}	21γ_7	60γ_{24}	8
May	0	10	89	1	0	0	101	58	50γ_6	42γ_6	29γ_6	20γ_6	0	46γ_{15}	85γ_7	239γ_{24}	31
Jun	0	10	89	1	0	0	135	78	66γ_6	56γ_6	39γ_6	26γ_6	0	68γ_{15}	128γ_7	358γ_{24}	46
Jul	0	10	89	1	0	0	135	78	66γ_6	56γ_6	39γ_6	26γ_6	0	68γ_{15}	128γ_7	358γ_{24}	46
Aug	0	10	89	1	0	0	169	97	83γ_6	70γ_6	48γ_6	33γ_6	0	57γ_{15}	106γ_7	298γ_{24}	38
Sept	0	10	89	1	0	0	169	97	83γ_6	70γ_6	48γ_6	33γ_6	0	46γ_{15}	85γ_7	239γ_{24}	31
Age 10 – female																	
Apr	0	10	89	1	0	0	50	21	14γ_6	9γ_6	4γ_6	2γ_6	0	30γ_{15}	55γ_7	112γ_{24}	4
May	0	10	89	1	0	0	149	64	43γ_6	27γ_6	12γ_6	5γ_6	0	89γ_{15}	166γ_7	335γ_{24}	11
Jun	0	10	89	1	0	0	99	43	29γ_6	18γ_6	8γ_6	3γ_6	0	118γ_{15}	221γ_7	446γ_{24}	15
Jul	0	10	89	1	0	0	99	43	29γ_6	18γ_6	8γ_6	3γ_6	0	118γ_{15}	221γ_7	446γ_{24}	15
Aug	0	10	89	1	0	0	99	43	29γ_6	18γ_6	8γ_6	3γ_6	0	118γ_{15}	221γ_7	446γ_{24}	15
Sept	0	10	89	1	0	0	99	43	29γ_6	18γ_6	8γ_6	3γ_6	0	103γ_{15}	193γ_7	390γ_{24}	13

Matrix P_2 : 'O' Stock used in Baseline D

Month /Age-class	1	2	3	4	5	6	7W	7E	8W	8E	9W	9E	10	11	12SW	12NE	9N
Age 4																	
Apr	0	10	89	1	0	0	92	31	17γ_6	8γ_6	2γ_6	1γ_6	0	69γ_{15}	32γ_7	48γ_{24}	1
May	0	10	89	1	0	0	184	61	33γ_6	16γ_6	5γ_6	1γ_6	0	230γ_{15}	107γ_7	161γ_{24}	2
Jun	0	10	89	1	0	0	184	61	33γ_6	16γ_6	5γ_6	1γ_6	0	322γ_{15}	150γ_7	225γ_{24}	2
Jul	0	10	89	1	0	0	184	61	33γ_6	16γ_6	5γ_6	1γ_6	0	322γ_{15}	150γ_7	225γ_{24}	2
Aug	0	10	89	1	0	0	214	71	39γ_6	18γ_6	6γ_6	1γ_6	0	299γ_{15}	140γ_7	209γ_{24}	2
Sept	0	10	89	1	0	0	214	71	39γ_6	18γ_6	6γ_6	1γ_6	0	253γ_{15}	118γ_7	177γ_{24}	2
Age 10 – male																	
Apr	0	10	89	1	0	0	89	42	31γ_6	21γ_6	11γ_6	5γ_6	0	14γ_{15}	26γ_7	58γ_{24}	3
May	0	10	89	1	0	0	134	64	46γ_6	32γ_6	17γ_6	8γ_6	0	55γ_{15}	102γ_7	231γ_{24}	12
Jun	0	10	89	1	0	0	178	85	62γ_6	43γ_6	22γ_6	10γ_6	0	82γ_{15}	153γ_7	346γ_{24}	18
Jul	0	10	89	1	0	0	178	85	62γ_6	43γ_6	22γ_6	10γ_6	0	82γ_{15}	153γ_7	346γ_{24}	18
Aug	0	10	89	1	0	0	223	106	77γ_6	53γ_6	28γ_6	13γ_6	0	68γ_{15}	128γ_7	289γ_{24}	15
Sept	0	10	89	1	0	0	223	106	77γ_6	53γ_6	28γ_6	13γ_6	0	55γ_{15}	102γ_7	231γ_{24}	12
Age 10 – female																	
Apr	0	10	89	1	0	0	61	20	11γ_6	5γ_6	2γ_6	0	0	35γ_{15}	66γ_7	98γ_{24}	1
May	0	10	89	1	0	0	184	61	33γ_6	16γ_6	5γ_6	1γ_6	0	105γ_{15}	197γ_7	295γ_{24}	3
Jun	0	10	89	1	0	0	123	41	22γ_6	10γ_6	3γ_6	1γ_6	0	141γ_{15}	263γ_7	393γ_{24}	4
Jul	0	10	89	1	0	0	123	41	22γ_6	10γ_6	3γ_6	1γ_6	0	141γ_{15}	263γ_7	393γ_{24}	4
Aug	0	10	89	1	0	0	123	41	22γ_6	10γ_6	3γ_6	1γ_6	0	141γ_{15}	263γ_7	393γ_{24}	4
Sept	0	10	89	1	0	0	123	41	22γ_6	10γ_6	3γ_6	1γ_6	0	123γ_{15}	230γ_7	344γ_{24}	4

Matrix P_3 : 'O' Stock used in Baseline D

Month /Age-class	1	2	3	4	5	6	7W	7E	8W	8E	9W	9E	10	11	12SW	12NE	9N
Age 4																	
Apr	0	10	89	1	0	0	65	32	23γ_6	16γ_6	9γ_6	4γ_6	0	58γ_{15}	27γ_7	62γ_{24}	3
May	0	10	89	1	0	0	131	63	47γ_6	33γ_6	18γ_6	8γ_6	0	192γ_{15}	90γ_7	207γ_{24}	12
Jun	0	10	89	1	0	0	131	63	47γ_6	33γ_6	18γ_6	8γ_6	0	269γ_{15}	126γ_7	289γ_{24}	16
Jul	0	10	89	1	0	0	131	63	47γ_6	33γ_6	18γ_6	8γ_6	0	269γ_{15}	126γ_7	289γ_{24}	16
Aug	0	10	89	1	0	0	153	74	55γ_6	38γ_6	21γ_6	10γ_6	0	250γ_{15}	117γ_7	269γ_{24}	15
Sept	0	10	89	1	0	0	153	74	55γ_6	38γ_6	21γ_6	10γ_6	0	211γ_{15}	99γ_7	227γ_{24}	13
Age 10 – male																	
Apr	0	10	89	1	0	0	53	35	33γ_6	31γ_6	26γ_6	22γ_6	0	10γ_{15}	18γ_7	58γ_{24}	14
May	0	10	89	1	0	0	80	52	49γ_6	47γ_6	39γ_6	33γ_6	0	39γ_{15}	73γ_7	234γ_{24}	55
Jun	0	10	89	1	0	0	107	69	65γ_6	63γ_6	52γ_6	45γ_6	0	58γ_{15}	109γ_7	351γ_{24}	82
Jul	0	10	89	1	0	0	107	69	65γ_6	63γ_6	52γ_6	45γ_6	0	58γ_{15}	109γ_7	351γ_{24}	82
Aug	0	10	89	1	0	0	133	87	82γ_6	78γ_6	64γ_6	56γ_6	0	49γ_{15}	91γ_7	292γ_{24}	68
Sept	0	10	89	1	0	0	133	87	82γ_6	78γ_6	64γ_6	56γ_6	0	39γ_{15}	73γ_7	234γ_{24}	55
Age 10 – female																	
Apr	0	10	89	1	0	0	44	21	16γ_6	11γ_6	6γ_6	3γ_6	0	27γ_{15}	50γ_7	116γ_{24}	7
May	0	10	89	1	0	0	131	63	47γ_6	33γ_6	18γ_6	8γ_6	0	81γ_{15}	151γ_7	348γ_{24}	20
Jun	0	10	89	1	0	0	87	42	31γ_6	22γ_6	12γ_6	6γ_6	0	108γ_{15}	202γ_7	464γ_{24}	26
Jul	0	10	89	1	0	0	87	42	31γ_6	22γ_6	12γ_6	6γ_6	0	108γ_{15}	202γ_7	464γ_{24}	26
Aug	0	10	89	1	0	0	87	42	31γ_6	22γ_6	12γ_6	6γ_6	0	108γ_{15}	202γ_7	464γ_{24}	26
Sept	0	10	89	1	0	0	87	42	31γ_6	22γ_6	12γ_6	6γ_6	0	94γ_{15}	176γ_7	406γ_{24}	23

Matrix P_4 : 'O' Stock used in Baseline D

Month / Age-class	1	2	3	4	5	6	7W	7E	8W	8E	9W	9E	10	11	12SW	12NE	9N
Age 4																	
Apr	0	10	89	1	0	0	66	28	19γ_6	12γ_6	5γ_6	2γ_6	0	102γ_{15}	48γ_7	97γ_{24}	3
May	0	10	89	1	0	0	118	51	34γ_6	21γ_6	10γ_6	4γ_6	0	246γ_{15}	115γ_7	232γ_{24}	8
Jun	0	10	89	1	0	0	99	43	29γ_6	18γ_6	8γ_6	3γ_6	0	328γ_{15}	153γ_7	309γ_{24}	10
Jul	0	10	89	1	0	0	99	43	29γ_6	18γ_6	8γ_6	3γ_6	0	328γ_{15}	153γ_7	309γ_{24}	10
Aug	0	10	89	1	0	0	124	54	36γ_6	22γ_6	10γ_6	4γ_6	0	307γ_{15}	143γ_7	290γ_{24}	10
Sept	0	10	89	1	0	0	136	59	40γ_6	25γ_6	11γ_6	4γ_6	0	266γ_{15}	124γ_7	251γ_{24}	8
Age 10 – male																	
Apr	0	10	89	1	0	0	60	35	30γ_6	25γ_6	17γ_6	12γ_6	0	23γ_{15}	43γ_7	119γ_{24}	15
May	0	10	89	1	0	0	84	49	41γ_6	35γ_6	24γ_6	16γ_6	0	57γ_{15}	106γ_7	298γ_{24}	38
Jun	0	10	89	1	0	0	101	58	50γ_6	42γ_6	29γ_6	20γ_6	0	80γ_{15}	149γ_7	418γ_{24}	54
Jul	0	10	89	1	0	0	101	58	50γ_6	42γ_6	29γ_6	20γ_6	0	80γ_{15}	149γ_7	418γ_{24}	54
Aug	0	10	89	1	0	0	135	78	66γ_6	56γ_6	39γ_6	26γ_6	0	68γ_{15}	128γ_7	358γ_{24}	46
Sept	0	10	89	1	0	0	141	81	69γ_6	58γ_6	40γ_6	27γ_6	0	57γ_{15}	106γ_7	298γ_{24}	38
Age 10 – female																	
Apr	0	10	89	1	0	0	44	19	13γ_6	8γ_6	4γ_6	1γ_6	0	44γ_{15}	83γ_7	167γ_{24}	6
May	0	10	89	1	0	0	112	48	32γ_6	20γ_6	9γ_6	4γ_6	0	103γ_{15}	193γ_7	390γ_{24}	13
Jun	0	10	89	1	0	0	50	21	14γ_6	9γ_6	4γ_6	2γ_6	0	133γ_{15}	248γ_7	502γ_{24}	17
Jul	0	10	89	1	0	0	50	21	14γ_6	9γ_6	4γ_6	2γ_6	0	133γ_{15}	248γ_7	502γ_{24}	17
Aug	0	10	89	1	0	0	50	21	14γ_6	9γ_6	4γ_6	2γ_6	0	133γ_{15}	248γ_7	502γ_{24}	17
Sept	0	10	89	1	0	0	66	28	19γ_6	12γ_6	5γ_6	2γ_6	0	118γ_{15}	221γ_7	446γ_{24}	15

Matrix P_5 : 'O' Stock used in Baseline D

Month / Age-class	1	2	3	4	5	6	7W	7E	8W	8E	9W	9E	10	11	12SW	12NE	9N
Age 4																	
Apr	0	10	89	1	0	0	83	36	24γ_6	15γ_6	7γ_6	3γ_6	0	20γ_{15}	10γ_7	19γ_{24}	1
May	0	10	89	1	0	0	180	78	52γ_6	32γ_6	15γ_6	6γ_6	0	164γ_{15}	76γ_7	155γ_{24}	5
Jun	0	10	89	1	0	0	198	86	58γ_6	36γ_6	16γ_6	6γ_6	0	246γ_{15}	115γ_7	232γ_{24}	8
Jul	0	10	89	1	0	0	198	86	58γ_6	36γ_6	16γ_6	6γ_6	0	246γ_{15}	115γ_7	232γ_{24}	8
Aug	0	10	89	1	0	0	223	96	65γ_6	40γ_6	19γ_6	7γ_6	0	225γ_{15}	105γ_7	213γ_{24}	7
Sept	0	10	89	1	0	0	211	91	61γ_6	38γ_6	17γ_6	7γ_6	0	184γ_{15}	86γ_7	174γ_{24}	6
Age 10 – male																	
Apr	0	10	89	1	0	0	75	43	37γ_6	31γ_6	21γ_6	15γ_6	0	0	0	0	0
May	0	10	89	1	0	0	118	68	58γ_6	49γ_6	34γ_6	23γ_6	0	34γ_{15}	64γ_7	179γ_{24}	23
Jun	0	10	89	1	0	0	169	97	83γ_6	70γ_6	48γ_6	33γ_6	0	57γ_{15}	106γ_7	298γ_{24}	38
Jul	0	10	89	1	0	0	169	97	83γ_6	70γ_6	48γ_6	33γ_6	0	57γ_{15}	106γ_7	298γ_{24}	38
Aug	0	10	89	1	0	0	203	117	99γ_6	84γ_6	58γ_6	39γ_6	0	46γ_{15}	85γ_7	239γ_{24}	31
Sept	0	10	89	1	0	0	197	113	97γ_6	81γ_6	56γ_6	38γ_6	0	34γ_{15}	64γ_7	179γ_{24}	23
Age 10 – female																	
Apr	0	10	89	1	0	0	56	24	16γ_6	10γ_6	5γ_6	2γ_6	0	15γ_{15}	28γ_7	56γ_{24}	2
May	0	10	89	1	0	0	186	80	54γ_6	34γ_6	15γ_6	6γ_6	0	74γ_{15}	138γ_7	279γ_{24}	9
Jun	0	10	89	1	0	0	149	64	43γ_6	27γ_6	12γ_6	5γ_6	0	103γ_{15}	193γ_7	390γ_{24}	13
Jul	0	10	89	1	0	0	149	64	43γ_6	27γ_6	12γ_6	5γ_6	0	103γ_{15}	193γ_7	390γ_{24}	13
Aug	0	10	89	1	0	0	149	64	43γ_6	27γ_6	12γ_6	5γ_6	0	103γ_{15}	193γ_7	390γ_{24}	13
Sept	0	10	89	1	0	0	132	57	38γ_6	24γ_6	11γ_6	4γ_6	0	89γ_{15}	166γ_7	335γ_{24}	11

Matrix Q : 'W' Stock used in Baseline D

Month / Age-class	1	2	3	4	5	6	7W	7E	8W	8E	9W	9E	10	11	12SW	12NE	9N
Age 4																	
Apr	0	0	338	362	0	0	0	14γ_6	18γ_6	25γ_6	35	59	0	0	18	74	58γ_{25}
May	0	0	96	104	0	0	0	28γ_6	35γ_6	50γ_6	69	117	0	0	59	247	194γ_{25}
Jun	0	0	0	0	0	0	0	28γ_6	35γ_6	50γ_6	69	117	0	0	82	346	272γ_{25}
Jul	0	0	0	0	0	0	0	28γ_6	35γ_6	50γ_6	69	117	0	0	82	346	272γ_{25}
Aug	0	0	0	0	0	0	0	33γ_6	41γ_6	59γ_6	81	137	0	0	76	321	252γ_{25}
Sept	0	0	48	52	0	0	0	33γ_6	41γ_6	59γ_6	81	137	0	0	65	272	213γ_{25}
Age 10 – male																	
Apr	0	0	305	395	0	0	0	15γ_6	20γ_6	31γ_6	48	85	0	0	12	49	39γ_{25}
May	0	0	131	169	0	0	0	23γ_6	31γ_6	47γ_6	72	128	0	0	47	198	155γ_{25}
Jun	0	0	0	0	0	0	0	31γ_6	41γ_6	62γ_6	95	171	0	0	70	297	233γ_{25}
Jul	0	0	0	0	0	0	0	31γ_6	41γ_6	62γ_6	95	171	0	0	70	297	233γ_{25}
Aug	0	0	0	0	0	0	0	38γ_6	51γ_6	78γ_6	119	213	0	0	59	247	194γ_{25}
Sept	0	0	44	56	0	0	0	38γ_6	51γ_6	78γ_6	119	213	0	0	47	198	155γ_{25}
Age 10 – female																	
Apr	0	0	338	362	0	0	0	9γ_6	12γ_6	17γ_6	23	39	0	0	23	99	78γ_{25}
May	0	0	48	52	0	0	0	28γ_6	35γ_6	50γ_6	69	117	0	0	70	297	233γ_{25}
Jun	0	0	0	0	0	0	0	19γ_6	24γ_6	33γ_6	46	78	0	0	94	396	311γ_{25}
Jul	0	0	0	0	0	0	0	19γ_6	24γ_6	33γ_6	46	78	0	0	94	396	311γ_{25}
Aug	0	0	0	0	0	0	0	19γ_6	24γ_6	33γ_6	46	78	0	0	94	396	311γ_{25}
Sept	0	0	48	52	0	0	0	19γ_6	24γ_6	33γ_6	46	78	0	0	82	346	272γ_{25}

Cont.

Matrix Q_2 : 'W' Stock used in Baseline D

Month /Age-class	Sub-area 1	2	3	4	5	6	7W	7E	8W	8E	9W	9E	10	11	12SW	12NE	9N
Age 4																	
Apr	0	0	328	372	0	0	0	$13\gamma_6$	$17\gamma_6$	$25\gamma_6$	35	60	0	0	18	74	$58\gamma_{25}$
May	0	0	94	106	0	0	0	$27\gamma_6$	$34\gamma_6$	$49\gamma_6$	70	120	0	0	59	247	$194\gamma_{25}$
Jun	0	0	0	0	0	0	0	$27\gamma_6$	$34\gamma_6$	$49\gamma_6$	70	120	0	0	82	346	$272\gamma_{25}$
Jul	0	0	0	0	0	0	0	$27\gamma_6$	$34\gamma_6$	$49\gamma_6$	70	120	0	0	82	346	$272\gamma_{25}$
Aug	0	0	0	0	0	0	0	$31\gamma_6$	$40\gamma_6$	$57\gamma_6$	82	140	0	0	76	321	$252\gamma_{25}$
Sept	0	0	47	53	0	0	0	$31\gamma_6$	$40\gamma_6$	$57\gamma_6$	82	140	0	0	65	272	$213\gamma_{25}$
Age 10 – male																	
Apr	0	0	281	419	0	0	0	$13\gamma_6$	$18\gamma_6$	$29\gamma_6$	49	91	0	0	12	49	$39\gamma_{25}$
May	0	0	120	180	0	0	0	$20\gamma_6$	$27\gamma_6$	$44\gamma_6$	73	136	0	0	47	198	$155\gamma_{25}$
Jun	0	0	0	0	0	0	0	$26\gamma_6$	$36\gamma_6$	$59\gamma_6$	97	181	0	0	70	297	$233\gamma_{25}$
Jul	0	0	0	0	0	0	0	$26\gamma_6$	$36\gamma_6$	$59\gamma_6$	97	181	0	0	70	297	$233\gamma_{25}$
Aug	0	0	0	0	0	0	0	$33\gamma_6$	$45\gamma_6$	$74\gamma_6$	122	227	0	0	59	247	$194\gamma_{25}$
Sept	0	0	40	60	0	0	0	$33\gamma_6$	$45\gamma_6$	$74\gamma_6$	122	227	0	0	47	198	$155\gamma_{25}$
Age 10 – female																	
Apr	0	0	328	372	0	0	0	$9\gamma_6$	$11\gamma_6$	$16\gamma_6$	23	40	0	0	23	99	$78\gamma_{25}$
May	0	0	47	53	0	0	0	$27\gamma_6$	$34\gamma_6$	$49\gamma_6$	70	120	0	0	70	297	$233\gamma_{25}$
Jun	0	0	0	0	0	0	0	$18\gamma_6$	$23\gamma_6$	$33\gamma_6$	47	80	0	0	94	396	$311\gamma_{25}$
Jul	0	0	0	0	0	0	0	$18\gamma_6$	$23\gamma_6$	$33\gamma_6$	47	80	0	0	94	396	$311\gamma_{25}$
Aug	0	0	0	0	0	0	0	$18\gamma_6$	$23\gamma_6$	$33\gamma_6$	47	80	0	0	94	396	$311\gamma_{25}$
Sept	0	0	47	53	0	0	0	$18\gamma_6$	$23\gamma_6$	$33\gamma_6$	47	80	0	0	82	346	$272\gamma_{25}$

Matrix Q_4 : 'W' Stock used in Baseline D

Month / Age-class	Sub-area 1	2	3	4	5	6	7W	7E	8W	8E	9W	9E	10	11	12SW	12NE	9N
Age 4																	
Apr	0	0	298	319	0	0	0	$13\gamma_6$	$16\gamma_6$	$22\gamma_6$	31	52	0	0	29	124	$97\gamma_{25}$
May	0	0	78	84	0	0	0	$22\gamma_6$	$28\gamma_6$	$40\gamma_6$	55	93	0	0	70	297	$233\gamma_{25}$
Jun	0	0	0	0	0	0	0	$19\gamma_6$	$24\gamma_6$	$33\gamma_6$	46	78	0	0	94	396	$311\gamma_{25}$
Jul	0	0	0	0	0	0	0	$19\gamma_6$	$24\gamma_6$	$33\gamma_6$	46	78	0	0	94	396	$311\gamma_{25}$
Aug	0	0	0	0	0	0	0	$24\gamma_6$	$29\gamma_6$	$42\gamma_6$	58	98	0	0	88	371	$291\gamma_{25}$
Sept	0	0	36	39	0	0	0	$26\gamma_6$	$32\gamma_6$	$46\gamma_6$	63	107	0	0	76	321	$252\gamma_{25}$
Age 10 – male																	
Apr	0	0	271	351	0	0	0	$14\gamma_6$	$18\gamma_6$	$28\gamma_6$	42	76	0	0	23	99	$78\gamma_{25}$
May	0	0	109	141	0	0	0	$19\gamma_6$	$26\gamma_6$	$39\gamma_6$	60	107	0	0	59	247	$194\gamma_{25}$
Jun	0	0	0	0	0	0	0	$23\gamma_6$	$31\gamma_6$	$47\gamma_6$	72	128	0	0	82	346	$272\gamma_{25}$
Jul	0	0	0	0	0	0	0	$23\gamma_6$	$31\gamma_6$	$47\gamma_6$	72	128	0	0	82	346	$272\gamma_{25}$
Aug	0	0	0	0	0	0	0	$31\gamma_6$	$41\gamma_6$	$62\gamma_6$	95	171	0	0	70	297	$233\gamma_{25}$
Sept	0	0	36	47	0	0	0	$32\gamma_6$	$43\gamma_6$	$65\gamma_6$	100	178	0	0	59	247	$194\gamma_{25}$
Age 10 – female																	
Apr	0	0	295	317	0	0	0	$8\gamma_6$	$10\gamma_6$	$15\gamma_6$	20	34	0	0	35	148	$116\gamma_{25}$
May	0	0	36	39	0	0	0	$21\gamma_6$	$27\gamma_6$	$38\gamma_6$	52	88	0	0	82	346	$272\gamma_{25}$
Jun	0	0	0	0	0	0	0	$9\gamma_6$	$12\gamma_6$	$17\gamma_6$	23	39	0	0	106	445	$349\gamma_{25}$
Jul	0	0	0	0	0	0	0	$9\gamma_6$	$12\gamma_6$	$17\gamma_6$	23	39	0	0	106	445	$349\gamma_{25}$
Aug	0	0	0	0	0	0	0	$9\gamma_6$	$12\gamma_6$	$17\gamma_6$	23	39	0	0	106	445	$349\gamma_{25}$
Sept	0	0	32	35	0	0	0	$13\gamma_6$	$16\gamma_6$	$22\gamma_6$	31	52	0	0	94	396	$311\gamma_{25}$

Matrix Q_3 : 'W' Stock used in Baseline D

Month /Age-class	Sub-area 1	2	3	4	5	6	7W	7E	8W	8E	9W	9E	10	11	12SW	12NE	9N
Age 4																	
Apr	0	0	351	349	0	0	0	$15\gamma_6$	$19\gamma_6$	$26\gamma_6$	34	56	0	0	18	74	$58\gamma_{25}$
May	0	0	100	100	0	0	0	$31\gamma_6$	$37\gamma_6$	$51\gamma_6$	68	113	0	0	59	247	$194\gamma_{25}$
Jun	0	0	0	0	0	0	0	$31\gamma_6$	$37\gamma_6$	$51\gamma_6$	68	113	0	0	82	346	$272\gamma_{25}$
Jul	0	0	0	0	0	0	0	$31\gamma_6$	$37\gamma_6$	$51\gamma_6$	68	113	0	0	82	346	$272\gamma_{25}$
Aug	0	0	0	0	0	0	0	$36\gamma_6$	$44\gamma_6$	$60\gamma_6$	79	131	0	0	76	321	$252\gamma_{25}$
Sept	0	0	50	50	0	0	0	$36\gamma_6$	$44\gamma_6$	$60\gamma_6$	79	131	0	0	65	272	$213\gamma_{25}$
Age 10 – male																	
Apr	0	0	329	371	0	0	0	$18\gamma_6$	$23\gamma_6$	$33\gamma_6$	47	80	0	0	12	49	$39\gamma_{25}$
May	0	0	141	159	0	0	0	$27\gamma_6$	$34\gamma_6$	$49\gamma_6$	70	120	0	0	47	198	$155\gamma_{25}$
Jun	0	0	0	0	0	0	0	$36\gamma_6$	$45\gamma_6$	$66\gamma_6$	93	160	0	0	70	297	$233\gamma_{25}$
Jul	0	0	0	0	0	0	0	$36\gamma_6$	$45\gamma_6$	$66\gamma_6$	93	160	0	0	70	297	$233\gamma_{25}$
Aug	0	0	0	0	0	0	0	$45\gamma_6$	$57\gamma_6$	$82\gamma_6$	116	200	0	0	59	247	$194\gamma_{25}$
Sept	0	0	47	53	0	0	0	$45\gamma_6$	$57\gamma_6$	$82\gamma_6$	116	200	0	0	47	198	$155\gamma_{25}$
Age 10 – female																	
Apr	0	0	351	349	0	0	0	$10\gamma_6$	$12\gamma_6$	$17\gamma_6$	23	38	0	0	23	99	$78\gamma_{25}$
May	0	0	50	50	0	0	0	$31\gamma_6$	$37\gamma_6$	$51\gamma_6$	68	113	0	0	70	297	$233\gamma_{25}$
Jun	0	0	0	0	0	0	0	$20\gamma_6$	$25\gamma_6$	$34\gamma_6$	45	75	0	0	94	396	$311\gamma_{25}$
Jul	0	0	0	0	0	0	0	$20\gamma_6$	$25\gamma_6$	$34\gamma_6$	45	75	0	0	94	396	$311\gamma_{25}$
Aug	0	0	0	0	0	0	0	$20\gamma_6$	$25\gamma_6$	$34\gamma_6$	45	75	0	0	94	396	$311\gamma_{25}$
Sept	0	0	50	50	0	0	0	$20\gamma_6$	$25\gamma_6$	$34\gamma_6$	45	75	0	0	82	346	$272\gamma_{25}$

Matrix Q_5 : 'W' Stock used in Baseline D

Month / Age-class	Sub-area 1	2	3	4	5	6	7W	7E	8W	8E	9W	9E	10	11	12SW	12NE	9N
Age 4																	
Apr	0	0	377	405	0	0	0	$16\gamma_6$	$20\gamma_6$	$28\gamma_6$	39	65	0	0	6	25	$19\gamma_{25}$
May	0	0	115	123	0	0	0	$34\gamma_6$	$43\gamma_6$	$61\gamma_6$	84	141	0	0	47	198	$155\gamma_{25}$
Jun	0	0	0	0	0	0	0	$38\gamma_6$	$47\gamma_6$	$67\gamma_6$	92	156	0	0	70	297	$233\gamma_{25}$
Jul	0	0	0	0	0	0	0	$38\gamma_6$	$47\gamma_6$	$67\gamma_6$	92	156	0	0	70	297	$233\gamma_{25}$
Aug	0	0	0	0	0	0	0	$42\gamma_6$	$53\gamma_6$	$75\gamma_6$	104	176	0	0	65	272	$213\gamma_{25}$
Sept	0	0	60	65	0	0	0	$40\gamma_6$	$50\gamma_6$	$71\gamma_6$	98	166	0	0	53	223	$175\gamma_{25}$
Age 10 – male																	
Apr	0	0	339	439	0	0	0	$17\gamma_6$	$23\gamma_6$	$35\gamma_6$	53	95	0	0	0	0	0
May	0	0	152	198	0	0	0	$27\gamma_6$	$36\gamma_6$	$55\gamma_6$	84	149	0	0	35	148	$116\gamma_{25}$
Jun	0	0	0	0	0	0	0	$38\gamma_6$	$51\gamma_6$	$78\gamma_6$	119	213	0	0	59	247	$194\gamma_{25}$
Jul	0	0	0	0	0	0	0	$38\gamma_6$	$51\gamma_6$	$78\gamma_6$	119	213	0	0	59	247	$194\gamma_{25}$
Aug	0	0	0	0	0	0	0	$46\gamma_6$	$61\gamma_6$	$94\gamma_6$	143	256	0	0	47	198	$155\gamma_{25}$
Sept	0	0	51	66	0	0	0	$45\gamma_6$	$59\gamma_6$	$91\gamma_6$	139	249	0	0	35	148	$116\gamma_{25}$
Age 10 – female																	
Apr	0	0	380	407	0	0	0	$11\gamma_6$	$13\gamma_6$	$19\gamma_6$	26	44	0	0	12	49	$39\gamma_{25}$
May	0	0	60	65	0	0	0	$35\gamma_6$	$44\gamma_6$	$63\gamma_6$	87	146	0	0	59	247	$194\gamma_{25}$
Jun	0	0	0	0	0	0	0	$28\gamma_6$	$35\gamma_6$	$50\gamma_6$	69	117	0	0	82	346	$272\gamma_{25}$
Jul	0	0	0	0	0	0	0	$28\gamma_6$	$35\gamma_6$	$50\gamma_6$	69	117	0	0	82	346	$272\gamma_{25}$
Aug	0	0	0	0	0	0	0	$28\gamma_6$	$35\gamma_6$	$50\gamma_6$	69	117	0	0	82	346	$272\gamma_{25}$
Sept	0	0	64	69	0	0	0	$25\gamma_6$	$31\gamma_6$	$45\gamma_6$	62	104	0	0	70	297	$233\gamma_{25}$

Adjunct 2

Table of commercial catches by area and sex for each season and year. The sub-areas are shown in Fig 1 of this Annex.

Sub-area	Year	Males						Females					
		J-A	M	J	J	A	S-D	J-A	M	J	J	A	S-D
1	1951	1	0	0	0	0	0	0	0	0	0	0	0
1	1957	17	0	0	0	0	0	11	0	0	0	0	0
2	1948	3	0	0	0	0	0	0	0	0	0	0	0
2	1950	3	0	0	0	0	0	2	0	0	0	0	0
2	1951	0	1	0	0	0	0	0	0	0	0	0	0
2	1952	1	0	0	0	0	0	1	0	0	0	0	0
2	1954	1	0	0	0	0	0	1	0	0	0	0	0
2	1957	1	0	0	0	0	0	1	0	0	0	0	0
2	1965	1	0	0	0	0	0	1	0	0	0	0	0
2	1966	2	0	0	0	0	0	1	0	0	0	0	0
2	1981	0	1	0	0	0	0	0	0	0	0	0	0
2	1985	1	0	0	0	0	0	0	0	0	0	0	0
5	1940	13	4	4	3	2	3	11	4	3	3	2	1
5	1941	25	8	7	6	4	4	22	7	6	6	3	4
5	1942	32	10	9	8	5	7	30	10	8	8	4	4
5	1943	25	8	7	6	4	4	22	7	6	6	3	4
5	1944	24	7	6	6	3	4	20	7	6	5	3	3
5	1945	2	1	1	1	1	0	0	0	0	0	0	0
5	1955	0	1	1	0	0	0	3	3	2	0	0	0
5	1956	0	1	1	0	0	0	3	3	2	0	0	0
5	1957	34	11	11	7	4	6	36	14	12	7	4	6
5	1958	46	11	13	6	3	4	55	22	21	7	3	3
5	1959	53	13	13	8	5	6	67	28	25	9	5	4
5	1960	36	18	13	11	5	5	57	38	31	12	4	9
5	1961	22	14	10	4	1	2	50	33	21	5	1	2
5	1962	7	21	16	10	1	1	35	39	27	12	0	0
5	1963	79	14	16	12	12	6	108	25	17	14	12	3
5	1964	83	18	14	18	8	21	98	25	14	18	8	20
5	1965	22	11	12	12	9	5	28	14	14	13	8	4
5	1966	19	22	10	20	19	17	46	41	22	21	19	15
5	1967	74	25	16	9	9	0	102	43	27	11	9	0
5	1968	54	17	16	22	7	7	83	35	28	23	6	6
5	1969	54	20	25	17	17	4	83	39	37	19	16	3
5	1970	88	41	52	35	2	4	116	60	63	37	1	3
5	1971	98	42	55	20	14	0	125	61	66	21	14	0
5	1972	108	41	52	36	11	37	134	59	63	38	10	36
5	1973	110	44	60	34	14	15	136	63	72	36	14	13
5	1974	80	40	18	9	5	7	108	58	30	11	4	6
5	1975	4	61	40	18	5	12	33	80	51	20	5	9
5	1976	143	23	19	5	0	5	170	41	30	6	0	2
5	1977	169	53	15	9	1	78	197	72	27	10	0	77
5	1978	83	44	32	8	0	38	97	49	34	7	0	35
5	1979	115	44	5	2	0	0	144	62	17	4	0	0
5	1980	101	67	60	63	41	12	100	67	59	62	41	12
5	1981	149	4	4	25	21	17	147	4	3	24	20	16
5	1982	113	2	15	29	17	8	89	5	18	44	21	30
5	1983	50	11	0	23	13	6	48	15	1	20	14	5
5	1984	21	43	14	10	0	1	18	36	11	15	0	3
5	1985	14	3	1	4	5	1	15	2	1	3	5	0
5	1986	0	0	0	0	0	0	0	0	0	0	0	0
6	1940	0	7	6	2	1	8	0	6	5	1	0	6
6	1941	1	12	11	3	1	14	0	12	11	2	1	12
6	1942	1	16	15	3	2	18	0	16	14	3	1	16
6	1943	1	13	11	3	1	13	0	12	11	2	1	12
6	1944	1	11	10	2	1	14	0	11	10	2	1	11
6	1945	0	1	1	0	0	2	0	0	0	0	0	0
6	1948	43	13	0	0	0	0	32	6	0	0	0	0
6	1949	15	5	0	0	0	0	17	12	0	0	0	0
6	1950	0	11	3	0	0	1	0	7	2	0	0	0
6	1951	34	25	2	1	0	0	28	9	1	1	0	0
6	1952	110	31	1	0	0	0	27	13	3	0	0	0
6	1953	76	11	3	0	0	0	42	4	2	0	0	0
6	1954	26	6	1	0	0	0	20	7	0	0	0	0
6	1955	13	7	0	0	0	0	9	6	0	0	0	0
6	1956	13	2	1	0	0	0	18	5	0	0	0	0
6	1957	3	16	18	3	2	17	0	16	17	3	1	16
6	1958	1	16	23	2	1	10	0	15	22	2	1	9
6	1959	1	19	23	3	2	11	0	18	23	2	1	9
6	1960	1	14	18	3	2	9	0	14	18	3	1	8
6	1961	1	10	8	1	1	4	0	9	8	0	0	3
6	1962	0	20	19	3	0	3	0	20	18	3	0	2
6	1963	1	7	11	4	4	8	0	6	11	4	4	7
6	1964	3	22	16	7	3	12	2	22	15	7	2	11
6	1965	6	19	18	5	3	23	5	17	17	5	3	21
6	1966	0	23	9	7	7	15	2	23	9	7	7	19
6	1967	4	28	18	3	3	3	8	27	18	3	3	2
6	1968	10	14	20	8	3	12	3	14	19	8	2	10
6	1969	11	20	35	7	6	9	10	19	35	6	6	8
6	1970	7	55	82	14	1	6	3	54	81	14	0	3
6	1971	5	57	86	8	5	1	3	56	86	7	5	0
6	1972	2	36	41	6	3	35	1	35	41	5	3	34
6	1973	1	35	42	10	8	86	3	35	42	9	7	83
6	1974	7	32	45	13	5	47	6	32	44	12	5	44
6	1975	13	87	60	7	2	8	3	87	60	6	2	4
6	1976	3	24	24	1	0	25	1	23	24	1	0	24
6	1977	4	74	18	3	0	117	2	74	17	2	0	114
6	1978	1	57	41	2	0	234	1	56	40	2	0	232
6	1979	5	82	108	37	13	64	23	82	108	36	12	63
6	1980	0	33	9	2	3	75	0	32	9	2	2	73
6	1981	1	69	31	11	6	47	0	68	30	11	6	46
6	1982	8	32	25	8	7	95	1	39	28	14	3	90
6	1983	0	30	37	4	2	65	0	31	37	3	1	60
6	1984	6	60	11	6	5	21	4	69	13	5	5	16
6	1985	0	8	7	2	2	18	0	5	8	1	1	16
6	1986	8	9	4	31	0	0	4	8	1	4	0	0
7W	1930	1	3	2	1	0	0	1	2	1	0	0	0
7W	1931	1	3	2	1	0	0	1	2	1	0	0	0
7W	1932	1	3	2	1	0	0	1	2	1	0	0	0
7W	1933	1	3	2	1	0	0	1	2	1	0	0	0
7W	1934	3	5	3	1	1	1	2	4	2	0	0	0
7W	1935	3	5	3	1	1	1	2	4	2	0	0	0
7W	1936	3	5	3	1	1	1	2	4	2	0	0	0
7W	1937	7	14	7	2	1	1	7	9	5	1	1	0
7W	1938	8	16	8	2	2	2	8	11	6	1	1	1
7W	1939	8	16	8	2	2	2	8	11	6	1	1	1
7W	1940	10	19	10	2	2	2	9	12	7	1	1	2
7W	1941	7	14	7	2	1	1	7	9	5	1	1	0
7W	1942	8	16	8	2	2	2	8	11	6	1	1	1
7W	1943	12	25	12	3	2	3	12	16	9	2	1	2
7W	1944	10	19	10	2	2	2	9	12	7	1	1	2
7W	1945	8	16	8	2	2	2	8	11	6	1	1	1
7W	1946	8	15	7	2	1	1	8	9	5	1	1	0
7W	1947	9	17	9	2	2	2	9	11	6	1	1	2
7W	1948	15	26	13	1	0	0	11	16	9	0	0	0
7W	1949	13	34	15	1	0	0	10	18	4	0	0	0
7W	1950	0	45	16	2	19	22	0	19	5	1	7	12
7W	1951	23	38	24	14	0	0	17	16	10	2	0	0
7W	1952	31	39	22	1	0	0	35	32	11	2	0	0
7W	1953	30	16	29	1	0	0	33	8	15	2	0	0
7W	1954	10	10	8	22	1	0	7	15	6	9	0	1
7W	1955	32	53	23	1	6	4	25	31	24	0	4	2
7W	1956	15	92	33	1	8	18	12	64	39	7	3	5
7W	1957	46	48	21	5	4	6	50	39	20	4	3	6
7W	1958	32	49	24	6	11	9	43	57	23	4	5	2
7W	1959	18	27	13	3	6	5	23	31	13	2	3	1
7W	1960	17	26	13	3	6	4	23	30	12	2	3	1
7W	1961	22	33	16	4	8	5	30	39	16	3	3	1
7W	1962	13	20	10	2	5	3	17	23	9	2	2	1
7W	1963	13	21	10	3	5	3	17	24	10	2	2	1
7W	1964	22	33	16	4	8	6	30	40	16	3	3	1
7W	1965	15	22	19	4	0	0	21	35	36	0	0	0
7W	1966	22	34	16	4	8	6	34	46	18	3	4	2
7W	1967	14	21	10	3	5	3	23	31	12	2	3	1
7W	1968	14	20	12	1	2	4	24	39	13	2	2	1
7W	1969	4	12	7	1	3	1	8	17	6	1	2	0
7W	1970	19	64	10	7	4	2	27	54	6	5	0	0
7W	1971	23	20	34	7	3	0	23	19	22	4	1	0
7W	1972	15	13	5	0	1	12	35	38	2	0	0	4
7W	1973	32	42	11	1	14	16	34	36	25	2	4	3
7W	1974	15	27	7	5	24	4	34	34	1	3	12	3
7W	1975	11	27	2	16	38	7	13	33	0	6	13	3
7W	1976	32	17	2	6	7	10	51	19	1	5	9	9

Sub-area	Year	Males						Females					
		J-A	M	J	J	A	S-D	J-A	M	J	J	A	S-D
7W	1977	11	21	2	20	24	29	16	28	0	7	1	5
7W	1978	37	46	9	32	51	53	47	46	1	12	4	6
7W	1979	34	53	9	31	55	64	26	21	3	10	9	8
7W	1980	33	22	25	37	9	35	40	40	7	9	1	5
7W	1981	30	38	55	38	25	3	32	29	11	9	3	2
7W	1982	37	34	46	25	13	7	38	24	14	12	6	1
7W	1983	24	34	24	32	10	10	42	27	18	13	6	4
7W	1984	37	22	18	16	17	42	29	7	19	13	10	16
7W	1985	30	7	37	35	12	43	17	16	18	10	4	7
7W	1986	44	13	20	28	20	33	26	9	12	17	5	15
7W	1987	32	46	15	13	10	50	25	17	11	6	2	12
7W	1996	0	0	0	0	15	13	0	0	0	1	0	2
7W	1997	0	0	1	0	0	0	0	0	0	0	0	0
7W	1998	0	22	0	0	0	0	0	3	0	0	0	0
7W	1999	0	0	43	0	0	0	0	0	7	0	0	0
7E	1973	0	0	0	0	0	2	0	0	0	0	0	2
7E	1974	0	0	0	0	0	9	0	0	0	0	0	2
7E	1975	0	0	0	0	0	3	0	0	0	0	0	4
7E	1997	0	0	1	0	0	0	0	0	0	0	0	0
7E	1998	0	25	1	0	0	0	0	4	0	0	0	0
8W	1949	0	0	0	0	0	0	0	0	1	0	0	0
8W	1952	0	0	0	0	0	0	0	0	0	0	1	0
8W	1953	0	0	0	0	0	0	0	0	0	0	0	1
8W	1954	0	0	0	0	0	1	0	0	0	0	0	0
8W	1955	0	0	0	0	0	0	0	0	0	1	0	0
8W	1956	0	0	0	0	0	0	0	0	0	1	0	0
8W	1957	0	0	0	0	0	1	0	1	0	1	0	0
8W	1959	0	0	0	0	0	0	0	0	0	0	1	0
8W	1960	0	0	0	0	1	0	0	0	0	0	0	0
8W	1973	0	0	0	0	0	6	0	0	0	0	0	4
8W	1998	0	9	24	0	0	0	0	1	1	0	0	0
8E	1973	0	0	0	0	0	8	0	0	0	0	0	3
8E	1996	0	0	0	11	5	0	0	0	0	0	0	0
8E	1997	0	0	0	30	0	0	0	0	0	1	0	0
8E	1998	0	0	8	0	0	0	0	0	2	0	0	0
9W	1949	0	0	0	0	0	0	0	0	0	1	0	0
9W	1950	0	0	0	0	1	0	0	0	0	0	0	0
9W	1951	0	0	0	0	0	0	0	0	1	1	0	0
9W	1953	0	0	0	0	3	0	0	0	0	1	1	0
9W	1955	0	0	0	0	0	1	0	0	0	0	0	0
9W	1956	0	0	1	0	1	0	0	0	0	1	0	0
9W	1957	0	0	0	1	0	0	0	0	0	0	0	0
9W	1958	0	0	0	1	0	0	0	0	1	0	1	0
9W	1960	0	0	0	1	0	0	0	0	0	0	0	0
9W	1970	0	0	0	1	0	0	0	0	0	0	0	0
9W	1994	0	0	0	4	2	0	0	0	0	1	0	0
9W	1995	0	0	13	56	3	0	0	0	0	5	1	0
9W	1997	0	2	13	0	0	0	0	2	4	0	0	0
9E	1949	0	0	0	0	1	1	0	0	0	0	0	0
9E	1950	0	0	0	1	0	0	0	0	0	0	0	0
9E	1951	0	0	0	0	0	0	0	0	1	0	0	0
9E	1952	0	0	0	1	0	0	0	0	1	0	0	0
9E	1954	0	0	0	0	0	0	0	0	0	0	1	0
9E	1956	0	0	0	0	0	0	0	0	0	0	1	0
9E	1969	0	0	0	0	3	0	0	0	0	0	8	0
9E	1970	0	0	1	0	4	0	0	0	0	0	0	0
9E	1994	0	0	0	2	6	4	0	0	0	1	1	0
9E	1995	0	0	1	0	18	0	0	0	0	0	3	0
9E	1997	0	18	22	0	0	0	0	5	1	0	0	0
10	1949	0	0	0	1	4	0	1	1	0	0	3	0
10	1950	0	3	2	1	2	5	0	0	0	0	0	0
10	1951	0	2	3	0	0	0	0	1	0	1	0	0
10	1952	0	0	5	4	0	0	0	0	0	0	0	0
10	1953	12	13	11	2	0	0	0	3	1	0	0	0
10	1954	9	4	15	4	0	0	0	4	0	0	0	0
10	1955	2	1	6	11	0	0	0	5	0	2	0	0
10	1956	3	10	17	17	0	0	0	2	5	6	0	0
10	1957	1	5	8	16	1	0	1	2	6	4	0	0
10	1964	0	0	4	1	0	0	0	1	3	0	0	0
10	1967	0	0	2	0	0	0	0	1	2	0	0	0
10	1968	0	0	2	0	0	0	0	0	12	0	0	0
10	1969	0	0	5	2	0	0	0	1	4	0	0	0
10	1970	0	1	6	1	0	0	0	2	2	0	0	0
10	1971	0	0	5	2	1	0	0	2	5	2	0	0
10	1972	0	0	2	0	0	0	0	0	1	1	0	0
10	1973	0	1	12	0	2	0	0	1	4	0	1	0
10	1974	0	0	5	1	0	0	0	0	0	0	0	0
10	1975	0	7	11	0	0	2	0	1	5	0	0	0
10	1976	0	0	6	1	0	3	0	0	2	3	0	6
10	1977	0	0	0	0	0	0	0	0	2	0	0	0
10	1979	0	0	8	0	0	0	0	0	7	0	0	0
10	1980	0	0	0	5	5	0	0	0	5	0	0	0
10	1981	0	0	0	7	6	0	0	0	0	2	0	0
10	1982	0	0	4	5	0	0	0	0	6	0	0	0
10	1983	0	0	1	2	3	0	0	0	0	1	4	0
10	1985	0	0	0	0	2	0	0	0	3	0	1	1
11	1930	0	0	0	0	0	0	0	1	1	0	0	0
11	1931	0	0	0	0	0	0	0	1	1	0	0	0
11	1932	0	0	0	0	0	0	0	1	1	0	0	0
11	1933	0	0	0	0	0	0	1	1	1	0	0	0
11	1934	0	0	0	0	0	0	0	1	1	0	0	0
11	1935	0	0	0	0	0	0	0	1	1	0	0	0
11	1936	0	0	0	0	0	0	0	1	1	0	0	0
11	1937	0	0	0	0	0	0	0	1	1	0	0	0
11	1938	0	0	0	0	0	0	0	1	1	0	0	0
11	1939	0	0	0	0	0	0	0	1	1	0	0	0
11	1940	0	0	0	0	0	0	0	1	1	0	0	0
11	1941	0	0	0	0	0	0	0	1	1	0	0	0
11	1942	0	0	0	0	0	0	0	1	1	0	0	0
11	1943	0	0	0	0	0	0	0	1	1	0	0	0
11	1944	0	0	0	0	0	0	0	1	1	0	0	0
11	1945	0	0	0	0	0	0	0	1	1	0	0	0
11	1946	1	1	3	4	1	2	5	8	7	4	1	1
11	1947	1	1	3	5	1	2	6	9	9	5	1	1
11	1948	0	1	2	13	7	3	19	10	9	12	1	0
11	1949	0	0	4	1	1	0	6	8	6	3	4	0
11	1950	0	5	5	3	0	5	0	12	16	3	0	1
11	1951	1	3	3	7	0	0	27	17	20	6	0	0
11	1952	1	7	3	9	0	0	30	37	20	9	0	0
11	1953	2	3	12	18	1	0	12	17	19	9	0	0
11	1954	10	9	21	18	0	0	15	30	53	21	1	1
11	1955	0	1	17	16	4	5	15	33	37	26	5	3
11	1956	2	4	9	25	13	15	9	22	11	22	11	8
11	1957	2	1	7	6	2	12	10	31	14	3	1	10
11	1958	1	9	32	32	14	5	9	25	50	40	22	8
11	1959	1	5	17	18	8	2	5	14	27	22	12	4
11	1960	1	4	14	15	6	2	4	11	23	18	10	4
11	1961	1	5	19	20	9	3	5	15	31	25	14	5
11	1962	1	4	17	17	8	2	5	13	27	21	12	4
11	1963	1	4	14	14	6	2	4	11	22	18	10	3
11	1964	0	4	14	14	6	2	4	11	22	17	10	3
11	1965	1	5	16	31	13	1	9	21	22	22	18	1
11	1966	1	7	24	25	11	3	5	15	30	24	13	5
11	1967	1	5	19	19	9	2	5	14	28	23	12	5
11	1968	0	2	11	5	5	1	1	12	25	8	6	4
11	1969	1	3	15	18	5	1	2	24	38	17	11	5
11	1970	1	2	27	6	1	1	6	11	30	12	2	4
11	1971	2	4	11	21	10	6	6	6	10	13	9	8
11	1972	1	1	22	40	17	1	4	5	37	56	21	7
11	1973	1	17	47	18	13	5	3	2	36	26	22	4
11	1974	0	6	12	25	10	7	2	11	21	19	9	3
11	1975	0	4	20	17	12	5	0	8	28	11	5	2
11	1976	6	10	15	27	17	2	5	15	19	27	19	9
11	1977	1	16	17	5	3	12	4	10	9	2	3	0
11	1978	2	8	3	3	1	0	8	24	7	0	0	0
11	1979	0	2	10	3	0	1	10	22	16	4	0	1
11	1980	1	4	9	7	7	11	3	23	31	1	2	2
11	1981	0	2	6	4	1	14	10	11	14	12	0	9
11	1982	0	2	1	1	0	1	15	15	6	10	0	1
11	1983	1	2	1	0	0	0	13	3	10	2	2	1
11	1984	1	22	16	1	4	2	14	34	27	0	0	0
11	1985	0	17	5	0	1	5	16	20	8	0	2	9
11	1986	1	7	6	1	2	2	13	25	7	1	4	0
11	1987	0	3	3	5	3	2	15	18	10	1	2	3
11	1996	0	0	0	0	19	0	0	0	0	0	11	0
11	1999	0	0	0	28	0	0	0	0	0	22	0	0
12SW	1973	0	0	0	1	1	0	0	0	4	5	2	0
12SW	1974	0	0	1	0	3	0	0	0	1	0	16	0
12SW	1975	0	0	0	7	4	0	0	0	0	11	7	5
12NE	1949	0	0	0	2	0	0	0	0	1	0	0	0

Sub-area	Year	Males						Females					
		J-A	M	J	J	A	S-D	J-A	M	J	J	A	S-D
12NE	1950	0	0	1	0	0	0	0	0	0	1	0	0
12NE	1951	0	0	0	0	0	0	0	1	0	0	1	0
12NE	1952	0	0	0	0	0	0	0	1	0	0	0	0
12NE	1953	0	0	0	0	0	0	0	0	0	0	1	0
12NE	1954	0	0	0	0	0	1	0	0	0	0	0	2
12NE	1955	0	0	0	2	1	0	0	0	0	2	0	0
12NE	1956	0	0	0	0	0	1	0	0	1	1	0	0
12NE	1957	0	0	0	0	0	0	0	0	1	1	0	0
12NE	1958	0	0	0	0	0	0	0	0	0	0	0	1
12NE	1960	0	0	0	0	0	0	0	1	0	0	1	0
12NE	1961	0	0	0	0	0	0	0	0	1	0	0	0
12NE	1962	0	0	0	0	0	0	0	0	1	0	0	0
12NE	1973	0	0	0	10	8	10	0	0	0	9	12	6
12NE	1974	0	0	0	22	0	0	0	0	0	18	0	0
12NE	1975	0	0	0	1	0	0	0	0	0	0	0	0

Adjunct 3

Dispersal estimates for *Implementation Simulation Trial* Baselines A and C[1]

Barbara L. Taylor and Karen Martien

This adjunct updates previous estimates of dispersal rates for the population structure hypotheses A and C in the *Implementation Simulation Trials*. Dispersal rates were estimated using the same techniques used in Taylor *et al*. (2000). Following suggestions made at SC/52, a range of dispersal rates were estimated for use in the North Pacific minke whale *Implementation Simulation Trials* (ISTs). Preliminary estimates of historical numbers of mature females were obtained from Cherry Allison and were roughly: Baseline A–O = 8,807, W = 2,309; Baseline C–Ow = 3,400, Oe = 1,600 and W = 5,165; C1J1-17– Ow = 4,218, Oe = 276 and W = 5,130; C1J1-19– Ow = 3,557, Oe = 3,731 and W = 2,548.

Methods

A brief description of the simulation and analysis methods follow. Simulations followed previously used methods (Taylor *et al*., 2000) but will be described here for Baseline C. The dynamics follow a stepping-stone model where each stock has the mean abundance for the estimated number of historical mature females (Fig 1). The simulation (genmod.exe) begins with all individuals having the same haplotype (40 basepairs with a per/basepair mutation rate of 0.00004). Each year every individual is allowed to give birth, die or disperse to the neighboring stock (with the probability *d*). The simulation runs for 30,000 years, which was sufficient to bring the dynamics into a state of quasi-equilibrium. The simulation is then run for an additional 20,000 years and is sampled every 100 years (Baseline A: Fst = 0.0179, No = 8,807, n_o = 361, Nw = 2,309 n_w = 100; Baseline C: Fst (Ow-Oe) = 0.0018, Fst (Oe-W) = 0.0061, Now = 3,400, n_{ow} = 165, Noe = 1,600, n_{oe} = 168, Nw = 5,165, n_w = 175; C1J1-17: Fst (Ow-Oe) = 0.0009, Fst (Oe-W) = 0.0061, Now = 4,218, n_{ow} = 234, Noe = 276, n_{oe} = 79, Nw = 5,130, n_w = 203; C1J1-10: Fst (Ow-Oe) = 0.0006, Fst (Oe-W) = 0.0152, Now = 3,557, n_{ow} = 165, Noe = 3,731, n_{oe} = 251, Nw = 2,548, n_w = 86). A series of different dispersal rates were run and the fit measured as the proportion of the estimated measures of genetic differentiation that are greater than the observed.

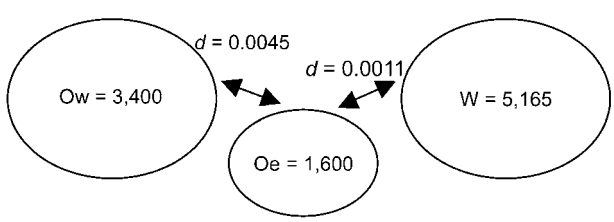

Fig. 1. Diagram of the simulation model for Baseline C with the best fit dispersal rates shown.

Results

The proportion of the simulated estimates of Fst that were greater than the observed served as the measure of fit for the given set of dispersal rates. For Baseline A the dispersal rates corresponding to 95% > observed, 50% > observed and 5% > observed were 0.00008, 0.00018, 0.0005 respectively. For Baseline C where two dispersal rates needed to be estimated, simulations were first run to achieve 50% > observed for

[1] Paper presented to meeting as SC/55/IST8.

both dispersal estimates, which resulted in *d*(Ow-Oe) = 0.0045 and *d*(Oe-W) = 0.0011. The *d*(Oe-W) dispersal rate was then fixed and the 'high but plausible' and 'low but plausible' dispersal rates between Ow and Oe were sought. The low estimate (95% > observed) *d*(Ow-Oe) = 0.001. However, it was not possible to achieve a high estimate if defined as 5% > observed because the observed Fst (0.0018) is too close to the lower bound for Fst of zero (see discussion below). For *d* = 0.01, 0.02 and 0.03 the proportion > observed was 25%, 15% and 16% respectively.

Best estimates were made for two additional Baseline C trials: C1J1-17 (Ow-Oe Fst = 0.00094, *d* = 0.015, Fst = 0.00437, Oe-W *d* = 0.01) and C1J1-19 (Ow-Oe *d* = 0.00725, Oe-W *d* = 0.0). Trial C1J1-17 proved very difficult to get a good estimate of both dispersal rates because the central population, which received dispersers from both its neighbors, was very small (276). Thus, this population had both high genetic drift plus many dispersers. Further, the program used to estimate dispersal maintains abundances in each population by capping the population size. All population dynamics processes are allowed to occur (birth, death and dispersal) and then 'extra' individuals beyond the carrying capacity are randomly 'killed'. The *IST*s treat dispersal differently so there may not be a good match. Further, the *IST*s only allow one dispersal rate. Since both of the estimated dispersal rates were high, the *IST*s will not be able to capture the full dynamics of this trial.

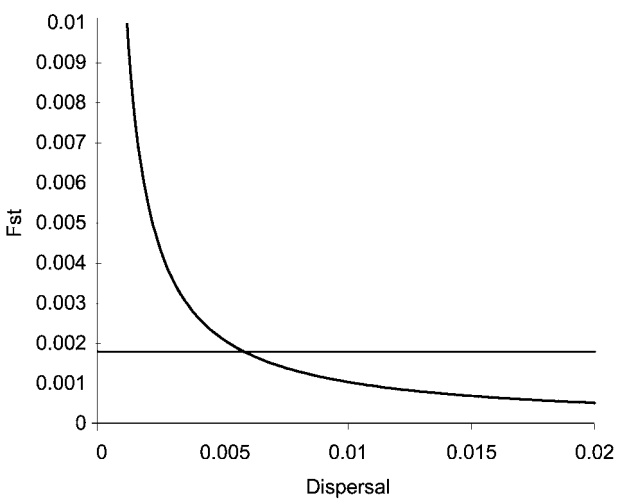

Fig. 2. Expected value for Fst assuming an average *N* = 2,400 (Oe + Ow/2) and *T* = 20. The horizontal line is the observed Fst = 0.0018.

Discussion

The general level of genetic differentiation is governed by the equation: Fst = 1/(2NdT +1), where *d* is the annual probability of dispersal and T is generation time. Although this equation (modified from Wright (1931) for mitochondrial DNA) uses the average abundance and makes various assumptions that lead to biases, the general form reveals a strong decrease in Fst with dispersal (Fig. 2).

The result of the relatively high abundance of minke whales is that the expected Fst is close to zero over a large range of dispersal rates. This can be seen in histograms of the estimated levels of genetic differentiation (Fig. 3).

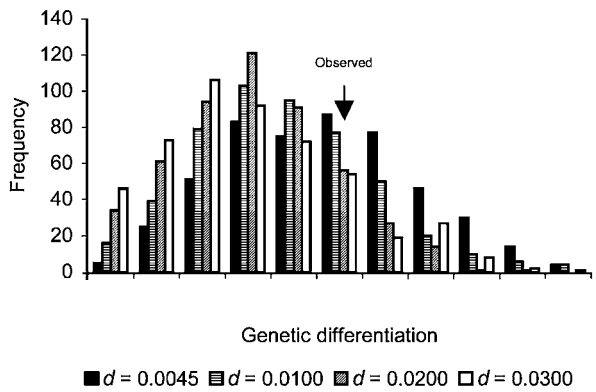

Fig. 3. Frequency histograms for estimated levels of genetic differentiation for a range of dispersal rates between Ow and Oe with the bin containing the observed value noted by the arrow.

From the perspective of the *Implementation Simulation Trials*, two 'high dispersal' scenarios could be run. One would use a 'high but plausible' of *d* = 0.01 (with 25% of the estimated values greater than the observed). Another alternative is to clump Ow and Oe into a single stock (O) which would correspond to earlier trials which had O stock in sub-areas 7 and 8 and W in 9.

REFERENCES

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Wright, S. 1931. Evolution in Mendelian populations. *Genetics* 16:97-159.

Appendix 11

SEPARATING ADVICE ON THE IMPACT OF THE RMP ON THE 'O'/'W' STOCKS AND THE 'J' STOCKS: A PROPOSAL

T. Polacheck, P. Hammond, G. Donovan, A. Punt, J. Zeh, B. Taylor, K. Martien, T. Schweder, H. Hatanaka, S. Kawahara, T. Smith, B. Perrin, D. Butterworth and J. Cooke

For North Pacific minke whales, the Committee's charge this year can be summarised as providing the best advice to the Commission on:

(a) the RMP variant that gives the best performance in terms of O/W stock catch conditional on providing acceptable performance in terms of risk to the O/W stocks; and
(b) the risk to the J stock of harvesting under the RMP.

There is a wide range of opinion within the Committee regarding plausibility of the level of incidental catches and

the appropriateness of different levels of current J stock depletion. It seems unlikely that these differences of opinion will be resolved at this meeting.

The relative plausibility assigned to the level of incidental take and J stock depletion will have only minor consequences for the final depletion levels for the O/W stocks in any of the *IST*s. Conversely, this will have major consequences for the final depletion level of the J stock. However, the different RMP variants will have major consequences for the final depletion levels for O/W stock components in different trials but have little effect on the final depletion level of the J stock.

It is imperative, therefore, that the sub-committee separates its discussion of factors that affect the O/W stocks (to which the RMP is being applied) from those factors that affect the J stock (which will be impacted by application of the RMP).

We propose that, given lack of agreement on plausibility rankings for levels of incidental catch and current J stock depletion, an appropriate way to provide advice to the Commission on the effects on the J stock of harvesting is:

(1) for the RMP variant that provides the best performance in terms of O/W stock catch given acceptable performance in terms of risk to the O/W stocks;
(2) for each J stock hypothesis list the additional risk (in terms of final depletion and extinction, where this occurs) for the RMP variant that provides the best performance in terms of O/W stock catch selected from those that provide acceptable performance in terms of risk to the O/W stocks.

We propose the following:

(1) Assign plausibility rankings to factors that will affect performance relative to the O/W stocks.
(2) Look at trial results and select RMP variants that provide acceptable performance in terms of risk to the O/W stocks (disregarding J stock performance at this stage).
(3) Select the RMP variant from those in (2) that provides the best performance in terms of catch. This becomes the RMP variant to be recommended relative to effects on the O/W stocks.
(4) Prepare a table to show, for each combination of incidental catch, current J stock depletion and MSYR, the range of relative risk for the J stock. Calculate these as a comparison of the RMP variant selected under (3) with the non-RMP catch scenario across *IST*s with high, medium or disputed plausibility used to select the RMP variant under (3).
(5) Derive a list of additional data requirements that should help resolve issues of plausibility with regard to J stock incidental catches and current depletion.

The results of (3) (4) and (5) then form the basis of our advice to the Commission.

Appendix 12

TRIAL RESULTS

Cherry Allison

The results of the trials (see Table 1 of Annex D) are summarised by catch- and risk-related statistics for each trial – RMP variant combination:

(a) Catch statistics
  (i) The median annual commercial catch.
  (ii) The median annual total catch (commercial and incidental catches combined).
  (iii) The median annual total catch by stock.
(b) Risk-related statistics
  (i) The initial (year 2000) depletion of the 'J' and 'O' stocks.
  (ii) The lower 5th percentile and median of the final depletion distributions for the 'J', the 'O' (Baselines A, B and D) and the 'O_e' and 'O_w' (Baseline C) stocks. These results are also shown for the 'W' stock for trials based on Baselines A and D.
  (iii) The value of the 'relative depletion risk' statistics for the stocks for which final depletion statistics are provided.
  (iv) An indicator that measures whether risk-related performance for a particular stock is: 'acceptable' (1); 'mediocre' (2); or 'unacceptable' (3) based on specifications in Appendix 4.
  (v) An indicator that measures whether risk-related performance for all stocks is 'acceptable' (no asterisk), 'mediocre' (one asterisk) or 'unacceptable' (two asterisks).

The trials are grouped by stock-structure Baseline (A, B, C and D), reference level of incidental catch (J1/J2) and *MSYR*(mat) (1% and 4%). Within each group, results are presented for trials that the Winnowing sub-group agreed had an impact upon the performance statistics for the 'O' stock ('O Trials'), the 'J' stock ('J trials') and neither stock ('E trials').

[*Appendix 12 tables on following pages*]

Table 1

			- - - - Median catch / year - - - -					J Stock	O Stock			J Stock				O Stock				W Stock			
			Comm.	Commercial + Incidental				Initial	Initial depletion			Final depletion				Final depletion				Final depletion			
Case	Var	Acc	Total	Total	J	O	W	Depl.	5%	Med	96%	5%	Med	Ratio	Ac	5%	Med	Ratio	Ac	5%	Med	Ratio	Ac
A1-J1 O Trials																							
A1J1	V1		142	219	73	132	15	0.30	0.70	0.78	0.83	0.11	0.12	0.98	1	0.68	0.73	0.72	1	0.89	0.92	0.89	1
A1J1	V2		129	205	73	114	19	0.30	0.70	0.78	0.83	0.11	0.12	0.90	1	0.61	0.68	0.66	1	0.89	0.96	0.89	1
A1J1	V3		125	199	74	105	20	0.30	0.70	0.78	0.83	0.09	0.11	0.75	1	0.70	0.75	0.73	1	0.89	0.96	0.89	1
A1J1	V4		138	213	73	123	19	0.30	0.70	0.78	0.83	0.10	0.12	0.89	1	0.57	0.65	0.60	1	0.89	0.96	0.89	1
A1J1	V5		137	216	73	128	14	0.30	0.70	0.78	0.83	0.11	0.12	0.96	1	0.72	0.76	0.75	1	0.92	0.95	0.91	1
A1J1	V6		144	217	74	123	20	0.30	0.70	0.78	0.83	0.10	0.11	0.78	1	0.70	0.76	0.73	1	0.89	0.96	0.89	1
A1J1	V8		0	78	73	6	0	0.30	0.70	0.78	0.83	0.11	0.12	1.00	1	0.91	0.94	1.00	1	1.00	1.00	1.00	1
A1J1	V0		0	0	0	0	0	0.30	0.70	0.78	0.83	0.57	0.57	1.00	1	0.93	0.95	1.00	1	1.00	1.00	1.00	1
A1J1-10	V1		146	223	73	134	15	0.30	0.83	0.88	0.91	0.11	0.13	0.98	1	0.85	0.87	0.87	1	0.94	0.96	0.94	1
A1J1-10	V2		133	211	73	118	20	0.30	0.83	0.88	0.91	0.10	0.12	0.91	1	0.81	0.85	0.83	1	0.95	0.98	0.94	1
A1J1-10	V3		128	201	74	108	20	0.30	0.83	0.88	0.91	0.09	0.11	0.76	1	0.86	0.89	0.87	1	0.95	0.98	0.94	1
A1J1-10	V4		146	224	73	132	20	0.30	0.83	0.88	0.91	0.10	0.12	0.90	1	0.79	0.83	0.81	1	0.95	0.98	0.94	1
A1J1-10	V5		142	220	73	131	14	0.30	0.83	0.88	0.91	0.11	0.12	0.97	1	0.87	0.89	0.88	1	0.96	0.97	0.95	1
A1J1-10	V6		148	222	74	129	20	0.30	0.83	0.88	0.91	0.09	0.11	0.79	1	0.86	0.89	0.87	1	0.95	0.98	0.94	1
A1J1-10	V8		0	78	73	6	0	0.30	0.83	0.88	0.91	0.11	0.13	1.00	1	0.96	0.98	1.00	1	1.00	1.00	1.00	1
A1J1-10	V0		0	0	0	0	0	0.30	0.83	0.88	0.91	0.57	0.57	1.00	1	0.97	0.98	1.00	1	1.00	1.00	1.00	1
A1J1-14	V1		143	220	73	105	40	0.30	0.64	0.74	0.82	0.11	0.12	0.98	1	0.65	0.71	0.71	1	0.90	0.93	0.90	1
A1J1-14	V2		129	205	73	111	18	0.30	0.64	0.74	0.82	0.11	0.12	0.88	1	0.51	0.59	0.55	1	0.98	0.99	0.98	1
A1J1-14	V3		123	196	74	102	18	0.30	0.64	0.74	0.82	0.09	0.11	0.72	1	0.63	0.69	0.66	1	0.98	0.99	0.98	1
A1J1-14	V4	*	134	210	73	116	18	0.30	0.64	0.74	0.82	0.10	0.12	0.87	1	0.47	0.55	0.50	2	0.98	0.99	0.98	1
A1J1-14	V5		137	215	73	103	36	0.30	0.64	0.74	0.82	0.11	0.12	0.96	1	0.68	0.73	0.73	1	0.93	0.95	0.92	1
A1J1-14	V6		136	209	74	117	18	0.30	0.64	0.74	0.82	0.10	0.11	0.78	1	0.63	0.69	0.66	1	0.98	0.99	0.98	1
A1J1-14	V8		0	78	73	6	0	0.30	0.64	0.74	0.82	0.11	0.12	1.00	1	0.88	0.93	1.00	1	1.00	1.00	1.00	1
A1J1-14	V0		0	0	0	0	0	0.30	0.64	0.74	0.82	0.57	0.57	1.00	1	0.90	0.94	1.00	1	1.00	1.00	1.00	1
A1J1-30	V1		276	352	73	250	30	0.30	0.83	0.88	0.91	0.11	0.12	0.95	1	0.71	0.76	0.74	1	0.89	0.92	0.89	1
A1J1-30	V2		257	332	74	225	37	0.30	0.83	0.88	0.91	0.09	0.12	0.82	1	0.64	0.71	0.66	1	0.90	0.96	0.89	1
A1J1-30	V3	**	271	338	76	226	38	0.30	0.83	0.88	0.91	0.06	0.08	0.47	3	0.67	0.74	0.68	1	0.90	0.96	0.89	1
A1J1-30	V4		267	342	74	234	36	0.30	0.83	0.88	0.91	0.09	0.12	0.81	1	0.61	0.68	0.61	1	0.90	0.96	0.89	1
A1J1-30	V5		304	380	73	271	30	0.30	0.83	0.88	0.91	0.10	0.12	0.92	1	0.71	0.75	0.72	1	0.90	0.94	0.89	1
A1J1-30	V6	*	311	377	76	266	38	0.30	0.83	0.88	0.91	0.07	0.09	0.57	2	0.69	0.75	0.70	1	0.90	0.96	0.89	1
A1J1-30	V8		0	78	73	6	0	0.30	0.83	0.88	0.91	0.11	0.13	1.00	1	0.96	0.98	1.00	1	1.00	1.00	1.00	1
A1J1-30	V0		0	0	0	0	0	0.30	0.83	0.88	0.91	0.57	0.57	1.00	1	0.97	0.98	1.00	1	1.00	1.00	1.00	1
A1-J1 J Trials																							
A1J1	V1		142	219	73	132	15	0.30	0.70	0.78	0.83	0.11	0.12	0.98	1	0.68	0.73	0.72	1	0.89	0.92	0.89	1
A1J1	V2		129	205	73	114	19	0.30	0.70	0.78	0.83	0.11	0.12	0.90	1	0.61	0.68	0.66	1	0.89	0.96	0.89	1
A1J1	V3		125	199	74	105	20	0.30	0.70	0.78	0.83	0.09	0.11	0.75	1	0.70	0.75	0.73	1	0.89	0.96	0.89	1
A1J1	V4		138	213	73	123	19	0.30	0.70	0.78	0.83	0.10	0.12	0.89	1	0.57	0.65	0.60	1	0.89	0.96	0.89	1
A1J1	V5		137	216	73	128	14	0.30	0.70	0.78	0.83	0.11	0.12	0.96	1	0.72	0.76	0.75	1	0.92	0.95	0.91	1
A1J1	V6		144	217	74	123	20	0.30	0.70	0.78	0.83	0.10	0.11	0.78	1	0.70	0.76	0.73	1	0.89	0.96	0.89	1
A1J1	V8		0	78	73	6	0	0.30	0.70	0.78	0.83	0.11	0.12	1.00	1	0.91	0.94	1.00	1	1.00	1.00	1.00	1
A1J1	V0		0	0	0	0	0	0.30	0.70	0.78	0.83	0.57	0.57	1.00	1	0.93	0.95	1.00	1	1.00	1.00	1.00	1
A1J1-3	V1		140	183	37	131	15	0.15	0.71	0.79	0.84	0.01	0.01	0.96	1	0.68	0.73	0.72	1	0.89	0.92	0.89	1
A1J1-3	V2		127	169	36	114	19	0.15	0.71	0.79	0.84	0.01	0.01	0.84	1	0.61	0.68	0.65	1	0.89	0.96	0.89	1
A1J1-3	V3	**	123	162	36	107	20	0.15	0.71	0.79	0.84	0.00	0.01	0.46	3	0.69	0.75	0.72	1	0.89	0.96	0.89	1
A1J1-3	V4		135	176	36	123	19	0.15	0.71	0.79	0.84	0.01	0.01	0.83	1	0.57	0.64	0.60	1	0.90	0.96	0.89	1
A1J1-3	V5		137	178	37	126	14	0.15	0.71	0.79	0.84	0.01	0.01	0.93	1	0.72	0.76	0.75	1	0.92	0.95	0.91	1
A1J1-3	V6	*	142	180	37	125	20	0.15	0.71	0.79	0.84	0.00	0.01	0.57	2	0.70	0.76	0.73	1	0.89	0.96	0.89	1
A1J1-3	V8		0	43	36	6	0	0.15	0.71	0.79	0.84	0.01	0.01	1.00	1	0.92	0.95	1.00	1	1.00	1.00	1.00	1
A1J1-3	V0		0	0	0	0	0	0.15	0.71	0.79	0.84	0.32	0.32	1.00	1	0.93	0.96	1.00	1	1.00	1.00	1.00	1

Cont.

			- - - - Median catch / year - - - -					J Stock	O Stock			J Stock				O Stock				W Stock			
				Commercial + Incidental					Initial depletion			Final depletion				Final depletion				Final depletion			
Case	Var	Acc	Comm. Total	Total	J	O	W	Initial Depl.	5%	Med	96%	5%	Med	Ratio	Ac	5%	Med	Ratio	Ac	5%	Med	Ratio	Ac
A1-J1 J Trials cont.																							
A1J1-4	V1		143	249	103	132	15	0.50	0.70	0.77	0.82	0.42	0.43	0.99	1	0.68	0.73	0.72	1	0.89	0.92	0.89	1
A1J1-4	V2		131	236	105	114	19	0.50	0.70	0.77	0.82	0.41	0.43	0.95	1	0.62	0.69	0.66	1	0.89	0.96	0.89	1
A1J1-4	V3		127	232	108	104	20	0.50	0.70	0.77	0.82	0.39	0.41	0.89	1	0.70	0.76	0.74	1	0.88	0.96	0.88	1
A1J1-4	V4		139	245	105	123	19	0.50	0.70	0.77	0.82	0.41	0.43	0.95	1	0.57	0.65	0.61	1	0.89	0.96	0.89	1
A1J1-4	V5		140	246	104	130	14	0.50	0.70	0.77	0.82	0.42	0.43	0.98	1	0.72	0.76	0.75	1	0.92	0.95	0.91	1
A1J1-4	V6		146	250	107	124	20	0.50	0.70	0.77	0.82	0.40	0.42	0.91	1	0.70	0.76	0.73	1	0.89	0.96	0.88	1
A1J1-4	V8		0	108	103	6	0	0.50	0.70	0.77	0.82	0.43	0.44	1.00	1	0.91	0.94	1.00	1	1.00	1.00	1.00	1
A1J1-4	V0		0	0	0	0	0	0.50	0.70	0.77	0.82	0.81	0.81	1.00	1	0.92	0.95	1.00	1	1.00	1.00	1.00	1
A1J1-5	V1		145	262	113	133	15	0.70	0.69	0.77	0.82	0.73	0.73	0.99	1	0.67	0.72	0.72	1	0.89	0.92	0.89	1
A1J1-5	V2		132	249	116	115	20	0.70	0.69	0.77	0.82	0.72	0.73	0.98	1	0.62	0.69	0.66	1	0.89	0.96	0.89	1
A1J1-5	V3		129	246	121	105	20	0.70	0.69	0.77	0.82	0.71	0.72	0.96	1	0.70	0.76	0.74	1	0.89	0.96	0.88	1
A1J1-5	V4		141	257	117	123	19	0.70	0.69	0.77	0.82	0.72	0.73	0.98	1	0.57	0.65	0.61	1	0.89	0.96	0.89	1
A1J1-5	V5		143	259	114	131	14	0.70	0.69	0.77	0.82	0.73	0.73	0.99	1	0.72	0.75	0.75	1	0.92	0.95	0.91	1
A1J1-5	V6		146	264	120	124	20	0.70	0.69	0.77	0.82	0.71	0.72	0.97	1	0.70	0.76	0.74	1	0.89	0.96	0.88	1
A1J1-5	V8		0	118	113	6	0	0.70	0.69	0.77	0.82	0.73	0.74	1.00	1	0.91	0.94	1.00	1	1.00	1.00	1.00	1
A1J1-5	V0		0	0	0	0	0	0.70	0.69	0.77	0.82	0.93	0.93	1.00	1	0.92	0.95	1.00	1	1.00	1.00	1.00	1
A1J1-12	V1	**	142	246	91	132	15	0.30	0.70	0.78	0.83	0.00	0.00	0.00	3	0.68	0.73	0.72	1	0.89	0.92	0.89	1
A1J1-12	V2	**	129	233	91	114	19	0.30	0.70	0.78	0.83	0.00	0.00	0.00	3	0.61	0.68	0.65	1	0.89	0.96	0.89	1
A1J1-12	V3	**	125	228	89	106	20	0.30	0.70	0.78	0.83	0.00	0.00	0.00	3	0.69	0.75	0.72	1	0.89	0.96	0.89	1
A1J1-12	V4	**	138	241	90	123	19	0.30	0.70	0.78	0.83	0.00	0.00	0.00	3	0.57	0.65	0.60	1	0.89	0.96	0.89	1
A1J1-12	V5	**	137	242	91	128	14	0.30	0.70	0.78	0.83	0.00	0.00	0.00	3	0.72	0.76	0.75	1	0.92	0.95	0.91	1
A1J1-12	V6	**	144	246	90	124	20	0.30	0.70	0.78	0.83	0.00	0.00	0.00	3	0.70	0.76	0.72	1	0.89	0.96	0.89	1
A1J1-12	V8		0	105	91	6	0	0.30	0.70	0.78	0.83	0.00	0.00	1.00	1	0.91	0.94	1.00	1	1.00	1.00	1.00	1
A1J1-12	V0		0	0	0	0	0	0.30	0.70	0.78	0.83	0.57	0.57	1.00	1	0.93	0.95	1.00	1	1.00	1.00	1.00	1
A4-J1 J Trials																							
A4J1	V1		150	292	138	140	16	0.30	0.89	0.93	0.95	0.39	0.43	0.98	1	0.92	0.94	0.90	1	0.97	0.98	0.94	1
A4J1	V2		142	283	138	124	21	0.30	0.89	0.93	0.95	0.37	0.42	0.91	1	0.91	0.93	0.86	1	0.97	0.99	0.95	1
A4J1	V3		136	266	136	110	21	0.30	0.89	0.93	0.95	0.30	0.38	0.75	1	0.94	0.96	0.89	1	0.97	0.99	0.95	1
A4J1	V4		157	296	137	138	21	0.30	0.89	0.93	0.95	0.36	0.42	0.90	1	0.90	0.93	0.82	1	0.97	0.99	0.95	1
A4J1	V5		150	293	138	139	15	0.30	0.89	0.93	0.95	0.39	0.43	0.96	1	0.93	0.96	0.89	1	0.98	0.99	0.95	1
A4J1	V6		156	289	137	132	21	0.30	0.89	0.93	0.95	0.32	0.39	0.78	1	0.93	0.96	0.89	1	0.97	0.99	0.95	1
A4J1	V8		0	143	138	6	0	0.30	0.89	0.93	0.95	0.39	0.44	1.00	1	1.00	1.00	1.00	1	1.00	1.00	1.00	1
A4J1	V0		0	0	0	0	0	0.30	0.89	0.93	0.95	1.00	1.00	1.00	1	1.00	1.00	1.00	1	1.00	1.00	1.00	1
A4J1-5	V1		151	290	133	140	16	0.70	0.88	0.93	0.95	0.89	0.90	1.00	1	0.92	0.94	0.90	1	0.97	0.98	0.94	1
A4J1-5	V2		143	280	137	123	21	0.70	0.88	0.93	0.95	0.89	0.90	0.98	1	0.91	0.93	0.86	1	0.97	0.99	0.95	1
A4J1-5	V3		139	275	143	111	21	0.70	0.88	0.93	0.95	0.88	0.89	0.97	1	0.94	0.96	0.89	1	0.97	0.99	0.95	1
A4J1-5	V4		159	294	137	138	21	0.70	0.88	0.93	0.95	0.89	0.90	0.98	1	0.90	0.93	0.83	1	0.97	0.99	0.95	1
A4J1-5	V5		153	289	134	139	15	0.70	0.88	0.93	0.95	0.89	0.90	0.99	1	0.93	0.96	0.89	1	0.98	0.99	0.95	1
A4J1-5	V6		159	296	142	133	21	0.70	0.88	0.93	0.95	0.88	0.89	0.98	1	0.93	0.96	0.89	1	0.97	0.99	0.95	1
A4J1-5	V8		0	137	132	5	0	0.70	0.88	0.93	0.95	0.90	0.90	1.00	1	1.00	1.00	1.00	1	1.00	1.00	1.00	1
A4J1-5	V0		0	0	0	0	0	0.70	0.88	0.93	0.95	1.00	1.00	1.00	1	1.00	1.00	1.00	1	1.00	1.00	1.00	1
A1-J1 E Trials																							
A1J1-6	V1		141	217	73	128	15	0.30	0.70	0.78	0.83	0.11	0.12	0.95	1	0.68	0.72	0.73	1	0.89	0.92	0.88	1
A1J1-6	V2		129	203	74	111	20	0.30	0.70	0.78	0.83	0.09	0.11	0.77	1	0.62	0.69	0.66	1	0.91	0.96	0.90	1
A1J1-6	V3		125	198	74	105	20	0.30	0.70	0.78	0.83	0.09	0.11	0.76	1	0.70	0.76	0.73	1	0.91	0.96	0.90	1
A1J1-6	V4		138	212	74	119	19	0.30	0.70	0.78	0.83	0.09	0.11	0.73	1	0.58	0.66	0.61	1	0.91	0.96	0.90	1
A1J1-6	V5		139	216	74	128	14	0.30	0.70	0.78	0.83	0.11	0.12	0.94	1	0.72	0.76	0.76	1	0.92	0.95	0.91	1
A1J1-6	V6		144	217	75	124	20	0.30	0.70	0.78	0.83	0.10	0.11	0.80	1	0.71	0.76	0.74	1	0.91	0.96	0.90	1
A1J1-6	V8		0	78	73	6	0	0.30	0.70	0.78	0.83	0.11	0.12	1.00	1	0.92	0.94	1.00	1	1.00	1.00	1.00	1
A1J1-6	V0		0	0	0	0	0	0.30	0.70	0.78	0.83	0.57	0.57	1.00	1	0.92	0.95	1.00	1	1.00	1.00	1.00	1
A1J1-7	V1		136	178	37	125	16	0.15	0.71	0.78	0.84	0.01	0.01	0.91	1	0.68	0.72	0.73	1	0.89	0.92	0.89	1

Cont.

			- - - - Median catch / year - - - -					J Stock	O Stock			J Stock				O Stock				W Stock			
				Commercial + Incidental					Initial depletion			Final depletion				Final depletion				Final depletion			
Case	Var	Acc	Comm. Total	Total	J	O	W	Initial Depl.	5%	Med	96%	5%	Med	Ratio	Ac	5%	Med	Ratio	Ac	5%	Med	Ratio	Ac
A1-J1 E Trials cont.																							
A1J1-7	V2	*	125	165	37	111	20	0.15	0.71	0.78	0.84	0.00	0.01	0.62	2	0.61	0.68	0.66	1	0.91	0.96	0.90	1
A1J1-7	V3	*	120	159	36	101	20	0.15	0.71	0.78	0.84	0.00	0.01	0.51	2	0.70	0.76	0.72	1	0.90	0.96	0.90	1
A1J1-7	V4	*	133	173	37	117	19	0.15	0.71	0.78	0.84	0.00	0.01	0.57	2	0.57	0.65	0.61	1	0.91	0.96	0.90	1
A1J1-7	V5		130	171	37	121	14	0.15	0.71	0.78	0.84	0.01	0.01	0.88	1	0.73	0.77	0.76	1	0.92	0.95	0.91	1
A1J1-7	V6	*	135	173	37	120	20	0.15	0.71	0.78	0.84	0.00	0.01	0.55	2	0.70	0.76	0.74	1	0.90	0.96	0.90	1
A1J1-7	V8		0	42	37	6	0	0.15	0.71	0.78	0.84	0.01	0.01	1.00	1	0.91	0.94	1.00	1	1.00	1.00	1.00	1
A1J1-7	V0		0	0	0	0	0	0.15	0.71	0.78	0.84	0.32	0.32	1.00	1	0.93	0.95	1.00	1	1.00	1.00	1.00	1
A1J1-8	V1		144	221	73	125	21	0.30	0.70	0.78	0.85	0.11	0.12	0.98	1	0.69	0.74	0.73	1	0.89	0.92	0.88	1
A1J1-8	V2		130	206	73	114	19	0.30	0.70	0.78	0.85	0.11	0.12	0.89	1	0.60	0.68	0.63	1	0.94	0.97	0.94	1
A1J1-8	V3		127	199	74	105	20	0.30	0.70	0.78	0.85	0.09	0.11	0.74	1	0.68	0.76	0.71	1	0.94	0.97	0.94	1
A1J1-8	V4		139	216	73	124	19	0.30	0.70	0.78	0.85	0.10	0.12	0.89	1	0.56	0.64	0.59	1	0.94	0.97	0.94	1
A1J1-8	V5		139	217	73	124	18	0.30	0.70	0.78	0.85	0.11	0.12	0.96	1	0.71	0.77	0.75	1	0.92	0.95	0.91	1
A1J1-8	V6		143	216	75	124	20	0.30	0.70	0.78	0.85	0.10	0.11	0.78	1	0.70	0.76	0.72	1	0.94	0.97	0.94	1
A1J1-8	V8		0	78	73	6	0	0.30	0.70	0.78	0.85	0.12	0.13	1.00	1	0.91	0.95	1.00	1	1.00	1.00	1.00	1
A1J1-8	V0		0	0	0	0	0	0.30	0.70	0.78	0.85	0.57	0.57	1.00	1	0.92	0.95	1.00	1	1.00	1.00	1.00	1
A1J1-9	V1		142	219	73	131	15	0.30	0.70	0.78	0.83	0.11	0.12	0.98	1	0.68	0.73	0.72	1	0.89	0.92	0.88	1
A1J1-9	V2		129	205	73	114	19	0.30	0.70	0.78	0.83	0.10	0.12	0.90	1	0.61	0.68	0.66	1	0.89	0.96	0.89	1
A1J1-9	V3		126	199	74	106	20	0.30	0.70	0.78	0.83	0.09	0.11	0.75	1	0.70	0.76	0.73	1	0.89	0.96	0.88	1
A1J1-9	V4		139	213	73	123	19	0.30	0.70	0.78	0.83	0.10	0.12	0.89	1	0.57	0.65	0.60	1	0.89	0.96	0.89	1
A1J1-9	V5		138	216	73	127	14	0.30	0.70	0.78	0.83	0.11	0.12	0.96	1	0.72	0.76	0.75	1	0.92	0.95	0.91	1
A1J1-9	V6		143	217	74	124	20	0.30	0.70	0.78	0.83	0.10	0.11	0.78	1	0.70	0.76	0.73	1	0.89	0.96	0.88	1
A1J1-9	V8		0	78	73	6	0	0.30	0.70	0.78	0.83	0.11	0.12	1.00	1	0.91	0.94	1.00	1	1.00	1.00	1.00	1
A1J1-9	V0		0	0	0	0	0	0.30	0.70	0.78	0.83	0.57	0.57	1.00	1	0.93	0.95	1.00	1	1.00	1.00	1.00	1
A1J1-11	V1		142	219	73	132	15	0.30	0.70	0.78	0.83	0.11	0.12	0.98	1	0.68	0.73	0.72	1	0.89	0.92	0.89	1
A1J1-11	V2		129	205	73	113	19	0.30	0.70	0.78	0.83	0.11	0.12	0.90	1	0.61	0.68	0.66	1	0.89	0.96	0.89	1
A1J1-11	V3		126	199	74	105	20	0.30	0.70	0.78	0.83	0.09	0.11	0.75	1	0.70	0.76	0.73	1	0.89	0.96	0.89	1
A1J1-11	V4		138	213	73	123	19	0.30	0.70	0.78	0.83	0.10	0.12	0.89	1	0.57	0.65	0.61	1	0.89	0.96	0.89	1
A1J1-11	V5		135	213	73	125	14	0.30	0.70	0.78	0.83	0.11	0.12	0.97	1	0.73	0.76	0.75	1	0.92	0.95	0.91	1
A1J1-11	V6		142	215	74	121	20	0.30	0.70	0.78	0.83	0.10	0.11	0.79	1	0.71	0.76	0.73	1	0.89	0.96	0.89	1
A1J1-11	V8		0	78	73	6	0	0.30	0.70	0.78	0.83	0.11	0.12	1.00	1	0.91	0.94	1.00	1	1.00	1.00	1.00	1
A1J1-11	V0		0	0	0	0	0	0.30	0.70	0.78	0.83	0.57	0.57	1.00	1	0.93	0.95	1.00	1	1.00	1.00	1.00	1
A1J1-13	V1		141	232	81	135	15	0.30	0.70	0.78	0.83	0.10	0.11	0.98	1	0.67	0.72	0.72	1	0.89	0.92	0.89	1
A1J1-13	V2		128	217	81	118	19	0.30	0.70	0.78	0.83	0.09	0.10	0.90	1	0.60	0.68	0.66	1	0.89	0.96	0.89	1
A1J1-13	V3		125	212	81	111	20	0.30	0.70	0.78	0.83	0.08	0.09	0.74	1	0.69	0.75	0.72	1	0.89	0.96	0.89	1
A1J1-13	V4		137	225	81	127	19	0.30	0.70	0.78	0.83	0.09	0.10	0.89	1	0.56	0.64	0.60	1	0.90	0.96	0.89	1
A1J1-13	V5		136	227	81	132	14	0.30	0.70	0.78	0.83	0.10	0.10	0.96	1	0.72	0.75	0.75	1	0.92	0.95	0.91	1
A1J1-13	V6		143	228	81	128	20	0.30	0.70	0.78	0.83	0.08	0.10	0.78	1	0.69	0.75	0.72	1	0.89	0.96	0.89	1
A1J1-13	V8		0	92	81	12	0	0.30	0.70	0.78	0.83	0.10	0.11	1.00	1	0.90	0.94	1.00	1	1.00	1.00	1.00	1
A1J1-13	V0		0	0	0	0	0	0.30	0.70	0.78	0.83	0.57	0.57	1.00	1	0.93	0.95	1.00	1	1.00	1.00	1.00	1
A1J1-23	V1		145	223	73	134	15	0.30	0.70	0.78	0.83	0.11	0.12	0.98	1	0.66	0.72	0.71	1	0.88	0.92	0.88	1
A1J1-23	V2		134	212	73	118	20	0.30	0.70	0.78	0.83	0.11	0.12	0.89	1	0.60	0.67	0.63	1	0.89	0.96	0.89	1
A1J1-23	V3		131	204	74	110	20	0.30	0.70	0.78	0.83	0.09	0.11	0.74	1	0.68	0.75	0.71	1	0.89	0.96	0.89	1
A1J1-23	V4		143	220	73	127	19	0.30	0.70	0.78	0.83	0.10	0.12	0.89	1	0.54	0.64	0.58	1	0.90	0.96	0.89	1
A1J1-23	V5		144	221	73	132	14	0.30	0.70	0.78	0.83	0.11	0.12	0.96	1	0.71	0.75	0.73	1	0.92	0.95	0.90	1
A1J1-23	V6		151	224	74	130	20	0.30	0.70	0.78	0.83	0.09	0.11	0.77	1	0.68	0.75	0.71	1	0.89	0.96	0.89	1
A1J1-23	V8		0	78	73	6	0	0.30	0.70	0.78	0.83	0.11	0.12	1.00	1	0.91	0.94	1.00	1	1.00	1.00	1.00	1
A1J1-23	V0		0	0	0	0	0	0.30	0.70	0.78	0.83	0.57	0.57	1.00	1	0.93	0.95	1.00	1	1.00	1.00	1.00	1
A1J1-24	V1		141	219	73	131	15	0.30	0.70	0.78	0.83	0.11	0.12	0.98	1	0.68	0.73	0.72	1	0.89	0.92	0.89	1
A1J1-24	V2		129	206	73	114	19	0.30	0.70	0.78	0.83	0.11	0.12	0.93	1	0.62	0.68	0.66	1	0.89	0.96	0.89	1
A1J1-24	V3		63	141	73	47	21	0.30	0.70	0.78	0.83	0.11	0.12	1.00	1	0.89	0.92	0.96	1	0.88	0.95	0.88	1
A1J1-24	V4		138	214	73	123	19	0.30	0.70	0.78	0.83	0.11	0.12	0.92	1	0.57	0.65	0.61	1	0.89	0.96	0.89	1

Cont.

			- - - - Median catch / year - - - -					J Stock	O Stock			J Stock				O Stock				W Stock			
			Comm.	Commercial + Incidental				Initial	Initial depletion			Final depletion				Final depletion				Final depletion			
Case	Var	Acc	Total	Total	J	O	W	Depl.	5%	Med	96%	5%	Med	Ratio	Ac	5%	Med	Ratio	Ac	5%	Med	Ratio	Ac
A1-J2 O Trials																							
A1J1-24	V5		134	212	73	125	14	0.30	0.70	0.78	0.83	0.11	0.12	0.98	1	0.73	0.77	0.76	1	0.92	0.95	0.91	1
A1J1-24	V6		104	181	73	88	21	0.30	0.70	0.78	0.83	0.11	0.12	0.96	1	0.84	0.87	0.89	1	0.88	0.96	0.88	1
A1J1-24	V8		0	78	73	6	0	0.30	0.70	0.78	0.83	0.11	0.12	1.00	1	0.91	0.94	1.00	1	1.00	1.00	1.00	1
A1J1-24	V0		0	0	0	0	0	0.30	0.70	0.78	0.83	0.57	0.57	1.00	1	0.93	0.95	1.00	1	1.00	1.00	1.00	1
A1J2	V1		140	268	103	149	15	0.30	0.67	0.76	0.81	0.04	0.05	0.98	1	0.64	0.69	0.71	1	0.89	0.92	0.89	1
A1J2	V2		127	251	103	131	19	0.30	0.67	0.76	0.81	0.04	0.05	0.90	1	0.57	0.65	0.64	1	0.89	0.96	0.89	1
A1J2	V3		128	251	102	130	20	0.30	0.67	0.76	0.81	0.03	0.04	0.74	1	0.63	0.70	0.70	1	0.89	0.96	0.89	1
A1J2	V4		136	260	103	140	19	0.30	0.67	0.76	0.81	0.04	0.05	0.89	1	0.52	0.61	0.59	1	0.90	0.96	0.89	1
A1J2	V5		131	260	103	142	14	0.30	0.67	0.76	0.81	0.04	0.05	0.97	1	0.68	0.73	0.75	1	0.92	0.95	0.91	1
A1J2	V6		130	253	103	133	20	0.30	0.67	0.76	0.81	0.04	0.04	0.81	1	0.67	0.74	0.73	1	0.89	0.96	0.89	1
A1J2	V8		0	131	103	29	0	0.30	0.67	0.76	0.81	0.04	0.05	1.00	1	0.86	0.91	1.00	1	1.00	1.00	1.00	1
A1J2	V0		0	0	0	0	0	0.30	0.67	0.76	0.81	0.58	0.58	1.00	1	0.91	0.95	1.00	1	1.00	1.00	1.00	1
A1J2-10	V1		148	276	102	156	15	0.30	0.81	0.87	0.90	0.04	0.05	0.98	1	0.82	0.85	0.86	1	0.94	0.96	0.94	1
A1J2-10	V2		135	261	102	139	20	0.30	0.81	0.87	0.90	0.04	0.05	0.91	1	0.79	0.83	0.83	1	0.95	0.98	0.94	1
A1J2-10	V3		136	258	102	139	20	0.30	0.81	0.87	0.90	0.03	0.04	0.76	1	0.83	0.86	0.85	1	0.95	0.98	0.94	1
A1J2-10	V4		147	274	102	154	20	0.30	0.81	0.87	0.90	0.04	0.05	0.90	1	0.77	0.81	0.81	1	0.95	0.98	0.94	1
A1J2-10	V5		139	269	102	148	14	0.30	0.81	0.87	0.90	0.04	0.05	0.97	1	0.85	0.87	0.88	1	0.96	0.97	0.95	1
A1J2-10	V6		136	260	103	140	21	0.30	0.81	0.87	0.90	0.04	0.04	0.80	1	0.85	0.88	0.87	1	0.95	0.98	0.94	1
A1J2-10	V8		0	130	102	28	0	0.30	0.81	0.87	0.90	0.04	0.05	1.00	1	0.94	0.96	1.00	1	1.00	1.00	1.00	1
A1J2-10	V0		0	0	0	0	0	0.30	0.81	0.87	0.90	0.58	0.58	1.00	1	0.96	0.98	1.00	1	1.00	1.00	1.00	1
A1J2-14	V1		140	268	103	123	39	0.30	0.61	0.71	0.80	0.04	0.05	0.98	1	0.59	0.66	0.70	1	0.90	0.93	0.90	1
A1J2-14	V2	*	125	248	103	126	18	0.30	0.61	0.71	0.80	0.04	0.05	0.88	1	0.45	0.55	0.54	2	0.98	0.99	0.98	1
A1J2-14	V3		122	242	102	122	18	0.30	0.61	0.71	0.80	0.03	0.04	0.72	1	0.56	0.63	0.63	1	0.98	0.99	0.98	1
A1J2-14	V4	*	132	253	102	132	18	0.30	0.61	0.71	0.80	0.04	0.05	0.87	1	0.42	0.51	0.48	2	0.98	0.99	0.98	1
A1J2-14	V5		130	257	103	117	36	0.30	0.61	0.71	0.80	0.04	0.05	0.97	1	0.65	0.70	0.73	1	0.93	0.95	0.92	1
A1J2-14	V6		123	247	102	124	19	0.30	0.61	0.71	0.80	0.04	0.04	0.81	1	0.59	0.67	0.66	1	0.98	0.99	0.98	1
A1J2-14	V8		0	131	103	29	0	0.30	0.61	0.71	0.80	0.04	0.05	1.00	1	0.81	0.88	1.00	1	1.00	1.00	1.00	1
A1J2-14	V0		0	0	0	0	0	0.30	0.61	0.71	0.80	0.58	0.58	1.00	1	0.88	0.93	1.00	1	1.00	1.00	1.00	1
A1J2-30	V1		279	404	102	270	30	0.30	0.81	0.87	0.90	0.04	0.05	0.95	1	0.70	0.74	0.73	1	0.89	0.92	0.89	1
A1J2-30	V2		253	374	102	237	38	0.30	0.81	0.87	0.90	0.03	0.05	0.82	1	0.62	0.69	0.65	1	0.90	0.96	0.89	1
A1J2-30	V3	**	278	389	102	252	38	0.30	0.81	0.87	0.90	0.02	0.03	0.49	3	0.65	0.71	0.66	1	0.90	0.96	0.89	1
A1J2-30	V4		272	392	102	253	37	0.30	0.81	0.87	0.90	0.03	0.04	0.81	1	0.58	0.66	0.61	1	0.90	0.96	0.89	1
A1J2-30	V5		294	420	103	282	30	0.30	0.81	0.87	0.90	0.04	0.05	0.92	1	0.70	0.74	0.72	1	0.90	0.94	0.89	1
A1J2-30	V6	*	304	419	103	280	38	0.30	0.81	0.87	0.90	0.03	0.04	0.60	2	0.68	0.74	0.70	1	0.90	0.96	0.89	1
A1J2-30	V8		0	130	102	28	0	0.30	0.81	0.87	0.90	0.04	0.05	1.00	1	0.94	0.96	1.00	1	1.00	1.00	1.00	1
A1J2-30	V0		0	0	0	0	0	0.30	0.81	0.87	0.90	0.58	0.58	1.00	1	0.96	0.98	1.00	1	1.00	1.00	1.00	1
A1-J2 J Trials																							
A1J2	V1		140	268	103	149	15	0.30	0.67	0.76	0.81	0.04	0.05	0.98	1	0.64	0.69	0.71	1	0.89	0.92	0.89	1
A1J2	V2		127	251	103	131	19	0.30	0.67	0.76	0.81	0.04	0.05	0.90	1	0.57	0.65	0.64	1	0.89	0.96	0.89	1
A1J2	V3		128	251	102	130	20	0.30	0.67	0.76	0.81	0.03	0.04	0.74	1	0.63	0.70	0.70	1	0.89	0.96	0.89	1
A1J2	V4		136	260	103	140	19	0.30	0.67	0.76	0.81	0.04	0.05	0.89	1	0.52	0.61	0.59	1	0.90	0.96	0.89	1
A1J2	V5		131	260	103	142	14	0.30	0.67	0.76	0.81	0.04	0.05	0.97	1	0.68	0.73	0.75	1	0.92	0.95	0.91	1
A1J2	V6		130	253	103	133	20	0.30	0.67	0.76	0.81	0.04	0.04	0.81	1	0.67	0.74	0.73	1	0.89	0.96	0.89	1
A1J2	V8		0	131	103	29	0	0.30	0.67	0.76	0.81	0.04	0.05	1.00	1	0.86	0.91	1.00	1	1.00	1.00	1.00	1
A1J2	V0		0	0	0	0	0	0.30	0.67	0.76	0.81	0.58	0.58	1.00	1	0.91	0.95	1.00	1	1.00	1.00	1.00	1
A1J2-3	V1		138	208	44	147	15	0.15	0.68	0.77	0.82	0.00	0.00	0.83	1	0.64	0.69	0.71	1	0.89	0.92	0.89	1
A1J2-3	V2		125	192	44	130	19	0.15	0.68	0.77	0.82	0.00	0.00	0.75	1	0.57	0.65	0.64	1	0.89	0.96	0.89	1
A1J2-3	V3	**	125	191	44	128	20	0.15	0.68	0.77	0.82	0.00	0.00	0.38	3	0.64	0.70	0.69	1	0.89	0.96	0.89	1
A1J2-3	V4		134	200	44	138	19	0.15	0.68	0.77	0.82	0.00	0.00	0.71	1	0.53	0.61	0.59	1	0.90	0.96	0.89	1
A1J2-3	V5		130	200	44	140	14	0.15	0.68	0.77	0.82	0.00	0.00	0.80	1	0.69	0.74	0.75	1	0.92	0.95	0.91	1
A1J2-3	V6	**	127	194	44	132	20	0.15	0.68	0.77	0.82	0.00	0.00	0.50	3	0.68	0.74	0.74	1	0.89	0.96	0.89	1

Cont.