Appendix 2

NORTH PACIFIC MINKE WHALE *IMPLEMENTATION SIMULATION TRIAL* SPECIFICATIONS

C. Allison, C.L. de Moor and A.E. Punt

A. Basic concepts and stock structure

The objective of the North Pacific minke whale *Implementation Simulation 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, age and month) 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 22 sub-areas (see Fig. 1). Future surveys are unlikely to cover sub-areas 1, 2, 3, 4 and 13 (see Table 3) so these sub-areas are taken to be *Residual Areas* in the current trials (although allowance is made for future bycatches from some of these sub-areas – see section D). The term 'stock' refers to a group of whales from the same breeding ground.

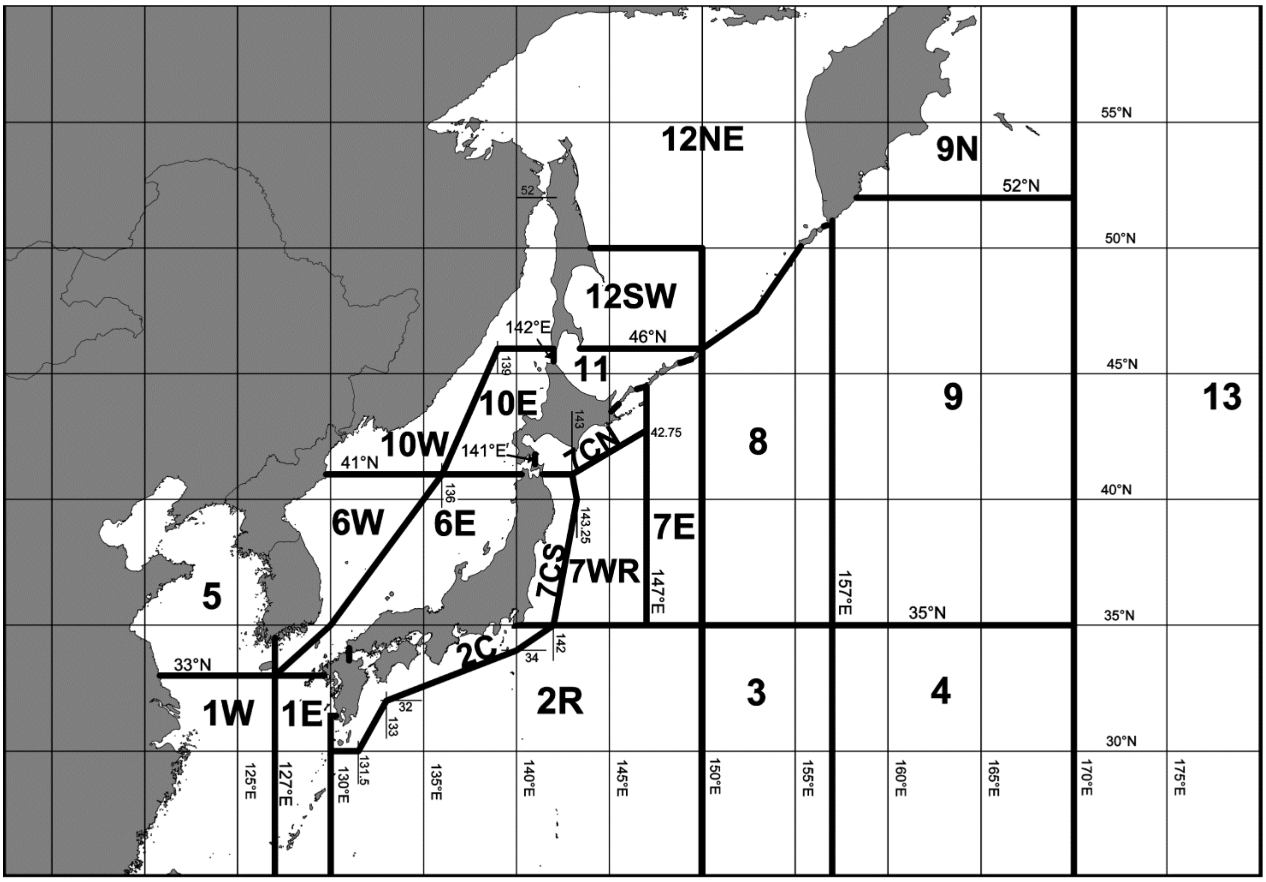


Fig. 1. The 22 sub-areas used for the *Implementation Simulation Trials* for North Pacific minke whales.

Three fundamental hypotheses are considered to account for patterns observed in the results from the genetic analyses:

(a) there is a single J-stock distributed in the Yellow Sea, Sea of Japan, and Pacific coast of Japan, and a single O-stock in sub-areas 7, 8, and 9 (referred to as hypothesis A);

(b) as for hypothesis (A), but there is a third stock (Y-stock) which resides in the Yellow Sea and overlaps with J-stock in the southern part of sub-area 6W (referred to as hypothesis B); and

(c) there are five stocks, referred to Y, JW, JE, OW, and OE, two of which (Y and JW) occur in the Sea of Japan, and three of which (JE, OW, and OE) are found to the east of Japan (referred to as hypothesis C).

Sensitivity tests in which there is a C-stock are also conducted based on stock structure hypotheses A and C. The C-stock stock is found in sub-areas 9 and 9N for the sensitivity test based on stock structure hypothesis A and in these sub-areas as well as sub-area 12NE for the sensitivity test based on stock structure hypothesis C. There is uncertainty regarding whether C-stock is found in sub-area 12NE because of the lack of genetics data for this sub-area.

B. Basic dynamics

Further details of the underlying age-structured model and its parameters can be found in IWC (1991, p112), except that the model has been extended to take sex-structure and dispersal into account. The dynamics of the animals in stock j are governed by equations B.1(a) for stocks for which there is no dispersal (permanent movement) between stocks as is the case in all the base case trials. Stocks for which there is dispersal are governed by Equations B.1(b):

$$N^{g,j}_{t+1,a}=\begin{cases}0.5b^j_{t+1} & \text{if } a=0\\ (N^{g,j}_{t,a-1}-C^{g,j}_{t,a-1})\tilde{S}_{a-1} & \text{if } 1\le a<x\\ (N^{g,j}_{t,x}-C^{g,j}_{t,x})\tilde{S}_x+(N^{g,j}_{t,x-1}-C^{g,j}_{t,x-1})\tilde{S}_{x-1} & \text{if } a=x\end{cases}\qquad\text{(B.1a)}$$

$$N^{g,j}_{t+1,a}=\begin{cases}0.5b^j_{t+1} & \text{if } a=0\\ \sum_{j\neq j'}[\left(1-D^{j,j'}\right)(N^{g,j}_{t,a-1}-C^{g,j}_{t,a-1})\tilde{S}_a+D^{j',j}(N^{g,j'}_{t,a-1}-C^{g,j'}_{t,a-1})\tilde{S}_a] & \text{if } 1\le a<x\\ \sum_{j\neq j'}[\left(1-D^{j,j'}\right)\left((N^{g,j}_{t,x}-C^{g,j}_{t,x})\tilde{S}_x+(N^{g,j}_{t,x-1}-C^{g,j}_{t,x-1})\tilde{S}_{x-1}\right) & \\ \quad\ldots\ldots\ldots+D^{j',j}\left((N^{g,j'}_{t,x}-C^{g,j'}_{t,x})\tilde{S}_x+(N^{g,j'}_{t,x-1}-C^{g,j'}_{t,x-1})\tilde{S}_{x-1}\right)] & \text{if } a=x\end{cases}\qquad\text{(B.1b)}$$

where

$N^{g,j}_{t,a}$ is the number of animals of gender *g* and age *a* in stock *j* at the start of year *t*;

$C^{g,j}_{t,a}$ is the catch (in number) of animals of gender *g* and age *a* in stock *j* during year *t* (whaling is assumed to take place in a pulse at the start of each year);

b^j_t is the number of calves born to females from stock *j* at the start of year *t*;

$\tilde{S}_a$ is the survival rate = e^{-M_a} where M_a is the instantaneous rate of natural mortality (assumed to be independent of stock and sex);

x is the maximum age (treated as a plus-group); and

$D^{j,j'}$ is the dispersal rate (i.e. the probability of an animal moving permanently) from stock *j* to *j'* (note: there is only dispersal between the OW and OE stocks and between the JW and JE stocks).

Note that *t*=0, the year for which catch limits might first be set, corresponds to 2013.

For computational ease, the numbers-at-age by sex are updated at the end of each year only, even though catching is assumed to occur from March to October. This simplification is unlikely to affect the results substantially for two reasons: (1) catches are at most only a few percent of the number of animals selected to the fisheries; 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.

$$b^j_t=B^jN^{\mathrm{f},j}_t\{1+A^j(1-(N^{\mathrm{f},j}_t/K^{\mathrm{f},j})^{z^j})\}\qquad\text{(C.1)}$$

where

B^j is the average number of births (of both sexes) per year for a mature female in stock *j* in the pristine population;

A^j is the resilience parameter for stock *j*;

z^j is the degree of compensation for stock *j*;

$N^{\mathrm{f},j}_t$ is the number of 'mature' females in stock *j* at the start of year *t*:

$$N^{\mathrm{f},j}_t=\sum_{a=a_m}^{x}N^{\mathrm{f},j}_{t,a}\qquad\text{(C.2)}$$

a_m is the age-at-first-parturition; and

$K^{\mathrm{f},j}$ is the number of mature females in stock *j* in the pristine (pre-exploitation, written as *t*=-∞) population:

$$K^{\mathrm{f},j}=\sum_{a=a_m}^{x}N^{\mathrm{f},j}_{-\infty,a}\qquad\text{(C.3)}$$

The values of the parameters A^j and z^j for each stock are calculated from the values for $MSYL^j$ and $MSYR^j$ (Punt, 1999). Their calculation assumes harvesting equal proportions of males and females.

D. Catches

The operating model considers two sources for non-natural mortality: direct catches and bycatches (which are also referred to as incidental catches). In future ($t \geq 2013$), the former are set by the RMP, while the latter are a function of abundance and future fishery effort. In cases in which the catch limit set by the RMP is less than the 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 (if any), the level of the commercial removals is taken to be the difference between the RMP catch limit and the best estimate of the incidental catch (see 'Future incidental catches' below).

Direct catches

The direct historical (pre-2013) catch series used are listed in Adjunct 1 and include both commercial and special permit catches. The baseline trials use the 'best' direct catch series and an alternative 'high' catch series is used in sensitivity trial 4. Sensitivity trials 8 and 9 test the effect of the method used to allocate historical catches between sub-areas 5 and 6W. The RMP will use the 'best' series in all trials. Consequently, the RMP will use what are in effect incorrect catches for trials 4, 8 and 9 in order to examine the implications of uncertainty about historical catches.

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.

$$C_{t,a}^{g,j} = \sum_k \sum_q F_t^{g,k,q} \sum_a V_{t,a}^{g,j,k,q} S_a^g \tilde{N}_{t,q,a}^{g,j} \tag{D.1}$$

$$F_t^{g,k,q} = \frac{C_t^{g,k,q}}{\sum_{j'} \sum_{a'} V_{t,a'}^{g,j',k,q} S_{a'}^g \tilde{N}_{t,q,a'}^{g,j'}} \tag{D.2}$$

where

$F_t^{g,k,q}$ is the exploitation rate in sub-area k on fully recruited ($S_a^g \to 1$) animals of gender g during month q of year t;

S_a^g is the selectivity on animals of gender g and age a :

$$S_a^g = (1 + e^{-(a - a_{50}^g)/\delta^g})^{-1} \tag{D.3}$$

$\tilde{N}_{t,q,a}^{g,j}$ is the number of animals of gender g and age a in stock j at the start of month q in year t after removal of catches in earlier months and after any bycatches have been removed;

a_{50}^g, δ^g are the parameters of the (logistic) selectivity ogive for gender g; and

$C_t^{g,k,q}$ is the catch of animals of gender g in sub-area k during month q of year t (see Adjunct 1 for the historical catches).

Each entry in the catch mixing matrix, $V_{t,a}^{g,k,q}$, is the fraction of males/females of age a from stock j 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 2 lists the catch mixing matrices considered. The matrices are based on the presence/absence matrices developed at the September 2010 workshop (IWC, 2012b) and give the relative fraction of an age-class in each of the sub-areas during the months March-October. Once the values of the parameters related to mixing rates (the γs – see section F) are specified (these are estimated separately for each trial and each replicate 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 parameters are selected to mimic available data (see Section F).

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 set by interpolating linearly between those for ages 4 and 10.

The trials model whale movements in the eight-months from March to October. In order to account for historical direct and incidental catches outside these months, all catches in January-March are modelled as being taken in March and the catches after October are assumed to have been taken in October. The historical direct catches by sex, sub-area, month and year are given in Adjunct 1. Details of the sources and construction of the catch data series are given in Allison (2011).

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

Sub-area	5	March to November (coastal whaling >60 n.miles offshore)
	6W	March to November (coastal whaling >30 n.miles offshore)
	7CS and 7CN	April to October (coastal/pelagic whaling outside 10 n.miles)
	7WR and 7E	April to October (pelagic whaling)
	8 and 9	April to October (pelagic whaling)
	11	August to October (coastal and pelagic whaling)

The future ($t \geq 2013$) commercial catches by sex, sub-area, month and year are calculated using the equation:

$$C_t^{g,k,q} = C_t^k Q^{g,k,q} \tag{D.4}$$

$Q^{g,k,q}$ is the fraction of the commercial catch in sub-area k of gender g which is taken during month q, the values of which are given in Table 1a; and

C_t^k is the commercial catch limit for sub-area k and year t ($t \geq 2013$). Note that C_t^k is equal to the catch limit set by the RMP less any 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 (e.g. Q is zero from April-July for sub-area 11). The non-zero entries in the Q matrix (see Table 1a) 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 and 9), the entries in the Q matrix are set using the entire historical commercial and scientific catch in these sub-areas. In some instances where regulations limited the commercial whaling season, the matrix entries have been adjusted using the special permit data.

Table 1a.

The Q matrix: the percentage of the future commercial 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. See text for description of how the entries are set.

Sub-area	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.
	Males								**Females**							
5	5.8	19.2	10.9	6.7	8.0	4.6	1.7	0.0	5.3	13.0	7.1	4.6	7.2	3.3	2.7	0.0
6W	0.2	1.9	14.8	11.4	5.5	2.0	8.9	9.9	0.2	0.9	13.3	9.8	3.4	1.2	8.4	8.2
7CS	-	24.3	21.5	10.1	4.8	0.8	0.3	0.0	-	21.7	12.6	2.8	0.7	0.3	0.0	0.0
7CN	-	0.0	0.8	7.9	15.1	14.9	23.2	15.1	-	0.1	0.3	4.8	6.7	3.4	5.1	2.5
7WR	-	1.1	47.9	30.9	3.2	1.1	1.1	0.0	-	0.0	9.6	2.1	3.2	0.0	0.0	0.0
7E	-	0.0	36.5	11.0	2.2	8.3	14.4	1.1	-	0.0	4.4	2.2	5.5	5.5	8.8	0.0
8	-	0.0	12.6	34.2	32.0	4.5	3.3	2.2	-	0.0	3.0	2.2	3.3	0.0	0.7	1.9
9	-	0.0	5.8	14.8	33.2	34.7	1.8	0.0	-	0.0	1.6	1.8	2.7	3.5	0.0	0.0
11	-	-	-	-	-	27.0	20.3	3.7	-	-	-	-	-	30.3	15.7	3.0
11 for Variant 10	-	-	10.4	18.1	-	-	-	-	-	-	36.5	35.0	-	-	-	-

The future commercial catches in sub-areas 7CS and 7CN are removed based on the mixing proportions from the offshore (>10 n.miles) samples only. Denote the modelled mixing proportion used when conditioning to be R^k as:

$$R^k = \sum_{t=1996}^{2007} P_{1+,t}^{J/JE,k} \Big/ \sum_j \sum_{t=1996}^{2007} P_{1+,t}^{j,k} \quad \text{where } P_{1+,t}^{j,k} \text{ is the average 1+ population of stock } j \text{ in sub-area } k \text{ in year } t.$$

The mixing proportions obtained from the offshore samples, $\tilde{R}^k$, are given in Table 2a. The proportion of J/JE-animals in some future year would normally be $P_{1+,t}^{J/JE,k} \big/ (P_{1+,t}^{J/JE,k} + P_{1+,t}^{O/OW,k})$. For sub-areas 7CS and 7CN in future this equation is adjusted to:

$$(\tilde{R}^k \neq R^k):\ \alpha^k P_{1+,t}^{J/JE,k} \big/ (\alpha^k P_{1+,t}^{J/JE,k} + P_{1+,t}^{O/OW,k}) \quad \text{where} \quad \alpha^k = \frac{(1-R^k)\tilde{R}^k}{(1-\tilde{R}^k)R^k} \qquad \text{(D4.a)}$$

The α^k factor is then applied to the recruited population from stock J/JE in sub-area k when setting the commercial catch by stock using equations D.1 and D.2.

In order to comply with RMP specifications regarding the sex ratio in catches (IWC, 1999), if the proportion, P_f, of females in the total direct catch (i.e. commercial and/or special permit) taken from a *Small Area* in the five years prior to the catch limit calculation exceeds 50%, the catch limits are adjusted downwards by the ratio $0.5/P_f$.

Incidental catches

Incidental catches of minke whales are known to occur off Japan (in sub-areas 1E, 2C, 6E, 7CS, 7CN, 10E and 11 and small numbers in 6W) and the Republic of Korea (sub-areas 5 and 6W and small numbers in 1W, 6E and 10W).

Japan: It has been obligatory to report bycatches in Japan since 2001 since when the bycatch numbers are considered to be reliable. Based on the sudden increase in reported bycatches in 2001, earlier bycatches are believed to be under-reported. In view of this, the relationship between bycatch and set-net effort is integrated into the conditioning process, with the advantage that the method is independent of the reporting rate prior to 2001. The reporting rate since 2001 is assumed to be constant at 100% (except in sensitivity trial 4 – see below).

Almost all of the reported bycatch off Japan occurred in set-net fisheries. Three types of set net are used off Japan: large-scale (excluding salmon nets), salmon nets and small scale. For fishing gears other than set-nets, incidental catch, retention and marketing of whales are prohibited by the 2001 regulation and a diagnostic DNA registry is used to deter illegal distribution of whales caught. Ideally, the catch by each gear type should be modelled separately to allow the historical (pre 2001) bycatch to be predicted. However, information on numbers of catches by net type is not available. Therefore the pre 2013 bycatches for each sub-area are set using the total number of incidental catch and the combined number of large-scale and salmon nets in each sub-area. For the best effort series, the number of nets from Japan is extrapolated from 1946 to 1969 assuming a linear relationship from 0 in 1935 to the known number in 1970 (Hakamada, 2010; Tobayama *et al.*, 1992). Incidental catches before 1946 are ignored because although some set-nets were in operation before 1946 (Brownell, pers. comm.) the numbers are highly uncertain and are sufficiently small that they are unlikely to effect the implementation. The years 2007-9 are excluded from the fitting as the number of nets is incomplete, and 2001 is excluded because the catch data are incomplete (as the new regulations date from June 2001). A high effort series is also generated, for use in sensitivity trial 4, in which the number of nets is double the best case values from 1946-1969, up to a maximum equal to the number of nets in 1969. In sensitivity trial 4 all bycatches are under-reported by a factor of 2.

Korea: The same method is used as for Japan above except the incidental catch numbers from 1996-2009 (sub-area 6W) and 2000-2009 (sub-area 5) are used to extrapolate backwards and the catch numbers are adjusted to allow for underreporting. The bycatches in sub-area 6W (the East Sea) are adjusted upward by a factor of 2. The factor 2 is based on DNA profiling and a capture-recapture analysis of market products which estimated a total of 887 whales going through Korean markets from 1999-2003, in comparison to the reported catch of 458 whales (Baker *et al.*, 2007). The base case assumes that the bycatches in the Yellow Sea (sub-area 5) are fully reported as there is no evidence that this is not the case. The 'high' effort series for sub-area 5 used in sensitivity trial 4 will apply the same estimate of under-reporting as for sub-area 6W (i.e. a factor of 2) and the number of nets is double the best case values from 1946-1969, up to a maximum equal to the number of nets in 1969.

To account for bycatch prior to 1996, the average for the *adjusted* takes are used to extrapolate backwards to 1946 based on fisheries effort using the same approach as for Japan. Incidental catches before 1946 are ignored as for Japan.

China: There are no data on incidental catches off China, although they are known to occur. The trials therefore consider two [essentially arbitrary] scenarios: (i) the incidental catches in sub-area 5 are multiplied by 3 (i.e. the incidental catch by China is twice that by Korea in sub-area 5); and (ii) incidental catches off China are ignored. The first of the options forms part of the base case specifications and the second is included in a sensitivity test (see trial 18) to determine the effects of the base case assumptions.

Allocation to sex and month: Bycatches by sex, sub-area (except for sub-areas 7CS and 7CN in future years), month and year are calculated using the equation:

$$C_{B,t}^{g,k,q} = C_{B,t}^{k}\, Q_B^{g,k,q} \tag{D.5}$$

$Q_B^{g,k,q}$ is the fraction of the by-catch in sub-area k which is taken during month q and gender g, the values of which are given in Table 1b; and

$C_{B,t}^{k}$ is the by-catch in sub-area k and year t (as estimated by the model).

Table 1b

QB matrix: the percentage of the incidental catch in sub-area *k* that is taken by sex and month.
The values are set using all the available bycatch data known by sub-area, sex and month. There is no incidental catch in the other sub-areas.

Sub-area	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Sample size
				Males								**Females**					
1E	18.6	14.0	0.0	4.7	0.0	0.0	0.0	4.7	20.9	2.3	9.3	7.0	7.0	2.3	0.0	9.3	43
2C	12.0	3.4	2.4	0.5	1.4	1.0	0.0	14.4	27.9	1.4	4.3	1.9	3.4	1.4	0.5	24.0	208
5	4.8	0.0	9.6	13.3	7.2	3.6	2.4	12.0	13.3	0.0	4.8	12.0	2.4	0.0	3.6	10.8	83
6W	10.3	5.4	5.7	5.1	3.1	2.5	5.1	14.4	11.3	5.6	6.4	7.2	2.0	1.6	1.8	12.5	610
6E	14.5	6.7	5.8	2.1	2.9	2.5	1.7	9.1	18.9	6.7	7.3	4.0	2.1	2.3	1.2	12.1	519
7CS	6.5	7.1	9.7	9.0	1.9	1.3	0.6	10.3	11.0	10.3	7.7	9.7	3.2	1.3	1.3	9.0	155
7CN	5.5	4.4	5.5	7.7	5.5	3.3	1.1	7.7	4.4	8.8	9.9	11.0	7.7	3.3	2.2	12.1	91
10E	0.0	0.0	0.0	0.0	0.0	0.0	0.0	41.7	0.0	0.0	0.0	8.3	0.0	0.0	0.0	50.0	12
11	0.00	0.00	0.00	0.00	0.00	0.00	5.41	29.73	0.00	0.00	16.22	16.22	2.70	0.00	0.00	29.73	37

Table 2a

Time invariant fixed proportions of J/JE-stock whales used in removing **future commercial catches** from sub-areas 7CS and 7CN for each for Hypothesis, based on the mixing proportions from the offshore samples (>10nm) only The values are set using data from 1996-2007.

Hypothesis	Stocks	Trials	Sub-area	Months	Sample size	mtDNA proportion	SE	Sample size	Allele proportion	SE	Weighted mean
A & B	J & O	A & B	7CS	Apr	76	0.166	0.047	76	0.214	0.028	0.201
A & B	J & O	A & B	7CS	May	99	0.159	0.040	99	0.215	0.024	0.200
A & B	J & O	A & B	7CS	Jun-Sep	52	0.027	0.025	52	0.080	0.029	0.050
A & B	J & O	A & B	7CN	Apr-Jun	96	0.067	0.032	96	0.058	0.021	0.061
A & B	J & O	A & B	7CN	Jul-Dec	320	0.084	0.018	318	0.128	0.012	0.114
C	JE & OW	C	7CS	Apr-May	175	0.166	0.038	175	0.229	0.018	0.217
C	JE & OW	C	7CS	Jun-Sep	52	0.035	0.037	52	0.088	0.030	0.067
C	JE & OW	C	7CN	Apr-Jun	96	0.000	0.001	96	0.001	0.000	0.001
C	JE & OW	C	7CN	Jul-Dec	320	0.071	0.020	318	0.145	0.013	0.123
C23	J & OW	C23	7CS	Apr-May	175	0.136	0.030	175	0.231	0.018	0.206
C23	J & OW	C23	7CS	Jun-Sep	52	0.022	0.024	52	0.088	0.030	0.048
C23	J & OW	C23	7CN	Apr-Jun	96	0.000	0.001	96	0.000	0.000	0.000
C23	J & OW	C23	7CN	Jul-Dec	320	0.060	0.016	318	0.141	0.013	0.109
C24	JE & O	C24	7CS	Apr-May	175	0.186	0.036	175	0.210	0.018	0.205
C24	JE & O	C24	7CS	Jun-Sep	52	0.028	0.028	52	0.065	0.029	0.046
C24	JE & O	C24	7CN	Apr-Jun	96	0.085	0.042	96	0.054	0.021	0.060
C24	JE & O	C24	7CN	Jul-Dec	320	0.097	0.022	318	0.122	0.013	0.116

A different limit was used in sub-area 7CN in June for the definition of the pure OW-stock for Hypothesis C, because there were 3 June SP samples at distances 8.81, 9.67 and 9.82n.miles which proponents considered to be from the OW-stock. When considering all months (June-Oct) for which SP data is available in sub-area 7CN, there are 19 data points between 8.8nm and 10nm. (These data points are not used in >10n.mile analyses.) When considering all months (April-June with 4 samples from Aug and 1 sample in Sep) for which SP data are available in sub-area 7CS, there are 32 data points between 8.8n.miless and 10n.miles.

To avoid a proliferation of sub-areas and to avoid the need for finer time-steps than month, the probability of the bycatch in sub-areas 7CS and 7CN being one of the two stocks in the sub-area is assumed to be time-invariant while the incidental catches in sub-areas other than 7CS and 7CN are apportioned to stock and age class in the same way as for the commercial catches (i.e. using Equations D.1 and D.2 but assuming that the bycatch is taken uniformly from all age classes (the selectivity=1)). The bycatches in 7CS and 7CN are split to stock using mixing proportions calculated from the weighted average of the mixing proportions obtained from mtDNA haplotype and microsatellite allele bycatch samples, as listed in the final column of Table 2b.

Table 2b

Time invariant fixed proportions of J/JE-stock whales used in removing bycatch from sub-areas 7CS and 7CN.

Hypothesis	Trials	Sub-area	Months	mtDNA Proportion	SE	Allele Proportion	SE	Weighted Mean
A & B	A & B	7CS	Jan.-Apr	0.419	0.086	0.440	0.041	0.44
A & B	A & B	7CS	May	0.160	0.078	0.168	0.047	0.17
A & B	A & B	7CS	Jun.-Oct.	0.645	0.067	0.664	0.030	0.66
A & B	A & B	7CN	Jan.-Jun.	0.477	0.071	0.507	0.033	0.50
A & B	A & B	7CN	Jul.-Oct.	0.758	0.074	0.680	0.036	0.69
C	C	7CS	Jan.-May	0.375	0.088	0.356	0.032	0.36
C	C	7CS	Jun.-Dec.	0.696	0.078	0.646	0.032	0.65
C	C	7CN	Jan.-Mar.					1.00[1]
C	C	7CN	Apr.-Jun.	0.486	0.095	0.426	0.037	0.43
C	C	7CN	Jul.-Dec.	0.764	0.091	0.670	0.036	0.68
C	C23	7CS	Jan.-May	0.280	0.069	0.348	0.032	0.34
C	C23	7CS	Jun.-Dec.	0.652	0.073	0.661	0.031	0.66
C	C23	7CN	Jan.-Mar.					1.00[1]
C	C23	7CN	Apr.-Jun.	0.396	0.080	0.441	0.037	0.43
C	C23	7CN	Jul.-Dec.	0.707	0.082	0.693	0.036	0.70
C31	31	7CN	Jan.-Jun.	0.569	0.087	0.480	0.035	0.49

The historical bycatch model: The historical bycatch $C^k_{B,t}$ in sub-area k in year t is given by:

$$C^k_{B,t} = A^k\, P^k_t E^k_t \tag{D.6}$$

where A^k is the bycatch constant, E^k_t is the number of nets in sub-area k in year t and P^k_t is the total population (including calves) in sub-area k in year t averaged over all 8 time periods. In trial 25, the abundance P^k_t in equation D.6 is replaced by $\sqrt{(P^k_t)}$ in order to test a different assumption for the relationship between bycatch and abundance and the impact of possible saturation effects. The values of the bycatch constants are set by fitting during the conditioning process (see section F). The recent by catches and the numbers of set-nets by type, year and area are listed in Adjunct 1. Further details are given in Annex H of IWC (2012a).

Future bycatches: Future bycatches by sub-area (except in sub-areas 7CS and 7CN) are generated assuming that the exploitation rate due to bycatch in the future equals that estimated for the trial in question for the most recent five-years of data used in the conditioning process, i.e.:

$$C^k_{B,t} = \bar{F}^k\, P^k_t \tag{D.7}$$

where $C^k_{B,t}$ is the by-catch in sub-area k in year t, P^k_t is the total population (including calves) in sub-area k in year t averaged over all 8 time periods (March-October), and $\bar{F}^k$ is the average exploitation rate (sum over years of bycatch divided by the sum over years of P^k_t) over the last five years of the period used for conditioning (2002-06 for sub-areas off Japan and 2005-09 for those off Korea) i.e F is reset for each of the 100 simulations within a trial. Thus the future bycatch by sex, month and sub-area is given by:

$$C^{g,k,q}_{B,t} = Q^{g,k,q}_B \bar{F}^k\, P^k_t \tag{D.7a}$$

For trial 25, the abundance P^k_t in equation D.7a is replaced by $\sqrt{(P^k_t)}$.

To avoid possible dis-proportionate bycatches of J/JE- to O/OW-stock whales, equation (D.7a) is replaced with (D.7b) in sub-areas 7CS and 7CN.

$$C^{g,k,q}_{B,t} = \tilde{P}^{k,q}_t \bar{F}^k Q^{g,k,q}_B \tag{D.7b}$$

where $\tilde{P}^{k,q}_t$ is the availability-weighted population size in sub-area k during month q:

$$\tilde{P}^{k,q}_t = (P^{k,q,J/E}_t + \lambda^{k,q} P^{k,q,O/OW}_t)\frac{\bar{P}^{k,q,J/JE} + \bar{P}^{k,q,O/OW}}{\bar{P}^{k,q,J/JE} + \lambda^{k,q}\bar{P}^{k,q,O/OW}} \tag{D.8}$$

where $\bar{P}^{k,q,j}$ is the average population (including calves) of stock j in sub-area k during month q over the last five years of the period used for conditioning;

[1]This proportion corresponded to the original assumption of no OW-stock in 7CN in Jan-Mar. Trial C31 tests sensitivity to alternative mixing proportions corresponding to this assumption.

$P_t^{k,q,j}$ is the total population (including calves) of stock *j* in sub-area *k* during month *q* of year *t*;

$\lambda^{k,q}$ is a relative availability factor for J/JE whales relative to O/OW whales:

$$\lambda^{k,q} = \frac{(1-\ddot{P}^{k,q})}{\ddot{P}^{k,q}} \frac{\overline{P}^{k,q,J/JE}}{\overline{P}^{k,q,O/OW}} \quad \text{(D.9)}$$

$\ddot{P}^{k,q}$ is the weighted mean proportion of stock J/JE in sub-area k during month q (as given in Table 2b).

This catch is allocated to stock as follows:

$$C_{B,t}^{g,k,q,J/JE} = \frac{P_t^{g,k,q,J/JE}}{\lambda^{k,q} P_t^{g,k,q,O/OW} + P_t^{g,k,q,J/JE}} C_{B,t}^{g,k,q} \quad \text{(D.10a)}$$

$$C_{B,t}^{g,k,q,O/OW} = \frac{\lambda^{k,q} P_t^{g,k,q,O/OW}}{\lambda^{k,q} P_t^{g,k,q,O/OW} + P_t^{g,k,q,J/JE}} C_{B,t}^{g,k,q} \quad \text{(D.10b)}$$

where $P_t^{g,k,q,j}$ is the total population (including calves) of animals of gender *g* from stock *j* in sub-area *k* during month *q* of year *t*.

Reported bycatches

A single series of historical bycatches will be used for all of the trials when applying the RMP (i.e. for calculating catch limits), irrespective of the true values of the bycatches, which differ both among trials and simulations within trials. The estimate of the bycatches used by the *CLA* will be set to the averages of the predicted bycatches based on the fit to the actual data[2] of the operating model for the six baseline trials (i.e. using the 'best fit' simulation (0)). The series is given in Adjunct 2, Table 9.

The future by-catches used when applying the RMP are the true by-catches in all sub-areas[3], except for trial 4 (in which the estimated by-catches are in error to reflect the under-estimation of bycatch inherent in these trials) and trial 18 (in which the bycatch by China is taken to be zero).

E. Generation of data

The plan for future sightings surveys is listed in Tables 3a and 3b. Surveys will be conducted by Japan in sub-areas 6E, 7CS, 7CN, 7WR, 7E, 8, 9, 10W, 10E, 11, 12SW and 12N and by Korea from mid-April to late-May in sub-areas 5 and 6W.

The estimates of absolute abundance (and their associated CVs) for the years prior to 2012 provided to the *CLA* are given in Table 4a. To allow for results of surveys already conducted, but for which the results are not yet available, estimates of abundance are generated for surveys listed for 2011 in sub-area 5 and 2012 in sub-area 6W using the same method as for future estimates.

Table 3a

List of past and planned future sighting surveys of minke whales to the West of Japan.

-=No survey, 1=survey (% coverage). All surveys are carried out in April-May except the historic surveys in 6E, 10W and 10E which were in May-June. For areas that are combinations of sub-areas, the last three columns specify how the survey estimates for the component sub-areas are combined.

	5	6W	6E	10W	10E	C1=6W,6E,10W	C2=6W,6E,10W,10E	C3=5,6W,6E,10W,10E
2000	-	1 (14.3%)	-	-	-	-	-	-
2001	1 (13%)	-	-	-	-	- (see [1])	- (see [1])	- (see [1])
2002	-	1 (14.3%)	1 (79.1%)	-	1 (100%)	-	-	-
2003	-	1 (14.3%)	1(79.1%)	-	1 (100%)	-	-	-
2004	1 (13%)	-	1(79.1%)	-	-	-	-	-
2005	-	1 (14.3%)	-	-	1 (64.6%)	-	-	-
2006	-	1 (14.3%)	-	1 (59.9%)	-	-	-	-
2007	-	1 (14.3%)	-	-	-	1 = 2003-10	1 = 2003-10	1 = 2003-11
2008	1 (13%)	-	-	-	-	-	-	-
2009	-	1 (14.3%)	-	-	-	-	-	-
2010	-	1 (14.3%)	-	-	-	-	-	-
2011	1	-	-	-	-	-	-	-
2012	-	1	-	-	-	-	-	-
2013	1	-	-	-	-	-	-	-
2014	1	-	-	-	-	1 = 2012-15	1 = 2012-15	1 = 2012-15
2015	-	1	1(79.1%)	1(59.9%)	1(100%)	-	-	-
2016	-	1	-	-	-	-	-	-
2017	1	-	-	-	-	-	-	-
2018	1	-	-	-	-	1 = 2016-19	1 = 2016-19	1 = 2016-19
2019	-	1	1(79.1%)	1(59.9%)	1(100%)	-	-	-
2020	-	1	-	-	-	-	-	-
2021	1	-	-	-	-	-	-	-
2022	1	-	-	-	-	1 = 2020-23	1 = 2020-23	1 = 2020-23
2023	-	1	1(79.1%)	1(59.9%)	1(100%)	-	-	-

Continue in future in the same pattern.

(1) There is no 10W estimate for inclusion in the combination estimates for 2000-02, so a combination estimate is not generated in this period.

(2) Abundance estimates will be generated for all surveys from 2011 on.

(3) The 2003-11 surveys are combined in combinations C1, C2 and C3 so that the most recent surveys in 5 and 6W are used in the 2012 assessment.

[2]In the case of sub-area 6W the actual data is the *adjusted* bycatch data.

[3]Including sub-area 6W since the best estimate of bycatches in this area is the adjusted figure.

Table 3b

List of past and planned future sighting surveys of minke whales to the North and East of Japan.
-=No survey, 1=survey (% coverage). All surveys are carried out in August-September unless otherwise noted.
For areas that are combinations of sub-areas, the last four columns specify how the survey estimates for the component sub-areas are combined.

	7CS	7CN	7WR	7E	8	9	11	12SW	12NE	C4=7,8	C5 = 7WR,7E,8	C6 = 7,8,9,11	C7 = 7,8,9,11,12
1990	-	-	-	-	1 (61.8%)	1 (35.0%)	1 (100%)	1 (100%)	1 (100%)	-	-	-	-
1991	1*	1	1	-	-	-	-	-	-	1 =90-91	1 =90-91	1 =90-91	1 =90-92
1992	-	-	-	-	-	-	-	-	1 (89.4%)	-	-	-	-
1999	-	-	-	-	-	-	1 (100%)	-	1 (63.8%)	-	-	-	-
2000	-	-	-	-	-	-	-	-	-	-	-	-	-
2001	-	-	-	-	-	-	-	-	-	-	-	-	-
2002	-	-	-	-	1 (Jn-Jl 65.0%)*	-	-	-	-	-	-	-	-
2003	-	-	1 (My-Jn 26.7%)	-	-	1 (Jl-S 33.2%)	1 (33.9%)	1 (100%)	1 (46.0%)	1 =02-04	1 =02-04	1 =99-04	1 =99-04
2004	1 (My 36.7%)	-	1 (My-Jn 88.8%)	1 (My-Jn 57.1%)	1 (Jn 40.5%)	-	-	-	-	-	-	-	-
2005	-	-	-	-	1 (My-Jl 65.0%)	-	-	-	-	-	-	-	-
2006	1 (J-J 100%)	-	-	1 (My-Jn 57.1%)	1 (My-Jl 65.0%)	-	-	-	-	1 =05-07	1 =05-07	- (see[8])	- (see[8])
2007	-	-	1 (Jn-Jl 88.8%)	1 (Jn-Jl 65.0%)*	1 (Jn-Jl 65.0%)	-	1 (20.2%)	-	-	-	-	-	-
2008	-	-	-	-	-	-	-	-	-	-	-	-	-
2009	-	-	-	-	-	-	-	-	-	-	-	-	-
2010	-	-	-	-	-	-	-	-	-	-	-	-	-
2011	-	-	-	-	-	-	-	-	-	-	-	-	-
2012	1[5](My-Jn)	1[5](My-Jn)	-	-	-	-	-	-	-	-	-	-	-
		1 (Au-Se)								-	-	-	-
2013	-	-	1 (88.8%)	1 (57.1%)	1 (100%)	1 (100%)	-	-	-	1=12-3	1=2013	1=12-14	1=12-14
2014	-	-	-	-	-	-	1 (30.1%)	1 (48.9%)	1 (46.4%)	-	-	-	-
2015	-	-	-	-	-	-	-	-	-	-	-	-	-
2016	1 (100%)	1 (75.4%)	0	0	0	0	-	-	-	-	-	-	-
2017	-	-	1 (88.8%)	1 (57.1%)	1 (100%)	1 (100%)	-	-	-	1=16-17	1=2017	1=16-18	1=16-18
2018	-	-	-	-	-	-	1 (30.1%)	1 (48.9%)	1 (46.4%)	-	-	-	-
2019	-	-	-	-	-	-	-	-	-	-	-	-	-
2020	1 (100%)	1 (75.4%)	-	-	-	-	-	-	-	-	-	-	-
2021	-	-	1 (88.8%)	1 (57.1%)	1 (100%)	1 (100%)	-	-	-	1=20-21	1=21	1=20-22	1=20-22
2022	-	-	-	-	-	-	1 (30.1%)	1 (48.9%)	1 (46.4%)	-	-	-	-
2023	-	-	-	-	-	-	-	-	-	-	-	-	-

*Abundance estimate=0.

(4) Future coverage in 7CN, 7WR and 7E is expected to be similar to above (because of territorial issues). Coverage in 8 and 9 assumes that future surveys include the Russian EEZ. Future coverage in 11 and 12SW (of 30.1% and 48.9% respectively) excludes areas in the Russian EEZ which cannot be surveyed until the resolution of territorial issues with Japan. Future coverage in 12NE (of 46.4) reflects the area which cannot be surveyed in the North and East because of Russian restrictions.

(5) The 2012 estimates will be made available a year early – this will be effected by assuming the 2012 surveys occurred in 2011 and so are available in 2013 to set the catch limits for 2013-8.

(6) The abundance estimates set for the combined areas in 1990-92 assume a zero contribution from 7E as there is no available estimate for 7E to include.

(7) The abundance estimates set for combined areas C4 and C5 in 2005-07 assume a zero contribution from 7CN as there is no 7CN estimate to include.

(8) There are no 2005-2011 abundance estimates for sub-areas 9 and 12 to include in combination estimates C6 and C7; no C6 or C7 estimates are generated in this period.

Table 4a

List of historical abundance estimates for use by the *CLA* (*= zero estimate – see text and Table 4b).
Further details are given in Table 6 of Annex D1 (this volume, pp.126-127).

Year	SubA	Period	Est.	CV	Year	SubA	Period	Est.	CV	Year	SubA	Period	Est.	CV
2001	5	Apr.-May	1,534	0.523	2002	10E	May-Jun.	816	0.658	1990	8	Aug.-Sep.	1,057	0.705
2004	5	Apr.-May	799	0.321	2003	10E	May-Jun.	405	0.566	2002	8	Jun.-Jul.	63.6*	0.603
2008	5	Apr.-May	680	0.372	2005	10E	May-Jun.	599	0.441	2004	8	Jun.	1,093	0.576
2000	6W	Apr.-May	549	0.419	1991	7CS	Aug.-Sep.	42*	0.603	2005	8	May-Jul.	132	1.047
2002	6W	Apr.-May	391	0.614	2004	7CS	May	504	0.291	2006	8	May-Jul.	309	0.677
2003	6W	Apr.-May	485	0.343	2006	7CS	Jun.-Jul.	3,690	1.199	2007	8	Jun.-Jul.	391	1.013
2005	6W	Apr.-May	336	0.317	2012	7CS	May-Jun.	890	0.393	1990	9	Aug.-Sep.	8,264	0.396
2006	6W	Apr.-May	459	0.516	1991	7CN	Aug.-Sep.	853	0.23	2003	9	Jul.-Sep.	2,546	0.276
2007	6W	Apr.-May	574	0.437	2012	7CN	Sep.	398	0.507	1990	11	Aug.-Sep.	2,120	0.449
2009	6W	Apr.-May	884	0.286	1991	7WR	Aug.-Sep.	311	0.23	1999	11	Aug.-Sep.	1,456	0.565
2010	6W	Apr.-May	1,014	0.397	2003	7WR	May-Jun.	267	0.700	2003	11	Aug.-Sep.	882	0.820
2002	6E	May-Jun.	891	0.608	2004	7WR	May-Jun.	863	0.648	2007	11	Aug.-Sep.	377	0.389
2003	6E	May-Jun.	935	0.357	2007	7WR	Jun.-Jul.	546	0.953	1990	12SW	Aug.-Sep.	5,244	0.806
2004	6E	May-Jun.	727	0.372	2004	7E	May-Jun.	440	0.779	2003	12SW	Aug.-Sep.	3,401	0.409
2006	10W	May-Jun.	2,476	0.312	2006	7E	May-Jun.	247	0.892	1990	12NE	Aug.-Sep.	10,397	0.364
					2007	7E	Jun.-Jul.	52.6*	0.603	1992	12NE	Aug.-Sep.	11,544	0.380
										1999	12NE	Aug.-Sep.	5,088	0.377
										2003	12NE	Aug.-Sep.	13,067	0.287

The sightings mixing matrix for a year in which a survey takes place is the average of the catch mixing matrices over the two survey months in that year (April-May for surveys to the west of Japan or August-September for the remainder). 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 6(a). The future estimates of abundance for a *Small Area* (say *Small Area E*) are generated using the formula:

$$\hat{P} = PYw/\mu = P^* \beta^2 Yw \tag{E.1}$$

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 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 the *Small Area* (E) over the survey period:

$$P = P_t^E = \frac{1}{2}\sum_{k\in F}\ \sum_{q\in SurveyPeriod}\ \sum_j\ \sum_g \sum_{a=1}^{x}\left(V_{t,a}^{g,j,k,q} N_{t,a}^{g,j}\right) \tag{E.2}$$

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 CV2(ab) ≅ CV2(a) + CV2(b): $E(\hat{P}) \cong P$ and $CV^2(\hat{P}) \cong \alpha^2 + \beta^2 P^*/P$

For consistency with the first stage screening trials for a single stock (IWC, 1991, p.109; 1994, pp.85-86), the ratio $\alpha^2:\beta^2 = 0.12:0.025$, so that:

$$CV(\hat{P}) = \tau(0.12 + 0.025P^*/P)^{1/2} \tag{E.3}$$

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

$$\sqrt{(\alpha^2+\beta^2)} = 0.38\tau \tag{E.4}$$

The values of τ applicable to each sub-area are calculated separately for each replicate once the conditioning has been accomplished by substituting the true value of the CV for each abundance estimate used in conditioning (Table 6a)[4] and the corresponding model depletion level into equation E.3. 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.

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

$$X_t = \sqrt{(\sigma_t^2 \chi^2/n)} \tag{E.5}$$

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*.

The trials will be based on the use of two alternative values for *g(0)* in the conditioning process: *g(0)* = 0.798[5] (the base case value) and *g(0)*=1 (trial 03) (IWC, 2012a, p.417; Okamura *et al.*, 2010). When *g(0)* = 0.798 the values of the operating model abundances are multiplied by this factor when setting the future survey estimates of abundance.

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 2012 would first be used for setting the catch limit in 2014. Table 4 lists the pattern for future surveys and also shows how results of surveys from different sub-areas are combined for use in variants in which *Small Areas* are comprised of more than one sub-areas. If a *Small Area* is comprised of sub-areas that are surveyed in different years, the combination 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. For example, for the management variant in which the RMP sets a catch limit for the combined 6W+6E+10W+10E area, an estimate dated 2007 will be generated using of the abundances from the constituent sub-areas for 2003 to 2010 for combinations C1 and C2 (and from 2003-11 for combination C3).

In cases where a zero abundance estimate occurs (either in the historical series or in the generated future estimates), a fixed standard deviation of 0.603 is assumed, and the zero estimate is replaced by a value which depends on the what the population estimates would have been for recent surveys in the areas had there been only one minke whale sighting made. Specifically, the averages taken over such population estimates are calculated separately for each of the surveys listed and then scaled by 42/98.6 as given in Table 4b. Details of the rationale are given in Annex G (this volume, p.504)[6].

---

[4]Excluding zero, minimum and maximum estimates and those assumed to apply to adjacent areas, except for sub-areas 5 and 6W where the pooled minimum values are used.

[5]This value of *g*(0) is rounded to 0.8 in the trial simulations.

[6]The approach is based on that for the zero abundance estimate obtained in sub-area 7CS in 1991 for which there was a final output negative log – likelihood component of P/98.6 where P is the true abundance present. This form was replaced by a negative log-likelihood based on the assumption of a log-normally distributed pseudo estimate, which as with the Poisson form would yield a value of 1when P = 98.6. Since this is not sufficient to define this likelihood term unambiguously, the mean was fixed at 42 (Adams, 1995) which resulted in a standard deviation of 0.603.

Table 4b

Population estimates which replace any zero estimates in the historical series or which are generated in future.
A default value of 42 is used to replace a future zero estimate generated in any other sub-area.

Sub-area	6E			10E			10W	7CS	7CN		7WR		7E	8		11	
Season	2002	2003	2004	2002	2003	2005	2006		1991	1992	1991	1992	2006	2006	2007	2003	2007
n	21	19	7	10	7	9	36		11	6	1	2	2	3	2	10	19
P	891	935	727	816	405	599	2,477		976	730	188	434	247	309	391	882	377
Scaled	18.1	21.0	44.2	34.8	24.6	28.4	29.3		37.8	51.8	80.1	92.4	52.6	43.9	83.3	37.6	8.5
Average	27.8			29.3			29.3	42.0	44.8		86.3		52.6	63.6		23.0	

F. Parameter values and conditioning

The biological parameters (natural mortality, age-at-maturity) and the technological parameters (selectivity) will be the same as for the previous *Implementation* (IWC, 1992a, p.160) (based on those for N Atlantic minke whales, IWC, 1992b, p.249)[7] i.e.:

Table 5

The values for the biological and technological parameters that are fixed.

Parameter	Value
Plus group age, x	20 years
Age-at-first-parturition, a_m	$m_{50} = 7$; $\sigma_m = 1.2$; first age at which a female can be mature is three
Selectivity: males and females	$r_{50} = 4$; $\sigma_r = 1.2$
Maximum Sustainable Yield Level, *MSYL*	0.6 in terms of mature female component of the population

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

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

The MSYR scenarios are specified in Section G.

The 'free' parameters of the above model are the initial (pre-exploitation) sizes of each of the stocks, the values that determine the mixing matrices (i.e. the γ parameters), the bycatch constants (A_k) and the dispersion rates between OW- and OE- stock and between the JW- and JE-stocks in trials C16-17. The process used to select the 'free' parameters is known as conditioning. The conditioning process involves first generating 100 sets of 'target' data as detailed in steps (a) and (b) below, and then fitting the population model to each (in the spirit of a bootstrap). 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 2013 in order to obtain values of abundance etc. for comparison with the generated data[8]. (When performing the projections, the direct catches from each sub-area are set to their historical values – Adjunct 1 and the bycatches are set as detailed below).

The information used in the conditioning process is as follows.

(a) Abundance estimates

The target values for the historical abundance by sub-area (excepting for the minimum and maximum values – see below) are generated using the formula:

$$P_t^k = O_t^k \exp[\mu_t^k - (\sigma_t^k)^2/2] \qquad \mu_t^k \sim N[0;(\sigma_t^k)^2] \tag{F.1}$$

P_t^k is the abundance for sub-area k in year t (or sub-areas 7E+8 for the 2007 abundance estimate)

O_t^k is the actual survey estimate for sub-area k in year t (see Table 6a); and

σ_t^k is the CV of O_t^k.

The abundance estimate for sub-area 8 in 2002 is zero. The value of O_t^k is set to 0 for all trials when fitting to this datum, and the likelihood is assumed to be normal rather than log-normal.

The trials are based on the two alternative values for $g(0)$ in the conditioning process: $g(0)=0.8$ [9](the base case value) and g $g(0)=1$ (IWC, 2012a, p.417; Okamura *et al.*, 2010). When $g(0)=0.8$ the values of the operating model abundances (P_t^k) are multiplied by this factor for comparison with the conditioning targets.

[7]The values are consistent with the results from JARPN. Japanese scientists advised that the above approach is appropriate given the well-known practical difficulties in using earplugs for age determination of North Pacific common minke whales. However, they also noted that technical advances mean that it may be possible to obtain age estimates in the future (see Item 2.1, this volume, p.492).

[8]In order to check that the conditioning exercise has been successfully achieved, plots such as those shown in IWC (2003, pp.473-80) will be examined, together with time-trajectories of the fraction of each stock in each sub-area.

[9]The value of 0.8 used for $g(0)$has been rounded from value of 0.798 given in IWC (2012a, p.417).

Table 6a

Abundance data used to condition the trials.

Sub-area	Year	Season	Survey type[10]	Mode[11]	Areal coverage (%)	STD estimate[12]	CV[13]	Conditioning	Source
5	2001	Apr.-May	KD	NC	13.0	1,534	0.523	Min	An *et al.* (2010)
	2004	Apr.-May	KD	NC	13.0	799	0.321	Min	Ditto
	2008	Apr.-May	KD	NC	13.0	680	0.372	Min	Ditto
6W	2000	Apr.-May	KD	NC	14.3	549	0.419	Min	Ditto
	2002	Apr.-May	KD	NC	14.3	391	0.614	Min	Ditto
	2003	Apr.-May	KD	NC	14.3	485	0.343	Min	Ditto
	2005	Apr.-May	KD	NC	14.3	336	0.317	Min	Ditto
	2006	Apr.-May	KD	NC	14.3	459	0.516	Min	Ditto
	2007	Apr.-May	KD	NC	14.3	574	0.437	Min	Ditto
	2009	Apr.-May	KD	NC	14.3	884	0.286	Min	Ditto
6E	2002	May-Jun.	JD	NC	79.1	891	0.608	Yes (see #)	Miyashita (2010)
	2003	May-Jun.	JD	NC	79.1	935	0.357	Yes (see #)	Ditto
	2004	May-Jun.	JD	NC	79.1	727	0.372	Yes (see #)	Ditto
7CS	2004	May	JR	NC	100.0	886	0.502	Yes	Hakamada and Kitakado (2010) (rev)
	2006	Jun.-Jul.	JR	NC	100.0	3,690	1.199	Yes	Hakamada and Kitakado (2010) (rev)
7CN	2003	May	JR	NC	75.4	184	0.805	Yes	Hakamada and Kitakado (2010) (rev)
7WR	2003	May-Jun.	JR	NC	54.2	524	0.700	Min	Hakamada and Kitakado (2010) (rev)
	2004	May-Jun.	JR	NC	88.8	863	0.648	Yes	Hakamada and Kitakado (2010) (rev)
	2007	Jun.-Jul.	JR	NC	88.8	546	0.953	Yes	Hakamada and Kitakado (2010) (rev)
7E	2004	May-Jun.	JR	NC	57.1	440	0.779	Yes	Hakamada and Kitakado (2010) (rev)
	2006	May-Jun.	JR	NC	57.1	247	0.892	Yes	Hakamada and Kitakado (2010) (rev)
8	1990	Aug.-Sep.	JD	NC	61.8	1,057	0.705	Yes	IWC (2004, p.124)
	2002	Jun.-Jul.	JR	NC	65.0	0	482[14]	Yes	Hakamada and Kitakado (2010) (rev)
	2004	Jun.	JR	NC	40.5	1,093	0.576	Yes	Ditto
	2005	May-Jul.	JR	NC	65.0	132	1.047	Yes	Ditto
	2006	May-Jul.	JR	NC	65.0	309	0.677	Yes	Ditto
7E+8	2007	Jun.-Jul.	JR	NC	65.0	391[15]	1.013	Yes	Ditto
9	1990	Aug.-Sep.	JD	NC	35.0	8,264	0.396	Yes	IWC (2004, p.124)
	2003	Jul.-Sep.	JR	NC	33.2	2,546	0.276	Min	Hakamada and Kitakado (2010) (rev)
9N	2005	Aug.-Sep.	JD	IO-PS	67.8	420	0.969	Yes	Extract from Miyashita and Okamura (2011)
10W	2006	May-Jun.	JD	IO-PS	59.9	2,476	0.312	Yes	Ditto
10E	2002	May-Jun.	JD	NC	100.0	816	0.658	Yes	Miyashita (2010)
	2003	May-Jun.	JD	NC	100.0	405	0.566	Yes	Ditto
	2004	May-Jun.	JD	NC	100.0	474	0.537	Yes	Ditto
	2005	May-Jun.	JD	NC	100.0	666	0.444	Yes	Ditto
11	1990	Aug.-Sep.	JD	NC	100.0	2,120	0.449	Yes	IWC (2004, p.124)
	1999	Aug.-Sep.	JD	NC	100.0	1,456	0.565	Yes	Ditto
	2003	Aug.-Sep.	JD	IO-AC	33.9	882	0.820	Yes	Extract from Miyashita and Okamura (2011)
	2007	Aug.-Sep.	JD	IO-PS	20.2	377	0.389	Min	Ditto
12SW	1990	Aug.-Sep.	JD	NC	100.0	5,244	0.806	Yes	IWC (2004, p.124)
	2003	Aug.-Sep.	JD	IO-AC	100.0	3,401	0.409	Yes	Extract from Miyashita and Okamura (2011)
12NE	1990	Aug.-Sep.	JD	NC	100.0	10,397	0.364	Yes	IWC (2004, p.124) extract from SC/46/NP6
	1999	Aug.-Sep.	JD	NC	89.4	11,544	0.380	Yes	Ditto
	2003	Aug.-Sep.	JD	IO-AC	46.0	13,067	0.287	Yes	Extract from Miyashita and Okamura (2011)
# Trial 19: Use estimates in full area in 2002 & 2003 (originally 100% coverage) and one extrapolated to the full area in 2004 (79.1% coverage)									
6E	2002	May-Jun	JD	NC	100.0	1,795	0.458	Yes	Miyashita (2010)
	2003	May-Jun	JD	NC	100.0	1,059	0.322	Yes	Ditto
	2004	May-Jun	JD	NC	100.0	919	0.372	Yes	Ditto
Trial 20: Use only in sensitivity as an estimate extrapolated to the full area									
10E	2007	May-Jun	JD	IO-PS	100.0	552	0.159	Yes	From Miyashita

Table 6b

The minimum and maximum abundance estimates used.

Sub-area	Year	Season		STD estimate	CV	Minimum = Mean-SE	Maximum = Mean*5
5	2004	Apr.-May	Pooled	848	0.220	661	4,240
6W	2005	Apr.-May	Pooled	533	0.144	456	2,665
7WR	2003	May-Jun.		524	0.700	157	n/a
9	2003	Jul.-Sep.		2,546	0.276	1,843	n/a
11	2007	Aug.-Sep.		377	0.389	230	n/a
2R	2009	Aug.-Sep.		-	-	-	500[16]

[10]KD=Korean dedicated survey, JD=Japanese dedicated survey, JR=JARPN II.
[11]NC=Normal-closing, IO-PS=Passing with IO mode, IO-AC=Abeam-closing with IO mode. (STD estimates by different modes, NC, IO-AC, IO-NC, are considered comparable.).
[12]Standard (STD) estimate based on 'Top and Upper bridge', which will be corrected by estimate of $g(0)$ for the combined platform 'Top and Upper bridge'.
[13]CV does not consider any process errors.
[14]Average of the SEs for the non-zero estimates.
[15]The estimate of 0 from sub-area 7E was combined with the estimate of 391 from sub-area 8.
[16]A maximum abundance of 500 whales in sub-area 2R in August-September 2009 is imposed in hypothesis C to avoid undesirably high numbers of animals in this area.

MINIMUM ABUNDANCE ESTIMATES

The levels of abundance listed in Table 6(a) for sub-areas 5 and 6W, and for sub-areas 7WR and 9 in 2003 and sub-area 11 in 2007 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 a value that is one standard error below the specified values. The values are listed in Table 6(b). Where there is more than one estimate for a sub-area, the estimates for the area were pooled using inverse variance weighting. The minimum estimate is the same across all replicates.

MAXIMUM ABUNDANCE ESTIMATES

Bounds need to be placed on the maximum size of populations in sub-areas 5 and 6W. These bounds are generated by multiplying the inverse variance weighted minimum (i.e. the 848 and 533) by 5 (see Table 6b). The maximum estimate is the same across all replicates.

There is insufficient information in the trials to estimate the abundance in sub-areas 5 and 6W, given the absence of a population estimate (only a minimum and a maximum given). Thus, for stochastic trials, the conditioning process will fit to a low variance (CV=0.1) pseudo-estimate of abundance for sub-area 5 and for sub-area 6 which are drawn from a uniform distribution across [minimum; maximum] for each of the 100 simulated projections within each trial. For 'deterministic' projections, the conditioning will fit to (maximum+minimum)/2. Trials 21, 22, 29 and 30 investigate sensitivities to the baseline assumptions and replace the random draws above by a fixed value for the sub-area 5 abundance equal to either the 'minimum' or 'maximum' estimate (Trials 21 and 22) or by a fixed value for the sub-area 6W abundance equal to either the 'minimum' or 'maximum' estimate (Trials 29 and 30).

(b) Proportion estimates

Estimates of the proportion of recruited 'J', 'JW', 'JE' and 'OW' stock whales in sub-areas 2C, 6W, 7CS, 7CN, 7WR and 11 (see Adjunct 3 for how these proportions are estimated) are generated from appropriately truncated normal distributions that correspond to the observed data and are based on mtDNA and other genetic information (see Table 7). 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. A minimum standard error for the mixing proportions of 0.05 was imposed so as to prevent a few of the mixing proportions from dominating the conditioning processes – see IWC (2012c, p.106).

The genetics data provide two proportion estimates for most sub-area / time periods: one from the mtDNA haplotypes and another from the microsatellite alleles. These estimates are used separately i.e. both go in the likelihood, with their standard errors, so that effectively the overall likelihood will combine them under inverse variance weighting. There is some non-independence here because the same animals are involved, but this is not seen as a major problem.

(c) Fixed stock proportion in sub-area 12SW

The data for sub-area 12SW is limited and so the proportion of J-stock (JW-stock for hypothesis C) in sub-area 12SW in June is fixed at 20% in the base case trials. The value reflects a rough average of the J-stock mixing proportions for sub-area 11 (J-stock animals in sub-area 12SW need to pass through sub-area 11). Since the proportions for sub-area 11 are calculated from the 1984-1999 data, the 20% will be taken as an average over these same years. Sensitivity trials test different levels of the 12SW proportion. In trial 10 the proportion is 10 % (with 0% J/JW-stock in 12NE as for the base case) and in trial 11 the proportion is 30% (with 10% J/JW-stock in 12NE in the same months/years; the mixing matrix is adjusted accordingly).

In addition, the proportion of OE:OW-stock in sub-area 12SW in June from 1984-1999 is set equal to that in sub-area 11 (excluding trials 13 and 14).

(d) Fixed stock proportion in sub-area 9 and 9N

The data for sub-area 9 is also limited. For sensitivity trials 2 and 12 which assume a C-stock that mixes with the O-stock (OE-stock for hypothesis C) in 9 and 9N, the proportion of O/OE-stock is assumed to be 0.5 during August and September in 1995. This is based on the ratio assumed in 9W in 2003. For hypothesis C trial 2 the same proportion is also assumed in 12NE in August and September 1995 (but not in trial 12).

(e) Dispersal rate

The model allows dispersal between the OW- and OE-stocks and between the JW- and JE-stocks (trials 16 and 17). To ensure equilibrium in the pristine population:

$$K^{1+,\mathrm{OW}} D^{\mathrm{OW,OE}} = K^{1+,\mathrm{OE}} D^{\mathrm{OE,OW}} \quad \text{and} \quad K^{1+,\mathrm{JW}} D^{\mathrm{JW,JE}} = K^{1+,\mathrm{JE}} D^{\mathrm{JE,JW}} \tag{F.2}$$

where
$$K^{1+,j} = \sum_{a=1}^{x} (N^{m,j}_{-\infty,a} + N^{f,j}_{-\infty,a}) \tag{F.3}$$

Table 7a

Estimates of the proportion of recruited 'J', 'JE', 'JW', and 'OE' whales used to condition the trials unless otherwise specified in Tables 7b and 7c.

Hypothesis	Area	Years	Months	Sex	Ratio	CV[17]	Data Type	Stock	
A & B	2C	2002-07	Jan.-Mar.	M+F	0.868	0.05	mtDNA	J:Total	Bycatch samples
A & B	2C	2002-07	Jan.-Mar.	M+F	0.853	0.05	Allelle	J:Total	Bycatch samples
A & B	2C	2002-07	Apr.-Jun.	M+F	0.660	0.095	mtDNA	J:Total	Bycatch samples
A & B	2C	2002-07	Apr.-Jun.	M+F	0.648	0.05	Allelle	J:Total	Bycatch samples
A & B	2C	2001-07	Jul.-Dec.	M+F	0.923	0.05	mtDNA	J:Total	Bycatch samples
A & B	2C	2001-07	Jul.-Dec.	M+F	0.920	0.05	Allelle	J:Total	Bycatch samples
A & B	7CS	2002-07	Jan.-Apr.	M+F	0.161	0.05	mtDNA	J:Total	5/60 BC+55/60SP samples[18]
A & B	7CS	2002-07	Jan.-Apr.	M+F	0.198	0.05	Allelle	J:Total	5/60 BC + 55/60SP samples
A & B	7CS	2001-07	May	M+F	0.191	0.05	mtDNA	J:Total	5/60 BC + 55/60SP samples
A & B	7CS	2001-07	May	M+F	0.225	0.05	Allelle	J:Total	5/60 BC + 55/60SP samples
A & B	7CS	2000-07	Jun.-Dec.	M+F	0.077	0.05	mtDNA	J:Total	5/60 BC + 55/60SP samples
A & B	7CS	2000-07	Jun.-Dec.	M+F	0.128	0.05	Allelle	J:Total	5/60 BC + 55/60SP samples
A & B	7CN	1999-2007	Jan.-Jun.	M+F	0.098	0.05	mtDNA	J:Total	5/60 BC + 55/60SP samples
A & B	7CN	1999-2007	Jan.-Jun.	M+F	0.090	0.05	Allelle	J:Total	5/60 BC + 55/60SP samples
A & B	7CN	1996-2007	Jul.-Dec.	M+F	0.176	0.05	mtDNA	J:Total	5/60 BC + 55/60SP samples
A & B	7CN	1996-2007	Jul.-Dec.	M+F	0.216	0.05	Allelle	J:Total	5/60 BC + 55/60SP samples
A & B	11	1984-86	Apr.-May	M	0.175	0.099	mtDNA	J:Total	Comml samples
A & B	11	1984-99	Jun.-Sep.	M	0.201	0.054	mtDNA	J:Total	Comml & SP samples
A & B	11	1984-99	Jun.-Sep.	M	0.327	0.050	Allelle	J:Total	Comml & SP samples
A & B	11	1984-87	Apr.	F	0.645	0.069	mtDNA	J:Total	Comml samples
A & B	11	1984-87	May	F	0.013	0.05	mtDNA	J:Total	Comml samples
A & B	11	1984-99	Jun.-Sep.	F	0.245	0.056	mtDNA	J:Total	Comml & BC & SP samples
A & B	11	1984-99	Jun.-Sep.	F	0.390	0.05	Allelle	J:Total	Comml & BC & SP samples
B	6W	1999-2007	Jan.-Mar.	M+F	0.584	0.131	mtDNA	J:Total	Bycatch samples
B	6W	1999-2007	Jan.-Mar.	M+F	0.672	0.05	Allelle	J:Total	Bycatch samples
B	6W	1999-2007	Apr.-Jun.	M+F	0.496	0.126	mtDNA	J:Total	Bycatch samples
B	6W	1999-2007	Apr.-Jun.	M+F	0.812	0.05	Allelle	J:Total	Bycatch samples
B	6W	1999-2007	Jul.-Aug.	M+F	1.000	0.05	mtDNA	J:Total	Bycatch samples
B	6W	1999-2007	Jul.-Aug.	M+F	0.749	0.077	Allelle	J:Total	Bycatch samples
B	6W	1999-2007	Sep.-Dec.	M+F	0.593	0.123	mtDNA	J:Total	Bycatch samples
B	6W	1999-2007	Sep.-Dec.	M+F	0.761	0.05	Allelle	J:Total	Bycatch samples
C	2C	2002-07	Jan.-Mar.	M+F	0.960	0.05	mtDNA	JE:Total	Bycatch samples
C	2C	2002-07	Jan.-Mar.	M+F	0.840	0.05	Allelle	JE:Total	Bycatch samples
C	2C	2002-07	Apr.-Jun.	M+F	0.721	0.103	mtDNA	JE:Total	Bycatch samples
C	2C	2002-07	Apr.-Jun.	M+F	0.672	0.05	Allelle	JE:Total	Bycatch samples
C	7CS	2001-07	Jan.-May	M+F	0.188	0.050	mtDNA	JE:Total	5/60 BC + 55/60SP samples
C	7CS	2001-07	Jan.-May	M+F	0.234	0.050	Allelle	JE:Total	5/60 BC + 55/60SP samples
C	7CS	2000-07	Jun.-Dec.	M+F	0.089	0.050	mtDNA	JE:Total	5/60 BC + 55/60SP samples
C	7CS	2000-07	Jun.-Dec.	M+F	0.139	0.050	Allelle	JE:Total	5/60 BC + 55/60SP samples
C	7CN	1999-2007	Apr.-Jun.	M+F	0.041	0.050	mtDNA	JE:Total	5/60 BC + 55/60SP samples
C	7CN	1999-2007	Apr.-Jun.	M+F	0.036	0.050	Allelle	JE:Total	5/60 BC + 55/60SP samples
C	7CN	1996-2007	Jul.-Dec.	M+F	0.173	0.050	mtDNA	JE:Total	5/60 BC + 55/60SP samples
C	7CN	1996-2007	Jul.-Dec.	M+F	0.230	0.050	Allelle	JE:Total	5/60 BC + 55/60SP samples
C	11	1984-6	Apr.-May	M	0.180	0.099	mtDNA	JW:Total	Comml samples
C	11	1984-1999	Jun.-Sep.	M	0.204	0.054	mtDNA	JW:Total	Comml & SP samples
C	11	1984-1999	Jun.-Sep.	M	0.316	0.050	Allelle	JW:Total	Comml & SP samples
C	11	1984-87	Apr.	F	0.628	0.073	mtDNA	JW:Total	Comml samples
C	11	1984-87	May	F	0.023	0.050	mtDNA	JW:Total	Comml samples
C	11	1984-99	Jun.-Sep.	F	0.254	0.056	mtDNA	JW:Total	Comml & BC & SP samples
C	11	1984-99	Jun.-Sep.	F	0.367	0.050	Allelle	JW:Total	Comml & BC & SP samples
C	11	1984-86	Apr.-May	M	0.000	0.050	mtDNA	OW:Total	Comml samples
C	11	1984-99	Jun.-Sep.	M	0.114	0.142	mtDNA	OW:Total	Comml & SP samples
C	11	1984-99	Jun.-Sep.	M	0.032	0.095	Allelle	OW:Total	Comml & SP samples
C	11	1984-87	Apr.	F	0.147	0.117	mtDNA	OW:Total	Comml samples
C	11	1984-87	May	F	0.290	0.173	mtDNA	OW:Total	Comml samples
C	11	1984-99	Jun.-Sep.	F	0.062	0.132	mtDNA	OW:Total	Comml & BC & SP samples
C	11	1984-99	Jun.-Sep.	F	0.018	0.106	Allelle	OW:Total	Comml & BC & SP samples
C	6W	1999-2007	Jan.-Mar.	M+F	0.584	0.131	mtDNA	JW:Total	Bycatch samples
C	6W	1999-2007	Jan.-Mar.	M+F	0.672	0.05	Allelle	JW:Total	Bycatch samples
C	6W	1999-2007	Apr.-Jun.	M+F	0.496	0.126	mtDNA	JW:Total	Bycatch samples
C	6W	1999-2007	Apr.-Jun.	M+F	0.812	0.05	Allelle	JW:Total	Bycatch samples
C	6W	1999-2007	Jul.-Aug.	M+F	1.000	0.05	mtDNA	JW:Total	Bycatch samples
C	6W	1999-2007	Jul.-Aug.	M+F	0.749	0.077	Allelle	JW:Total	Bycatch samples
C	6W	1999-2007	Sep.-Dec.	M+F	0.593	0.123	mtDNA	JW:Total	Bycatch samples
C	6W	1999-2007	Sep.-Dec.	M+F	0.761	0.05	Allelle	JW:Total	Bycatch samples
C	7WR	1996-2007	Apr.-Aug.	M+F	0.327	0.149	mtDNA	OW:Total	SP samples
C	7WR	1996-2007	Apr.-Aug.	M+F	0.195	0.085	Allele	OW:Total	SP samples

[17]In cases when the sample size used to generate the proportion estimates is small and the se's are small (which will overweight such results), the standard error is set to 0.05.

[18]The mixing proportions in sub-areas 7CS and 7CN are based on the bycatch samples and the offshore samples, with weights of 5/60 and 55/60 respectively. Although most of the bycatch occurs within 2 n.miles of the coast, the density of minke whales is highest closest to coast and there will be movement between inshore and offshore. The weight of 5/60 places higher weight on the mixing proportions from the bycatch samples than the area where bycatch occurs would (i.e. a weight of 2/60) to reflect these considerations.

Table 7b

Alternative proportions of recruited 'J', "JE', 'JW', and 'OE' whales used to condition trials 06 and 07.
The mixing proportion in 7CS, 7CN is calculated using a 2/60 weight for the bycatch for trial 06 and using a 10/60 weight for trial 07.

Hypothesis	Trial	Area	Years	Months	Sex	Ratio	CV	Data Type	Stock	
A & B	06	7CS	2002-07	Jan.-Apr	M+F	0.147	0.05	mtDNA	J:Total	2/60 BC + 58/60SP samples
A & B	06	7CS	2002-07	Jan.-Apr.	M+F	0.185	0.05	Allelle	J:Total	2/60 BC + 58/60SP samples
A & B	06	7CS	2001-07	May	M+F	0.193	0.05	mtDNA	J:Total	2/60 BC + 58/60SP samples
A & B	06	7CS	2001-07	May	M+F	0.228	0.05	Allelle	J:Total	2/60 BC + 58/60SP samples
A & B	06	7CS	2000-07	Jun.-Dec	M+F	0.046	0.05	mtDNA	J:Total	2/60 BC + 58/60SP samples
A & B	06	7CS	2000-07	Jun.-Dec	M+F	0.099	0.05	Allelle	J:Total	2/60 BC + 58/60SP samples
A & B	06	7CN	1999-2007	Jan.-Jun.	M+F	0.078	0.05	mtDNA	J:Total	2/60 BC + 58/60SP samples
A & B	06	7CN	1999-2007	Jan.-Jun.	M+F	0.067	0.05	Allelle	J:Total	2/60 BC + 58/60SP samples
A & B	06	7CN	1996-2007	Jul.-Dec.	M+F	0.144	0.05	mtDNA	J:Total	2/60 BC + 58/60SP samples
A & B	06	7CN	1996-2007	Jul.-Dec.	M+F	0.191	0.05	Allelle	J:Total	2/60 BC + 58/60SP samples
C	06	7CS	2001-07	Jan.-May	M+F	0.178	0.050	mtDNA	JE:Total	2/60 BC + 58/60SP samples
C	06	7CS	2001-07	Jan.-May	M+F	0.227	0.050	Allelle	JE:Total	2/60 BC + 58/60SP samples
C	06	7CS	2000-07	Jun.-Dec.	M+F	0.056	0.050	mtDNA	JE:Total	2/60 BC + 58/60SP samples
C	06	7CS	2000-07	Jun.-Dec.	M+F	0.111	0.050	Allelle	JE:Total	2/60 BC + 58/60SP samples
C	06	7CN	1999-2007	Apr.-Jun.	M+F	0.016	0.050	mtDNA	JE:Total	2/60 BC + 58/60SP samples
C	06	7CN	1999-2007	Apr.-Jun.	M+F	0.014	0.050	Allelle	JE:Total	2/60 BC + 58/60SP samples
C	06	7CN	1996-2007	Jul.-Dec.	M+F	0.141	0.050	mtDNA	JE:Total	2/60 BC + 58/60SP samples
C	06	7CN	1996-2007	Jul.-Dec.	M+F	0.206	0.050	Allelle	JE:Total	2/60 BC + 58/60SP samples
A & B	07	7CS	2002-07	Jan.-Apr.	M+F	0.185	0.05	mtDNA	J:Total	10/60 BC + 50/60SP samples
A & B	07	7CS	2002-07	Jan.-Apr.	M+F	0.220	0.05	Allelle	J:Total	10/60 BC + 50/60SP samples
A & B	07	7CS	2001-07	May	M+F	0.188	0.05	mtDNA	J:Total	10/60 BC + 50/60SP samples
A & B	07	7CS	2001-07	May	M+F	0.220	0.05	Allelle	J:Total	10/60 BC + 50/60SP samples
A & B	07	7CS	2000-07	Jun.-Dec.	M+F	0.128	0.05	mtDNA	J:Total	10/60 BC + 50/60SP samples
A & B	07	7CS	2000-07	Jun.-Dec.	M+F	0.177	0.05	Allelle	J:Total	10/60 BC + 50/60SP samples
A & B	07	7CN	1999-2007	Jan.-Jun.	M+F	0.133	0.05	mtDNA	J:Total	10/60 BC + 50/60SP samples
A & B	07	7CN	1999-2007	Jan.-Jun.	M+F	0.128	0.05	Allelle	J:Total	10/60 BC + 50/60SP samples
A & B	07	7CN	1996-2007	Jul.-Dec.	M+F	0.229	0.05	mtDNA	J:Total	10/60 BC + 50/60SP samples
A & B	07	7CN	1996-2007	Jul.-Dec.	M+F	0.258	0.05	Allelle	J:Total	10/60 BC + 50/60SP samples
C	07	7CS	2001-07	Jan.-May	M+F	0.205	0.050	mtDNA	JE:Total	10/60 BC + 50/60SP samples
C	07	7CS	2001-07	Jan.-May	M+F	0.245	0.050	Allelle	JE:Total	10/60 BC + 50/60SP samples
C	07	7CS	2000-07	Jun.-Dec.	M+F	0.144	0.050	mtDNA	JE:Total	10/60 BC + 50/60SP samples
C	07	7CS	2000-07	Jun.-Dec.	M+F	0.185	0.050	Allelle	JE:Total	10/60 BC + 50/60SP samples
C	07	7CN	1999-2007	Apr.-Jun.	M+F	0.081	0.050	mtDNA	JE:Total	10/60 BC + 50/60SP samples
C	07	7CN	1999-2007	Apr.-Jun.	M+F	0.071	0.050	Allelle	JE:Total	10/60 BC + 50/60SP samples
C	07	7CN	1996-2007	Jul.-Dec.	M+F	0.227	0.050	mtDNA	JE:Total	10/60 BC + 50/60SP samples
C	07	7CN	1996-2007	Jul.-Dec.	M+F	0.270	0.050	Allelle	JE:Total	10/60 BC + 50/60SP samples

Table 7c

Alternative proportions of recruited 'J', 'JE', and 'JW' whales used to condition trials 13, 14, 15, 23 and 24.
(Note: trial 24 is a low plausibility trial but the proportions are included here for completeness)

Hypothesis	Trial	Area	Years	Months	Sex	Ratio	CV	Data Type	Stock	
C	13	11	1984-86	Apr.-May	M	0.180	0.099	mtDNA	JW:Total	Comml samples
C	13	11	1984-99	Jun.-Sep.	M	0.212	0.054	mtDNA	JW:Total	Comml & SP samples
C	13	11	1984-99	Jun.-Sep.	M	0.317	0.050	Allelle	JW:Total	Comml & SP samples
C	13	11	1984-87	Apr.	F	0.654	0.068	mtDNA	JW:Total	Comml samples
C	13	11	1984-87	May	F	0.032	0.050	mtDNA	JW:Total	Comml samples
C	13	11	1984-99	Jun.-Sep.	F	0.256	0.055	mtDNA	JW:Total	Comml & BC & SP samples
C	13	11	1984-99	Jun.-Sep.	F	0.368	0.050	Allelle	JW:Total	Comml & BC & SP samples
C	14	11	1984-86	Apr.-May	M	0.126	0.103	mtDNA	JW:Total	Comml samples
C	14	11	1984-99	Jun.-Sep.	M	0.181	0.054	mtDNA	JW:Total	Comml & SP samples
C	14	11	1984-99	Jun.-Sep.	M	0.346	0.050	Allelle	JW:Total	Comml & SP samples
C	14	11	1984-87	Apr.	F	0.610	0.075	mtDNA	JW:Total	Comml samples
C	14	11	1984-87	May	F	0.024	0.050	mtDNA	JW:Total	Comml samples
C	14	11	1984-99	Jun.-Sep.	F	0.249	0.058	mtDNA	JW:Total	Comml & BC & SP samples
C	14	11	1984-99	Jun.-Sep.	F	0.399	0.050	Allelle	JW:Total	Comml & BC & SP samples
C	23	2C	2002-07	Jan.-Mar.	M+F	0.875	0.05	mtDNA	J:Total	Bycatch samples
C	23	2C	2002-07	Jan.-Mar	M+F	0.868	0.05	Allelle	J:Total	Bycatch samples
C	23	2C	2002-07	Apr.-Jun.	M+F	0.656	0.102	mtDNA	J:Total	Bycatch samples
C	23	2C	2002-07	Apr.-Jun.	M+F	0.661	0.05	Allelle	J:Total	Bycatch samples
C	23	7CS	2001-07	Jan.-May	M+F	0.154	0.050	mtDNA	J:Total	5/60 BC + 55/60SP samples
C	23	7CS	2001-07	Jan.-May	M+F	0.232	0.050	Allelle	J:Total	5/60 BC + 55/60SP samples
C	23	7CS	2000-07	Jun.-Dec.	M+F	0.074	0.050	mtDNA	J:Total	5/60 BC + 55/60SP samples
C	23	7CS	2000-07	Jun.-Dec.	M+F	0.138	0.050	Allelle	J:Total	5/60 BC + 55/60SP samples
C	23	7CN	1999-2007	Apr.-Jun.	M+F	0.033	0.050	mtDNA	J:Total	5/60 BC + 55/60SP samples

Cont.

Hypothesis	Trial	Area	Years	Months	Sex	Ratio	CV	Data Type	Stock	
C	23	7CN	1999-2007	Apr.-Jun.	M+F	0.037	0.050	Allelle	J:Total	5/60 BC + 55/60SP samples
C	23	7CN	1996-2007	Jul.-Dec.	M+F	0.148	0.050	mtDNA	J:Total	5/60 BC + 55/60SP samples
C	23	7CN	1996-2007	Jul.-Dec.	M+F	0.227	0.050	Allelle	J:Total	5/60 BC + 55/60SP samples
C	23	11	1984-86	Apr.-May	M	0.180	0.099	mtDNA	J:Total	Comml samples
C	23	11	1984-99	Jun.-Sep.	M	0.204	0.054	mtDNA	J:Total	Comml & SP samples
C	23	11	1984-99	Jun.-Sep.	M	0.316	0.050	Allelle	J:Total	Comml & SP samples
C	23	11	1984-87	Apr.	F	0.628	0.073	mtDNA	J:Total	Comml samples
C	23	11	1984-87	May	F	0.023	0.050	mtDNA	J:Total	Comml samples
C	23	11	1984-99	Jun.-Sep.	F	0.254	0.056	mtDNA	J:Total	Comml & BC & SP samples
C	23	11	1984-99	Jun.-Sep.	F	0.367	0.050	Allelle	J:Total	Comml & BC & SP samples
C	23	11	1984-86	Apr.-May	M	0.000	0.050	mtDNA	OW:Total	Comml samples
C	23	11	1984-99	Jun.-Sep.	M	0.114	0.142	mtDNA	OW:Total	Comml & SP samples
C	23	11	1984-99	Jun.-Sep.	M	0.032	0.095	Allelle	OW:Total	Comml & SP samples
C	23	11	1984-87	Apr.	F	0.147	0.117	mtDNA	OW:Total	Comml samples
C	23	11	1984-87	May	F	0.290	0.173	mtDNA	OW:Total	Comml samples
C	23	11	1984-99	Jun.-Sep.	F	0.062	0.132	mtDNA	OW:Total	Comml & BC & SP samples
C	23	11	1984-99	Jun.-Sep.	F	0.018	0.106	Allelle	OW:Total	Comml & BC & SP samples
C	24	2C	2002-07	Jan.-Mar.	M+F	0.920	0.05	mtDNA	JE:Total	Bycatch samples
C	24	2C	2002-07	Jan.-Mar.	M+F	0.834	0.05	Allelle	JE:Total	Bycatch samples
C	24	2C	2002-07	Apr.-Jun.	M+F	0.699	0.097	mtDNA	JE:Total	Bycatch samples
C	24	2C	2002-07	Apr.-Jun.	M+F	0.662	0.05	Allelle	JE:Total	Bycatch samples
C	24	7CS	2001-07	Jan.-May	M+F	0.207	0.050	mtDNA	JE:Total	5/60 BC + 55/60SP samples
C	24	7CS	2001-07	Jan.-May	M+F	0.215	0.050	Allelle	JE:Total	5/60 BC + 55/60SP samples
C	24	7CS	2000-07	Jun.-Dec.	M+F	0.080	0.050	mtDNA	JE:Total	5/60 BC + 55/60SP samples
C	24	7CS	2000-07	Jun.-Dec.	M+F	0.116	0.050	Allelle	JE:Total	5/60 BC + 55/60SP samples
C	24	7CN	1999-2007	Apr.-Jun.	M+F	0.111	0.050	mtDNA	JE:Total	5/60 BC + 55/60SP samples
C	24	7CN	1999-2007	Apr.-Jun.	M+F	0.082	0.050	Allelle	JE:Total	5/60 BC + 55/60SP samples
C	24	7CN	1996-2007	Jul.-Dec.	M+F	0.198	0.050	mtDNA	JE:Total	5/60 BC + 55/60SP samples
C	24	7CN	1996-2007	Jul.-Dec.	M+F	0.213	0.050	Allelle	JE:Total	5/60 BC + 55/60SP samples
C	24	11	1984-86	Apr.-May	M	0.175	0.099	mtDNA	JW:Total	Comml samples
C	24	11	1984-99	Jun.-Sep.	M	0.201	0.054	mtDNA	JW:Total	Comml & SP samples
C	24	11	1984-99	Jun.-Sep.	M	0.327	0.050	Allelle	JW:Total	Comml & SP samples
C	24	11	1984-87	Apr.	F	0.645	0.069	mtDNA	JW:Total	Comml samples
C	24	11	1984-87	May	F	0.013	0.050	mtDNA	JW:Total	Comml samples
C	24	11	1984-99	Jun.-Sep.	F	0.245	0.056	mtDNA	JW:Total	Comml & BC & SP samples
C	24	11	1984-99	Jun.-Sep.	F	0.390	0.050	Allelle	JW:Total	Comml & BC & SP samples

(f) Calculation of likelihood

The likelihood function consists of three components: Likelihood = -2 (L_1+L_2+L_3) Equations F.4-6 list the negative of the logarithm of the objective function for each of the three components:

ABUNDANCE ESTIMATES

$$L_1 = 0.5\sum_n \frac{1}{(\sigma_t^k)^2} \ln\left(P_n / \hat{P}_n\right)^2 \tag{F.4}$$

where $\hat{P}_n$ is the model estimate of the abundance in the same year, period and sub-area as the *n*th estimate of abundance P_n.

STOCK PROPORTIONS

$$L_2 = 0.5\sum_n \frac{1}{(\sigma_n^k)^2}\left(p_n^k - \hat{p}_n^k\right)^2 \tag{F.5}$$

where $\hat{p}_n$ is the model estimate of the proportion of whales in the same year, period and sub-area as the *n*th proportion estimate P_n.

BYCATCH ESTIMATES

$$L_3 = 0.5\sum_n \left(B_n^k - \hat{B}_n^k\right)^2 / 10 \tag{F.6}$$

where $\hat{B}_n^k$ is the model estimate of the total bycatch in sub-area *k* over the years being fitted and B_n^k is the observed bycatch in the same area and period.

G. Trials

The set of trials is given in Table 8. The sensitivity trials are variants of the base-case trials A01-1 etc. (see section A).

Table 8

The list of Trials (Trial 24 is assigned low plausibility and so is crossed through).

Stock hypothesis	Trial no.	MSYR	Mix matrix	Description
A	A01-1 & A01-4	1% & 4%	See Adjunct 2	Baseline A: 2 stocks ('J' and 'O'); g(0) = 0.8; including Chinese bycatch
B	B01-1 & B01-4	1% & 4%	See Adjunct 2	Baseline B: 3 stocks ('J', 'O', and 'Y'); g(0) = 0.8; including Chinese bycatch
C	C01-1 & C01-4	1% & 4%	See Adjunct 2	Baseline C: 5 stocks ('JW', 'JE', 'OW', 'OE', and 'Y'); g(0) = 0.8; including Chinese bycatch
AC	A02-1 etc	1% / 4%	See Adjunct 2	With a 'C' stock
ABC	A03-1 etc	1% / 4%	Baseline	Assume g(0) = 1
ABC	A04-1 etc	1% / 4%	Baseline	High direct catches + alternative Korean & Japanese bycatch level
ABC	A05-1 etc	1% / 4%	See Adjunct 2	Some 'O' or 'OW' animals in sub-area 10E. The mixing matrices will be modified such that the proportion of O/OW-stock in 10E is ~30% of that in 7CN in all months. Note: the small no. (9) of genetic samples in 10E (Oct-Dec) precludes mixing proportions being estimated for 10E.
ABC	A06-1 etc	1% / 4%	Baseline	Mixing proportion in 7CS and 7CN calculated using 2/60 weight for bycatch
ABC	A07-1 etc	1% / 4%	Baseline	Mixing proportion in 7CS and 7CN calculated using 10/60 weight for bycatch
ABC	A08-1 etc	1% / 4%	Baseline	More Korean catches in sub-area 5 (and fewer in 6W). Rationale: the baseline uses the best split. Trials 8 and 9 test alternatives in both directions.
ABC	A09-1 etc	1% / 4%	Baseline	More Korean catches in sub-area 6W (and fewer in 5)
ABC	A10-1 etc	1% / 4%	Baseline	10% J (/ JW) -stock in sub-area 12SW in June (base case value = 25%). See section F(c).
ABC	A11-1 etc	1% / 4%	See Adjunct 2	30% J (/ JW) -stock in sub-area 12SW in June (base case value = 25%). See section F(c).
C	C12-1 & 4	1% / 4%	See Adjunct 2	No 'C' animals in sub-area 12NE
C	C13-1 & 4	1% / 4%	See Adjunct 2	No 'OW' in 11 or 12 SW. (OW & OE whales mix with JW in 11 & 12 SW in the baseline C trials).
C	C14-1 & 4	1% / 4%	See Adjunct 2	No 'OE' in 11 or 12 SW
C	C15-1 & 4	1% / 4%	See Adjunct 2	No 'OE' in 7WR. (OE & OW whales mix in 7WR from Apr-Sep, while OW whales are present year round in the baseline C trials)
C	C16-1 & 4	1% / 4%	Baseline	Dispersal rate of 0.005 between the OW and OE & the JW and JE stocks
C	C17-1 & 4	1% / 4%	Baseline	Dispersal rate of 0.02 between the OW and OE & the JW and JE stocks
ABC	A18-1 etc	1% / 4%	Baseline	Chinese incidental catch = 0 (the base case value = twice that of Korea in sub-area 5)
ABC	A19-1 etc	1% / 4%	Baseline	Alternative abundance estimates in 6E (see table 6a)
ABC	A20-1 etc	1% / 4%	See Adjunct 2	Additional abundance estimate in 10E in 2007 (see table 6a)
ABC	A21-1 etc	1% / 4%	See Adjunct 2	Abundance estimate in 5 = 'minimum' value listed in Table 6b, with a CV=0.1. See section F(a). (The baseline fits to a low variance pseudo-estimate of abundance drawn from U[minimum : maximum] where the 'minimum' and 'maximum' values are those listed in Table 6b).
ABC	A22-1 etc	1% / 4%	Baseline	Abundance estimate in 5 = 'maximum' value listed in Table 6b (= 5 * baseline value), with a CV=0.1
C	C23-1 & 4	1% / 4%	See Adjunct 2	Single J-stock (with pure J-stock definition using 6E (all months))
~~C~~	~~C24-1 & 4~~	~~1% / 4%~~	~~See Adjunct 2~~	~~Single O-stock (with pure O-stock definition using 7WR, 7E and 8 (all months))~~
ABC	A25-1 etc	1% / 4%	Baseline	The number of bycaught animals is proportional to the square-root of abundance rather than to abundance (in order to examine the impact of possible saturation effects)
AB	A26-1 etc	1% / 4%	See Adjunct 2	A substantially larger fraction of whales ages 1-4 from O-stock are found in sub-areas 2R, 3 and 4 year-round (so the proportion of 1-4 whales in sub-area 9 is closer to expectations given the length-frequencies of catches from sub-area 9). The mixing matrices are adjusted such that the numbers of age 1-4 of O-stock animals in sub-area 9 and 9N are no more than half the base case numbers; juveniles will be allowed into sub-areas 2R, 3 and 4 in the corresponding months.
ABC	A27-1 etc	1% / 4%	See Adjunct 2	Set the proportion of O/OE animals of ages 1-4 in sub-area 9 and 9N to zero and allow the abundance in sub-areas 7CS and 7CN to exceed the abundance estimates for these sub-areas. Projections for this sub-area will need to account for the implied survey bias
ABC	A28-1 etc	1% / 4%	See Adjunct 2	The number of 1+ whales in 2009 in sub-area 2C in any month < 200 (if large numbers of whales were found in 2C, the historical catch would be expected to be much greater).
ABC	A29-1 etc	1% / 4%	See Adjunct 2	Abundance estimate in 6W = 'minimum' value listed in Table 6b, with a CV=0.1. See section F(a). (The baseline fits to a low variance pseudo-estimate of abundance drawn from U[minimum : maximum] where the 'minimum' and 'maximum' values are those listed in Table 6b).
ABC	A30-1 etc	1% / 4%	See Adjunct 2	Abundance estimate in 6W = 'maximum' value listed in Table 6b (= 5 * baseline value), with a CV=0.1
C	C31-1 etc	1% / 4%	Baseline	Alternative time invariant proportion of JE-stock whales in 7CN in Jan-Jun used to remove bycatch (see Table 2b)

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 RMP variants include specifications regarding the *Small Areas* (combinations of sub-areas), the use of the capping and cascading options of the RMP, and when and where harvesting will occur. The initial set of RMP variants to be considered in the trials and the sub-areas from which catches are taken when a *Small Area* consists of more than one sub-area are:

(1) *Small Areas* equal sub-areas. For this option, the *Small Areas* for which catch limits would be set are 5, 6W, 7CS, 7CN, 7WR, 7E, 8, 9*, and 11.

(2) 5, 6W, 7+8, 9*, and 11 are *Small Areas* and catches are taken from sub-areas 5, 6W, 7CN, 9, and 11.

(3) 5, 6W, 7+8, 9*, and 11 are *Small Areas* and catches are taken from sub-areas 5, 6W, 7CS, 9, and 11.

(4) 5, 6W, 7CS, 7CN, 7WR+7E+8, 9* and 11 are *Small Areas* and catches are taken from sub-areas 5, 6W, 7CS, 7CN, 7WR, 9* and 11.

(5) 5 and 6W are *Small Areas* and catches are taken from sub-areas 5 and 6W. 7+8+9*+11+12 is a combination area and catches are cascaded to the sub-areas within the combination area. The catch limits for sub-areas 12SW and 12NE are not taken.

(6) 5, 6W, 7+8, 9*, and 11 are *Small Areas* except that the catches from the 7+8 *Small Area* are taken from sub-areas 7CS and 7CN using the same method as for catch cascading to allocate the catch across the two sub-areas.

(7) 5+6W+6E+10W+10E, 7+8+9*+11 are *Small Areas*; catches from the 5+6W+6E+10W+10E *Small Area* are taken from sub-areas 5 and 6W using the same method as for catch cascading to allocate the catch across those two sub-areas, and catches from the Small Area 7+8+9+11 are taken in the sub-area 7CN.

(8) 5, 6W, 7+8+9*+11+12 are *Small Areas*; catches from the 7+8+9*+11+12 *Small Area* are taken from sub-areas 8 and 9 using the same method as for catch cascading to allocate the catch across the two sub-areas.

(9) 5, 6W, 7+8+9*+11+12 are *Small Areas;* catches from the 7+8+9*+11+12 *Small Area* are taken from sub-areas 7CS, 7CN, 7WR, 7E, 8 and 9 using the same method as for catch cascading to allocate the catch across the five sub-areas.

(10) 5, 6W, 7+8+9*+11+12 are *Small Areas;* catches from the 7+8+9*+11+12 *Small Area* are taken from sub-areas 7CS, 7CN, 7WR, 7E, 8, 9 and 11 using the same method as for catch cascading to allocate the catch across the six sub-areas. The catch from sub-area 11 is taken in May and June.

(11) 5, 6W, 7+8+9*+11+12 are *Small Areas;* catches from the 7+8+9*+11+12 *Small Area* are taken from sub-areas 7CS, 7CN, 7WR, 7E, 8 and 9 using the same method as for catch cascading to allocate the catch across the five sub-areas but the catch taken from sub-areas 7CS, 7CN, 7WR and 7E is reduced by 50% after first subtracting the bycatches in these sub-areas.

: 9 refers to sub-area 9 alone (i.e. excluding 9N) in the definitions of the variants given above.

Note that the proportions of the whales in a sub-area that belong to each stock will differ from sub-area to sub-area (as well as from year to year). Thus when a *Small Area* is specified which consists of a number of sub-areas, the impact on the various stocks of the catch allowed under the RMP will differ depending on how this catch is distributed amongst the constituent sub-areas. In such cases trials are specified which attempt to bound the extremes of such catch distributions in terms of their likely impact on stocks. The initial trials above incorporate a first attempt to address this aspect, e.g. variants (2) and (3) reflect likely alternative "extremes" in this context regarding a catch taken from 7+8.

Simulations of future catch limit calculations will be performed (i.e. catch limits will be set by the *CLA*) every 6 years, beginning in 2013[19]. No phaseout will be applied so as not to confound comparison of the different management variants.

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 being 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.

[19]In practice 2014 is the earliest year in which catch limits could be set, for the 2015 season.

REFERENCES

Adams, D. 1995. *Hitchhikers Guide to the Galaxy: a Trilogy in Five Parts*. William Heinemann, London. 784pp.

Allison, C. 2011. Direct catch data for western North Pacific minke whale simulation trials. Paper SC/D11/NPM3 presented to the First Intersessional Workshop for the *Implementation Review* of western North Pacific common minke whales, 12-16 December 2011, Tokyo, Japan (unpublished). [Paper available from the Office of this Journal].

An, Y.R., Choi, C.D., Moon, D.Y. and Park, K.H. 2010. Summary of the information on Korean dedicated sighting surveys for abundance estimates of common minke whales. Paper SC/D10/NPM15 presented to the First Intersessional Workshop for Western North Pacific Common Minke Whales, 14-17 December 2010, Pusan, Republic of Korea (unpublished). 7pp. [Paper available from the Office of this Journal].

Baker, C.S., Cooke, J.G., Lavery, S., Dalebout, M.L., Ma, Y.U., Funahashi, N., Carraher, C. and Brownell, J., R.L. 2007. Estimating the number of whales entering trade using DNA profiling and capture-recapture analysis of market produce. *Mol. Ecol.* 16(13): 2617-26.

Hakamada, T. 2010. The number of set nest in the coast of Japan by sub-areas and years during 1979-2006. Paper SC/D10/NPM13 presented to the First Intersessional Workshop for Western North Pacific Common Minke Whales, 14-17 December 2010, Pusan, Republic of Korea (unpublished). 1pp. [Paper available from the Office of this Journal].

Hakamada, T. and Kitakado, T. 2010. Summary of the information on dedicated sighting surveys for abundance estimation in JARPN and JARPN II. Paper SC/D10/NPM12rev presented to the First Intersessional Workshop for Western North Pacific Common Minke Whales, 14-17 December 2010, Pusan, Republic of Korea (unpublished). [Paper available from the Office of this Journal].

International Whaling Commission. 1991. Report of the Sub-Committee on Management Procedures, Appendix 4. Report of the *ad-hoc* trials subgroup. *Rep. int. Whal. Commn* 41:108-12.

International Whaling Commission. 1992a. Report of the Scientific Committee, Annex F. Report of the Sub-Committee on North Pacific Minke Whales. *Rep. int. Whal. Commn* 42:156-77.

International Whaling Commission. 1992b. Report of the Scientific Committee, Annex K. Report of the Working Group on North Atlantic Minke Trials. *Rep. int. Whal. Commn* 42:246-51.

International Whaling Commission. 1994. Report of the Scientific Committee, Annex D. Report of the Sub-Committee on Management Procedures, Appendix 2. Minimum Standards Trials. *Rep. int. Whal. Commn* 44:85-88.

International Whaling Commission. 1999. Report of the Scientific Committee. Annex N. The Revised Management Procedure (RMP) for Baleen Whales. *J. Cetacean Res. Manage. (Suppl.)* 1:251-58.

International Whaling Commission. 2003. Report of the Workshop on North Pacific common minke whale (*Balaenoptera acutorostrata*) *Implementation Simulation Trials*. *J. Cetacean Res. Manage. (Suppl.)* 5:455-87.

International Whaling Commission. 2004. Report of the Scientific Committee. Annex D. Report of the Sub-Committee on the Revised Management Procedure. *J. Cetacean Res. Manage. (Suppl.)* 6:75-184.

International Whaling Commission. 2012a. Report of the first RMP intersessional workshop for western North Pacific common minke whales. *J. Cetacean Res. Manage. (Suppl.)* 13:411-60.

International Whaling Commission. 2012b. Report of the first RMP intersessional workshop for western North Pacific common minke whales. Annex G. NPM mixing matrices. *J. Cetacean Res. Manage. (Suppl.)* 13:445-48.

International Whaling Commission. 2012c. Report of the Scientific Committee. Annex D1. Report of the Working Group on the *Implementation Review* for western North Pacific common minke whales. *J. Cetacean Res. Manage. (Suppl.)* 13:102-29.

Miyashita, T. 2010. Summary of the information on Japanese dedicated sighting surveys for abundance estimation. Paper SC/D10/NPM11 presented to the First Intersessional Workshop for Western North Pacific Common Minke Whales, 14-17 December 2010, Pusan, Republic of Korea (unpublished). 6pp. [Paper available from the Office of this Journal].

Miyashita, T. and Okamura, H. 2011. Abundance estimates of common minke whales using the Japanese dedicated sighting survey data for RMP *Implementation* and CLA - Sea of Japan and Sea of Okhotsk. Paper SC/63/RMP11 presented to the IWC Scientific Committee, June 2011, Tromsø, Norway (unpublished). 34pp. [Paper available from the Office of this Journal].

Okamura, H., Miyashita, T. and Kitakado, T. 2010. *g*(0) estimates for western North Pacific common minke whales. Paper SC/62/NPM9 presented to the IWC Scientific Committee, June 2010, Agadir, Morocco (unpublished). 7pp. [Paper available from the Office of this Journal].

Punt, A.E. 1999. Report of the Scientific Committee. Annex R. A full description of the standard BALEEN II model and some variants thereof. *J. Cetacean Res. Manage. (Suppl.)* 1: 267-76.

Tobayama, T., Yanagisawa, F. and Kasuya, T. 1992. Incidental take of minke whales in Japanese trap nets. *Rep. int. Whal. Commn* 42: 433-36.

Adjunct 1

The Historical Catch Series

C. Allison

Direct catches

The baseline trials use the 'best' estimates of the historical direct catch which are summarised in Tables 1 and 2. Details of the sources and construction of the catch series are given in Allison (2011). The data are taken from the IWC individual catch database (Allison, 2013) where available. Information on the direct catches taken in 2012 was not available when the conditioning was performed, so the 2012 catch was assumed to be equal to the 2011 catch. The actual numbers for 2012 are included here in Table 3 for completeness.

An alternative 'high' catch series is used in sensitivity trial 4. Table 4 lists the 'high' catch numbers for the years and sub-areas where they differ from the 'best' catch series. The catches are identical to the 'best' series for all other areas and years. The Japanese coastal catch from 1930-1 and 1936-45 (in sub-areas 7CS, 7CN and 11) is estimated (Ohsumi, 1982) and the values are doubled in the 'high' catch series. The catch series off Korea assumes a linear increase from 60 whales in 1946 to 249 in 1957 in the 'best' series whereas the 'high' series assumes an annual catch of 249 minke whales over this period.

The split between sub-areas 5 and 6W is unknown for most of the catches taken off Korea. The 'best' catch series includes 19,349 minke whales taken off Korea, of which 3,902 are recorded in the Yellow Sea and 4,199 in the Sea of Japan (East Sea) and Southern waters. The remaining 11,248 of unknown area are allocated between sub-areas 5 and 6W in the ratio of the catches known by area from 1940-79[20] (2,028:2,517). Trials 8 and 9 test the sensitivity to this assumption. In trial 8 the number of whales allocated to sub-area 5 is reduced by 20% and reallocated to sub-area 6W. In Trial 9, 20% fewer animals are allocated to sub-area 6W and are reallocated to sub-area 5. The resulting catch series are given in Table 5.

Table 1

Summary of the final western North Pacific minke whale direct catch series (1930-2011) by sub-area, sex and month. The highlighted catches cannot be taken as no whales are modelled the area/month.

	Males								Females										
Area	J-M	Apr	May	Jun	Jul	Aug	Sep	O-D	J-M	Apr	May	Jun	Jul	Aug	Sep	O-D	Total	M	F
1E	17	0	0	0	1	0	0	0	11	0	0	0	0	0	0	0	29	18	11
2C	3	2	2	3	2	0	1	0	2	2	0	0	1	0	0	0	18	13	5
2R	1	1	0	0	0	0	0	0	1	0	0	0	0	0	1	0	4	2	2
5	981	1,280	906	671	568	322	102	174	1,128	1,457	1,244	757	570	300	121	185	10,766	5,004	5,762
6W	181	383	1,325	1,167	392	202	557	1,063	178	364	1,300	1,136	376	189	545	1,009	10,367	5,270	5,097
6E	181	223	135	13	21	0	8	2	95	144	95	16	3	0	6	1	943	583	360
7CS	210	974	1,715	762	126	8	1	0	164	1,087	1,278	464	27	1	0	0	6,817	3,796	3,021
7CN	0	0	34	221	380	424	746	147	0	19	71	96	158	118	243	67	2,724	1,952	772
7W	0	1	45	29	3	1	1	0	0	0	9	2	3	0	0	0	94	80	14
7E	0	0	36	11	3	0	13	1	0	0	7	2	0	0	8	0	81	64	17
8	0	0	34	93	90	20	11	6	0	0	8	10	16	4	5	6	303	254	49
9	0	0	32	82	182	190	10	0	0	0	9	10	15	20	0	0	550	496	54
9N	0	0	1	2	5	8	0	1	0	0	0	6	0	11	0	0	34	17	17
10W	0	0	6	12	1	0	2	0	0	2	0	9	0	0	0	0	32	21	11
10E	2	25	42	119	83	26	5	3	0	1	28	60	26	9	7	0	436	305	131
11	0	62	248	492	557	210	143	29	2	465	872	858	593	240	113	25	4,909	1,741	3,168
12SW	0	0	0	1	11	9	1	0	0	0	1	5	16	27	5	0	76	22	54
12NE	0	0	0	0	36	9	10	0	0	0	0	3	33	14	6	0	111	55	56
13	0	0	0	0	0	2	0	0	0	0	0	0	1	3	0	0	6	2	4
Total	1,576	2,951	4,561	3,678	2,461	1,431	1,611	1,426	1,581	3,541	4,922	3,434	1,838	936	1,060	1,293	38,300	19,695	18,605

[20]The period 1940-79 is used in view of a comment by Gong (1982) that, in 1980, Government policy led to a shift to the western sector in order to direct the minke whale fishery away from areas where the (protected) fin whale might also be caught.

Table 2
Summary of the 'best' direct catch series for western North Pacific minke whales by year, sub-area and sex.
Catches in 2012 were not available when the conditioning was performed and so are assumed to be equal to the catch in 2011.

	1E	2C	2R	5	6W	6E	7CS	7CN	7WR	7E	8	9	9N	10W	10E	11	12SW	12NE	13	Total
Males:																				
1930	0	0	0	0	0	0	7	0	0	0	0	0	0	0	0	1	0	0	0	8
1931	0	0	0	0	0	0	7	1	0	0	0	0	0	0	0	0	0	0	0	8
1932	0	0	0	0	9	0	13	1	0	0	0	0	0	0	0	0	0	0	0	23
1933	0	0	0	0	8	0	13	1	0	0	0	0	0	0	0	0	0	0	0	22
1934	0	0	0	1	21	0	20	1	0	0	0	0	0	0	0	0	0	0	0	43
1935	0	0	0	9	9	0	20	1	0	0	0	0	0	0	0	1	0	0	0	40
1936	0	0	0	12	14	0	15	0	0	0	0	0	0	0	0	0	0	0	0	41
1937	0	0	0	13	17	0	37	0	0	0	0	0	0	0	0	1	0	0	0	68
1938	0	0	0	15	20	0	44	0	0	0	0	0	0	0	0	1	0	0	0	80
1939	0	0	0	18	24	0	44	1	0	0	0	0	2	0	0	0	0	0	0	89
1940	0	0	0	15	33	0	52	0	0	0	0	0	0	0	0	1	0	0	0	101
1941	0	0	0	40	40	0	37	1	0	0	0	0	2	0	0	0	0	0	0	120
1942	0	0	0	53	67	0	44	0	0	0	0	0	1	0	0	1	0	0	0	166
1943	0	0	0	42	51	0	67	1	0	0	0	0	0	0	0	0	0	0	0	161
1944	0	0	0	38	47	0	52	0	0	0	0	0	0	0	0	1	0	0	0	138
1945	0	0	0	3	2	0	44	0	0	0	0	0	0	0	0	0	0	0	0	49
1946	0	0	0	11	21	14	51	4	0	0	0	0	1	0	0	4	0	0	0	106
1947	0	0	0	19	21	27	57	7	0	0	0	0	0	0	0	8	0	0	0	139
1948	0	3	0	22	26	56	57	1	0	0	1	0	0	0	0	26	0	0	0	192
1949	0	0	0	25	31	20	61	0	0	0	1	0	2	0	5	6	0	2	0	153
1950	0	3	0	29	37	15	63	41	0	0	2	0	1	0	13	18	0	0	0	222
1951	1	1	0	31	40	62	87	9	0	3	0	0	0	0	5	14	0	0	0	253
1952	0	1	0	36	45	142	92	1	0	0	0	0	1	0	9	20	0	0	0	347
1953	0	0	0	42	50	90	75	1	0	0	3	0	0	0	38	35	1	0	0	335
1954	0	0	1	43	54	35	24	26	0	0	0	0	0	0	32	59	1	0	0	275
1955	0	0	0	49	60	20	108	11	0	0	2	0	0	0	20	43	1	1	0	315
1956	0	0	0	54	62	16	140	25	0	1	3	0	0	0	47	69	0	0	0	417
1957	17	1	0	59	70	2	111	14	2	0	1	0	0	0	31	33	1	0	0	342
1958	0	0	0	67	65	0	126	13	0	0	1	0	0	0	0	86	0	0	0	358
1959	0	0	0	78	71	0	69	7	0	0	0	0	0	0	0	47	0	0	0	272
1960	0	0	0	72	59	0	64	6	0	1	1	0	0	0	0	41	0	0	0	244
1961	0	0	0	39	28	0	81	9	0	0	0	0	0	0	0	56	0	0	0	213
1962	0	0	0	55	52	0	46	7	0	0	0	0	0	0	0	48	0	0	0	208
1963	0	0	0	122	52	0	49	6	0	0	0	0	0	0	0	40	0	0	0	269
1964	0	0	0	139	95	6	85	6	0	0	0	0	0	0	0	39	0	0	0	370
1965	0	1	0	83	101	11	51	3	0	0	0	0	0	0	0	62	0	0	0	312
1966	0	2	0	76	87	0	81	8	1	0	0	0	0	0	0	71	0	0	0	326
1967	0	0	0	109	73	2	50	6	0	0	0	0	0	0	2	55	0	0	0	297
1968	0	0	0	98	75	8	58	4	1	0	0	0	0	2	0	22	0	0	0	268
1969	0	0	0	118	95	10	27	2	0	0	0	0	3	0	7	43	0	0	0	305
1970	0	0	0	186	188	5	101	5	1	0	0	2	4	0	8	38	0	0	2	540
1971	0	0	0	200	189	3	84	6	0	0	0	0	0	0	8	54	1	0	0	545
1972	0	0	0	252	286	0	35	17	0	0	0	0	0	0	0	78	0	0	0	668
1973	0	0	0	215	244	0	83	26	0	2	14	0	0	0	15	95	2	28	0	724
1974	0	0	0	213	271	0	63	34	0	9	0	0	0	1	5	44	4	22	0	666
1975	0	0	0	196	293	9	35	63	0	3	0	0	0	18	2	62	11	1	0	693
1976	0	0	0	353	174	0	35	27	0	0	0	0	0	0	10	89	0	0	0	688
1977	0	0	0	234	304	0	32	71	0	0	0	0	0	0	0	58	0	0	0	699
1978	0	0	0	181	354	0	93	133	0	0	0	0	0	0	0	19	0	0	0	780
1979	0	0	0	164	379	0	95	150	0	0	0	0	0	0	8	17	0	0	0	813
1980	0	0	0	447	147	0	88	72	0	0	0	0	0	0	10	40	0	0	0	804
1981	0	1	0	188	192	0	148	39	1	0	0	0	0	0	13	28	0	0	0	610
1982	0	0	0	229	210	2	105	56	1	0	0	0	0	0	9	5	0	0	0	617
1983	0	0	0	100	142	3	66	68	0	0	0	0	0	0	6	4	0	0	0	389
1984	0	0	0	87	105	0	64	88	0	0	0	0	0	0	0	46	0	0	0	390
1985	0	0	1	23	29	5	39	123	0	0	0	0	0	0	2	30	0	0	0	252
1986	0	0	0	1	31	20	69	89	0	0	0	0	0	0	0	19	0	0	0	229
1987	0	0	0	0	0	0	80	86	0	0	0	0	0	0	0	16	0	0	0	182
1988	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1989	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1990	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1991	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1992	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1993	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1994	0	0	0	0	0	0	0	0	0	0	0	18	0	0	0	0	0	0	0	18
1995	0	0	0	0	0	0	0	0	0	0	0	91	0	0	0	0	0	0	0	91
1996	0	0	0	0	0	0	0	28	0	0	16	0	0	0	0	19	0	0	0	63
1997	0	0	0	0	0	0	0	0	1	1	30	55	0	0	0	0	0	0	0	87
1998	0	0	0	0	0	0	0	0	22	26	41	0	0	0	0	0	0	0	0	89
1999	0	0	0	0	0	0	2	39	2	0	0	0	0	0	0	28	0	0	0	71
2000	0	0	0	0	0	0	4	15	0	0	0	16	0	0	0	0	0	0	0	35
2001	0	0	0	0	0	0	11	10	19	7	20	26	0	0	0	0	0	0	0	93

Cont.

	1E	2C	2R	5	6W	6E	7CS	7CN	7WR	7E	8	9	9N	10W	10E	11	12SW	12NE	13	Total
2002	0	0	0	0	0	0	0	78	1	0	8	30	0	0	0	0	0	0	0	117
2003	0	0	0	0	0	0	32	0	4	7	34	37	0	0	0	0	0	0	0	114
2004	0	0	0	0	0	0	0	61	0	0	0	75	0	0	0	0	0	1	0	137
2005	0	0	0	0	0	0	28	66	2	0	7	51	0	0	0	0	0	0	0	154
2006	0	0	0	0	0	0	40	33	11	1	36	23	0	0	0	0	0	0	0	144
2007	0	0	0	0	0	0	50	67	3	0	15	5	0	0	0	0	0	0	0	140
2008	0	0	0	0	0	0	23	32	0	0	5	48	0	0	0	0	0	0	0	108
2009	0	0	0	0	0	0	28	41	8	3	13	6	0	0	0	0	0	0	0	99
2010	0	0	0	0	0	0	17	40	0	0	0	12	0	0	0	0	0	0	0	69
2011	0	0	0	0	0	0	17	64	0	0	0	1	0	0	0	0	0	0	0	82

	1E	2C	2R	5	6W	6E	7CS	7CN	7WR	7E	8	9	9N	10W	10E	11	12SW	12NE	13	Total
Females:																				
1930	0	0	0	0	0	0	4	0	0	0	0	0	0	0	0	1	0	0	0	5
1931	0	0	0	0	0	0	4	0	0	0	0	0	0	0	0	2	0	0	0	6
1932	0	0	0	5	4	0	7	0	0	0	0	0	0	0	0	1	0	0	0	17
1933	0	0	0	5	4	0	7	1	0	0	0	0	0	1	0	1	0	0	0	19
1934	0	0	0	9	10	0	10	0	0	0	0	0	0	1	0	1	0	0	0	31
1935	0	0	0	8	14	0	10	0	0	0	0	0	0	0	0	1	0	0	0	33
1936	0	0	0	12	13	0	7	0	0	0	0	0	0	0	0	2	0	0	0	34
1937	0	0	0	14	18	0	18	1	0	0	0	0	0	0	0	1	0	0	0	52
1938	0	0	0	18	20	0	22	0	0	0	0	0	0	0	0	1	0	0	0	61
1939	0	0	0	19	23	0	22	0	0	0	0	0	1	0	0	2	0	0	1	68
1940	0	0	0	13	34	0	25	0	0	0	0	0	0	0	0	1	0	0	0	73
1941	0	0	0	64	38	0	18	0	0	0	0	0	0	0	0	2	0	0	0	122
1942	0	0	0	54	66	0	22	0	0	0	0	0	2	0	0	1	0	0	0	145
1943	0	0	0	39	51	0	32	0	0	0	0	0	0	0	0	2	0	0	0	124
1944	0	0	0	38	45	0	25	0	0	0	0	0	0	0	0	1	0	0	0	109
1945	0	0	0	2	3	0	22	1	0	0	0	0	0	0	0	2	0	0	0	30
1946	0	0	0	10	18	10	24	1	0	0	0	0	1	0	0	13	0	0	0	77
1947	0	0	0	18	19	21	27	3	0	0	0	0	0	0	0	23	0	0	0	111
1948	0	0	0	21	25	38	31	0	0	0	0	0	0	0	0	53	0	0	0	168
1949	0	0	0	25	31	30	32	0	0	0	2	0	0	0	4	27	0	1	0	152
1950	0	1	1	29	34	9	25	19	0	0	0	0	0	0	0	32	0	1	0	151
1951	0	0	0	33	42	39	42	2	0	2	1	0	2	0	2	70	0	1	0	236
1952	0	0	1	37	45	43	78	2	0	0	0	0	1	0	0	97	1	0	0	305
1953	0	0	0	39	49	47	56	2	0	0	3	0	0	0	5	57	1	0	0	259
1954	0	1	0	45	55	27	22	15	0	0	3	0	1	0	4	124	0	0	0	297
1955	0	0	0	58	59	15	80	4	0	0	3	0	0	0	7	119	0	2	0	347
1956	0	0	0	62	66	23	97	7	0	0	1	0	1	0	13	108	0	4	0	382
1957	11	1	0	79	68	0	81	12	2	0	3	0	0	0	13	96	1	0	0	367
1958	0	0	0	101	63	0	128	8	0	0	1	0	0	0	0	153	0	0	0	454
1959	0	0	0	126	73	0	70	4	0	0	0	0	0	0	0	83	0	1	0	357
1960	0	0	0	141	57	0	65	4	0	1	1	0	0	0	0	73	0	0	0	342
1961	0	0	0	82	30	0	83	5	0	0	1	0	0	0	0	98	0	0	0	299
1962	0	0	0	117	52	0	47	5	0	0	0	0	0	0	0	85	0	1	0	307
1963	0	0	0	168	52	0	50	4	0	0	0	0	0	0	0	71	0	0	0	345
1964	0	0	0	186	97	6	86	4	0	0	0	0	0	0	0	69	0	0	0	448
1965	0	1	0	110	102	9	99	3	0	0	0	0	0	0	0	94	0	0	0	418
1966	0	1	0	105	88	2	100	15	0	0	0	0	0	0	0	84	0	0	0	395
1967	0	0	0	139	73	8	65	7	0	0	0	0	0	0	3	87	0	0	0	382
1968	0	0	0	124	73	3	81	3	0	0	0	0	0	7	5	56	0	0	0	352
1969	0	0	0	156	96	10	32	1	0	0	0	0	8	0	5	97	0	0	0	405
1970	0	0	0	216	188	2	87	5	1	0	0	0	0	0	4	70	0	0	2	575
1971	0	0	0	250	190	2	67	4	0	0	0	0	0	0	9	52	0	0	0	574
1972	0	0	0	292	286	0	75	22	0	0	0	0	0	0	1	113	0	0	0	789
1973	0	0	0	239	244	2	90	15	0	2	7	0	0	0	6	116	11	27	0	759
1974	0	0	0	267	272	0	51	19	0	3	0	0	0	0	3	79	17	18	0	729
1975	0	0	0	229	288	2	46	22	0	4	0	0	0	2	4	58	23	0	0	678
1976	0	0	0	445	174	0	46	29	0	0	0	0	0	0	11	113	0	0	1	819
1977	0	0	0	269	303	0	28	14	0	0	0	0	0	0	2	43	0	0	0	659
1978	0	0	0	207	356	0	85	22	0	0	0	0	0	0	0	48	0	0	0	718
1979	0	0	0	130	264	0	38	28	0	0	0	0	0	0	7	64	0	0	0	531
1980	0	0	0	272	109	0	70	12	0	0	0	0	0	0	5	82	0	0	0	550
1981	0	0	0	188	192	0	68	11	0	0	0	0	0	0	2	63	0	0	0	524
1982	0	0	0	236	219	2	58	28	0	0	0	0	0	0	6	56	0	0	0	605
1983	0	0	0	98	138	4	69	30	0	0	0	0	0	0	5	42	0	0	0	386
1984	0	0	0	87	114	0	38	55	0	0	0	0	0	0	0	76	0	0	0	370
1985	0	0	0	26	35	4	20	41	0	0	0	0	0	0	5	66	0	0	0	197
1986	0	0	0	0	15	2	35	43	2	0	0	0	0	0	0	54	0	0	0	151
1987	0	0	0	0	0	0	43	30	0	0	0	0	0	0	0	49	0	0	0	122
1988	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1989	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1990	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1991	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Cont.

	1E	2C	2R	5	6W	6E	7CS	7CN	7WR	7E	8	9	9N	10W	10E	11	12SW	12NE	13	Total
1992	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1993	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1994	0	0	0	0	0	0	0	0	0	0	0	3	0	0	0	0	0	0	0	3
1995	0	0	0	0	0	0	0	0	0	0	0	9	0	0	0	0	0	0	0	9
1996	0	0	0	0	0	0	0	2	1	0	0	0	0	0	0	11	0	0	0	14
1997	0	0	0	0	0	0	0	0	0	0	1	12	0	0	0	0	0	0	0	13
1998	0	0	0	0	0	0	0	0	3	4	4	0	0	0	0	0	0	0	0	11
1999	0	0	0	0	0	0	0	7	0	0	0	0	0	0	0	22	0	0	0	29
2000	0	0	0	0	0	0	1	4	0	0	0	0	0	0	0	0	0	0	0	5
2001	0	0	0	0	0	0	0	0	3	0	1	3	0	0	0	0	0	0	0	7
2002	0	0	0	0	0	0	0	31	0	0	0	2	0	0	0	0	0	0	0	33
2003	0	0	0	0	0	0	30	0	1	0	3	2	0	0	0	0	0	0	0	36
2004	0	0	0	0	0	0	0	14	0	0	0	8	0	0	0	0	0	0	0	22
2005	0	0	0	0	0	0	37	19	0	0	7	3	0	0	0	0	0	0	0	66
2006	0	0	0	0	0	0	34	12	1	1	2	1	0	0	0	0	0	0	0	51
2007	0	0	0	0	0	0	45	21	0	0	0	1	0	0	0	0	0	0	0	67
2008	0	0	0	0	0	0	37	18	0	0	0	6	0	0	0	0	0	0	0	61
2009	0	0	0	0	0	0	33	24	0	0	5	1	0	0	0	0	0	0	0	63
2010	0	0	0	0	0	0	28	20	0	0	0	2	0	0	0	0	0	0	0	50
2011	0	0	0	0	0	0	6	37	0	0	0	1	0	0	0	0	0	0	0	44

Table 3

Direct catches in 2012 by sub-area and sex.
These catches were not available when the conditioning was performed but are included here for completeness.

	1E	2C	2R	5	6W	6E	7CS	7CN	7WR	7E	8	9	9N	10W	10E	11	12SW	12NE	13	Total
Males	0	0	0	0	0	0	15	36	1	0	0	0	0	0	0	0	0	0	0	52
Females	0	0	0	0	0	0	50	53	4	0	3	0	0	0	0	0	0	0	0	110

Table 4

The High Catch Series.

The table shows the catches for the years and sub-areas where they differ from the 'best' catch series (1930-31, 1936-45 in sub-areas 7CS, 7CN and 11; 1947-56 in sub-areas 5 and 6W). Numbers from the 'best' catch series are shown for comparison.
The 'high' catch series is identical to the 'best' series for all other areas and years.

Series:	Best	Best	High	High	Best	Best	High	High	Best	Best	High	High
Sub-area:	7CS	7CS	7CS	7CS	7CN	7CN	7CN	7CN	11	11	11	11
	Male	Female	Male	Female	Male	Female	Male	Female	Male	Female	Male	Female
1930	7	4	**14**	**8**	0	0	0	0	1	1	**2**	**2**
1931	7	4	**14**	**8**	1	0	**2**	0	0	2	0	**4**
1932	13	7	13	7	1	0	1	0	0	1	0	1
1933	13	7	13	7	1	1	1	1	0	1	0	1
1934	20	10	20	10	1	0	1	0	0	1	0	1
1935	20	10	20	10	1	0	1	0	1	1	1	1
1936	15	7	**30**	**14**	0	0	0	0	0	2	0	**4**
1937	37	18	**74**	**36**	0	1	0	**2**	1	1	**2**	**2**
1938	44	22	**88**	**44**	0	0	0	0	1	1	**2**	**2**
1939	44	22	**88**	**44**	1	0	**2**	0	0	2	0	**4**
1940	52	25	**104**	**50**	0	0	0	0	1	1	**2**	**2**
1941	37	18	**74**	**36**	1	0	**2**	0	0	2	0	**4**
1942	44	22	**88**	**44**	0	0	0	0	1	1	**2**	**2**
1943	67	32	**134**	**64**	1	0	**2**	0	0	2	0	**4**
1944	52	25	**104**	**50**	0	0	0	0	1	1	**2**	**2**
1945	44	22	44	22	0	1	0	**2**	0	2	0	**4**

Series:	Best	Best	High	High	Best	Best	High	High
Sub-area:	5	5	5	5	6W	6W	6W	6W
	Male	Female	Male	Female	Male	Female	Male	Female
1946	11	10	11	10	21	18	21	18
1947	19	18	**55**	**56**	21	19	**70**	**68**
1948	22	21	**55**	**56**	26	25	**70**	**68**
1949	25	25	**55**	**56**	31	31	**70**	**68**
1950	29	29	**55**	**56**	37	34	**70**	**68**
1951	31	33	**55**	**56**	40	42	**70**	**68**
1952	36	37	**55**	**56**	45	45	**70**	**68**
1953	42	39	**55**	**56**	50	49	**70**	**68**
1954	43	45	**55**	**56**	54	55	**70**	**68**
1955	49	58	**56**	**66**	60	59	**70**	**68**
1956	54	62	**57**	**66**	62	66	**70**	**68**
1957	59	79	59	79	70	68	70	68

Table 5
The catch series for Trials 8 and 9 used to test the sensitivity to the allocation of catches off Korea between sub-areas 5 and 6W. Catches in the other sub-areas are the same as for the 'Best' catch series.

	Trial 8				Trial 9			
Sub-area:	5	5	6W	6W	5	5	6W	6W
	Male	Female	Male	Female	Male	Female	Male	Female
1932	0	5	9	4	0	5	9	4
1933	0	5	8	4	0	5	8	4
1934	1	9	21	10	1	9	21	10
1935	9	12	9	10	7	7	12	14
1936	14	15	13	9	9	10	15	17
1937	17	16	14	15	12	9	21	20
1938	19	22	16	16	14	13	24	22
1939	23	23	20	18	15	15	27	27
1940	21	21	27	26	12	11	37	35
1941	48	72	31	31	38	62	41	41
1942	66	66	53	55	43	43	77	77
1943	51	51	40	41	31	33	59	60
1944	48	48	37	35	31	31	53	53
1945	3	2	2	3	3	2	2	3
1946	14	15	15	16	10	8	22	20
1947	24	21	16	16	15	15	23	24
1948	27	26	20	21	18	18	28	30
1949	30	32	25	25	18	22	36	36
1950	34	38	28	29	23	24	42	40
1951	40	40	33	33	26	26	47	47
1952	46	46	37	34	29	30	51	53
1953	50	51	40	39	31	33	58	58
1954	55	54	43	45	35	35	64	63
1955	62	69	46	49	39	48	70	69
1956	67	74	52	51	42	53	75	74
1957	73	92	56	55	49	66	79	82
1958	80	114	51	51	53	89	77	77
1959	93	141	57	57	63	110	86	89
1960	84	152	46	47	63	131	68	67
1961	44	87	24	24	35	77	33	34
1962	65	128	43	40	49	110	58	59
1963	131	179	43	41	104	149	71	70
1964	159	205	77	76	118	162	119	118
1965	102	131	82	81	68	97	116	115
1966	95	121	70	70	64	91	100	101
1967	125	153	59	57	91	120	93	90
1968	112	139	60	59	82	107	91	90
1969	137	176	75	77	98	138	114	115
1970	223	253	151	151	152	183	221	222
1971	239	286	152	152	165	214	225	225
1972	308	348	229	231	230	267	311	308
1973	251	275	208	208	197	220	262	263
1974	251	302	235	235	188	241	297	297
1975	253	287	235	231	159	196	327	324
1976	389	479	139	139	292	384	235	235
1977	294	331	242	243	192	226	346	346
1978	253	276	283	286	152	175	384	387
1979	164	130	379	264	164	130	379	264
1980	447	272	147	109	447	272	147	109
1981	188	188	192	192	188	188	192	192
1982	236	247	202	209	222	229	217	226
1983	100	98	142	138	100	98	142	138
1984	87	87	105	114	87	87	105	114
1985	23	26	29	35	23	26	29	35
1986	1	0	31	15	1	0	31	15

Bycatches

Recent bycatches (also referred to as incidental catches) are listed in Tables 6 and 7. The numbers of nets are listed in Table 8. The numbers of bycatches are only used in the trials if the number of nets is also known. Thus for Japan the catches from 2007-09 are not used and are shown greyed out in the table.

The bycatch in area 6W by Japan is small (9 whales) (and there are no corresponding set net numbers) so the numbers are added to those for sub-area 6E. The bycatch by Korea in sub-area 1W is very small (2 whales in total) and there are no corresponding set net numbers so the numbers are added to the data for sub-area 5. Similarly the numbers in sub-areas 6E and 10W (3 whales and 1 whale respectively) have been added to those for 6W.

A single series of historical bycatches is used for all of the trials when applying the RMP (i.e. for calculating catch limits), irrespective of the true values of the bycatches, which differ both among trials and simulations within trials. The estimate of the bycatches used by the *CLA* is set to the averages of the predicted bycatches based on the fit to the actual data of the operating model for the six baseline trials (i.e. using the 'best fit' simulation (0)). The series is given in Table 9 and Fig 1.

Table 6

Recent bycatches by Japan. The numbers are taken from the individual records. The catches that are greyed out are not used in the trials.

	1E	2C	6W	6E	7CS	7CN	10E	11	Sum	
2001	1	10	0	25	8	3	4	3	54	Numbers incomplete
2002	7	19	0	45	17	13	3	5	109	
2003	5	17	2	59	18	15	0	8	124	125 in Progress Report
2004	4	19	1	65	14	9	0	3	115	117 in Progress Report
2005	4	33	1	54	17	10	3	6	128	130 in Progress Report
2006	3	28	2	74	21	16	0	3	147	150 in Progress Report
2007	7	42	1	68	20	11	0	6	155	157 in Progress Report
2008	9	23	0	68	17	11	2	3	133	
2009	3	17	2	64	23	3	0	1	113	+ 5 unknown area

Table 7

Recent bycatches by Korea. The numbers are taken from the individual records.

	5	6W	1W	6E	10W	Total
1996	0	128	0	0	0	128
1997	0	80	0	0	1	81
1998	0	45	0	0	0	45
1999	0	62	0	0	0	62
2000	11	69	0	0	0	80
2001	12	148	0	0	0	160
2002	7	82	0	0	0	89
2003	11	80	1	0	0	92
2004	13	55	0	1	0	69
2005	8	99	0	0	0	107
2006	13	67	0	2	0	82
2007	15	64	1	0	0	80
2008	13	68	0	0	0	81
2009	17	70	0	0	0	87

Table 8

Numbers of nets.

	Japan large scale trap nets								Japan salmon trap nets					Korean nets		
	1E	2C	6E	7CS	7CN	10E	11	Total	7CS	7CN	10E	11	Total	5	6W	Total
1946	24	67	103	41	7	9	2	252	3	57	24	44	129	0	0	0
1947	26	73	112	44	7	10	2	275	3	62	26	48	140	2	5	7
1948	29	79	122	48	8	11	2	298	3	68	29	52	152	4	11	15
1949	31	85	131	52	8	12	2	320	4	73	31	56	164	6	16	22
1950	33	91	141	55	9	12	2	343	4	78	33	60	175	8	21	29
1951	35	97	150	59	10	13	2	366	4	83	35	64	187	10	27	36
1952	37	103	159	63	10	14	2	389	4	88	37	68	199	12	32	44
1953	40	109	169	66	11	15	3	412	5	94	40	73	210	14	38	51
1954	42	115	178	70	11	16	3	435	5	99	42	77	222	15	43	58
1955	44	121	187	74	12	17	3	458	5	104	44	81	234	17	48	66
1956	46	127	197	77	13	17	3	481	5	109	46	85	245	19	54	73
1957	48	133	206	81	13	18	3	503	6	114	48	89	257	21	59	80
1958	51	139	216	85	14	19	3	526	6	120	51	93	269	23	64	88
1959	53	145	225	88	14	20	3	549	6	125	53	97	280	25	70	95
1960	55	151	234	92	15	21	4	572	6	130	55	101	292	27	75	102
1961	57	157	244	96	16	22	4	595	7	135	57	105	304	29	80	109
1962	59	164	253	100	16	22	4	618	7	140	59	109	316	31	86	117
1963	62	170	262	103	17	23	4	641	7	146	62	113	327	33	91	124
1964	64	176	272	107	17	24	4	664	7	151	64	117	339	35	97	131
1965	66	182	281	111	18	25	4	687	8	156	66	121	351	37	102	139
1966	68	188	291	114	19	26	4	709	8	161	68	125	362	39	107	146
1967	70	194	300	118	19	27	5	732	8	166	70	129	374	41	113	153
1968	73	200	309	122	20	27	5	755	8	172	73	133	386	43	118	161
1969	75	206	319	125	20	28	5	778	9	177	75	137	397	44	123	168
1970	77	212	328	129	21	29	5	801	9	182	77	141	409	46	129	175
1971	80	209	324	127	21	29	5	795	9	190	81	148	428	48	134	182
1972	83	206	321	124	21	29	5	788	9	199	84	154	447	50	139	190
1973	86	203	317	122	20	28	5	782	10	207	88	161	465	52	145	197
1974	89	200	314	119	20	28	5	775	10	216	91	167	484	54	150	204
1975	92	197	310	117	20	28	5	769	10	224	95	174	503	56	156	212
1976	82	197	320	119	20	33	4	775	11	249	104	196	559	58	161	219
1977	72	197	330	122	20	39	3	781	11	274	113	217	615	60	166	226
1978	61	197	339	124	20	44	1	787	12	299	122	239	671	62	172	233
1979	51	197	349	126	20	50	0	793	12	324	131	260	727	64	177	241
1980	54	200	359	134	20	47	0	814	0	334	125	263	722	66	182	248
1981	56	197	362	137	18	44	0	814	0	327	141	281	749	68	188	255
1982	55	196	375	135	19	44	0	824	0	332	134	277	743	70	193	263

Cont.

	Japan large scale trap nets								Japan salmon trap nets					Korean nets		
	1E	2C	6E	7CS	7CN	10E	11	Total	7CS	7CN	10E	11	Total	5	6W	Total
1983	59	191	379	135	33	43	12	852	0	330	126	278	734	71	198	270
1984	56	184	381	144	52	45	18	880	0	320	151	250	721	73	204	277
1985	52	185	406	144	36	53	11	887	0	348	158	256	762	75	209	285
1986	55	191	401	139	49	53	17	905	0	349	154	255	758	77	215	292
1987	52	190	398	141	48	52	16	897	0	357	158	251	766	79	220	299
1988	51	183	394	135	38	41	15	857	0	362	165	252	779	81	225	306
1989	60	177	384	145	36	38	9	849	0	369	287	230	886	83	231	314
1990	61	176	397	140	34	43	7	858	0	363	293	226	882	85	236	321
1991	66	172	394	139	22	46	0	839	0	373	290	229	892	85	286	371
1992	61	164	385	139	22	42	0	813	0	369	287	231	887	96	305	401
1993	66	177	391	138	22	43	0	837	0	369	290	236	895	96	291	387
1994	59	173	372	134	26	42	0	806	0	350	401	217	968	94	286	380
1995	61	173	365	121	23	39	0	782	0	349	400	216	965	97	292	389
1996	62	169	364	134	22	39	0	790	0	335	390	217	942	103	352	455
1997	58	167	362	135	22	36	0	780	0	335	372	210	917	123	340	463
1998	60	163	361	137	25	36	0	782	0	331	372	211	914	105	338	443
1999	59	165	354	135	27	40	0	780	0	322	386	209	917	120	321	441
2000	59	164	352	134	27	39	0	775	0	322	381	209	912	105	318	423
2001	62	157	344	138	30	39	0	770	0	327	368	219	914	82	311	393
2002	57	159	353	137	34	43	0	783	0	316	367	209	892	88	292	380
2003	53	161	352	143	31	42	0	782	0	315	353	207	875	81	286	367
2004	55	157	341	142	26	38	0	759	0	312	354	211	877	94	267	361
2005	57	156	319	138	24	37	0	731	0	313	356	209	878	81	263	344
2006	50	152	302	137	25	38	0	704	0	324	353	209	886	78	255	333
2007	44	131	291	120	4	13	0	654						77	247	324
2008	43	123	295	122	23	27	0	651						71	230	301
2009														68	219	287

Sources:
Japan 1935-70. Set using linear interpolation, assuming 0 in 1935.
Japan 1970-79. Set using linear interpolation between the numbers for 1970 and 1975 from Tobayama *et al*. (1992).
Japan 1979-2006. Hakamada (2010)
Japan 2007-08, large scale. Hakamada, pers. comm.
Korea 1946-89. Set using linear interpolation, assuming 0 in 1946.
Korea 1990-2009. An, pers. comm.
Missing data: where the numbers of nets between 2007-12 are unknown, the numbers from the last known year are used.

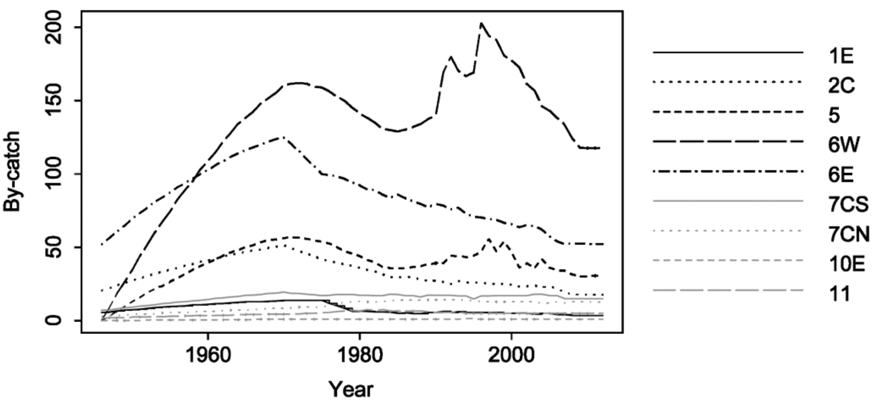


Fig 1. Plot of the historical bycatches used when applying the RMP (the same series is used for all trials).

Table 9

The single series of historical bycatches used in all trials when applying the RMP (i.e. for calculating catch limits). The series is the average of the predicted bycatches based on the fit to the actual data of the operating model for the six baseline trials (i.e. using the 'best fit' simulation (0)).

Year	1E	2C	5	6W	6E	7CS	7CN	10E	11
1946	5.50	20.50	0.00	0.00	52.00	7.00	3.00	0.00	1.67
1947	6.00	22.17	3.17	8.50	56.33	7.33	3.50	0.00	2.00
1948	6.67	24.00	6.33	18.17	60.83	8.00	3.50	0.00	2.00
1949	7.17	25.50	9.67	26.17	64.83	8.83	3.67	0.00	2.00
1950	7.50	27.50	12.83	34.17	69.50	9.17	4.33	0.00	2.33
1951	7.83	28.83	16.00	43.83	73.50	9.83	4.50	0.17	2.50
1952	8.33	30.33	19.00	51.50	77.00	10.33	4.50	0.33	2.50
1953	9.00	32.00	22.00	60.00	81.17	10.83	4.67	0.50	2.67
1954	9.33	33.50	23.67	67.33	84.00	11.67	5.33	0.50	2.67
1955	9.67	34.67	26.50	74.33	87.50	12.00	5.33	0.50	3.00
1956	9.83	36.00	29.00	82.67	91.00	12.67	5.50	0.50	3.17
1957	10.17	37.50	32.00	89.00	93.83	13.00	5.50	0.50	3.33
1958	10.83	38.67	34.67	95.00	97.00	13.50	6.17	0.50	3.33
1959	10.83	40.00	37.17	102.83	100.00	13.83	6.33	0.50	3.50
1960	11.17	41.17	39.50	109.00	102.83	14.50	6.33	0.50	3.50
1961	11.67	42.17	41.67	114.83	106.17	15.17	6.33	0.50	3.50
1962	11.83	43.83	44.17	122.17	108.83	15.50	6.83	0.67	3.67
1963	12.17	45.00	46.50	127.83	111.83	16.17	7.33	0.67	3.67
1964	12.50	46.00	48.33	134.33	114.33	16.50	7.33	0.67	4.00
1965	12.83	47.00	50.00	138.67	116.17	17.33	7.33	0.67	4.17
1966	12.83	48.00	51.67	142.83	118.33	17.50	7.50	0.67	4.33
1967	13.00	48.67	53.50	148.17	120.00	17.83	8.00	1.00	4.33
1968	13.33	49.67	55.00	152.17	122.00	18.50	8.33	1.00	4.50
1969	13.50	50.50	55.33	155.67	123.83	18.83	8.33	1.00	4.50
1970	13.83	51.33	56.33	160.50	125.00	19.50	8.33	1.00	4.50
1971	13.83	49.33	56.67	161.50	120.33	18.67	8.67	1.00	4.50
1972	13.83	47.50	56.67	162.00	115.83	18.67	9.33	1.00	4.67
1973	13.83	45.83	55.67	161.50	110.17	18.00	9.33	1.00	5.00
1974	13.83	43.83	54.83	159.83	105.50	17.67	9.33	1.00	5.00
1975	13.83	42.00	53.67	159.00	100.00	17.00	9.50	1.00	5.33
1976	11.83	40.67	52.67	156.33	99.17	17.17	10.33	1.00	5.50
1977	10.00	39.50	50.00	152.83	98.33	17.83	11.33	1.00	6.33
1978	8.33	38.50	47.67	150.00	96.67	17.83	12.33	1.00	6.50
1979	6.33	37.17	45.67	145.33	94.33	17.83	13.17	1.00	6.83
1980	6.50	36.17	44.00	141.17	92.33	17.17	13.33	1.00	6.67
1981	6.33	34.67	41.33	138.33	89.50	17.33	13.00	1.00	7.50
1982	6.00	33.67	39.67	135.00	89.17	17.00	13.00	1.00	7.17
1983	6.00	31.83	36.83	131.00	86.00	17.00	13.17	0.83	7.50
1984	5.83	29.67	35.67	130.00	83.67	18.00	13.33	1.00	6.50
1985	5.00	29.50	35.50	129.17	86.33	17.83	14.00	1.00	6.50
1986	5.33	30.00	35.67	130.33	83.50	17.00	14.00	1.00	6.50
1987	4.83	29.33	36.50	132.00	81.33	17.00	14.00	1.00	6.50
1988	4.83	28.00	37.17	134.17	79.67	16.17	14.00	1.00	6.50
1989	5.50	27.33	38.33	137.50	77.50	17.50	14.33	1.00	6.00
1990	5.50	27.17	39.33	140.17	79.50	17.17	14.17	1.00	5.67
1991	6.33	26.33	39.33	169.33	78.67	17.17	14.17	1.00	5.50
1992	5.50	25.00	44.33	180.00	76.00	17.17	14.17	1.00	5.67
1993	6.17	27.00	44.00	170.50	77.00	16.83	14.17	1.00	6.00
1994	5.50	26.17	43.33	166.67	72.83	16.83	13.83	1.50	5.00
1995	5.50	26.33	44.33	169.17	70.83	14.83	13.67	1.50	5.00
1996	5.50	25.50	46.83	202.83	70.33	16.83	12.83	1.00	5.00
1997	5.33	25.33	55.83	194.50	69.33	16.83	13.00	1.00	5.00
1998	5.50	24.67	47.33	191.67	68.50	17.00	13.00	1.00	5.00
1999	5.00	24.83	53.83	180.83	66.67	17.00	13.00	1.00	5.00
2000	5.00	24.67	46.83	177.50	65.67	17.00	13.00	1.00	5.00
2001	5.17	23.33	36.33	172.67	63.67	17.00	13.00	1.00	5.00
2002	5.00	23.50	39.17	161.33	65.00	17.00	13.00	1.00	5.00
2003	4.50	24.00	35.67	157.00	64.50	18.00	13.00	1.00	5.00
2004	5.00	23.00	42.00	146.17	62.00	18.00	12.00	1.00	5.00
2005	5.00	23.00	36.00	143.33	57.50	17.00	12.00	1.00	5.00
2006	4.00	22.17	34.50	138.33	54.00	17.00	13.00	1.00	5.00
2007	4.00	19.17	34.00	133.67	52.00	15.00	12.00	1.00	5.00
2008	3.50	17.83	31.50	124.17	52.67	15.00	12.83	1.00	5.00
2009	3.50	17.83	30.17	118.00	52.50	15.00	12.83	1.00	5.00
2010	3.50	17.67	30.17	117.83	52.33	15.00	12.83	1.00	5.00
2011	3.50	17.67	30.67	117.83	52.33	15.00	12.67	1.00	5.00
2012	3.50	17.67	30.67	117.83	52.33	15.00	12.67	1.00	5.00

REFERENCES

Allison, C. 2011. Direct catch data for western North Pacific minke whale simulation trials. Paper SC/D11/NPM3 presented to the First Intersessional Workshop for the *Implementation Review* of western North Pacific common minke whales, 12-16 December 2011, Tokyo, Japan (unpublished). [Paper available from the Office of this Journal].

Allison, C. 2013. IWC individual catch database Version 5.5 (12 February 2013).

Gong, Y. 1982. A note on the distribution of minke whales in Korean waters. *Rep int. Whal. Commn* 32:279-82 [SC/33/Mi7].

Hakamada, T. 2010. The number of set nets in the coast of Japan by sub-areas and years during 1979-2006. Paper SC/D10/NPM13 presented to the First Intersessional Workshop for Western North Pacific Common Minke Whales, 14-17 December 2010, Pusan, Republic of Korea (unpublished). 1pp. [Paper available from the Office of this Journal].

Tobayama, T., Yanagisawa, F., and Kasuya, T. 1992. Incidental take of minke whales in Japanese trap nets. *Rep. Int. Whal. Commn* 42:433-436.

Ohsumi, S. 1982 Minke whales in the coastal waters of Japan, 1980 and a population assessment of the Okhotsk Sea-West Pacific stock. *Rep. Int. Whal. Commn* 32: 283-6 [SC/33/Mi8].

Adjunct 2

Mixing matrices

An initial description of the information used to inform the parameters used is given in Allison and De Moor (2010).

Hypothesis A Baseline

J Stock Baseline A (Matrix J-A)

Age/sex	Mon	1W	1E	2C	2R	3	4	5	6W	6E	7CS	7CN	7WR	7E	8	9	9N	10W	10E	11	12SW	12NE	13
		Sub-Area																					
Juv	J-M	2	2	2	0	0	0	2	2	$4\gamma_{29}$	$2\gamma_{1}$	$2\gamma_{4}$	0	0	0	0	0	γ_{6}	γ_{7}	0	0	0	0
	Apr.	2	2	2	0	0	0	2	2	$4\gamma_{29}$	$2\gamma_{1}$	$2\gamma_{4}$	0	0	0	0	0	γ_{6}	γ_{7}	$2\gamma_{8}$	$2\gamma_{8}$	0	0
	May	2	2	2	0	0	0	2	2	$4\gamma_{29}$	$2\gamma_{2}$	$2\gamma_{4}$	0	0	0	0	0	γ_{6}	γ_{7}	$2\gamma_{8}$	$2\gamma_{8}$	0	0
	Jun.	2	2	2	0	0	0	2	2	$4\gamma_{29}$	$2\gamma_{3}$	$2\gamma_{4}$	0	0	0	0	0	γ_{6}	γ_{7}	$2\gamma_{9}$	$2\gamma_{9}$	0	0
	Jul.	2	2	2	0	0	0	2	2	$4\gamma_{29}$	$2\gamma_{3}$	$2\gamma_{5}$	0	0	0	0	0	γ_{6}	γ_{7}	$2\gamma_{9}$	$2\gamma_{9}$	0	0
	Aug.	2	2	2	0	0	0	2	2	$4\gamma_{29}$	$2\gamma_{3}$	$2\gamma_{5}$	0	0	0	0	0	γ_{6}	γ_{7}	$2\gamma_{9}$	$2\gamma_{9}$	0	0
	Sep.	2	2	2	0	0	0	2	2	$4\gamma_{29}$	$2\gamma_{3}$	$2\gamma_{5}$	0	0	0	0	0	γ_{6}	γ_{7}	$2\gamma_{9}$	$2\gamma_{9}$	0	0
	O-D	2	2	2	0	0	0	2	2	$4\gamma_{29}$	$2\gamma_{3}$	$2\gamma_{5}$	0	0	0	0	0	γ_{6}	γ_{7}	$2\gamma_{9}$	0	0	0
Ad.M	J-M	2	2	1	0	0	0	2	4	$4\gamma_{29}$	$2\gamma_{1}$	$2\gamma_{4}$	0	0	0	0	0	γ_{6}	γ_{7}	0	0	0	0
	Apr.	0	0	1	0	0	0	2	2	$2\gamma_{29}$	$4\gamma_{1}$	$2\gamma_{4}$	0	0	0	0	0	γ_{6}	$2\gamma_{7}$	γ_{8}	γ_{8}	0	0
	May	0	0	1	0	0	0	2	2	$2\gamma_{29}$	$4\gamma_{2}$	$2\gamma_{4}$	0	0	0	0	0	$2\gamma_{6}$	$2\gamma_{7}$	γ_{8}	$2\gamma_{8}$	0	0
	Jun.	0	0	1	0	0	0	2	2	$2\gamma_{29}$	$2\gamma_{3}$	$4\gamma_{4}$	0	0	0	0	0	$2\gamma_{6}$	$2\gamma_{7}$	γ_{9}	$2\gamma_{9}$	0	0
	Jul.	0	0	1	0	0	0	2	2	$2\gamma_{29}$	$2\gamma_{3}$	$4\gamma_{5}$	0	0	0	0	0	γ_{6}	γ_{7}	γ_{9}	$2\gamma_{9}$	0	0
	Aug.	0	0	1	0	0	0	2	2	$2\gamma_{29}$	$2\gamma_{3}$	$4\gamma_{5}$	0	0	0	0	0	γ_{6}	γ_{7}	γ_{9}	$2\gamma_{9}$	0	0
	Sep.	2	2	1	0	0	0	2	4	$4\gamma_{29}$	$2\gamma_{3}$	$4\gamma_{5}$	0	0	0	0	0	γ_{6}	γ_{7}	0	0	0	0
	O-D	4	4	1	0	0	0	2	2	0	$2\gamma_{3}$	$2\gamma_{5}$	0	0	0	0	0	0	0	0	0	0	0
Ad.F	J-M	2	2	1	0	0	0	2	4	$4\gamma_{29}$	γ_{1}	γ_{4}	0	0	0	0	0	γ_{6}	γ_{7}	0	0	0	0
	Apr.	0	0	1	0	0	0	2	2	$2\gamma_{29}$	$2\gamma_{1}$	γ_{4}	0	0	0	0	0	$2\gamma_{6}$	$2\gamma_{7}$	γ_{10}	γ_{10}	0	0
	May	0	0	1	0	0	0	2	2	$2\gamma_{29}$	$2\gamma_{2}$	γ_{4}	0	0	0	0	0	$2\gamma_{6}$	$2\gamma_{7}$	γ_{11}	$2\gamma_{11}$	0	0
	Jun.	0	0	1	0	0	0	2	2	$2\gamma_{29}$	γ_{3}	γ_{4}	0	0	0	0	0	$2\gamma_{6}$	$2\gamma_{7}$	γ_{12}	$2\gamma_{12}$	0	0
	Jul.	0	0	1	0	0	0	2	2	$2\gamma_{29}$	γ_{3}	γ_{5}	0	0	0	0	0	γ_{6}	γ_{7}	γ_{12}	$2\gamma_{12}$	0	0
	Aug.	0	0	1	0	0	0	2	2	$2\gamma_{29}$	γ_{3}	γ_{5}	0	0	0	0	0	γ_{6}	γ_{7}	γ_{12}	$2\gamma_{12}$	0	0
	Sep.	2	2	1	0	0	0	2	4	$4\gamma_{29}$	γ_{3}	γ_{5}	0	0	0	0	0	γ_{6}	γ_{7}	0	0	0	0
	O-D	4	4	1	0	0	0	2	2	0	γ_{3}	γ_{5}	0	0	0	0	0	0	0	0	0	0	0

O Stock Baseline A (Matrix O-AB)

Age/sex	Mon	1W	1E	2C	2R	3	4	5	6W	6E	7CS	7CN	7WR	7E	8	9	9N	10W	10E	11	12SW	12NE	13
		Sub-Area																					
Juv	J-M	0	0	γ_{13}	4	4	4	0	0	0	4	γ_{16}	0	0	0	0	0	0	0	0	0	0	0
	Apr.	0	0	γ_{14}	2	2	2	0	0	0	8	$2\gamma_{16}$	γ_{17}	γ_{18}	γ_{19}	γ_{20}	0	0	0	γ_{22}	γ_{23}	γ_{24}	0
	May	0	0	γ_{14}	2	2	2	0	0	0	8	$2\gamma_{16}$	γ_{17}	γ_{18}	γ_{19}	γ_{20}	γ_{21}	0	0	γ_{22}	γ_{23}	γ_{24}	0
	Jun.	0	0	γ_{14}	2	2	2	0	0	0	4	$4\gamma_{16}$	γ_{17}	γ_{18}	γ_{19}	γ_{20}	γ_{21}	0	0	γ_{22}	γ_{23}	γ_{24}	0
	Jul.	0	0	γ_{15}	2	2	2	0	0	0	4	$4\gamma_{16}$	γ_{17}	γ_{18}	γ_{19}	γ_{20}	γ_{21}	0	0	γ_{22}	γ_{23}	γ_{24}	0
	Aug.	0	0	γ_{15}	2	2	2	0	0	0	4	$4\gamma_{16}$	γ_{17}	γ_{18}	γ_{19}	γ_{20}	γ_{21}	0	0	γ_{22}	γ_{23}	γ_{24}	0
	Sep.	0	0	γ_{15}	2	2	2	0	0	0	4	$4\gamma_{16}$	γ_{17}	γ_{18}	γ_{19}	γ_{20}	γ_{21}	0	0	γ_{22}	γ_{23}	γ_{24}	0
	O-D	0	0	γ_{15}	4	4	4	0	0	0	4	$2\gamma_{16}$	0	0	0	0	0	0	0	0	0	0	0
Ad.M	J-M	0	0	γ_{13}	4	4	4	0	0	0	1	γ_{16}	0	0	0	0	0	0	0	0	0	0	0
	Apr.	0	0	γ_{14}	2	2	2	0	0	0	2	$2\gamma_{16}$	$4\gamma_{17}$	$4\gamma_{18}$	$4\gamma_{19}$	$4\gamma_{20}$	0	0	0	γ_{22}	γ_{23}	$3\gamma_{24}$	0
	May	0	0	0	0	0	0	0	0	0	2	$2\gamma_{16}$	$4\gamma_{17}$	$4\gamma_{18}$	$4\gamma_{19}$	$4\gamma_{20}$	$2\gamma_{21}$	0	0	γ_{22}	γ_{23}	$6\gamma_{24}$	0
	Jun.	0	0	0	0	0	0	0	0	0	2	$4\gamma_{16}$	$4\gamma_{17}$	$4\gamma_{18}$	$4\gamma_{19}$	$4\gamma_{20}$	$2\gamma_{21}$	0	0	γ_{22}	γ_{23}	$6\gamma_{24}$	0
	Jul.	0	0	0	0	0	0	0	0	0	2	$4\gamma_{16}$	$4\gamma_{17}$	$4\gamma_{18}$	$4\gamma_{19}$	$4\gamma_{20}$	$2\gamma_{21}$	0	0	γ_{22}	γ_{23}	$6\gamma_{24}$	0
	Aug.	0	0	0	0	0	0	0	0	0	2	$4\gamma_{16}$	$4\gamma_{17}$	$4\gamma_{18}$	$4\gamma_{19}$	$4\gamma_{20}$	$2\gamma_{21}$	0	0	γ_{22}	γ_{23}	$6\gamma_{24}$	0
	Sep.	0	0	0	0	0	0	0	0	0	2	$4\gamma_{16}$	$4\gamma_{17}$	$4\gamma_{18}$	$4\gamma_{19}$	$4\gamma_{20}$	γ_{21}	0	0	γ_{22}	γ_{23}	$3\gamma_{24}$	0
	O-D	0	0	γ_{15}	4	4	4	0	0	0	1	γ_{16}	0	0	0	0	0	0	0	0	0	0	0
Ad.F	J-M	0	0	γ_{13}	4	4	4	0	0	0	1	γ_{16}	0	0	0	0	0	0	0	0	0	0	0
	Apr.	0	0	γ_{14}	2	2	2	0	0	0	1	γ_{16}	$2\gamma_{17}$	$2\gamma_{18}$	$2\gamma_{19}$	$2\gamma_{20}$	0	0	0	γ_{22}	γ_{23}	$3\gamma_{24}$	0
	May	0	0	0	0	0	0	0	0	0	1	γ_{16}	γ_{17}	γ_{18}	γ_{19}	γ_{20}	$4\gamma_{21}$	0	0	$2\gamma_{22}$	$2\gamma_{23}$	$9\gamma_{24}$	0
	Jun.	0	0	0	0	0	0	0	0	0	1	$2\gamma_{16}$	γ_{17}	γ_{18}	γ_{19}	γ_{20}	$4\gamma_{21}$	0	0	$2\gamma_{22}$	$2\gamma_{23}$	$9\gamma_{24}$	0
	Jul.	0	0	0	0	0	0	0	0	0	1	$2\gamma_{16}$	γ_{17}	γ_{18}	γ_{19}	γ_{20}	$4\gamma_{21}$	0	0	$2\gamma_{22}$	$2\gamma_{23}$	$9\gamma_{24}$	0
	Aug.	0	0	0	0	0	0	0	0	0	1	$2\gamma_{16}$	γ_{17}	γ_{18}	γ_{19}	γ_{20}	$4\gamma_{21}$	0	0	$2\gamma_{22}$	$2\gamma_{23}$	$9\gamma_{24}$	0
	Sep.	0	0	0	0	0	0	0	0	0	1	$2\gamma_{16}$	γ_{17}	γ_{18}	γ_{19}	γ_{20}	$2\gamma_{21}$	0	0	$2\gamma_{22}$	$2\gamma_{23}$	$3\gamma_{24}$	0
	O-D	0	0	γ_{15}	4	4	4	0	0	0	1	γ_{16}	0	0	0	0	0	0	0	0	0	0	0

Hypothesis B Baseline

Y Stock Baseline B (Matrix Y-BC)

Age/sex	Mon	1W	1E	2C	2R	3	4	5	6W	6E	7CS	7CN	7WR	7E	8	9	9N	10W	10E	11	12SW	12NE	13
		Sub-Area																					
Juv	J-M	4	0	0	0	0	0	4	γ_{25}	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Apr.	1	0	0	0	0	0	4	γ_{26}	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	May	1	0	0	0	0	0	4	γ_{26}	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Jun.	1	0	0	0	0	0	4	γ_{26}	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Jul.	1	0	0	0	0	0	4	γ_{27}	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Aug.	1	0	0	0	0	0	4	γ_{27}	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Sep.	2	0	0	0	0	0	4	γ_{28}	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	O-D	4	0	0	0	0	0	4	γ_{28}	0	0	0	0	0	0	0	0	0	0	0	0	0	0
AdM	J-M	4	0	0	0	0	0	4	γ_{25}	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Apr.	1	0	0	0	0	0	4	γ_{26}	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	May	1	0	0	0	0	0	4	γ_{26}	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Jun.	1	0	0	0	0	0	4	γ_{26}	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Jul.	1	0	0	0	0	0	4	γ_{27}	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Aug.	1	0	0	0	0	0	4	γ_{27}	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Sep.	2	0	0	0	0	0	4	γ_{28}	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	O-D	4	0	0	0	0	0	4	γ_{28}	0	0	0	0	0	0	0	0	0	0	0	0	0	0
AdF	J-M	4	0	0	0	0	0	4	γ_{25}	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Apr.	1	0	0	0	0	0	4	γ_{26}	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	May	1	0	0	0	0	0	4	γ_{26}	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Jun.	1	0	0	0	0	0	4	γ_{26}	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Jul.	1	0	0	0	0	0	4	γ_{27}	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Aug.	1	0	0	0	0	0	4	γ_{27}	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Sep.	2	0	0	0	0	0	4	γ_{28}	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	O-D	4	0	0	0	0	0	4	γ_{28}	0	0	0	0	0	0	0	0	0	0	0	0	0	0

J Stock Baseline B (Matrix J-B)

Age/sex	Mon	1W	1E	2C	2R	3	4	5	6W	6E	7CS	7CN	7WR	7E	8	9	9N	10W	10E	11	12SW	12NE	13
		Sub-Area																					
Juv	J-M	0	2	2	0	0	0	0	2	$4\gamma_{29}$	$2\gamma_{1}$	$2\gamma_{4}$	0	0	0	0	0	γ_{6}	γ_{7}	0	0	0	0
	Apr.	0	2	2	0	0	0	0	2	$4\gamma_{29}$	$2\gamma_{1}$	$2\gamma_{4}$	0	0	0	0	0	γ_{6}	γ_{7}	$2\gamma_{8}$	$2\gamma_{8}$	0	0
	May	0	2	2	0	0	0	0	2	$4\gamma_{29}$	$2\gamma_{2}$	$2\gamma_{4}$	0	0	0	0	0	γ_{6}	γ_{7}	$2\gamma_{8}$	$2\gamma_{8}$	0	0
	Jun.	0	2	2	0	0	0	0	2	$4\gamma_{29}$	$2\gamma_{3}$	$2\gamma_{4}$	0	0	0	0	0	γ_{6}	γ_{7}	$2\gamma_{9}$	$2\gamma_{9}$	0	0
	Jul.	0	2	2	0	0	0	0	2	$4\gamma_{29}$	$2\gamma_{3}$	$2\gamma_{5}$	0	0	0	0	0	γ_{6}	γ_{7}	$2\gamma_{9}$	$2\gamma_{9}$	0	0
	Aug.	0	2	2	0	0	0	0	2	$4\gamma_{29}$	$2\gamma_{3}$	$2\gamma_{5}$	0	0	0	0	0	γ_{6}	γ_{7}	$2\gamma_{9}$	$2\gamma_{9}$	0	0
	Sep.	0	2	2	0	0	0	0	2	$4\gamma_{29}$	$2\gamma_{3}$	$2\gamma_{5}$	0	0	0	0	0	γ_{6}	γ_{7}	$2\gamma_{9}$	$2\gamma_{9}$	0	0
	O-D	0	2	2	0	0	0	0	2	$4\gamma_{29}$	$2\gamma_{3}$	$2\gamma_{5}$	0	0	0	0	0	γ_{6}	γ_{7}	$2\gamma_{9}$	0	0	0
Ad.M	J-M	0	2	1	0	0	0	0	4	$4\gamma_{29}$	$2\gamma_{1}$	$2\gamma_{4}$	0	0	0	0	0	γ_{6}	γ_{7}	0	0	0	0
	Apr.	0	0	1	0	0	0	0	2	$2\gamma_{29}$	$4\gamma_{1}$	$2\gamma_{4}$	0	0	0	0	0	γ_{6}	$2\gamma_{7}$	γ_{8}	γ_{8}	0	0
	May	0	0	1	0	0	0	0	2	$2\gamma_{29}$	$4\gamma_{2}$	$2\gamma_{4}$	0	0	0	0	0	$2\gamma_{6}$	$2\gamma_{7}$	γ_{8}	$2\gamma_{8}$	0	0
	Jun.	0	0	1	0	0	0	0	2	$2\gamma_{29}$	$2\gamma_{3}$	$4\gamma_{4}$	0	0	0	0	0	$2\gamma_{6}$	$2\gamma_{7}$	γ_{9}	$2\gamma_{9}$	0	0
	Jul.	0	0	1	0	0	0	0	2	$2\gamma_{29}$	$2\gamma_{3}$	$4\gamma_{5}$	0	0	0	0	0	γ_{6}	γ_{7}	γ_{9}	$2\gamma_{9}$	0	0
	Aug.	0	0	1	0	0	0	0	2	$2\gamma_{29}$	$2\gamma_{3}$	$4\gamma_{5}$	0	0	0	0	0	γ_{6}	γ_{7}	γ_{9}	$2\gamma_{9}$	0	0
	Sep.	0	2	1	0	0	0	0	4	$4\gamma_{29}$	$2\gamma_{3}$	$4\gamma_{5}$	0	0	0	0	0	γ_{6}	γ_{7}	0	0	0	0
	O-D	0	4	1	0	0	0	0	2	0	$2\gamma_{3}$	$2\gamma_{5}$	0	0	0	0	0	0	0	0	0	0	0
Ad.F	J-M	0	2	1	0	0	0	0	4	$4\gamma_{29}$	γ_{1}	γ_{4}	0	0	0	0	0	γ_{6}	γ_{7}	0	0	0	0
	Apr.	0	0	1	0	0	0	0	2	$2\gamma_{29}$	$2\gamma_{1}$	γ_{4}	0	0	0	0	0	$2\gamma_{6}$	$2\gamma_{7}$	γ_{10}	γ_{10}	0	0
	May	0	0	1	0	0	0	0	2	$2\gamma_{29}$	$2\gamma_{2}$	γ_{4}	0	0	0	0	0	$2\gamma_{6}$	$2\gamma_{7}$	γ_{11}	$2\gamma_{11}$	0	0
	Jun.	0	0	1	0	0	0	0	2	$2\gamma_{29}$	γ_{3}	γ_{4}	0	0	0	0	0	$2\gamma_{6}$	$2\gamma_{7}$	γ_{12}	$2\gamma_{12}$	0	0
	Jul.	0	0	1	0	0	0	0	2	$2\gamma_{29}$	γ_{3}	γ_{5}	0	0	0	0	0	γ_{6}	γ_{7}	γ_{12}	$2\gamma_{12}$	0	0
	Aug.	0	0	1	0	0	0	0	2	$2\gamma_{29}$	γ_{3}	γ_{5}	0	0	0	0	0	γ_{6}	γ_{7}	γ_{12}	$2\gamma_{12}$	0	0
	Sep.	0	2	1	0	0	0	0	4	$4\gamma_{29}$	γ_{3}	γ_{5}	0	0	0	0	0	γ_{6}	γ_{7}	0	0	0	0
	O-D	0	4	1	0	0	0	0	2	0	γ_{3}	γ_{5}	0	0	0	0	0	0	0	0	0	0	0

Hypothesis B Baseline continued
O Stock Baseline B = O Stock Baseline A (Matrix O-AB)

Age/	Mon	Sub-Area																					
sex		1W	1E	2C	2R	3	4	5	6W	6E	7CS	7CN	7WR	7E	8	9	9N	10W	10E	11	12SW	12NE	13
Juv	J-M	0	0	γ_{13}	4	4	4	0	0	0	4	γ_{16}	0	0	0	0	0	0	0	0	0	0	0
	Apr.	0	0	γ_{14}	2	2	2	0	0	0	8	$2\gamma_{16}$	γ_{17}	γ_{18}	γ_{19}	γ_{20}	0	0	0	γ_{22}	γ_{23}	γ_{24}	0
	May	0	0	γ_{14}	2	2	2	0	0	0	8	$2\gamma_{16}$	γ_{17}	γ_{18}	γ_{19}	γ_{20}	γ_{21}	0	0	γ_{22}	γ_{23}	γ_{24}	0
	Jun.	0	0	γ_{14}	2	2	2	0	0	0	4	$4\gamma_{16}$	γ_{17}	γ_{18}	γ_{19}	γ_{20}	γ_{21}	0	0	γ_{22}	γ_{23}	γ_{24}	0
	Jul.	0	0	γ_{15}	2	2	2	0	0	0	4	$4\gamma_{16}$	γ_{17}	γ_{18}	γ_{19}	γ_{20}	γ_{21}	0	0	γ_{22}	γ_{23}	γ_{24}	0
	Aug.	0	0	γ_{15}	2	2	2	0	0	0	4	$4\gamma_{16}$	γ_{17}	γ_{18}	γ_{19}	γ_{20}	γ_{21}	0	0	γ_{22}	γ_{23}	γ_{24}	0
	Sep.	0	0	γ_{15}	2	2	2	0	0	0	4	$4\gamma_{16}$	γ_{17}	γ_{18}	γ_{19}	γ_{20}	γ_{21}	0	0	γ_{22}	γ_{23}	γ_{24}	0
	O-D	0	0	γ_{15}	4	4	4	0	0	0	4	$2\gamma_{16}$	0	0	0	0	0	0	0	0	0	0	0
Ad.M	J-M	0	0	γ_{13}	4	4	4	0	0	0	1	γ_{16}	0	0	0	0	0	0	0	0	0	0	0
	Apr.	0	0	γ_{14}	2	2	2	0	0	0	2	$2\gamma_{16}$	$4\gamma_{17}$	$4\gamma_{18}$	$4\gamma_{19}$	$4\gamma_{20}$	0	0	0	γ_{22}	γ_{23}	$3\gamma_{24}$	0
	May	0	0	0	0	0	0	0	0	0	2	$2\gamma_{16}$	$4\gamma_{17}$	$4\gamma_{18}$	$4\gamma_{19}$	$4\gamma_{20}$	$2\gamma_{21}$	0	0	γ_{22}	γ_{23}	$6\gamma_{24}$	0
	Jun.	0	0	0	0	0	0	0	0	0	2	$4\gamma_{16}$	$4\gamma_{17}$	$4\gamma_{18}$	$4\gamma_{19}$	$4\gamma_{20}$	$2\gamma_{21}$	0	0	γ_{22}	γ_{23}	$6\gamma_{24}$	0
	Jul.	0	0	0	0	0	0	0	0	0	2	$4\gamma_{16}$	$4\gamma_{17}$	$4\gamma_{18}$	$4\gamma_{19}$	$4\gamma_{20}$	$2\gamma_{21}$	0	0	γ_{22}	γ_{23}	$6\gamma_{24}$	0
	Aug.	0	0	0	0	0	0	0	0	0	2	$4\gamma_{16}$	$4\gamma_{17}$	$4\gamma_{18}$	$4\gamma_{19}$	$4\gamma_{20}$	$2\gamma_{21}$	0	0	γ_{22}	γ_{23}	$6\gamma_{24}$	0
	Sep.	0	0	0	0	0	0	0	0	0	2	$4\gamma_{16}$	$4\gamma_{17}$	$4\gamma_{18}$	$4\gamma_{19}$	$4\gamma_{20}$	γ_{21}	0	0	γ_{22}	γ_{23}	$3\gamma_{24}$	0
	O-D	0	0	γ_{15}	4	4	4	0	0	0	1	γ_{16}	0	0	0	0	0	0	0	0	0	0	0
Ad.F	J-M	0	0	γ_{13}	4	4	4	0	0	0	1	γ_{16}	0	0	0	0	0	0	0	0	0	0	0
	Apr.	0	0	γ_{14}	2	2	2	0	0	0	1	γ_{16}	$2\gamma_{17}$	$2\gamma_{18}$	$2\gamma_{19}$	$2\gamma_{20}$	0	0	0	γ_{22}	γ_{23}	$3\gamma_{24}$	0
	May	0	0	0	0	0	0	0	0	0	1	γ_{16}	γ_{17}	γ_{18}	γ_{19}	γ_{20}	$4\gamma_{21}$	0	0	$2\gamma_{22}$	$2\gamma_{23}$	$9\gamma_{24}$	0
	Jun.	0	0	0	0	0	0	0	0	0	1	$2\gamma_{16}$	γ_{17}	γ_{18}	γ_{19}	γ_{20}	$4\gamma_{21}$	0	0	$2\gamma_{22}$	$2\gamma_{23}$	$9\gamma_{24}$	0
	Jul.	0	0	0	0	0	0	0	0	0	1	$2\gamma_{16}$	γ_{17}	γ_{18}	γ_{19}	γ_{20}	$4\gamma_{21}$	0	0	$2\gamma_{22}$	$2\gamma_{23}$	$9\gamma_{24}$	0
	Aug.	0	0	0	0	0	0	0	0	0	1	$2\gamma_{16}$	γ_{17}	γ_{18}	γ_{19}	γ_{20}	$4\gamma_{21}$	0	0	$2\gamma_{22}$	$2\gamma_{23}$	$9\gamma_{24}$	0
	Sep.	0	0	0	0	0	0	0	0	0	1	$2\gamma_{16}$	γ_{17}	γ_{18}	γ_{19}	γ_{20}	$2\gamma_{21}$	0	0	$2\gamma_{22}$	$2\gamma_{23}$	$3\gamma_{24}$	0
	O-D	0	0	γ_{15}	4	4	4	0	0	0	1	γ_{16}	0	0	0	0	0	0	0	0	0	0	0

Hypothesis C Baseline
Y Stock Baseline C = Y Baseline B (Matrix Y-BC)

Age/	Mon	Sub-Area																					
sex		1W	1E	2C	2R	3	4	5	6W	6E	7CS	7CN	7WR	7E	8	9	9N	10W	10E	11	12SW	12NE	13
Juv	J-M	4	0	0	0	0	0	4	γ_{25}	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Apr.	1	0	0	0	0	0	4	γ_{26}	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	May	1	0	0	0	0	0	4	γ_{26}	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Jun.	1	0	0	0	0	0	4	γ_{26}	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Jul.	1	0	0	0	0	0	4	γ_{27}	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Aug.	1	0	0	0	0	0	4	γ_{27}	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Sep.	2	0	0	0	0	0	4	γ_{28}	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	O-D	4	0	0	0	0	0	4	γ_{28}	0	0	0	0	0	0	0	0	0	0	0	0	0	0
AdM	J-M	4	0	0	0	0	0	4	γ_{25}	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Apr.	1	0	0	0	0	0	4	γ_{26}	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	May	1	0	0	0	0	0	4	γ_{26}	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Jun.	1	0	0	0	0	0	4	γ_{26}	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Jul.	1	0	0	0	0	0	4	γ_{27}	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Aug.	1	0	0	0	0	0	4	γ_{27}	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Sep.	2	0	0	0	0	0	4	γ_{28}	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	O-D	4	0	0	0	0	0	4	γ_{28}	0	0	0	0	0	0	0	0	0	0	0	0	0	0
AdF	J-M	4	0	0	0	0	0	4	γ_{25}	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Apr.	1	0	0	0	0	0	4	γ_{26}	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	May	1	0	0	0	0	0	4	γ_{26}	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Jun.	1	0	0	0	0	0	4	γ_{26}	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Jul.	1	0	0	0	0	0	4	γ_{27}	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Aug.	1	0	0	0	0	0	4	γ_{27}	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Sep.	2	0	0	0	0	0	4	γ_{28}	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	O-D	4	0	0	0	0	0	4	γ_{28}	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Hypothesis C Baseline continued
JW Stock Baseline C (Matrix JW-C)

Age/	Mon	Sub-Area																					
sex		1W	1E	2C	2R	3	4	5	6W	6E	7CS	7CN	7WR	7E	8	9	9N	10W	10E	11	12SW	12NE	13
0	J-M	0	2	0	0	0	0	0	2	$4\gamma_{29}$	0	0	0	0	0	0	0	γ_6	γ_7	0	0	0	0
	Apr.	0	2	0	0	0	0	0	2	$4\gamma_{29}$	0	0	0	0	0	0	0	γ_6	γ_7	$2\gamma_8$	$2\gamma_8$	0	0
	May	0	2	0	0	0	0	0	2	$4\gamma_{29}$	0	0	0	0	0	0	0	γ_6	γ_7	$2\gamma_8$	$2\gamma_8$	0	0
	Jun.	0	2	0	0	0	0	0	2	$4\gamma_{29}$	0	0	0	0	0	0	0	γ_6	γ_7	$2\gamma_9$	$2\gamma_9$	0	0
	Jul.	0	2	0	0	0	0	0	2	$4\gamma_{29}$	0	0	0	0	0	0	0	γ_6	γ_7	$2\gamma_9$	$2\gamma_9$	0	0
	Aug.	0	2	0	0	0	0	0	2	$4\gamma_{29}$	0	0	0	0	0	0	0	γ_6	γ_7	$2\gamma_9$	$2\gamma_9$	0	0
	Sep.	0	2	0	0	0	0	0	2	$4\gamma_{29}$	0	0	0	0	0	0	0	γ_6	γ_7	$2\gamma_9$	$2\gamma_9$	0	0
	O-D	0	2	0	0	0	0	0	2	$4\gamma_{29}$	0	0	0	0	0	0	0	γ_6	γ_7	$2\gamma_9$	0	0	0
Ad.M	J-M	0	2	0	0	0	0	0	4	$4\gamma_{29}$	0	0	0	0	0	0	0	γ_6	γ_7	0	0	0	0
	Apr.	0	0	0	0	0	0	0	2	$2\gamma_{29}$	0	0	0	0	0	0	0	γ_6	$2\gamma_7$	γ_8	γ_8	0	0
	May	0	0	0	0	0	0	0	2	$2\gamma_{29}$	0	0	0	0	0	0	0	$2\gamma_6$	$2\gamma_7$	γ_8	$2\gamma_8$	0	0
	Jun.	0	0	0	0	0	0	0	2	$2\gamma_{29}$	0	0	0	0	0	0	0	$2\gamma_6$	$2\gamma_7$	γ_9	$2\gamma_9$	0	0
	Jul.	0	0	0	0	0	0	0	2	$2\gamma_{29}$	0	0	0	0	0	0	0	γ_6	γ_7	γ_9	$2\gamma_9$	0	0
	Aug.	0	0	0	0	0	0	0	2	$2\gamma_{29}$	0	0	0	0	0	0	0	γ_6	γ_7	γ_9	$2\gamma_9$	0	0
	Sep.	0	2	0	0	0	0	0	4	$4\gamma_{29}$	0	0	0	0	0	0	0	γ_6	γ_7	0	0	0	0
	O-D	0	4	0	0	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Ad.F	J-M	0	2	0	0	0	0	0	4	$4\gamma_{29}$	0	0	0	0	0	0	0	γ_6	γ_7	0	0	0	0
	Apr.	0	0	0	0	0	0	0	2	$2\gamma_{29}$	0	0	0	0	0	0	0	$2\gamma_6$	$2\gamma_7$	γ_{10}	γ_{10}	0	0
	May	0	0	0	0	0	0	0	2	$2\gamma_{29}$	0	0	0	0	0	0	0	$2\gamma_6$	$2\gamma_7$	γ_{11}	$2\gamma_{11}$	0	0
	Jun.	0	0	0	0	0	0	0	2	$2\gamma_{29}$	0	0	0	0	0	0	0	$2\gamma_6$	$2\gamma_7$	γ_{12}	$2\gamma_{12}$	0	0
	Jul.	0	0	0	0	0	0	0	2	$2\gamma_{29}$	0	0	0	0	0	0	0	γ_6	γ_7	γ_{12}	$2\gamma_{12}$	0	0
	Aug.	0	0	0	0	0	0	0	2	$2\gamma_{29}$	0	0	0	0	0	0	0	γ_6	γ_7	γ_{12}	$2\gamma_{12}$	0	0
	Sep.	0	2	0	0	0	0	0	4	$4\gamma_{29}$	0	0	0	0	0	0	0	γ_6	γ_7	γ_{12}	0	0	0
	O-D	0	4	0	0	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0

JE Stock Baseline C (Matrix JE-C)

Age/	Mon	Sub-Area																					
sex		1W	1E	2C	2R	3	4	5	6W	6E	7CS	7CN	7WR	7E	8	9	9N	10W	10E	11	12SW	12NE	13
Juv	J-M	0	0	2	0	0	0	0	0	0	γ_{31}	$2\gamma_{16}$	0	0	0	0	0	0	0	0	0	0	0
	Apr.	0	0	2	0	0	0	0	0	0	$2\gamma_{31}$	$3\gamma_{16}$	0	0	0	0	0	0	0	0	0	0	0
	May	0	0	2	0	0	0	0	0	0	$2\gamma_{31}$	$3\gamma_{16}$	0	0	0	0	0	0	0	0	0	0	0
	Jun.	0	0	2	0	0	0	0	0	0	$2\gamma_{31}$	$3\gamma_{16}$	0	0	0	0	0	0	0	0	0	0	0
	Jul.	0	0	2	0	0	0	0	0	0	$2\gamma_{31}$	$6\gamma_{16}$	0	0	0	0	0	0	0	0	0	0	0
	Aug.	0	0	2	0	0	0	0	0	0	$2\gamma_{31}$	$6\gamma_{16}$	0	0	0	0	0	0	0	0	0	0	0
	Sep.	0	0	2	0	0	0	0	0	0	$2\gamma_{31}$	$6\gamma_{16}$	0	0	0	0	0	0	0	0	0	0	0
	O-D	0	0	2	0	0	0	0	0	0	γ_{31}	$2\gamma_{16}$	0	0	0	0	0	0	0	0	0	0	0
Ad.M	J-M	0	0	1	0	0	0	0	0	0	γ_{31}	$2\gamma_{16}$	0	0	0	0	0	0	0	0	0	0	0
	Apr.	0	0	1	0	0	0	0	0	0	$4\gamma_{31}$	$3\gamma_{16}$	0	0	0	0	0	0	0	0	0	0	0
	May	0	0	1	0	0	0	0	0	0	$4\gamma_{31}$	$3\gamma_{16}$	0	0	0	0	0	0	0	0	0	0	0
	Jun.	0	0	1	0	0	0	0	0	0	$4\gamma_{31}$	$8\gamma_{16}$	0	0	0	0	0	0	0	0	0	0	0
	Jul.	0	0	1	0	0	0	0	0	0	$4\gamma_{31}$	$8\gamma_{16}$	0	0	0	0	0	0	0	0	0	0	0
	Aug.	0	0	1	0	0	0	0	0	0	$4\gamma_{31}$	$8\gamma_{16}$	0	0	0	0	0	0	0	0	0	0	0
	Sep.	0	0	1	0	0	0	0	0	0	$4\gamma_{31}$	$8\gamma_{16}$	0	0	0	0	0	0	0	0	0	0	0
	O-D	0	0	1	0	0	0	0	0	0	γ_{31}	$2\gamma_{16}$	0	0	0	0	0	0	0	0	0	0	0
Ad.F	J-M	0	0	1	0	0	0	0	0	0	γ_{31}	$2\gamma_{16}$	0	0	0	0	0	0	0	0	0	0	0
	Apr.	0	0	1	0	0	0	0	0	0	$4\gamma_{31}$	$3\gamma_{16}$	0	0	0	0	0	0	0	0	0	0	0
	May	0	0	1	0	0	0	0	0	0	$4\gamma_{31}$	$3\gamma_{16}$	0	0	0	0	0	0	0	0	0	0	0
	Jun.	0	0	1	0	0	0	0	0	0	$4\gamma_{31}$	$8\gamma_{16}$	0	0	0	0	0	0	0	0	0	0	0
	Jul.	0	0	1	0	0	0	0	0	0	$4\gamma_{31}$	$8\gamma_{16}$	0	0	0	0	0	0	0	0	0	0	0
	Aug.	0	0	1	0	0	0	0	0	0	$4\gamma_{31}$	$8\gamma_{16}$	0	0	0	0	0	0	0	0	0	0	0
	Sep.	0	0	1	0	0	0	0	0	0	$4\gamma_{31}$	$8\gamma_{16}$	0	0	0	0	0	0	0	0	0	0	0
	O-D	0	0	1	0	0	0	0	0	0	γ_{31}	$2\gamma_{16}$	0	0	0	0	0	0	0	0	0	0	0

Note: γ_2 not used for Hypothesis III.

Hypothesis C Baseline continued

OW Stock Baseline C (Matrix OW-C)

Age/ sex	Mon	1W	1E	2C	2R	3	4	5	6W	6E	7CS	7CN	7WR	7E	8	9	9N	10W	10E	11	12SW	12NE	13
		Sub-Area																					
Juv	J-M	0	0	γ_{13}	4	0	0	0	0	0	$4\gamma_1$	γ_5	γ_{32}	0	0	0	0	0	0	0	0	0	0
	Apr.	0	0	γ_{14}	2	0	0	0	0	0	$8\gamma_1$	γ_4	γ_{32}	0	0	0	0	0	0	γ_{33}	0	0	0
	May	0	0	γ_{14}	0	0	0	0	0	0	$8\gamma_1$	γ_4	γ_{32}	0	0	0	0	0	0	γ_{33}	γ_{34}	0	0
	Jun.	0	0	γ_{14}	0	0	0	0	0	0	$4\gamma_3$	$2\gamma_4$	γ_{32}	0	0	0	0	0	0	γ_{33}	γ_{34}	0	0
	Jul.	0	0	0	0	0	0	0	0	0	$4\gamma_3$	$2\gamma_5$	γ_{32}	0	0	0	0	0	0	γ_{33}	γ_{34}	0	0
	Aug.	0	0	0	0	0	0	0	0	0	$4\gamma_3$	$2\gamma_5$	γ_{32}	0	0	0	0	0	0	γ_{33}	γ_{34}	0	0
	Sep.	0	0	0	0	0	0	0	0	0	$4\gamma_3$	$2\gamma_5$	γ_{32}	0	0	0	0	0	0	γ_{33}	γ_{34}	0	0
	O-D	0	0	0	4	0	0	0	0	0	$4\gamma_3$	γ_5	γ_{32}	0	0	0	0	0	0	0	0	0	0
Ad.M	J-M	0	0	γ_{13}	4	0	0	0	0	0	γ_1	γ_5	γ_{32}	0	0	0	0	0	0	0	0	0	0
	Apr.	0	0	γ_{14}	2	0	0	0	0	0	$2\gamma_1$	γ_4	$4\gamma_{32}$	0	0	0	0	0	0	γ_{33}	0	0	0
	May	0	0	0	0	0	0	0	0	0	$2\gamma_1$	γ_4	$4\gamma_{32}$	0	0	0	0	0	0	γ_{33}	γ_{34}	0	0
	Jun.	0	0	0	0	0	0	0	0	0	$2\gamma_3$	$2\gamma_4$	$4\gamma_{32}$	0	0	0	0	0	0	γ_{33}	γ_{34}	0	0
	Jul.	0	0	0	0	0	0	0	0	0	$2\gamma_3$	$2\gamma_5$	$4\gamma_{32}$	0	0	0	0	0	0	γ_{33}	γ_{34}	0	0
	Aug.	0	0	0	0	0	0	0	0	0	$2\gamma_3$	$2\gamma_5$	$4\gamma_{32}$	0	0	0	0	0	0	γ_{33}	γ_{34}	0	0
	Sep.	0	0	0	0	0	0	0	0	0	γ_3	$2\gamma_5$	$4\gamma_{32}$	0	0	0	0	0	0	γ_{33}	γ_{34}	0	0
	O-D	0	0	0	4	0	0	0	0	0	γ_3	γ_5	γ_{32}	0	0	0	0	0	0	0	0	0	0
Ad.F	J-M	0	0	γ_{13}	4	0	0	0	0	0	γ_1	γ_5	γ_{32}	0	0	0	0	0	0	0	0	0	0
	Apr.	0	0	γ_{14}	2	0	0	0	0	0	γ_1	γ_4	$2\gamma_{32}$	0	0	0	0	0	0	γ_{33}	γ_{34}	0	0
	May	0	0	0	0	0	0	0	0	0	γ_1	γ_4	γ_{32}	0	0	0	0	0	0	$2\gamma_{33}$	$2\gamma_{34}$	0	0
	Jun.	0	0	0	0	0	0	0	0	0	γ_3	$2\gamma_4$	γ_{32}	0	0	0	0	0	0	$2\gamma_{33}$	$2\gamma_{34}$	0	0
	Jul.	0	0	0	0	0	0	0	0	0	γ_3	$2\gamma_5$	γ_{32}	0	0	0	0	0	0	$2\gamma_{33}$	$2\gamma_{34}$	0	0
	Aug.	0	0	0	0	0	0	0	0	0	γ_3	$2\gamma_5$	γ_{32}	0	0	0	0	0	0	$2\gamma_{33}$	$2\gamma_{34}$	0	0
	Sep.	0	0	0	0	0	0	0	0	0	γ_3	$2\gamma_5$	γ_{32}	0	0	0	0	0	0	$2\gamma_{33}$	$2\gamma_{34}$	0	0
	O-D	0	0	0	4	0	0	0	0	0	γ_3	γ_5	γ_{32}	0	0	0	0	0	0	0	0	0	0

OE Stock Baseline C (Matrix OE-C)

Age/ sex	Mon	1W	1E	2C	2R	3	4	5	6W	6E	7CS	7CN	7WR	7E	8	9	9N	10W	10E	11	12SW	12NE	13
		Sub-Area																					
Juv	J-M	0	0	0	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Apr.	0	0	0	2	2	2	0	0	0	0	0	γ_{17}	γ_{18}	γ_{19}	γ_{20}	0	0	0	γ_{22}	γ_{23}	γ_{24}	0
	May	0	0	0	2	2	2	0	0	0	0	0	γ_{17}	γ_{18}	γ_{19}	γ_{20}	γ_{21}	0	0	γ_{22}	γ_{23}	γ_{24}	0
	Jun.	0	0	0	2	2	2	0	0	0	0	0	γ_{17}	γ_{18}	γ_{19}	γ_{20}	γ_{21}	0	0	γ_{22}	γ_{23}	γ_{24}	0
	Jul.	0	0	0	2	2	2	0	0	0	0	0	γ_{17}	γ_{18}	γ_{19}	γ_{20}	γ_{21}	0	0	γ_{22}	γ_{23}	γ_{24}	0
	Aug.	0	0	0	2	2	2	0	0	0	0	0	γ_{17}	γ_{18}	γ_{19}	γ_{20}	γ_{21}	0	0	γ_{22}	γ_{23}	γ_{24}	0
	Sep.	0	0	0	2	2	2	0	0	0	0	0	γ_{17}	γ_{18}	γ_{19}	γ_{20}	γ_{21}	0	0	γ_{22}	γ_{23}	γ_{24}	0
	O-D	0	0	0	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Ad.M	J-M	0	0	0	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Apr.	0	0	0	2	2	2	0	0	0	0	0	$4\gamma_{17}$	$4\gamma_{18}$	$4\gamma_{19}$	$4\gamma_{20}$	0	0	0	γ_{22}	γ_{23}	$3\gamma_{24}$	0
	May	0	0	0	0	0	0	0	0	0	0	0	$4\gamma_{17}$	$4\gamma_{18}$	$4\gamma_{19}$	$4\gamma_{20}$	$2\gamma_{21}$	0	0	γ_{22}	γ_{23}	$6\gamma_{24}$	0
	Jun.	0	0	0	0	0	0	0	0	0	0	0	$4\gamma_{17}$	$4\gamma_{18}$	$4\gamma_{19}$	$4\gamma_{20}$	$2\gamma_{21}$	0	0	γ_{22}	γ_{23}	$6\gamma_{24}$	0
	Jul.	0	0	0	0	0	0	0	0	0	0	0	$4\gamma_{17}$	$4\gamma_{18}$	$4\gamma_{19}$	$4\gamma_{20}$	$2\gamma_{21}$	0	0	γ_{22}	γ_{23}	$6\gamma_{24}$	0
	Aug.	0	0	0	0	0	0	0	0	0	0	0	$4\gamma_{17}$	$4\gamma_{18}$	$4\gamma_{19}$	$4\gamma_{20}$	$2\gamma_{21}$	0	0	γ_{22}	γ_{23}	$6\gamma_{24}$	0
	Sep.	0	0	0	0	0	0	0	0	0	0	0	$4\gamma_{17}$	$4\gamma_{18}$	$4\gamma_{19}$	$4\gamma_{20}$	γ_{21}	0	0	γ_{22}	γ_{23}	$3\gamma_{24}$	0
	O-D	0	0	0	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Ad.F	J-M	0	0	0	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Apr.	0	0	0	2	2	2	0	0	0	0	0	$2\gamma_{17}$	$2\gamma_{18}$	$2\gamma_{19}$	$2\gamma_{20}$	0	0	0	γ_{22}	γ_{23}	$3\gamma_{24}$	0
	May	0	0	0	0	0	0	0	0	0	0	0	γ_{17}	γ_{18}	γ_{19}	γ_{20}	$4\gamma_{21}$	0	0	γ_{22}	$2\gamma_{23}$	$9\gamma_{24}$	0
	Jun.	0	0	0	0	0	0	0	0	0	0	0	γ_{17}	γ_{18}	γ_{19}	γ_{20}	$4\gamma_{21}$	0	0	$2\gamma_{22}$	$2\gamma_{23}$	$9\gamma_{24}$	0
	Jul.	0	0	0	0	0	0	0	0	0	0	0	γ_{17}	γ_{18}	γ_{19}	γ_{20}	$4\gamma_{21}$	0	0	$2\gamma_{22}$	$2\gamma_{23}$	$9\gamma_{24}$	0
	Aug.	0	0	0	0	0	0	0	0	0	0	0	γ_{17}	γ_{18}	γ_{19}	γ_{20}	$4\gamma_{21}$	0	0	$2\gamma_{22}$	$2\gamma_{23}$	$9\gamma_{24}$	0
	Sep.	0	0	0	0	0	0	0	0	0	0	0	γ_{17}	γ_{18}	γ_{19}	γ_{20}	$2\gamma_{21}$	0	0	$2\gamma_{22}$	$2\gamma_{23}$	$3\gamma_{24}$	0
	O-D	0	0	0	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Note γ_{15} not used in Hypothesis III.

MIXING MATRICES FOR SENSITIVITY TRIALS (JUNE 2012)

Trial 02 (With a 'C' stock): Hypothesis A

J Stock and O stock: As for Baseline A (Matrix J-A and O-AB)

C Stock Trial A02 (Matrix C-A2)

Age/ sex	Mon	1W	1E	2C	2R	3	4	5	6W	6E	7CS	7CN	7WR	7E	8	9	9N	10W	10E	11	12SW	12NE	13
		Sub-Area																					
Juv	J-M	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
	Apr.	0	0	0	0	0	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	0	0	0	0	0	1
	Jun.	0	0	0	0	0	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	0	0	0	0	0	1
	Aug.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
	Sep.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
	O-D	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
Ad.M	J-M	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
	Apr.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	γ_{36}	0	0	0	0	0	0	6
	May	0	0	0	0	0	0	0	0	0	0	0	0	0	0	γ_{36}	γ_{30}	0	0	0	0	0	5
	Jun.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	γ_{36}	γ_{30}	0	0	0	0	0	4
	Jul.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	γ_{36}	γ_{30}	0	0	0	0	0	4
	Aug.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	γ_{36}	γ_{30}	0	0	0	0	0	4
	Sep.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	γ_{36}	γ_{30}	0	0	0	0	0	3
	O-D	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
Ad.F	J-M	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
	Apr.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	$2\gamma_{36}$	0	0	0	0	0	0	6
	May	0	0	0	0	0	0	0	0	0	0	0	0	0	0	γ_{36}	$3\gamma_{30}$	0	0	0	0	0	3
	Jun.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	γ_{36}	$3\gamma_{30}$	0	0	0	0	0	1
	Jul.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	γ_{36}	$3\gamma_{30}$	0	0	0	0	0	1
	Aug.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	γ_{36}	$3\gamma_{30}$	0	0	0	0	0	1
	Sep.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	γ_{36}	$3\gamma_{30}$	0	0	0	0	0	1
	O-D	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1

Trial 02 (With a 'C' stock): Hypothesis C

Y Stock, JW Stock, JE Stock, OW Stock and OE Stock: as for Baseline C (Matrix Y-BC, JW-C, JE-C, OW-C & OE-C)

C Stock Trial C02 (Matrix C-C2)

Age/ sex	Mon	1W	1E	2C	2R	3	4	5	6W	6E	7CS	7CN	7WR	7E	8	9	9N	10W	10E	11	12SW	12NE	13
		Sub-Area																					
Juv	J-M	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
	Apr.	0	0	0	0	0	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	0	0	0	0	0	1
	Jun.	0	0	0	0	0	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	0	0	0	0	0	1
	Aug.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
	Sep.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
	O-D	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
Ad.M	J-M	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
	Apr.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	γ_{36}	0	0	0	0	0	0	2
	May	0	0	0	0	0	0	0	0	0	0	0	0	0	0	γ_{36}	γ_{30}	0	0	0	0	γ_{35}	1
	Jun.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	γ_{36}	γ_{30}	0	0	0	0	γ_{35}	0
	Jul.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	γ_{36}	γ_{30}	0	0	0	0	γ_{35}	0
	Aug.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	γ_{36}	γ_{30}	0	0	0	0	γ_{35}	0
	Sep.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	γ_{36}	γ_{30}	0	0	0	0	γ_{35}	0
	O-D	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
Ad.F	J-M	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
	Apr.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	$2\gamma_{36}$	0	0	0	0	0	0	2
	May	0	0	0	0	0	0	0	0	0	0	0	0	0	0	γ_{36}	$3\gamma_{30}$	0	0	0	0	$3\gamma_{35}$	1
	Jun.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	γ_{36}	$3\gamma_{30}$	0	0	0	0	$3\gamma_{35}$	0
	Jul.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	γ_{36}	$3\gamma_{30}$	0	0	0	0	$3\gamma_{35}$	0
	Aug.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	γ_{36}	$3\gamma_{30}$	0	0	0	0	$3\gamma_{35}$	0
	Sep.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	γ_{36}	$3\gamma_{30}$	0	0	0	0	$3\gamma_{35}$	0
	O-D	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1

Trial 05 (Some 'O'/'OW' animals in sub-area 10E): Hypothesis A
J Stock as for Baseline A (Matrix J-A)
O Stock Trial A05 (Matrix O-AB5) Differences from the Baseline trial are highlighted.

Age/ sex	Mon	Sub-Area																					
		1W	1E	2C	2R	3	4	5	6W	6E	7CS	7CN	7WR	7E	8	9	9N	10W	10E	11	12SW	12NE	13
Juv	J-M	0	0	γ_{13}	4	4	4	0	0	0	4	$3\gamma_{16}$	0	0	0	0	0	0	γ_{16}	0	0	0	0
	Apr.	0	0	γ_{14}	2	2	2	0	0	0	8	$6\gamma_{16}$	γ_{17}	γ_{18}	γ_{19}	γ_{20}	0	0	$2\gamma_{16}$	γ_{22}	γ_{23}	γ_{24}	0
	May	0	0	γ_{14}	2	2	2	0	0	0	8	$6\gamma_{16}$	γ_{17}	γ_{18}	γ_{19}	γ_{20}	γ_{21}	0	$2\gamma_{16}$	γ_{22}	γ_{23}	γ_{24}	0
	Jun.	0	0	γ_{14}	2	2	2	0	0	0	4	$12\gamma_{16}$	γ_{17}	γ_{18}	γ_{19}	γ_{20}	γ_{21}	0	$4\gamma_{16}$	γ_{22}	γ_{23}	γ_{24}	0
	Jul.	0	0	γ_{15}	2	2	2	0	0	0	4	$12\gamma_{16}$	γ_{17}	γ_{18}	γ_{19}	γ_{20}	γ_{21}	0	$4\gamma_{16}$	γ_{22}	γ_{23}	γ_{24}	0
	Aug.	0	0	γ_{15}	2	2	2	0	0	0	4	$12\gamma_{16}$	γ_{17}	γ_{18}	γ_{19}	γ_{20}	γ_{21}	0	$4\gamma_{16}$	γ_{22}	γ_{23}	γ_{24}	0
	Sep.	0	0	γ_{15}	2	2	2	0	0	0	4	$12\gamma_{16}$	γ_{17}	γ_{18}	γ_{19}	γ_{20}	γ_{21}	0	$4\gamma_{16}$	γ_{22}	γ_{23}	γ_{24}	0
	O-D	0	0	γ_{15}	4	4	4	0	0	0	4	$6\gamma_{16}$	0	0	0	0	0	0	$2\gamma_{16}$	0	0	0	0
Ad.M	J-M	0	0	γ_{13}	4	4	4	0	0	0	1	$3\gamma_{16}$	0	0	0	0	0	0	γ_{16}	0	0	0	0
	Apr.	0	0	γ_{14}	2	2	2	0	0	0	2	$6\gamma_{16}$	$4\gamma_{17}$	$4\gamma_{18}$	$4\gamma_{19}$	$4\gamma_{20}$	0	0	$2\gamma_{16}$	γ_{22}	γ_{23}	$3\gamma_{24}$	0
	May	0	0	0	0	0	0	0	0	0	2	$6\gamma_{16}$	$4\gamma_{17}$	$4\gamma_{18}$	$4\gamma_{19}$	$4\gamma_{20}$	$2\gamma_{21}$	0	$2\gamma_{16}$	γ_{22}	γ_{23}	$6\gamma_{24}$	0
	Jun.	0	0	0	0	0	0	0	0	0	2	$12\gamma_{16}$	$4\gamma_{17}$	$4\gamma_{18}$	$4\gamma_{19}$	$4\gamma_{20}$	$2\gamma_{21}$	0	$4\gamma_{16}$	γ_{22}	γ_{23}	$6\gamma_{24}$	0
	Jul.	0	0	0	0	0	0	0	0	0	2	$12\gamma_{16}$	$4\gamma_{17}$	$4\gamma_{18}$	$4\gamma_{19}$	$4\gamma_{20}$	$2\gamma_{21}$	0	$4\gamma_{16}$	γ_{22}	γ_{23}	$6\gamma_{24}$	0
	Aug.	0	0	0	0	0	0	0	0	0	2	$12\gamma_{16}$	$4\gamma_{17}$	$4\gamma_{18}$	$4\gamma_{19}$	$4\gamma_{20}$	$2\gamma_{21}$	0	$4\gamma_{16}$	γ_{22}	γ_{23}	$6\gamma_{24}$	0
	Sep.	0	0	0	0	0	0	0	0	0	2	$12\gamma_{16}$	$4\gamma_{17}$	$4\gamma_{18}$	$4\gamma_{19}$	$4\gamma_{20}$	γ_{21}	0	$4\gamma_{16}$	γ_{22}	γ_{23}	$3\gamma_{24}$	0
	O-D	0	0	γ_{15}	4	4	4	0	0	0	1	$3\gamma_{16}$	0	0	0	0	0	0	γ_{16}	0	0	0	0
Ad.F	J-M	0	0	γ_{13}	4	4	4	0	0	0	1	$3\gamma_{16}$	0	0	0	0	0	0	γ_{16}	0	0	0	0
	Apr.	0	0	γ_{14}	2	2	2	0	0	0	1	$3\gamma_{16}$	$2\gamma_{17}$	$2\gamma_{18}$	$2\gamma_{19}$	$2\gamma_{20}$	0	0	γ_{16}	γ_{22}	γ_{23}	$3\gamma_{24}$	0
	May	0	0	0	0	0	0	0	0	0	1	$3\gamma_{16}$	γ_{17}	γ_{18}	γ_{19}	γ_{20}	$4\gamma_{21}$	0	γ_{16}	$2\gamma_{22}$	$2\gamma_{23}$	$9\gamma_{24}$	0
	Jun.	0	0	0	0	0	0	0	0	0	1	$6\gamma_{16}$	γ_{17}	γ_{18}	γ_{19}	γ_{20}	$4\gamma_{21}$	0	$2\gamma_{16}$	$2\gamma_{22}$	$2\gamma_{23}$	$9\gamma_{24}$	0
	Jul.	0	0	0	0	0	0	0	0	0	1	$6\gamma_{16}$	γ_{17}	γ_{18}	γ_{19}	γ_{20}	$4\gamma_{21}$	0	$2\gamma_{16}$	$2\gamma_{22}$	$2\gamma_{23}$	$9\gamma_{24}$	0
	Aug.	0	0	0	0	0	0	0	0	0	1	$6\gamma_{16}$	γ_{17}	γ_{18}	γ_{19}	γ_{20}	$4\gamma_{21}$	0	$2\gamma_{16}$	$2\gamma_{22}$	$2\gamma_{23}$	$9\gamma_{24}$	0
	Sep.	0	0	0	0	0	0	0	0	0	1	$6\gamma_{16}$	γ_{17}	γ_{18}	γ_{19}	γ_{20}	$2\gamma_{21}$	0	$2\gamma_{16}$	$2\gamma_{22}$	$2\gamma_{23}$	$3\gamma_{24}$	0
	O-D	0	0	γ_{15}	4	4	4	0	0	0	1	$3\gamma_{16}$	0	0	0	0	0	0	γ_{16}	0	0	0	0

Trial 05 (Some 'O'/'OW' animals in sub-area 10E): Hypothesis B
Y Stock and J stock: As for Baseline B (Matrix Y-BC and J-B)
O Stock Trial B05 (Matrix O-AB5) as above

Trial 05 (Some 'O'/'OW' animals in sub-area 10E): Hypothesis C
Y Stock, JW Stock, JE Stock and OE Stock: as for Baseline C (Matrix Y-BC, JW-C, JE-C & OE-C)
OW Stock Trial C05 (Matrix OW-C5) Differences from the Baseline trial are highlighted.

Age/ sex	Mon	Sub-Area																					
		1W	1E	2C	2R	3	4	5	6W	6E	7CS	7CN	7WR	7E	8	9	9N	10W	10E	11	12SW	12NE	13
Juv	J-M	0	0	γ_{13}	4	0	0	0	0	0	$4\gamma_{1}$	$3\gamma_{5}$	γ_{32}	0	0	0	0	0	γ_{5}	0	0	0	0
	Apr.	0	0	γ_{14}	2	0	0	0	0	0	$8\gamma_{1}$	$3\gamma_{4}$	γ_{32}	0	0	0	0	0	γ_{4}	γ_{33}	0	0	0
	May	0	0	γ_{14}	0	0	0	0	0	0	$8\gamma_{1}$	$3\gamma_{4}$	γ_{32}	0	0	0	0	0	γ_{4}	γ_{33}	γ_{34}	0	0
	Jun.	0	0	γ_{14}	0	0	0	0	0	0	$4\gamma_{3}$	$6\gamma_{4}$	γ_{32}	0	0	0	0	0	$2\gamma_{4}$	γ_{33}	γ_{34}	0	0
	Jul.	0	0	0	0	0	0	0	0	0	$4\gamma_{3}$	$6\gamma_{5}$	γ_{32}	0	0	0	0	0	$2\gamma_{5}$	γ_{33}	γ_{34}	0	0
	Aug.	0	0	0	0	0	0	0	0	0	$4\gamma_{3}$	$6\gamma_{5}$	γ_{32}	0	0	0	0	0	$2\gamma_{5}$	γ_{33}	γ_{34}	0	0
	Sep.	0	0	0	0	0	0	0	0	0	$4\gamma_{3}$	$6\gamma_{5}$	γ_{32}	0	0	0	0	0	$2\gamma_{5}$	γ_{33}	γ_{34}	0	0
	O-D	0	0	0	4	0	0	0	0	0	$4\gamma_{3}$	$3\gamma_{5}$	γ_{32}	0	0	0	0	0	γ_{5}	0	0	0	0
Ad.M	J-M	0	0	γ_{13}	4	0	0	0	0	0	γ_{1}	$3\gamma_{5}$	γ_{32}	0	0	0	0	0	γ_{5}	0	0	0	0
	Apr.	0	0	γ_{14}	2	0	0	0	0	0	$2\gamma_{1}$	$3\gamma_{4}$	$4\gamma_{32}$	0	0	0	0	0	γ_{4}	γ_{33}	0	0	0
	May	0	0	0	0	0	0	0	0	0	$2\gamma_{1}$	$3\gamma_{4}$	$4\gamma_{32}$	0	0	0	0	0	γ_{4}	γ_{33}	γ_{34}	0	0
	Jun.	0	0	0	0	0	0	0	0	0	$2\gamma_{3}$	$6\gamma_{4}$	$4\gamma_{32}$	0	0	0	0	0	$2\gamma_{4}$	γ_{33}	γ_{34}	0	0
	Jul.	0	0	0	0	0	0	0	0	0	$2\gamma_{3}$	$6\gamma_{5}$	$4\gamma_{32}$	0	0	0	0	0	$2\gamma_{5}$	γ_{33}	γ_{34}	0	0
	Aug.	0	0	0	0	0	0	0	0	0	$2\gamma_{3}$	$6\gamma_{5}$	$4\gamma_{32}$	0	0	0	0	0	$2\gamma_{5}$	γ_{33}	γ_{34}	0	0
	Sep.	0	0	0	0	0	0	0	0	0	γ_{3}	$6\gamma_{5}$	$4\gamma_{32}$	0	0	0	0	0	$2\gamma_{5}$	γ_{33}	γ_{34}	0	0
	O-D	0	0	0	4	0	0	0	0	0	γ_{3}	$3\gamma_{5}$	γ_{32}	0	0	0	0	0	γ_{5}	0	0	0	0
Ad.F	J-M	0	0	γ_{13}	4	0	0	0	0	0	γ_{1}	$3\gamma_{5}$	γ_{32}	0	0	0	0	0	γ_{5}	0	0	0	0
	Apr.	0	0	γ_{14}	2	0	0	0	0	0	γ_{1}	$3\gamma_{4}$	$2\gamma_{32}$	0	0	0	0	0	γ_{4}	γ_{33}	γ_{34}	0	0
	May	0	0	0	0	0	0	0	0	0	γ_{1}	$3\gamma_{4}$	γ_{32}	0	0	0	0	0	γ_{4}	$2\gamma_{33}$	$2\gamma_{34}$	0	0
	Jun.	0	0	0	0	0	0	0	0	0	γ_{3}	$6\gamma_{4}$	γ_{32}	0	0	0	0	0	$2\gamma_{4}$	$2\gamma_{33}$	$2\gamma_{34}$	0	0
	Jul.	0	0	0	0	0	0	0	0	0	γ_{3}	$6\gamma_{5}$	γ_{32}	0	0	0	0	0	$2\gamma_{5}$	$2\gamma_{33}$	$2\gamma_{34}$	0	0
	Aug.	0	0	0	0	0	0	0	0	0	γ_{3}	$6\gamma_{5}$	γ_{32}	0	0	0	0	0	$2\gamma_{5}$	$2\gamma_{33}$	$2\gamma_{34}$	0	0
	Sep.	0	0	0	0	0	0	0	0	0	γ_{3}	$6\gamma_{5}$	γ_{32}	0	0	0	0	0	$2\gamma_{5}$	$2\gamma_{33}$	$2\gamma_{34}$	0	0
	O-D	0	0	0	4	0	0	0	0	0	γ_{3}	$3\gamma_{5}$	γ_{32}	0	0	0	0	0	γ_{5}	0	0	0	0

Trial 11 (37.5% J/JW-stock in sub-area 12SW in June, with 10% J/JW-stock in 12NE): Hypothesis A
O Stock: as for Baseline A (Matrix O-AB)
J Stock Trial A11 (Matrix J-A11) Differences from the Baseline trial are highlighted.

Age/ sex	Mon	Sub-Area																					
		1W	1E	2C	2R	3	4	5	6W	6E	7CS	7CN	7WR	7E	8	9	9N	10W	10E	11	12SW	12NE	13
Juv	J-M	2	2	2	0	0	0	2	2	$4\gamma_{29}$	$2\gamma_{1}$	$2\gamma_{4}$	0	0	0	0	0	γ_{6}	γ_{7}	0	0	0	0
	Apr.	2	2	2	0	0	0	2	2	$4\gamma_{29}$	$2\gamma_{1}$	$2\gamma_{4}$	0	0	0	0	0	γ_{6}	γ_{7}	$2\gamma_{8}$	$2\gamma_{8}$	$2\gamma_{37}$	0
	May	2	2	2	0	0	0	2	2	$4\gamma_{29}$	$2\gamma_{2}$	$2\gamma_{4}$	0	0	0	0	0	γ_{6}	γ_{7}	$2\gamma_{8}$	$2\gamma_{8}$	$2\gamma_{37}$	0
	Jun.	2	2	2	0	0	0	2	2	$4\gamma_{29}$	$2\gamma_{3}$	$2\gamma_{4}$	0	0	0	0	0	γ_{6}	γ_{7}	$2\gamma_{9}$	$2\gamma_{9}$	$2\gamma_{37}$	0
	Jul.	2	2	2	0	0	0	2	2	$4\gamma_{29}$	$2\gamma_{3}$	$2\gamma_{5}$	0	0	0	0	0	γ_{6}	γ_{7}	$2\gamma_{9}$	$2\gamma_{9}$	$2\gamma_{37}$	0
	Aug.	2	2	2	0	0	0	2	2	$4\gamma_{29}$	$2\gamma_{3}$	$2\gamma_{5}$	0	0	0	0	0	γ_{6}	γ_{7}	$2\gamma_{9}$	$2\gamma_{9}$	$2\gamma_{37}$	0
	Sep.	2	2	2	0	0	0	2	2	$4\gamma_{29}$	$2\gamma_{3}$	$2\gamma_{5}$	0	0	0	0	0	γ_{6}	γ_{7}	$2\gamma_{9}$	$2\gamma_{9}$	$2\gamma_{37}$	0
	O-D	2	2	2	0	0	0	2	2	$4\gamma_{29}$	$2\gamma_{3}$	$2\gamma_{5}$	0	0	0	0	0	γ_{6}	γ_{7}	$2\gamma_{9}$	0	0	0
Ad.M	J-M	2	2	1	0	0	0	2	4	$4\gamma_{29}$	$2\gamma_{1}$	$2\gamma_{4}$	0	0	0	0	0	γ_{6}	γ_{7}	0	0	0	0
	Apr.	0	0	1	0	0	0	2	2	$2\gamma_{29}$	$4\gamma_{1}$	$2\gamma_{4}$	0	0	0	0	0	γ_{6}	$2\gamma_{7}$	γ_{8}	γ_{8}	γ_{37}	0
	May	0	0	1	0	0	0	2	2	$2\gamma_{29}$	$4\gamma_{2}$	$2\gamma_{4}$	0	0	0	0	0	$2\gamma_{6}$	$2\gamma_{7}$	γ_{8}	$2\gamma_{8}$	$2\gamma_{37}$	0
	Jun.	0	0	1	0	0	0	2	2	$2\gamma_{29}$	$2\gamma_{3}$	$4\gamma_{4}$	0	0	0	0	0	$2\gamma_{6}$	$2\gamma_{7}$	γ_{9}	$2\gamma_{9}$	$2\gamma_{37}$	0
	Jul.	0	0	1	0	0	0	2	2	$2\gamma_{29}$	$2\gamma_{3}$	$4\gamma_{5}$	0	0	0	0	0	γ_{6}	γ_{7}	γ_{9}	$2\gamma_{9}$	$2\gamma_{37}$	0
	Aug.	0	0	1	0	0	0	2	2	$2\gamma_{29}$	$2\gamma_{3}$	$4\gamma_{5}$	0	0	0	0	0	γ_{6}	γ_{7}	γ_{9}	$2\gamma_{9}$	$2\gamma_{37}$	0
	Sep.	2	2	1	0	0	0	2	4	$4\gamma_{29}$	$2\gamma_{3}$	$4\gamma_{5}$	0	0	0	0	0	γ_{6}	γ_{7}	0	0	0	0
	O-D	4	4	1	0	0	0	2	2	0	$2\gamma_{3}$	$2\gamma_{5}$	0	0	0	0	0	0	0	0	0	0	0
Ad.F	J-M	2	2	1	0	0	0	2	4	$4\gamma_{29}$	γ_{1}	γ_{4}	0	0	0	0	0	γ_{6}	γ_{7}	0	0	0	0
	Apr.	0	0	1	0	0	0	2	2	$2\gamma_{29}$	$2\gamma_{1}$	γ_{4}	0	0	0	0	0	$2\gamma_{6}$	$2\gamma_{7}$	γ_{10}	γ_{10}	γ_{37}	0
	May	0	0	1	0	0	0	2	2	$2\gamma_{29}$	$2\gamma_{2}$	γ_{4}	0	0	0	0	0	$2\gamma_{6}$	$2\gamma_{7}$	γ_{11}	$2\gamma_{11}$	$2\gamma_{37}$	0
	Jun.	0	0	1	0	0	0	2	2	$2\gamma_{29}$	γ_{3}	γ_{4}	0	0	0	0	0	$2\gamma_{6}$	$2\gamma_{7}$	γ_{12}	$2\gamma_{12}$	$2\gamma_{37}$	0
	Jul.	0	0	1	0	0	0	2	2	$2\gamma_{29}$	γ_{3}	γ_{5}	0	0	0	0	0	γ_{6}	γ_{7}	γ_{12}	$2\gamma_{12}$	$2\gamma_{37}$	0
	Aug.	0	0	1	0	0	0	2	2	$2\gamma_{29}$	γ_{3}	γ_{5}	0	0	0	0	0	γ_{6}	γ_{7}	γ_{12}	$2\gamma_{12}$	$2\gamma_{37}$	0
	Sep.	2	2	1	0	0	0	2	4	$4\gamma_{29}$	γ_{3}	γ_{5}	0	0	0	0	0	γ_{6}	γ_{7}	0	0	0	0
	O-D	4	4	1	0	0	0	2	2	0	γ_{3}	γ_{5}	0	0	0	0	0	0	0	0	0	0	0

Trial 11 (37.5% J/JW-stock in sub-area 12SW in June): Hypothesis B
Y Stock, O Stock: as for Baseline B (Matrix Y-BC, O-AB)
J Stock Trial B11 (Matrix J-B11) Differences from the Baseline trial are highlighted.

Age/ sex	Mon	Sub-Area																					
		1W	1E	2C	2R	3	4	5	6W	6E	7CS	7CN	7WR	7E	8	9	9N	10W	10E	11	12SW	12NE	13
Juv	J-M	0	2	2	0	0	0	0	2	$4\gamma_{29}$	$2\gamma_{1}$	$2\gamma_{4}$	0	0	0	0	0	γ_{6}	γ_{7}	0	0	0	0
	Apr.	0	2	2	0	0	0	0	2	$4\gamma_{29}$	$2\gamma_{1}$	$2\gamma_{4}$	0	0	0	0	0	γ_{6}	γ_{7}	$2\gamma_{8}$	$2\gamma_{8}$	$2\gamma_{37}$	0
	May	0	2	2	0	0	0	0	2	$4\gamma_{29}$	$2\gamma_{2}$	$2\gamma_{4}$	0	0	0	0	0	γ_{6}	γ_{7}	$2\gamma_{8}$	$2\gamma_{8}$	$2\gamma_{37}$	0
	Jun.	0	2	2	0	0	0	0	2	$4\gamma_{29}$	$2\gamma_{3}$	$2\gamma_{4}$	0	0	0	0	0	γ_{6}	γ_{7}	$2\gamma_{9}$	$2\gamma_{9}$	$2\gamma_{37}$	0
	Jul.	0	2	2	0	0	0	0	2	$4\gamma_{29}$	$2\gamma_{3}$	$2\gamma_{5}$	0	0	0	0	0	γ_{6}	γ_{7}	$2\gamma_{9}$	$2\gamma_{9}$	$2\gamma_{37}$	0
	Aug.	0	2	2	0	0	0	0	2	$4\gamma_{29}$	$2\gamma_{3}$	$2\gamma_{5}$	0	0	0	0	0	γ_{6}	γ_{7}	$2\gamma_{9}$	$2\gamma_{9}$	$2\gamma_{37}$	0
	Sep.	0	2	2	0	0	0	0	2	$4\gamma_{29}$	$2\gamma_{3}$	$2\gamma_{5}$	0	0	0	0	0	γ_{6}	γ_{7}	$2\gamma_{9}$	$2\gamma_{9}$	$2\gamma_{37}$	0
	O-D	0	2	2	0	0	0	0	2	$4\gamma_{29}$	$2\gamma_{3}$	$2\gamma_{5}$	0	0	0	0	0	γ_{6}	γ_{7}	$2\gamma_{9}$	0	0	0
Ad.M	J-M	0	2	1	0	0	0	0	4	$4\gamma_{29}$	$2\gamma_{1}$	$2\gamma_{4}$	0	0	0	0	0	γ_{6}	γ_{7}	0	0	0	0
	Apr.	0	0	1	0	0	0	0	2	$2\gamma_{29}$	$4\gamma_{1}$	$2\gamma_{4}$	0	0	0	0	0	γ_{6}	$2\gamma_{7}$	γ_{8}	γ_{8}	γ_{37}	0
	May	0	0	1	0	0	0	0	2	$2\gamma_{29}$	$4\gamma_{2}$	$2\gamma_{4}$	0	0	0	0	0	$2\gamma_{6}$	$2\gamma_{7}$	γ_{8}	$2\gamma_{8}$	$2\gamma_{37}$	0
	Jun.	0	0	1	0	0	0	0	2	$2\gamma_{29}$	$2\gamma_{3}$	$4\gamma_{4}$	0	0	0	0	0	$2\gamma_{6}$	$2\gamma_{7}$	γ_{9}	$2\gamma_{9}$	$2\gamma_{37}$	0
	Jul.	0	0	1	0	0	0	0	2	$2\gamma_{29}$	$2\gamma_{3}$	$4\gamma_{5}$	0	0	0	0	0	γ_{6}	γ_{7}	γ_{9}	$2\gamma_{9}$	$2\gamma_{37}$	0
	Aug.	0	0	1	0	0	0	0	2	$2\gamma_{29}$	$2\gamma_{3}$	$4\gamma_{5}$	0	0	0	0	0	γ_{6}	γ_{7}	γ_{9}	$2\gamma_{9}$	$2\gamma_{37}$	0
	Sep.	0	2	1	0	0	0	0	4	$4\gamma_{29}$	$2\gamma_{3}$	$4\gamma_{5}$	0	0	0	0	0	γ_{6}	γ_{7}	0	0	0	0
	O-D	0	4	1	0	0	0	0	2	0	$2\gamma_{3}$	$2\gamma_{5}$	0	0	0	0	0	0	0	0	0	0	0
Ad.F	J-M	0	2	1	0	0	0	0	4	$4\gamma_{29}$	γ_{1}	γ_{4}	0	0	0	0	0	γ_{6}	γ_{7}	0	0	0	0
	Apr.	0	0	1	0	0	0	0	2	$2\gamma_{29}$	$2\gamma_{1}$	γ_{4}	0	0	0	0	0	$2\gamma_{6}$	$2\gamma_{7}$	γ_{10}	γ_{10}	γ_{37}	0
	May	0	0	1	0	0	0	0	2	$2\gamma_{29}$	$2\gamma_{2}$	γ_{4}	0	0	0	0	0	$2\gamma_{6}$	$2\gamma_{7}$	γ_{11}	$2\gamma_{11}$	$2\gamma_{37}$	0
	Jun.	0	0	1	0	0	0	0	2	$2\gamma_{29}$	γ_{3}	γ_{4}	0	0	0	0	0	$2\gamma_{6}$	$2\gamma_{7}$	γ_{12}	$2\gamma_{12}$	$2\gamma_{37}$	0
	Jul.	0	0	1	0	0	0	0	2	$2\gamma_{29}$	γ_{3}	γ_{5}	0	0	0	0	0	γ_{6}	γ_{7}	γ_{12}	$2\gamma_{12}$	$2\gamma_{37}$	0
	Aug.	0	0	1	0	0	0	0	2	$2\gamma_{29}$	γ_{3}	γ_{5}	0	0	0	0	0	γ_{6}	γ_{7}	γ_{12}	$2\gamma_{12}$	$2\gamma_{37}$	0
	Sep.	0	2	1	0	0	0	0	4	$4\gamma_{29}$	γ_{3}	γ_{5}	0	0	0	0	0	γ_{6}	γ_{7}	0	0	0	0
	O-D	0	4	1	0	0	0	0	2	0	γ_{3}	γ_{5}	0	0	0	0	0	0	0	0	0	0	0

Trial 11 (37.5% J/JW-stock in sub-area 12SW in June): Hypothesis C
Y Stock, JE Stock, OW Stock and OE Stock: as for Baseline C (Matrix Y-BC, JE-C, OW-C, OE-C)
JW Stock Trial C11 (Matrix JW-C11) Differences from the Baseline trial are highlighted.

Age/ sex	Mon	1W	1E	2C	2R	3	4	5	6W	6E	7CS	7CN	7WR	7E	8	9	9N	10W	10E	11	12SW	12NE	13
0	J-M	0	2	0	0	0	0	0	2	$4\gamma_{29}$	0	0	0	0	0	0	0	γ_6	γ_7	0	0	0	0
	Apr.	0	2	0	0	0	0	0	2	$4\gamma_{29}$	0	0	0	0	0	0	0	γ_6	γ_7	$2\gamma_8$	$2\gamma_8$	$2\gamma_{37}$	0
	May	0	2	0	0	0	0	0	2	$4\gamma_{29}$	0	0	0	0	0	0	0	γ_6	γ_7	$2\gamma_8$	$2\gamma_8$	$2\gamma_{37}$	0
	Jun.	0	2	0	0	0	0	0	2	$4\gamma_{29}$	0	0	0	0	0	0	0	γ_6	γ_7	$2\gamma_9$	$2\gamma_9$	$2\gamma_{37}$	0
	Jul.	0	2	0	0	0	0	0	2	$4\gamma_{29}$	0	0	0	0	0	0	0	γ_6	γ_7	$2\gamma_9$	$2\gamma_9$	$2\gamma_{37}$	0
	Aug.	0	2	0	0	0	0	0	2	$4\gamma_{29}$	0	0	0	0	0	0	0	γ_6	γ_7	$2\gamma_9$	$2\gamma_9$	$2\gamma_{37}$	0
	Sep.	0	2	0	0	0	0	0	2	$4\gamma_{29}$	0	0	0	0	0	0	0	γ_6	γ_7	$2\gamma_9$	$2\gamma_9$	$2\gamma_{37}$	0
	O-D	0	2	0	0	0	0	0	2	$4\gamma_{29}$	0	0	0	0	0	0	0	γ_6	γ_7	$2\gamma_9$	0	0	0
Ad.M	J-M	0	2	0	0	0	0	0	4	$4\gamma_{29}$	0	0	0	0	0	0	0	γ_6	γ_7	0	0	0	0
	Apr.	0	0	0	0	0	0	0	2	$2\gamma_{29}$	0	0	0	0	0	0	0	γ_6	$2\gamma_7$	γ_8	γ_8	γ_{37}	0
	May	0	0	0	0	0	0	0	2	$2\gamma_{29}$	0	0	0	0	0	0	0	$2\gamma_6$	$2\gamma_7$	γ_8	$2\gamma_8$	$2\gamma_{37}$	0
	Jun.	0	0	0	0	0	0	0	2	$2\gamma_{29}$	0	0	0	0	0	0	0	$2\gamma_6$	$2\gamma_7$	γ_9	$2\gamma_9$	$2\gamma_{37}$	0
	Jul.	0	0	0	0	0	0	0	2	$2\gamma_{29}$	0	0	0	0	0	0	0	γ_6	γ_7	γ_9	$2\gamma_9$	$2\gamma_{37}$	0
	Aug.	0	0	0	0	0	0	0	2	$2\gamma_{29}$	0	0	0	0	0	0	0	γ_6	γ_7	γ_9	$2\gamma_9$	$2\gamma_{37}$	0
	Sep.	0	2	0	0	0	0	0	4	$4\gamma_{29}$	0	0	0	0	0	0	0	γ_6	γ_7	0	0	0	0
	O-D	0	4	0	0	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Ad.F	J-M	0	2	0	0	0	0	0	4	$4\gamma_{29}$	0	0	0	0	0	0	0	γ_6	γ_7	0	0	0	0
	Apr.	0	0	0	0	0	0	0	2	$2\gamma_{29}$	0	0	0	0	0	0	0	$2\gamma_6$	$2\gamma_7$	γ_{10}	γ_{10}	γ_{37}	0
	May	0	0	0	0	0	0	0	2	$2\gamma_{29}$	0	0	0	0	0	0	0	$2\gamma_6$	$2\gamma_7$	γ_{11}	$2\gamma_{11}$	$2\gamma_{37}$	0
	Jun.	0	0	0	0	0	0	0	2	$2\gamma_{29}$	0	0	0	0	0	0	0	$2\gamma_6$	$2\gamma_7$	γ_{12}	$2\gamma_{12}$	$2\gamma_{37}$	0
	Jul.	0	0	0	0	0	0	0	2	$2\gamma_{29}$	0	0	0	0	0	0	0	γ_6	γ_7	γ_{12}	$2\gamma_{12}$	$2\gamma_{37}$	0
	Aug.	0	0	0	0	0	0	0	2	$2\gamma_{29}$	0	0	0	0	0	0	0	γ_6	γ_7	γ_{12}	$2\gamma_{12}$	$2\gamma_{37}$	0
	Sep.	0	2	0	0	0	0	0	4	$4\gamma_{29}$	0	0	0	0	0	0	0	γ_6	γ_7	γ_{12}	0	0	0
	O-D	0	4	0	0	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Trial 12 (No 'C' animals in sub-area 12NE): Hypothesis C
Y Stock, JW Stock, JE Stock, OW Stock and OE Stock: as for Baseline C (Matrix Y-BC, JW-C, JE-C, OW-C & OE-C)
C Stock Trial C12 (Matrix C-C12) outline shows the difference from Trial02

Age/ sex	Mon	1W	1E	2C	2R	3	4	5	6W	6E	7CS	7CN	7WR	7E	8	9	9N	10W	10E	11	12SW	12NE	13
Juv	J-M	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
	Apr.	0	0	0	0	0	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	0	0	0	0	0	1
	Jun.	0	0	0	0	0	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	0	0	0	0	0	1
	Aug.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
	Sep.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
	O-D	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
Ad.M	J-M	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
	Apr.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	γ_{36}	0	0	0	0	0	0	2
	May	0	0	0	0	0	0	0	0	0	0	0	0	0	0	γ_{36}	γ_{30}	0	0	0	0	0	1
	Jun.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	γ_{36}	γ_{30}	0	0	0	0	0	0
	Jul.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	γ_{36}	γ_{30}	0	0	0	0	0	0
	Aug.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	γ_{36}	γ_{30}	0	0	0	0	0	0
	Sep.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	γ_{36}	γ_{30}	0	0	0	0	0	0
	O-D	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
Ad.F	J-M	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
	Apr.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	$2\gamma_{36}$	0	0	0	0	0	0	2
	May	0	0	0	0	0	0	0	0	0	0	0	0	0	0	γ_{36}	$3\gamma_{30}$	0	0	0	0	0	1
	Jun.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	γ_{36}	$3\gamma_{30}$	0	0	0	0	0	0
	Jul.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	γ_{36}	$3\gamma_{30}$	0	0	0	0	0	0
	Aug.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	γ_{36}	$3\gamma_{30}$	0	0	0	0	0	0
	Sep.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	γ_{36}	$3\gamma_{30}$	0	0	0	0	0	0
	O-D	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1

Trial 13 (No 'OW' in 11 or 12 SW): Hypothesis C
Y Stock, JW Stock, JE Stock and OE Stock: as for Baseline C (Matrix Y-BC, JW-C, JE-C & OE-C)
OW Stock Trial C13 (Matrix OW-C13) Differences from the Baseline trial are highlighted.

Age/ sex	Mon	1W	1E	2C	2R	3	4	5	6W	6E	7CS	7CN	7WR	7E	8	9	9N	10W	10E	11	12SW	12NE	13
Juv	J-M	0	0	γ_{13}	4	0	0	0	0	0	$4\gamma_1$	γ_5	γ_{32}	0	0	0	0	0	0	0	0	0	0
	Apr.	0	0	γ_{14}	2	0	0	0	0	0	$8\gamma_1$	γ_4	γ_{32}	0	0	0	0	0	0	0	0	0	0
	May	0	0	γ_{14}	0	0	0	0	0	0	$8\gamma_1$	γ_4	γ_{32}	0	0	0	0	0	0	0	0	0	0
	Jun.	0	0	γ_{14}	0	0	0	0	0	0	$4\gamma_3$	$2\gamma_4$	γ_{32}	0	0	0	0	0	0	0	0	0	0
	Jul.	0	0	0	0	0	0	0	0	0	$4\gamma_3$	$2\gamma_5$	γ_{32}	0	0	0	0	0	0	0	0	0	0
	Aug.	0	0	0	0	0	0	0	0	0	$4\gamma_3$	$2\gamma_5$	γ_{32}	0	0	0	0	0	0	0	0	0	0
	Sep.	0	0	0	0	0	0	0	0	0	$4\gamma_3$	$2\gamma_5$	γ_{32}	0	0	0	0	0	0	0	0	0	0
	O-D	0	0	0	4	0	0	0	0	0	$4\gamma_3$	γ_5	γ_{32}	0	0	0	0	0	0	0	0	0	0
Ad.M	J-M	0	0	γ_{13}	4	0	0	0	0	0	γ_1	γ_5	γ_{32}	0	0	0	0	0	0	0	0	0	0
	Apr.	0	0	γ_{14}	2	0	0	0	0	0	$2\gamma_1$	γ_4	$4\gamma_{32}$	0	0	0	0	0	0	0	0	0	0
	May	0	0	0	0	0	0	0	0	0	$2\gamma_1$	γ_4	$4\gamma_{32}$	0	0	0	0	0	0	0	0	0	0
	Jun.	0	0	0	0	0	0	0	0	0	$2\gamma_3$	$2\gamma_4$	$4\gamma_{32}$	0	0	0	0	0	0	0	0	0	0
	Jul.	0	0	0	0	0	0	0	0	0	$2\gamma_3$	$2\gamma_5$	$4\gamma_{32}$	0	0	0	0	0	0	0	0	0	0
	Aug.	0	0	0	0	0	0	0	0	0	$2\gamma_3$	$2\gamma_5$	$4\gamma_{32}$	0	0	0	0	0	0	0	0	0	0
	Sep.	0	0	0	0	0	0	0	0	0	γ_3	$2\gamma_5$	$4\gamma_{32}$	0	0	0	0	0	0	0	0	0	0
	O-D	0	0	0	4	0	0	0	0	0	γ_3	γ_5	γ_{32}	0	0	0	0	0	0	0	0	0	0
Ad.F	J-M	0	0	γ_{13}	4	0	0	0	0	0	γ_1	γ_5	γ_{32}	0	0	0	0	0	0	0	0	0	0
	Apr.	0	0	γ_{14}	2	0	0	0	0	0	γ_1	γ_4	$2\gamma_{32}$	0	0	0	0	0	0	0	0	0	0
	May	0	0	0	0	0	0	0	0	0	γ_1	γ_4	γ_{32}	0	0	0	0	0	0	0	0	0	0
	Jun.	0	0	0	0	0	0	0	0	0	γ_3	$2\gamma_4$	γ_{32}	0	0	0	0	0	0	0	0	0	0
	Jul.	0	0	0	0	0	0	0	0	0	γ_3	$2\gamma_5$	γ_{32}	0	0	0	0	0	0	0	0	0	0
	Aug.	0	0	0	0	0	0	0	0	0	γ_3	$2\gamma_5$	γ_{32}	0	0	0	0	0	0	0	0	0	0
	Sep.	0	0	0	0	0	0	0	0	0	γ_3	$2\gamma_5$	γ_{32}	0	0	0	0	0	0	0	0	0	0
	O-D	0	0	0	4	0	0	0	0	0	γ_3	γ_5	γ_{32}	0	0	0	0	0	0	0	0	0	0

Trial 14 (No 'OE' in 11 or 12 SW): Hypothesis C
Y Stock, JW Stock, JE Stock and OW Stock: as for Baseline C (Matrix Y-BC, JW-C, JE-C & OW-C)
OE Stock Trial C14 (Matrix OE-C14) Differences from the Baseline trial are highlighted .

Age/ sex	Mon	1W	1E	2C	2R	3	4	5	6W	6E	7CS	7CN	7WR	7E	8	9	9N	10W	10E	11	12SW	12NE	13
Juv	J-M	0	0	0	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Apr.	0	0	0	2	2	2	0	0	0	0	0	γ_{17}	γ_{18}	γ_{19}	γ_{20}	0	0	0	0	0	γ_{24}	0
	May	0	0	0	2	2	2	0	0	0	0	0	γ_{17}	γ_{18}	γ_{19}	γ_{20}	γ_{21}	0	0	0	0	γ_{24}	0
	Jun.	0	0	0	2	2	2	0	0	0	0	0	γ_{17}	γ_{18}	γ_{19}	γ_{20}	γ_{21}	0	0	0	0	γ_{24}	0
	Jul.	0	0	0	2	2	2	0	0	0	0	0	γ_{17}	γ_{18}	γ_{19}	γ_{20}	γ_{21}	0	0	0	0	γ_{24}	0
	Aug.	0	0	0	2	2	2	0	0	0	0	0	γ_{17}	γ_{18}	γ_{19}	γ_{20}	γ_{21}	0	0	0	0	γ_{24}	0
	Sep.	0	0	0	2	2	2	0	0	0	0	0	γ_{17}	γ_{18}	γ_{19}	γ_{20}	γ_{21}	0	0	0	0	γ_{24}	0
	O-D	0	0	0	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Ad.M	J-M	0	0	0	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Apr.	0	0	0	2	2	2	0	0	0	0	0	$4\gamma_{17}$	$4\gamma_{18}$	$4\gamma_{19}$	$4\gamma_{20}$	0	0	0	0	0	$3\gamma_{24}$	0
	May	0	0	0	0	0	0	0	0	0	0	0	$4\gamma_{17}$	$4\gamma_{18}$	$4\gamma_{19}$	$4\gamma_{20}$	$2\gamma_{21}$	0	0	0	0	$6\gamma_{24}$	0
	Jun.	0	0	0	0	0	0	0	0	0	0	0	$4\gamma_{17}$	$4\gamma_{18}$	$4\gamma_{19}$	$4\gamma_{20}$	$2\gamma_{21}$	0	0	0	0	$6\gamma_{24}$	0
	Jul.	0	0	0	0	0	0	0	0	0	0	0	$4\gamma_{17}$	$4\gamma_{18}$	$4\gamma_{19}$	$4\gamma_{20}$	$2\gamma_{21}$	0	0	0	0	$6\gamma_{24}$	0
	Aug.	0	0	0	0	0	0	0	0	0	0	0	$4\gamma_{17}$	$4\gamma_{18}$	$4\gamma_{19}$	$4\gamma_{20}$	$2\gamma_{21}$	0	0	0	0	$6\gamma_{24}$	0
	Sep.	0	0	0	0	0	0	0	0	0	0	0	$4\gamma_{17}$	$4\gamma_{18}$	$4\gamma_{19}$	$4\gamma_{20}$	γ_{21}	0	0	0	0	$3\gamma_{24}$	0
	O-D	0	0	0	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Ad.F	J-M	0	0	0	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Apr.	0	0	0	2	2	2	0	0	0	0	0	$2\gamma_{17}$	$2\gamma_{18}$	$2\gamma_{19}$	$2\gamma_{20}$	0	0	0	0	0	$3\gamma_{24}$	0
	May	0	0	0	0	0	0	0	0	0	0	0	γ_{17}	γ_{18}	γ_{19}	γ_{20}	$4\gamma_{21}$	0	0	0	0	$9\gamma_{24}$	0
	Jun.	0	0	0	0	0	0	0	0	0	0	0	γ_{17}	γ_{18}	γ_{19}	γ_{20}	$4\gamma_{21}$	0	0	0	0	$9\gamma_{24}$	0
	Jul.	0	0	0	0	0	0	0	0	0	0	0	γ_{17}	γ_{18}	γ_{19}	γ_{20}	$4\gamma_{21}$	0	0	0	0	$9\gamma_{24}$	0
	Aug.	0	0	0	0	0	0	0	0	0	0	0	γ_{17}	γ_{18}	γ_{19}	γ_{20}	$4\gamma_{21}$	0	0	0	0	$9\gamma_{24}$	0
	Sep.	0	0	0	0	0	0	0	0	0	0	0	γ_{17}	γ_{18}	γ_{19}	γ_{20}	$2\gamma_{21}$	0	0	0	0	$3\gamma_{24}$	0
	O-D	0	0	0	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Trial 15 (No 'OE' in 7WR): Hypothesis C
Y Stock, JW Stock, JE Stock and OW Stock: as for Baseline C (Matrix Y-BC, JW-C, JE-C & OW-C)
OE Stock Trial C15 (Matrix OE-C15) Differences from the Baseline trial are highlighted .

Age/	Mon	Sub-Area																					
sex		1W	1E	2C	2R	3	4	5	6W	6E	7CS	7CN	7WR	7E	8	9	9N	10W	10E	11	12SW	12NE	13
Juv	J-M	0	0	0	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Apr.	0	0	0	2	2	2	0	0	0	0	0	0	γ_{18}	γ_{19}	γ_{20}	0	0	0	γ_{22}	γ_{23}	γ_{24}	0
	May	0	0	0	2	2	2	0	0	0	0	0	0	γ_{18}	γ_{19}	γ_{20}	γ_{21}	0	0	γ_{22}	γ_{23}	γ_{24}	0
	Jun.	0	0	0	2	2	2	0	0	0	0	0	0	γ_{18}	γ_{19}	γ_{20}	γ_{21}	0	0	γ_{22}	γ_{23}	γ_{24}	0
	Jul.	0	0	0	2	2	2	0	0	0	0	0	0	γ_{18}	γ_{19}	γ_{20}	γ_{21}	0	0	γ_{22}	γ_{23}	γ_{24}	0
	Aug.	0	0	0	2	2	2	0	0	0	0	0	0	γ_{18}	γ_{19}	γ_{20}	γ_{21}	0	0	γ_{22}	γ_{23}	γ_{24}	0
	Sep.	0	0	0	2	2	2	0	0	0	0	0	0	γ_{18}	γ_{19}	γ_{20}	γ_{21}	0	0	γ_{22}	γ_{23}	γ_{24}	0
	O-D	0	0	0	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Ad.M	J-M	0	0	0	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Apr.	0	0	0	2	2	2	0	0	0	0	0	0	$4\gamma_{18}$	$4\gamma_{19}$	$4\gamma_{20}$	0	0	0	γ_{22}	γ_{23}	$3\gamma_{24}$	0
	May	0	0	0	0	0	0	0	0	0	0	0	0	$4\gamma_{18}$	$4\gamma_{19}$	$4\gamma_{20}$	$2\gamma_{21}$	0	0	γ_{22}	γ_{23}	$6\gamma_{24}$	0
	Jun.	0	0	0	0	0	0	0	0	0	0	0	0	$4\gamma_{18}$	$4\gamma_{19}$	$4\gamma_{20}$	$2\gamma_{21}$	0	0	γ_{22}	γ_{23}	$6\gamma_{24}$	0
	Jul.	0	0	0	0	0	0	0	0	0	0	0	0	$4\gamma_{18}$	$4\gamma_{19}$	$4\gamma_{20}$	$2\gamma_{21}$	0	0	γ_{22}	γ_{23}	$6\gamma_{24}$	0
	Aug.	0	0	0	0	0	0	0	0	0	0	0	0	$4\gamma_{18}$	$4\gamma_{19}$	$4\gamma_{20}$	$2\gamma_{21}$	0	0	γ_{22}	γ_{23}	$6\gamma_{24}$	0
	Sep.	0	0	0	0	0	0	0	0	0	0	0	0	$4\gamma_{18}$	$4\gamma_{19}$	$4\gamma_{20}$	γ_{21}	0	0	γ_{22}	γ_{23}	$3\gamma_{24}$	0
	O-D	0	0	0	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Ad.F	J-M	0	0	0	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Apr.	0	0	0	2	2	2	0	0	0	0	0	0	$2\gamma_{18}$	$2\gamma_{19}$	$2\gamma_{20}$	0	0	0	γ_{22}	γ_{23}	$3\gamma_{24}$	0
	May	0	0	0	0	0	0	0	0	0	0	0	0	γ_{18}	γ_{19}	γ_{20}	$4\gamma_{21}$	0	0	γ_{22}	$2\gamma_{23}$	$9\gamma_{24}$	0
	Jun.	0	0	0	0	0	0	0	0	0	0	0	0	γ_{18}	γ_{19}	γ_{20}	$4\gamma_{21}$	0	0	$2\gamma_{22}$	$2\gamma_{23}$	$9\gamma_{24}$	0
	Jul.	0	0	0	0	0	0	0	0	0	0	0	0	γ_{18}	γ_{19}	γ_{20}	$4\gamma_{21}$	0	0	$2\gamma_{22}$	$2\gamma_{23}$	$9\gamma_{24}$	0
	Aug.	0	0	0	0	0	0	0	0	0	0	0	0	γ_{18}	γ_{19}	γ_{20}	$4\gamma_{21}$	0	0	$2\gamma_{22}$	$2\gamma_{23}$	$9\gamma_{24}$	0
	Sep.	0	0	0	0	0	0	0	0	0	0	0	0	γ_{18}	γ_{19}	γ_{20}	$2\gamma_{21}$	0	0	$2\gamma_{22}$	$2\gamma_{23}$	$3\gamma_{24}$	0
	O-D	0	0	0	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Hypothesis A Trials 21 (Abundance estimate in 5 = 'minimum'),
22 (Abundance estimate in 5 = 'maximum'),
29 (Abundance estimate in 6W = 'minimum') and
30 (Abundance estimate in 6W = 'maximum'):
O Stock: as for Baseline A (Matrix O-AB)
J Stock Trial A11 (Matrix J-Am) Differences from the Baseline trial are highlighted.

Age/	Mon	Sub-Area																					
Sex		1W	1E	2C	2R	3	4	5	6W	6E	7CS	7CN	7WR	7E	8	9	9N	10W	10E	11	12SW	12NE	13
Juv	J-M	2	2	2	0	0	0	$2\gamma_{39}$	2	$4\gamma_{29}$	$2\gamma_{1}$	$2\gamma_{4}$	0	0	0	0	0	γ_{6}	γ_{7}	0	0	0	0
	Apr.	2	2	2	0	0	0	$2\gamma_{39}$	2	$4\gamma_{29}$	$2\gamma_{1}$	$2\gamma_{4}$	0	0	0	0	0	γ_{6}	γ_{7}	$2\gamma_{8}$	$2\gamma_{8}$	0	0
	May	2	2	2	0	0	0	$2\gamma_{39}$	2	$4\gamma_{29}$	$2\gamma_{2}$	$2\gamma_{4}$	0	0	0	0	0	γ_{6}	γ_{7}	$2\gamma_{8}$	$2\gamma_{8}$	0	0
	Jun.	2	2	2	0	0	0	$2\gamma_{39}$	2	$4\gamma_{29}$	$2\gamma_{3}$	$2\gamma_{4}$	0	0	0	0	0	γ_{6}	γ_{7}	$2\gamma_{9}$	$2\gamma_{9}$	0	0
	Jul.	2	2	2	0	0	0	$2\gamma_{39}$	2	$4\gamma_{29}$	$2\gamma_{3}$	$2\gamma_{5}$	0	0	0	0	0	γ_{6}	γ_{7}	$2\gamma_{9}$	$2\gamma_{9}$	0	0
	Aug.	2	2	2	0	0	0	$2\gamma_{39}$	2	$4\gamma_{29}$	$2\gamma_{3}$	$2\gamma_{5}$	0	0	0	0	0	γ_{6}	γ_{7}	$2\gamma_{9}$	$2\gamma_{9}$	0	0
	Sep.	2	2	2	0	0	0	$2\gamma_{39}$	2	$4\gamma_{29}$	$2\gamma_{3}$	$2\gamma_{5}$	0	0	0	0	0	γ_{6}	γ_{7}	$2\gamma_{9}$	$2\gamma_{9}$	0	0
	O-D	2	2	2	0	0	0	$2\gamma_{39}$	2	$4\gamma_{29}$	$2\gamma_{3}$	$2\gamma_{5}$	0	0	0	0	0	γ_{6}	γ_{7}	$2\gamma_{9}$	0	0	0
Ad.M	J-M	2	2	1	0	0	0	$2\gamma_{39}$	4	$4\gamma_{29}$	$2\gamma_{1}$	$2\gamma_{4}$	0	0	0	0	0	γ_{6}	γ_{7}	0	0	0	0
	Apr.	0	0	1	0	0	0	$2\gamma_{39}$	2	$2\gamma_{29}$	$4\gamma_{1}$	$2\gamma_{4}$	0	0	0	0	0	γ_{6}	$2\gamma_{7}$	γ_{8}	γ_{8}	0	0
	May	0	0	1	0	0	0	$2\gamma_{39}$	2	$2\gamma_{29}$	$4\gamma_{2}$	$2\gamma_{4}$	0	0	0	0	0	$2\gamma_{6}$	$2\gamma_{7}$	γ_{8}	$2\gamma_{8}$	0	0
	Jun.	0	0	1	0	0	0	$2\gamma_{39}$	2	$2\gamma_{29}$	$2\gamma_{3}$	$4\gamma_{4}$	0	0	0	0	0	$2\gamma_{6}$	$2\gamma_{7}$	γ_{9}	$2\gamma_{9}$	0	0
	Jul.	0	0	1	0	0	0	$2\gamma_{39}$	2	$2\gamma_{29}$	$2\gamma_{3}$	$4\gamma_{5}$	0	0	0	0	0	γ_{6}	γ_{7}	γ_{9}	$2\gamma_{9}$	0	0
	Aug.	0	0	1	0	0	0	$2\gamma_{39}$	2	$2\gamma_{29}$	$2\gamma_{3}$	$4\gamma_{5}$	0	0	0	0	0	γ_{6}	γ_{7}	γ_{9}	$2\gamma_{9}$	0	0
	Sep.	2	2	1	0	0	0	$2\gamma_{39}$	4	$4\gamma_{29}$	$2\gamma_{3}$	$4\gamma_{5}$	0	0	0	0	0	γ_{6}	γ_{7}	0	0	0	0
	O-D	4	4	1	0	0	0	$2\gamma_{39}$	2	0	$2\gamma_{3}$	$2\gamma_{5}$	0	0	0	0	0	0	0	0	0	0	0
Ad.F	J-M	2	2	1	0	0	0	$2\gamma_{39}$	4	$4\gamma_{29}$	γ_{1}	γ_{4}	0	0	0	0	0	γ_{6}	γ_{7}	0	0	0	0
	Apr.	0	0	1	0	0	0	$2\gamma_{39}$	2	$2\gamma_{29}$	$2\gamma_{1}$	γ_{4}	0	0	0	0	0	$2\gamma_{6}$	$2\gamma_{7}$	γ_{10}	γ_{10}	0	0
	May	0	0	1	0	0	0	$2\gamma_{39}$	2	$2\gamma_{29}$	$2\gamma_{2}$	γ_{4}	0	0	0	0	0	$2\gamma_{6}$	$2\gamma_{7}$	γ_{11}	$2\gamma_{11}$	0	0
	Jun.	0	0	1	0	0	0	$2\gamma_{39}$	2	$2\gamma_{29}$	γ_{3}	γ_{4}	0	0	0	0	0	$2\gamma_{6}$	$2\gamma_{7}$	γ_{12}	$2\gamma_{12}$	0	0
	Jul.	0	0	1	0	0	0	$2\gamma_{39}$	2	$2\gamma_{29}$	γ_{3}	γ_{5}	0	0	0	0	0	γ_{6}	γ_{7}	γ_{12}	$2\gamma_{12}$	0	0
	Aug.	0	0	1	0	0	0	$2\gamma_{39}$	2	$2\gamma_{29}$	γ_{3}	γ_{5}	0	0	0	0	0	γ_{6}	γ_{7}	γ_{12}	$2\gamma_{12}$	0	0
	Sep.	2	2	1	0	0	0	$2\gamma_{39}$	4	$4\gamma_{29}$	γ_{3}	γ_{5}	0	0	0	0	0	γ_{6}	γ_{7}	0	0	0	0
	O-D	4	4	1	0	0	0	$2\gamma_{39}$	2	0	γ_{3}	γ_{5}	0	0	0	0	0	0	0	0	0	0	0

Trial 23 (Single J-stock): Hypothesis C
Y Stock, OW Stock and OE Stock: as for Baseline C (Matrix Y-BC, OW-C & OE-C)
J Stock Trial C23 (Matrix J-C23) the highlighted cells correspond to the only difference with the J-stock matrix, Hyp. B

Age/	Mon	Sub-Area																					
sex		1W	1E	2C	2R	3	4	5	6W	6E	7CS	7CN	7WR	7E	8	9	9N	10W	10E	11	12SW	12NE	13
0	J-M	0	2	2	0	0	0	0	2	$4\gamma_{29}$	γ_{31}	$2\gamma_{16}$	0	0	0	0	0	γ_{6}	γ_{7}	0	0	0	0
	Apr.	0	2	2	0	0	0	0	2	$4\gamma_{29}$	$2\gamma_{31}$	$3\gamma_{16}$	0	0	0	0	0	γ_{6}	γ_{7}	$2\gamma_{8}$	$2\gamma_{8}$	0	0
	May	0	2	2	0	0	0	0	2	$4\gamma_{29}$	$2\gamma_{31}$	$3\gamma_{16}$	0	0	0	0	0	γ_{6}	γ_{7}	$2\gamma_{8}$	$2\gamma_{8}$	0	0
	Jun.	0	2	2	0	0	0	0	2	$4\gamma_{29}$	$2\gamma_{31}$	$3\gamma_{16}$	0	0	0	0	0	γ_{6}	γ_{7}	$2\gamma_{9}$	$2\gamma_{9}$	0	0
	Jul.	0	2	2	0	0	0	0	2	$4\gamma_{29}$	$2\gamma_{31}$	$6\gamma_{16}$	0	0	0	0	0	γ_{6}	γ_{7}	$2\gamma_{9}$	$2\gamma_{9}$	0	0
	Aug.	0	2	2	0	0	0	0	2	$4\gamma_{29}$	$2\gamma_{31}$	$6\gamma_{16}$	0	0	0	0	0	γ_{6}	γ_{7}	$2\gamma_{9}$	$2\gamma_{9}$	0	0
	Sep.	0	2	2	0	0	0	0	2	$4\gamma_{29}$	$2\gamma_{31}$	$6\gamma_{16}$	0	0	0	0	0	γ_{6}	γ_{7}	$2\gamma_{9}$	$2\gamma_{9}$	0	0
	O-D	0	2	2	0	0	0	0	2	$4\gamma_{29}$	γ_{31}	$2\gamma_{16}$	0	0	0	0	0	γ_{6}	γ_{7}	$2\gamma_{9}$	0	0	0
Ad.M	J-M	0	2	1	0	0	0	0	4	$4\gamma_{29}$	γ_{31}	$2\gamma_{16}$	0	0	0	0	0	γ_{6}	γ_{7}	0	0	0	0
	Apr.	0	0	1	0	0	0	0	2	$2\gamma_{29}$	$4\gamma_{31}$	$3\gamma_{16}$	0	0	0	0	0	γ_{6}	$2\gamma_{7}$	γ_{8}	γ_{8}	0	0
	May	0	0	1	0	0	0	0	2	$2\gamma_{29}$	$4\gamma_{31}$	$3\gamma_{16}$	0	0	0	0	0	$2\gamma_{6}$	$2\gamma_{7}$	γ_{8}	$2\gamma_{8}$	0	0
	Jun.	0	0	1	0	0	0	0	2	$2\gamma_{29}$	$4\gamma_{31}$	$8\gamma_{16}$	0	0	0	0	0	$2\gamma_{6}$	$2\gamma_{7}$	γ_{9}	$2\gamma_{9}$	0	0
	Jul.	0	0	1	0	0	0	0	2	$2\gamma_{29}$	$4\gamma_{31}$	$8\gamma_{16}$	0	0	0	0	0	γ_{6}	γ_{7}	γ_{9}	$2\gamma_{9}$	0	0
	Aug.	0	0	1	0	0	0	0	2	$2\gamma_{29}$	$4\gamma_{31}$	$8\gamma_{16}$	0	0	0	0	0	γ_{6}	γ_{7}	γ_{9}	$2\gamma_{9}$	0	0
	Sep.	0	2	1	0	0	0	0	4	$4\gamma_{29}$	$4\gamma_{31}$	$8\gamma_{16}$	0	0	0	0	0	γ_{6}	γ_{7}	0	0	0	0
	O-D	0	4	1	0	0	0	0	2	0	γ_{31}	$2\gamma_{16}$	0	0	0	0	0	0	0	0	0	0	0
Ad.F	J-M	0	2	1	0	0	0	0	4	$4\gamma_{29}$	γ_{31}	$2\gamma_{16}$	0	0	0	0	0	γ_{6}	γ_{7}	0	0	0	0
	Apr.	0	0	1	0	0	0	0	2	$2\gamma_{29}$	$4\gamma_{31}$	$3\gamma_{16}$	0	0	0	0	0	$2\gamma_{6}$	$2\gamma_{7}$	γ_{10}	γ_{10}	0	0
	May	0	0	1	0	0	0	0	2	$2\gamma_{29}$	$4\gamma_{31}$	$3\gamma_{16}$	0	0	0	0	0	$2\gamma_{6}$	$2\gamma_{7}$	γ_{11}	$2\gamma_{11}$	0	0
	Jun.	0	0	1	0	0	0	0	2	$2\gamma_{29}$	$4\gamma_{31}$	$8\gamma_{16}$	0	0	0	0	0	$2\gamma_{6}$	$2\gamma_{7}$	γ_{12}	$2\gamma_{12}$	0	0
	Jul.	0	0	1	0	0	0	0	2	$2\gamma_{29}$	$4\gamma_{31}$	$8\gamma_{16}$	0	0	0	0	0	γ_{6}	γ_{7}	γ_{12}	$2\gamma_{12}$	0	0
	Aug.	0	0	1	0	0	0	0	2	$2\gamma_{29}$	$4\gamma_{31}$	$8\gamma_{16}$	0	0	0	0	0	γ_{6}	γ_{7}	γ_{12}	$2\gamma_{12}$	0	0
	Sep.	0	2	1	0	0	0	0	4	$4\gamma_{29}$	$4\gamma_{31}$	$8\gamma_{16}$	0	0	0	0	0	γ_{6}	γ_{7}	γ_{12}	0	0	0
	O-D	0	4	1	0	0	0	0	2	0	γ_{31}	$2\gamma_{16}$	0	0	0	0	0	0	0	0	0	0	0

Trial 24 (Single O-stock): Hypothesis C
Y Stock, JW Stock & JE Stock: as for Baseline C (Matrix Y-BC, JW-C & JE-C)
O Stock Trial C24 (Matrix O-C24) (Based primarily on OE, with some additions from OW in sub-areas where OW occurs without OE. Highlight shows the difference from the O-stock matrix of Hypothesis B. Note: this is a starting point which may need to be revised after inspection of the results.

Age/	Mon	Sub-Area																					
sex		1W	1E	2C	2R	3	4	5	6W	6E	7CS	7CN	7WR	7E	8	9	9N	10W	10E	11	12SW	12NE	13
Juv	J-M	0	0	γ_{13}	4	4	4	0	0	0	$4\gamma_{1}$	γ_{5}	γ_{17}	0	0	0	0	0	0	0	0	0	0
	Apr.	0	0	γ_{14}	2	2	2	0	0	0	$8\gamma_{1}$	γ_{4}	γ_{17}	γ_{18}	γ_{19}	γ_{20}	0	0	0	γ_{22}	γ_{23}	γ_{24}	0
	May	0	0	γ_{14}	2	2	2	0	0	0	$8\gamma_{1}$	γ_{4}	γ_{17}	γ_{18}	γ_{19}	γ_{20}	γ_{21}	0	0	γ_{22}	γ_{23}	γ_{24}	0
	Jun.	0	0	γ_{14}	2	2	2	0	0	0	$4\gamma_{3}$	$2\gamma_{4}$	γ_{17}	γ_{18}	γ_{19}	γ_{20}	γ_{21}	0	0	γ_{22}	γ_{23}	γ_{24}	0
	Jul.	0	0	0	2	2	2	0	0	0	$4\gamma_{3}$	$2\gamma_{5}$	γ_{17}	γ_{18}	γ_{19}	γ_{20}	γ_{21}	0	0	γ_{22}	γ_{23}	γ_{24}	0
	Aug.	0	0	0	2	2	2	0	0	0	$4\gamma_{3}$	$2\gamma_{5}$	γ_{17}	γ_{18}	γ_{19}	γ_{20}	γ_{21}	0	0	γ_{22}	γ_{23}	γ_{24}	0
	Sep.	0	0	0	2	2	2	0	0	0	$4\gamma_{3}$	$2\gamma_{5}$	γ_{17}	γ_{18}	γ_{19}	γ_{20}	γ_{21}	0	0	γ_{22}	γ_{23}	γ_{24}	0
	O-D	0	0	0	4	4	4	0	0	0	$4\gamma_{3}$	γ_{5}	γ_{17}	0	0	0	0	0	0	0	0	0	0
Ad.M	J-M	0	0	γ_{13}	4	4	4	0	0	0	γ_{1}	γ_{5}	γ_{17}	0	0	0	0	0	0	0	0	0	0
	Apr.	0	0	γ_{14}	2	2	2	0	0	0	$2\gamma_{1}$	γ_{4}	$4\gamma_{17}$	$4\gamma_{18}$	$4\gamma_{19}$	$4\gamma_{20}$	0	0	0	γ_{22}	γ_{23}	$3\gamma_{24}$	0
	May	0	0	0	0	0	0	0	0	0	$2\gamma_{1}$	γ_{4}	$4\gamma_{17}$	$4\gamma_{18}$	$4\gamma_{19}$	$4\gamma_{20}$	$2\gamma_{21}$	0	0	γ_{22}	γ_{23}	$6\gamma_{24}$	0
	Jun.	0	0	0	0	0	0	0	0	0	$2\gamma_{3}$	$2\gamma_{4}$	$4\gamma_{17}$	$4\gamma_{18}$	$4\gamma_{19}$	$4\gamma_{20}$	$2\gamma_{21}$	0	0	γ_{22}	γ_{23}	$6\gamma_{24}$	0
	Jul.	0	0	0	0	0	0	0	0	0	$2\gamma_{3}$	$2\gamma_{5}$	$4\gamma_{17}$	$4\gamma_{18}$	$4\gamma_{19}$	$4\gamma_{20}$	$2\gamma_{21}$	0	0	γ_{22}	γ_{23}	$6\gamma_{24}$	0
	Aug.	0	0	0	0	0	0	0	0	0	$2\gamma_{3}$	$2\gamma_{5}$	$4\gamma_{17}$	$4\gamma_{18}$	$4\gamma_{19}$	$4\gamma_{20}$	$2\gamma_{21}$	0	0	γ_{22}	γ_{23}	$6\gamma_{24}$	0
	Sep.	0	0	0	0	0	0	0	0	0	γ_{3}	$2\gamma_{5}$	$4\gamma_{17}$	$4\gamma_{18}$	$4\gamma_{19}$	$4\gamma_{20}$	γ_{21}	0	0	γ_{22}	γ_{23}	$3\gamma_{24}$	0
	O-D	0	0	0	4	4	4	0	0	0	γ_{3}	γ_{5}	γ_{17}	0	0	0	0	0	0	0	0	0	0
Ad.F	J-M	0	0	γ_{13}	4	4	4	0	0	0	γ_{1}	γ_{5}	γ_{17}	0	0	0	0	0	0	0	0	0	0
	Apr.	0	0	γ_{14}	2	2	2	0	0	0	γ_{1}	γ_{4}	$2\gamma_{17}$	$2\gamma_{18}$	$2\gamma_{19}$	$2\gamma_{20}$	0	0	0	γ_{22}	γ_{23}	$3\gamma_{24}$	0
	May	0	0	0	0	0	0	0	0	0	γ_{1}	γ_{4}	γ_{17}	γ_{18}	γ_{19}	γ_{20}	$4\gamma_{21}$	0	0	$2\gamma_{22}$	$2\gamma_{23}$	$9\gamma_{24}$	0
	Jun.	0	0	0	0	0	0	0	0	0	γ_{3}	$2\gamma_{4}$	γ_{17}	γ_{18}	γ_{19}	γ_{20}	$4\gamma_{21}$	0	0	$2\gamma_{22}$	$2\gamma_{23}$	$9\gamma_{24}$	0
	Jul.	0	0	0	0	0	0	0	0	0	γ_{3}	$2\gamma_{5}$	γ_{17}	γ_{18}	γ_{19}	γ_{20}	$4\gamma_{21}$	0	0	$2\gamma_{22}$	$2\gamma_{23}$	$9\gamma_{24}$	0
	Aug.	0	0	0	0	0	0	0	0	0	γ_{3}	$2\gamma_{5}$	γ_{17}	γ_{18}	γ_{19}	γ_{20}	$4\gamma_{21}$	0	0	$2\gamma_{22}$	$2\gamma_{23}$	$9\gamma_{24}$	0
	Sep.	0	0	0	0	0	0	0	0	0	γ_{3}	$2\gamma_{5}$	γ_{17}	γ_{18}	γ_{19}	γ_{20}	$2\gamma_{21}$	0	0	$2\gamma_{22}$	$2\gamma_{23}$	$3\gamma_{24}$	0
	O-D	0	0	0	4	4	4	0	0	0	γ_{3}	γ_{5}	γ_{17}	0	0	0	0	0	0	0	0	0	0

Trial 26 (Substantially more O-/OE-stock ages 1-4 are found in sub-areas 2R, 3 & 4 year-round): Hypothesis A
J Stock as for Baseline A (Matrix J-A)
O Stock Trial A26 (Matrix O-AB26) Differences from the Baseline trial are highlighted.

Age/sex	Mon	1W	1E	2C	2R	3	4	5	6W	6E	7CS	7CN	7WR	7E	8	9	9N	10W	10E	11	12SW	12NE	13
Juv	J-M	0	0	γ_{13}	4	4	4	0	0	0	4	γ_{16}	0	0	0	0	0	0	0	0	0	0	0
	Apr.	0	0	γ_{14}	44	44	44	0	0	0	8	$2\gamma_{16}$	γ_{17}	γ_{18}	γ_{19}	γ_{20}	0	0	0	γ_{22}	γ_{23}	γ_{24}	0
	May	0	0	γ_{14}	44	44	44	0	0	0	8	$2\gamma_{16}$	γ_{17}	γ_{18}	γ_{19}	γ_{20}	γ_{21}	0	0	γ_{22}	γ_{23}	γ_{24}	0
	Jun.	0	0	γ_{14}	44	44	44	0	0	0	4	$4\gamma_{16}$	γ_{17}	γ_{18}	γ_{19}	γ_{20}	γ_{21}	0	0	γ_{22}	γ_{23}	γ_{24}	0
	Jul.	0	0	γ_{15}	44	44	44	0	0	0	4	$4\gamma_{16}$	γ_{17}	γ_{18}	γ_{19}	γ_{20}	γ_{21}	0	0	γ_{22}	γ_{23}	γ_{24}	0
	Aug.	0	0	γ_{15}	44	44	44	0	0	0	4	$4\gamma_{16}$	γ_{17}	γ_{18}	γ_{19}	γ_{20}	γ_{21}	0	0	γ_{22}	γ_{23}	γ_{24}	0
	Sep.	0	0	γ_{15}	44	44	44	0	0	0	4	$4\gamma_{16}$	γ_{17}	γ_{18}	γ_{19}	γ_{20}	γ_{21}	0	0	γ_{22}	γ_{23}	γ_{24}	0
	O-D	0	0	γ_{15}	4	4	4	0	0	0	4	$2\gamma_{16}$	0	0	0	0	0	0	0	0	0	0	0
Ad.M	J-M	0	0	γ_{13}	4	4	4	0	0	0	1	γ_{16}	0	0	0	0	0	0	0	0	0	0	0
	Apr.	0	0	γ_{14}	2	2	2	0	0	0	2	$2\gamma_{16}$	$4\gamma_{17}$	$4\gamma_{18}$	$4\gamma_{19}$	$4\gamma_{20}$	0	0	0	γ_{22}	γ_{23}	$3\gamma_{24}$	0
	May	0	0	0	0	0	0	0	0	0	2	$2\gamma_{16}$	$4\gamma_{17}$	$4\gamma_{18}$	$4\gamma_{19}$	$4\gamma_{20}$	$2\gamma_{21}$	0	0	γ_{22}	γ_{23}	$6\gamma_{24}$	0
	Jun.	0	0	0	0	0	0	0	0	0	2	$4\gamma_{16}$	$4\gamma_{17}$	$4\gamma_{18}$	$4\gamma_{19}$	$4\gamma_{20}$	$2\gamma_{21}$	0	0	γ_{22}	γ_{23}	$6\gamma_{24}$	0
	Jul.	0	0	0	0	0	0	0	0	0	2	$4\gamma_{16}$	$4\gamma_{17}$	$4\gamma_{18}$	$4\gamma_{19}$	$4\gamma_{20}$	$2\gamma_{21}$	0	0	γ_{22}	γ_{23}	$6\gamma_{24}$	0
	Aug.	0	0	0	0	0	0	0	0	0	2	$4\gamma_{16}$	$4\gamma_{17}$	$4\gamma_{18}$	$4\gamma_{19}$	$4\gamma_{20}$	$2\gamma_{21}$	0	0	γ_{22}	γ_{23}	$6\gamma_{24}$	0
	Sep.	0	0	0	0	0	0	0	0	0	2	$4\gamma_{16}$	$4\gamma_{17}$	$4\gamma_{18}$	$4\gamma_{19}$	$4\gamma_{20}$	γ_{21}	0	0	γ_{22}	γ_{23}	$3\gamma_{24}$	0
	O-D	0	0	γ_{15}	4	4	4	0	0	0	1	γ_{16}	0	0	0	0	0	0	0	0	0	0	0
Ad.F	J-M	0	0	γ_{13}	4	4	4	0	0	0	1	γ_{16}	0	0	0	0	0	0	0	0	0	0	0
	Apr.	0	0	γ_{14}	2	2	2	0	0	0	1	γ_{16}	$2\gamma_{17}$	$2\gamma_{18}$	$2\gamma_{19}$	$2\gamma_{20}$	0	0	0	γ_{22}	γ_{23}	$3\gamma_{24}$	0
	May	0	0	0	0	0	0	0	0	0	1	γ_{16}	γ_{17}	γ_{18}	γ_{19}	γ_{20}	$4\gamma_{21}$	0	0	$2\gamma_{22}$	$2\gamma_{23}$	$9\gamma_{24}$	0
	Jun.	0	0	0	0	0	0	0	0	0	1	$2\gamma_{16}$	γ_{17}	γ_{18}	γ_{19}	γ_{20}	$4\gamma_{21}$	0	0	$2\gamma_{22}$	$2\gamma_{23}$	$9\gamma_{24}$	0
	Jul.	0	0	0	0	0	0	0	0	0	1	$2\gamma_{16}$	γ_{17}	γ_{18}	γ_{19}	γ_{20}	$4\gamma_{21}$	0	0	$2\gamma_{22}$	$2\gamma_{23}$	$9\gamma_{24}$	0
	Aug.	0	0	0	0	0	0	0	0	0	1	$2\gamma_{16}$	γ_{17}	γ_{18}	γ_{19}	γ_{20}	$4\gamma_{21}$	0	0	$2\gamma_{22}$	$2\gamma_{23}$	$9\gamma_{24}$	0
	Sep.	0	0	0	0	0	0	0	0	0	1	$2\gamma_{16}$	γ_{17}	γ_{18}	γ_{19}	γ_{20}	$2\gamma_{21}$	0	0	$2\gamma_{22}$	$2\gamma_{23}$	$3\gamma_{24}$	0
	O-D	0	0	γ_{15}	4	4	4	0	0	0	1	γ_{16}	0	0	0	0	0	0	0	0	0	0	0

Trial 26 (Substantially more O-/OE-stock ages 1-4 are found in sub-areas 2R, 3 & 4 year-round): Hypothesis B
Y Stock and J stock: As for Baseline B (Matrix Y-BC and J-B)
O Stock Trial B26 (Matrix O-AB26) as above

Trial 26 (Substantially more O-/OE-stock ages 1-4 are found in sub-areas 2R, 3 & 4 year-round): Hypothesis C
Y Stock, JW Stock, JE Stock and OW Stock: as for Baseline C (Matrix Y-BC, JW-C, JE-C & OW-C)
OE Stock Trial C26 (Matrix OE-C26) Differences from the Baseline trial are highlighted.

Age/sex	Mon	1W	1E	2C	2R	3	4	5	6W	6E	7CS	7CN	7WR	7E	8	9	9N	10W	10E	11	12SW	12NE	13
Juv	J-M	0	0	0	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Apr.	0	0	0	44	44	44	0	0	0	0	0	γ_{17}	γ_{18}	γ_{19}	γ_{20}	0	0	0	γ_{22}	γ_{23}	γ_{24}	0
	May	0	0	0	44	44	44	0	0	0	0	0	γ_{17}	γ_{18}	γ_{19}	γ_{20}	γ_{21}	0	0	γ_{22}	γ_{23}	γ_{24}	0
	Jun.	0	0	0	44	44	44	0	0	0	0	0	γ_{17}	γ_{18}	γ_{19}	γ_{20}	γ_{21}	0	0	γ_{22}	γ_{23}	γ_{24}	0
	Jul.	0	0	0	44	44	44	0	0	0	0	0	γ_{17}	γ_{18}	γ_{19}	γ_{20}	γ_{21}	0	0	γ_{22}	γ_{23}	γ_{24}	0
	Aug.	0	0	0	44	44	44	0	0	0	0	0	γ_{17}	γ_{18}	γ_{19}	γ_{20}	γ_{21}	0	0	γ_{22}	γ_{23}	γ_{24}	0
	Sep.	0	0	0	44	44	44	0	0	0	0	0	γ_{17}	γ_{18}	γ_{19}	γ_{20}	γ_{21}	0	0	γ_{22}	γ_{23}	γ_{24}	0
	O-D	0	0	0	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Ad.M	J-M	0	0	0	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Apr.	0	0	0	2	2	2	0	0	0	0	0	$4\gamma_{17}$	$4\gamma_{18}$	$4\gamma_{19}$	$4\gamma_{20}$	0	0	0	γ_{22}	γ_{23}	$3\gamma_{24}$	0
	May	0	0	0	0	0	0	0	0	0	0	0	$4\gamma_{17}$	$4\gamma_{18}$	$4\gamma_{19}$	$4\gamma_{20}$	$2\gamma_{21}$	0	0	γ_{22}	γ_{23}	$6\gamma_{24}$	0
	Jun.	0	0	0	0	0	0	0	0	0	0	0	$4\gamma_{17}$	$4\gamma_{18}$	$4\gamma_{19}$	$4\gamma_{20}$	$2\gamma_{21}$	0	0	γ_{22}	γ_{23}	$6\gamma_{24}$	0
	Jul.	0	0	0	0	0	0	0	0	0	0	0	$4\gamma_{17}$	$4\gamma_{18}$	$4\gamma_{19}$	$4\gamma_{20}$	$2\gamma_{21}$	0	0	γ_{22}	γ_{23}	$6\gamma_{24}$	0
	Aug.	0	0	0	0	0	0	0	0	0	0	0	$4\gamma_{17}$	$4\gamma_{18}$	$4\gamma_{19}$	$4\gamma_{20}$	$2\gamma_{21}$	0	0	γ_{22}	γ_{23}	$6\gamma_{24}$	0
	Sep.	0	0	0	0	0	0	0	0	0	0	0	$4\gamma_{17}$	$4\gamma_{18}$	$4\gamma_{19}$	$4\gamma_{20}$	γ_{21}	0	0	γ_{22}	γ_{23}	$3\gamma_{24}$	0
	O-D	0	0	0	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Ad.F	J-M	0	0	0	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Apr.	0	0	0	2	2	2	0	0	0	0	0	$2\gamma_{17}$	$2\gamma_{18}$	$2\gamma_{19}$	$2\gamma_{20}$	0	0	0	γ_{22}	γ_{23}	$3\gamma_{24}$	0
	May	0	0	0	0	0	0	0	0	0	0	0	γ_{17}	γ_{18}	γ_{19}	γ_{20}	$4\gamma_{21}$	0	0	γ_{22}	$2\gamma_{23}$	$9\gamma_{24}$	0
	Jun.	0	0	0	0	0	0	0	0	0	0	0	γ_{17}	γ_{18}	γ_{19}	γ_{20}	$4\gamma_{21}$	0	0	$2\gamma_{22}$	$2\gamma_{23}$	$9\gamma_{24}$	0
	Jul.	0	0	0	0	0	0	0	0	0	0	0	γ_{17}	γ_{18}	γ_{19}	γ_{20}	$4\gamma_{21}$	0	0	$2\gamma_{22}$	$2\gamma_{23}$	$9\gamma_{24}$	0
	Aug.	0	0	0	0	0	0	0	0	0	0	0	γ_{17}	γ_{18}	γ_{19}	γ_{20}	$4\gamma_{21}$	0	0	$2\gamma_{22}$	$2\gamma_{23}$	$9\gamma_{24}$	0
	Sep.	0	0	0	0	0	0	0	0	0	0	0	γ_{17}	γ_{18}	γ_{19}	γ_{20}	$2\gamma_{21}$	0	0	$2\gamma_{22}$	$2\gamma_{23}$	$3\gamma_{24}$	0
	O-D	0	0	0	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Trial 27 (no age 1-4 whales in sub-area 9 / 9N): Hypothesis A
J Stock as for Baseline A (Matrix J-A)
O Stock Trial A27 (Matrix O-AB27) Differences from the Baseline trial are highlighted.

Age/sex	Mon	1W	1E	2C	2R	3	4	5	6W	6E	7CS	7CN	7WR	7E	8	9	9N	10W	10E	11	12SW	12NE	13
Juv	J-M	0	0	γ_{13}	4	4	4	0	0	0	4	γ_{16}	0	0	0	0	0	0	0	0	0	0	0
	Apr.	0	0	γ_{14}	2	2	2	0	0	0	8	$2\gamma_{16}$	γ_{17}	γ_{18}	γ_{19}	0	0	0	0	γ_{22}	γ_{23}	γ_{24}	0
	May	0	0	γ_{14}	2	2	2	0	0	0	8	$2\gamma_{16}$	γ_{17}	γ_{18}	γ_{19}	0	0	0	0	γ_{22}	γ_{23}	γ_{24}	0
	Jun.	0	0	γ_{14}	2	2	2	0	0	0	4	$4\gamma_{16}$	γ_{17}	γ_{18}	γ_{19}	0	0	0	0	γ_{22}	γ_{23}	γ_{24}	0
	Jul.	0	0	γ_{15}	2	2	2	0	0	0	4	$4\gamma_{16}$	γ_{17}	γ_{18}	γ_{19}	0	0	0	0	γ_{22}	γ_{23}	γ_{24}	0
	Aug.	0	0	γ_{15}	2	2	2	0	0	0	4	$4\gamma_{16}$	γ_{17}	γ_{18}	γ_{19}	0	0	0	0	γ_{22}	γ_{23}	γ_{24}	0
	Sep.	0	0	γ_{15}	2	2	2	0	0	0	4	$4\gamma_{16}$	γ_{17}	γ_{18}	γ_{19}	0	0	0	0	γ_{22}	γ_{23}	γ_{24}	0
	O-D	0	0	γ_{15}	4	4	4	0	0	0	4	$2\gamma_{16}$	0	0	0	0	0	0	0	0	0	0	0
Ad.M	J-M	0	0	γ_{13}	4	4	4	0	0	0	1	γ_{16}	0	0	0	0	0	0	0	0	0	0	0
	Apr.	0	0	γ_{14}	2	2	2	0	0	0	2	$2\gamma_{16}$	$4\gamma_{17}$	$4\gamma_{18}$	$4\gamma_{19}$	$4\gamma_{20}$	0	0	0	γ_{22}	γ_{23}	$3\gamma_{24}$	0
	May	0	0	0	0	0	0	0	0	0	2	$2\gamma_{16}$	$4\gamma_{17}$	$4\gamma_{18}$	$4\gamma_{19}$	$4\gamma_{20}$	$2\gamma_{21}$	0	0	γ_{22}	γ_{23}	$6\gamma_{24}$	0
	Jun.	0	0	0	0	0	0	0	0	0	2	$4\gamma_{16}$	$4\gamma_{17}$	$4\gamma_{18}$	$4\gamma_{19}$	$4\gamma_{20}$	$2\gamma_{21}$	0	0	γ_{22}	γ_{23}	$6\gamma_{24}$	0
	Jul.	0	0	0	0	0	0	0	0	0	2	$4\gamma_{16}$	$4\gamma_{17}$	$4\gamma_{18}$	$4\gamma_{19}$	$4\gamma_{20}$	$2\gamma_{21}$	0	0	γ_{22}	γ_{23}	$6\gamma_{24}$	0
	Aug.	0	0	0	0	0	0	0	0	0	2	$4\gamma_{16}$	$4\gamma_{17}$	$4\gamma_{18}$	$4\gamma_{19}$	$4\gamma_{20}$	$2\gamma_{21}$	0	0	γ_{22}	γ_{23}	$6\gamma_{24}$	0
	Sep.	0	0	0	0	0	0	0	0	0	2	$4\gamma_{16}$	$4\gamma_{17}$	$4\gamma_{18}$	$4\gamma_{19}$	$4\gamma_{20}$	γ_{21}	0	0	γ_{22}	γ_{23}	$3\gamma_{24}$	0
	O-D	0	0	γ_{15}	4	4	4	0	0	0	1	γ_{16}	0	0	0	0	0	0	0	0	0	0	0
Ad.F	J-M	0	0	γ_{13}	4	4	4	0	0	0	1	γ_{16}	0	0	0	0	0	0	0	0	0	0	0
	Apr.	0	0	γ_{14}	2	2	2	0	0	0	1	γ_{16}	$2\gamma_{17}$	$2\gamma_{18}$	$2\gamma_{19}$	$2\gamma_{20}$	0	0	0	γ_{22}	γ_{23}	$3\gamma_{24}$	0
	May	0	0	0	0	0	0	0	0	0	1	γ_{16}	γ_{17}	γ_{18}	γ_{19}	γ_{20}	$4\gamma_{21}$	0	0	$2\gamma_{22}$	$2\gamma_{23}$	$9\gamma_{24}$	0
	Jun.	0	0	0	0	0	0	0	0	0	1	$2\gamma_{16}$	γ_{17}	γ_{18}	γ_{19}	γ_{20}	$4\gamma_{21}$	0	0	$2\gamma_{22}$	$2\gamma_{23}$	$9\gamma_{24}$	0
	Jul.	0	0	0	0	0	0	0	0	0	1	$2\gamma_{16}$	γ_{17}	γ_{18}	γ_{19}	γ_{20}	$4\gamma_{21}$	0	0	$2\gamma_{22}$	$2\gamma_{23}$	$9\gamma_{24}$	0
	Aug.	0	0	0	0	0	0	0	0	0	1	$2\gamma_{16}$	γ_{17}	γ_{18}	γ_{19}	γ_{20}	$4\gamma_{21}$	0	0	$2\gamma_{22}$	$2\gamma_{23}$	$9\gamma_{24}$	0
	Sep.	0	0	0	0	0	0	0	0	0	1	$2\gamma_{16}$	γ_{17}	γ_{18}	γ_{19}	γ_{20}	$2\gamma_{21}$	0	0	$2\gamma_{22}$	$2\gamma_{23}$	$3\gamma_{24}$	0
	O-D	0	0	γ_{15}	4	4	4	0	0	0	1	γ_{16}	0	0	0	0	0	0	0	0	0	0	0

Trial 27 (no age 1-4 whales in sub-area 9/9N): Hypothesis B
Y Stock and J stock: As for Baseline B (Matrix Y-BC and J-B)
O Stock Trial B27 (Matrix O-AB27) as above

Trial 27 (no age 1-4 whales in sub-area 9/9N): Hypothesis C
Y Stock, JW Stock, JE Stock and OW Stock: as for Baseline C (Matrix Y-BC, JW-C, JE-C & OW-C)
OE Stock Trial C27 (Matrix OE-C27) Differences from the Baseline trial are highlighted.

Age/sex	Mon	1W	1E	2C	2R	3	4	5	6W	6E	7CS	7CN	7WR	7E	8	9	9N	10W	10E	11	12SW	12NE	13
Juv	J-M	0	0	0	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Apr.	0	0	0	2	2	2	0	0	0	0	0	γ_{17}	γ_{18}	γ_{19}	0	0	0	0	γ_{22}	γ_{23}	γ_{24}	0
	May	0	0	0	2	2	2	0	0	0	0	0	γ_{17}	γ_{18}	γ_{19}	0	0	0	0	γ_{22}	γ_{23}	γ_{24}	0
	Jun.	0	0	0	2	2	2	0	0	0	0	0	γ_{17}	γ_{18}	γ_{19}	0	0	0	0	γ_{22}	γ_{23}	γ_{24}	0
	Jul.	0	0	0	2	2	2	0	0	0	0	0	γ_{17}	γ_{18}	γ_{19}	0	0	0	0	γ_{22}	γ_{23}	γ_{24}	0
	Aug.	0	0	0	2	2	2	0	0	0	0	0	γ_{17}	γ_{18}	γ_{19}	0	0	0	0	γ_{22}	γ_{23}	γ_{24}	0
	Sep.	0	0	0	2	2	2	0	0	0	0	0	γ_{17}	γ_{18}	γ_{19}	0	0	0	0	γ_{22}	γ_{23}	γ_{24}	0
	O-D	0	0	0	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Ad.M	J-M	0	0	0	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Apr.	0	0	0	2	2	2	0	0	0	0	0	$4\gamma_{17}$	$4\gamma_{18}$	$4\gamma_{19}$	$4\gamma_{20}$	0	0	0	γ_{22}	γ_{23}	$3\gamma_{24}$	0
	May	0	0	0	0	0	0	0	0	0	0	0	$4\gamma_{17}$	$4\gamma_{18}$	$4\gamma_{19}$	$4\gamma_{20}$	$2\gamma_{21}$	0	0	γ_{22}	γ_{23}	$6\gamma_{24}$	0
	Jun.	0	0	0	0	0	0	0	0	0	0	0	$4\gamma_{17}$	$4\gamma_{18}$	$4\gamma_{19}$	$4\gamma_{20}$	$2\gamma_{21}$	0	0	γ_{22}	γ_{23}	$6\gamma_{24}$	0
	Jul.	0	0	0	0	0	0	0	0	0	0	0	$4\gamma_{17}$	$4\gamma_{18}$	$4\gamma_{19}$	$4\gamma_{20}$	$2\gamma_{21}$	0	0	γ_{22}	γ_{23}	$6\gamma_{24}$	0
	Aug.	0	0	0	0	0	0	0	0	0	0	0	$4\gamma_{17}$	$4\gamma_{18}$	$4\gamma_{19}$	$4\gamma_{20}$	$2\gamma_{21}$	0	0	γ_{22}	γ_{23}	$6\gamma_{24}$	0
	Sep.	0	0	0	0	0	0	0	0	0	0	0	$4\gamma_{17}$	$4\gamma_{18}$	$4\gamma_{19}$	$4\gamma_{20}$	γ_{21}	0	0	γ_{22}	γ_{23}	$3\gamma_{24}$	0
	O-D	0	0	0	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Ad.F	J-M	0	0	0	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Apr.	0	0	0	2	2	2	0	0	0	0	0	$2\gamma_{17}$	$2\gamma_{18}$	$2\gamma_{19}$	$2\gamma_{20}$	0	0	0	γ_{22}	γ_{23}	$3\gamma_{24}$	0
	May	0	0	0	0	0	0	0	0	0	0	0	γ_{17}	γ_{18}	γ_{19}	γ_{20}	$4\gamma_{21}$	0	0	γ_{22}	$2\gamma_{23}$	$9\gamma_{24}$	0
	Jun.	0	0	0	0	0	0	0	0	0	0	0	γ_{17}	γ_{18}	γ_{19}	γ_{20}	$4\gamma_{21}$	0	0	$2\gamma_{22}$	$2\gamma_{23}$	$9\gamma_{24}$	0
	Jul.	0	0	0	0	0	0	0	0	0	0	0	γ_{17}	γ_{18}	γ_{19}	γ_{20}	$4\gamma_{21}$	0	0	$2\gamma_{22}$	$2\gamma_{23}$	$9\gamma_{24}$	0
	Aug.	0	0	0	0	0	0	0	0	0	0	0	γ_{17}	γ_{18}	γ_{19}	γ_{20}	$4\gamma_{21}$	0	0	$2\gamma_{22}$	$2\gamma_{23}$	$9\gamma_{24}$	0
	Sep.	0	0	0	0	0	0	0	0	0	0	0	γ_{17}	γ_{18}	γ_{19}	γ_{20}	$2\gamma_{21}$	0	0	$2\gamma_{22}$	$2\gamma_{23}$	$3\gamma_{24}$	0
	O-D	0	0	0	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Trial 28 (Number of 1+ whales in 2009 in sub-area 2C in any month <200): Hypothesis A
O Stock: as for Baseline A (Matrix O-AB)
J Stock Trial A28 (Matrix J-A28) Differences from the Baseline trial are highlighted.

Age/ sex	Mon	1W	1E	2C	2R	3	4	5	6W	6E	7CS	7CN	7WR	7E	8	9	9N	10W	10E	11	12SW	12NE	13
		Sub-Area																					
Juv	J-M	2	2	$2\gamma_{38}$	0	0	0	2	2	$4\gamma_{29}$	$2\gamma_1$	$2\gamma_4$	0	0	0	0	0	γ_6	γ_7	0	0	0	0
	Apr.	2	2	$2\gamma_{38}$	0	0	0	2	2	$4\gamma_{29}$	$2\gamma_1$	$2\gamma_4$	0	0	0	0	0	γ_6	γ_7	$2\gamma_8$	$2\gamma_8$	0	0
	May	2	2	$2\gamma_{38}$	0	0	0	2	2	$4\gamma_{29}$	$2\gamma_2$	$2\gamma_4$	0	0	0	0	0	γ_6	γ_7	$2\gamma_8$	$2\gamma_8$	0	0
	Jun.	2	2	$2\gamma_{38}$	0	0	0	2	2	$4\gamma_{29}$	$2\gamma_3$	$2\gamma_4$	0	0	0	0	0	γ_6	γ_7	$2\gamma_9$	$2\gamma_9$	0	0
	Jul.	2	2	$2\gamma_{38}$	0	0	0	2	2	$4\gamma_{29}$	$2\gamma_3$	$2\gamma_5$	0	0	0	0	0	γ_6	γ_7	$2\gamma_9$	$2\gamma_9$	0	0
	Aug.	2	2	$2\gamma_{38}$	0	0	0	2	2	$4\gamma_{29}$	$2\gamma_3$	$2\gamma_5$	0	0	0	0	0	γ_6	γ_7	$2\gamma_9$	$2\gamma_9$	0	0
	Sep.	2	2	$2\gamma_{38}$	0	0	0	2	2	$4\gamma_{29}$	$2\gamma_3$	$2\gamma_5$	0	0	0	0	0	γ_6	γ_7	$2\gamma_9$	$2\gamma_9$	0	0
	O-D	2	2	$2\gamma_{38}$	0	0	0	2	2	$4\gamma_{29}$	$2\gamma_3$	$2\gamma_5$	0	0	0	0	0	γ_6	γ_7	$2\gamma_9$	0	0	0
Ad.M	J-M	2	2	γ_{38}	0	0	0	2	4	$4\gamma_{29}$	$2\gamma_1$	$2\gamma_4$	0	0	0	0	0	γ_6	γ_7	0	0	0	0
	Apr.	0	0	γ_{38}	0	0	0	2	2	$2\gamma_{29}$	$4\gamma_1$	$2\gamma_4$	0	0	0	0	0	γ_6	$2\gamma_7$	γ_8	γ_8	0	0
	May	0	0	γ_{38}	0	0	0	2	2	$2\gamma_{29}$	$4\gamma_2$	$2\gamma_4$	0	0	0	0	0	$2\gamma_6$	$2\gamma_7$	γ_8	$2\gamma_8$	0	0
	Jun.	0	0	γ_{38}	0	0	0	2	2	$2\gamma_{29}$	$2\gamma_3$	$4\gamma_4$	0	0	0	0	0	$2\gamma_6$	$2\gamma_7$	γ_9	$2\gamma_9$	0	0
	Jul.	0	0	γ_{38}	0	0	0	2	2	$2\gamma_{29}$	$2\gamma_3$	$4\gamma_5$	0	0	0	0	0	γ_6	γ_7	γ_9	$2\gamma_9$	0	0
	Aug.	0	0	γ_{38}	0	0	0	2	2	$2\gamma_{29}$	$2\gamma_3$	$4\gamma_5$	0	0	0	0	0	γ_6	γ_7	γ_9	$2\gamma_9$	0	0
	Sep.	2	2	γ_{38}	0	0	0	2	4	$4\gamma_{29}$	$2\gamma_3$	$4\gamma_5$	0	0	0	0	0	γ_6	γ_7	0	0	0	0
	O-D	4	4	γ_{38}	0	0	0	2	2	0	$2\gamma_3$	$2\gamma_5$	0	0	0	0	0	0	0	0	0	0	0
Ad.F	J-M	2	2	γ_{38}	0	0	0	2	4	$4\gamma_{29}$	γ_1	γ_4	0	0	0	0	0	γ_6	γ_7	0	0	0	0
	Apr.	0	0	γ_{38}	0	0	0	2	2	$2\gamma_{29}$	$2\gamma_1$	γ_4	0	0	0	0	0	$2\gamma_6$	$2\gamma_7$	γ_{10}	γ_{10}	0	0
	May	0	0	γ_{38}	0	0	0	2	2	$2\gamma_{29}$	$2\gamma_2$	γ_4	0	0	0	0	0	$2\gamma_6$	$2\gamma_7$	γ_{11}	$2\gamma_{11}$	0	0
	Jun.	0	0	γ_{38}	0	0	0	2	2	$2\gamma_{29}$	γ_3	γ_4	0	0	0	0	0	$2\gamma_6$	$2\gamma_7$	γ_{12}	$2\gamma_{12}$	0	0
	Jul.	0	0	γ_{38}	0	0	0	2	2	$2\gamma_{29}$	γ_3	γ_5	0	0	0	0	0	γ_6	γ_7	γ_{12}	$2\gamma_{12}$	0	0
	Aug.	0	0	γ_{38}	0	0	0	2	2	$2\gamma_{29}$	γ_3	γ_5	0	0	0	0	0	γ_6	γ_7	γ_{12}	$2\gamma_{12}$	0	0
	Sep.	2	2	γ_{38}	0	0	0	2	4	$4\gamma_{29}$	γ_3	γ_5	0	0	0	0	0	γ_6	γ_7	0	0	0	0
	O-D	4	4	γ_{38}	0	0	0	2	2	0	γ_3	γ_5	0	0	0	0	0	0	0	0	0	0	0

Trial 28 (Number of 1+ whales in 2009 in sub-area 2C in any month <200): Hypothesis B
Y Stock, O Stock: as for Baseline B (Matrix Y-BC, O-AB)
J Stock Trial B28 (Matrix J-B28) Differences from the Baseline trial are highlighted.

Age/ sex	Mon	1W	1E	2C	2R	3	4	5	6W	6E	7CS	7CN	7WR	7E	8	9	9N	10W	10E	11	12SW	12NE	13
		Sub-Area																					
Juv	J-M	0	2	$2\gamma_{38}$	0	0	0	0	2	$4\gamma_{29}$	$2\gamma_1$	$2\gamma_4$	0	0	0	0	0	γ_6	γ_7	0	0	0	0
	Apr.	0	2	$2\gamma_{38}$	0	0	0	0	2	$4\gamma_{29}$	$2\gamma_1$	$2\gamma_4$	0	0	0	0	0	γ_6	γ_7	$2\gamma_8$	$2\gamma_8$	0	0
	May	0	2	$2\gamma_{38}$	0	0	0	0	2	$4\gamma_{29}$	$2\gamma_2$	$2\gamma_4$	0	0	0	0	0	γ_6	γ_7	$2\gamma_8$	$2\gamma_8$	0	0
	Jun.	0	2	$2\gamma_{38}$	0	0	0	0	2	$4\gamma_{29}$	$2\gamma_3$	$2\gamma_4$	0	0	0	0	0	γ_6	γ_7	$2\gamma_9$	$2\gamma_9$	0	0
	Jul.	0	2	$2\gamma_{38}$	0	0	0	0	2	$4\gamma_{29}$	$2\gamma_3$	$2\gamma_5$	0	0	0	0	0	γ_6	γ_7	$2\gamma_9$	$2\gamma_9$	0	0
	Aug.	0	2	$2\gamma_{38}$	0	0	0	0	2	$4\gamma_{29}$	$2\gamma_3$	$2\gamma_5$	0	0	0	0	0	γ_6	γ_7	$2\gamma_9$	$2\gamma_9$	0	0
	Sep.	0	2	$2\gamma_{38}$	0	0	0	0	2	$4\gamma_{29}$	$2\gamma_3$	$2\gamma_5$	0	0	0	0	0	γ_6	γ_7	$2\gamma_9$	$2\gamma_9$	0	0
	O-D	0	2	$2\gamma_{38}$	0	0	0	0	2	$4\gamma_{29}$	$2\gamma_3$	$2\gamma_5$	0	0	0	0	0	γ_6	γ_7	$2\gamma_9$	0	0	0
Ad.M	J-M	0	2	γ_{38}	0	0	0	0	4	$4\gamma_{29}$	$2\gamma_1$	$2\gamma_4$	0	0	0	0	0	γ_6	γ_7	0	0	0	0
	Apr.	0	0	γ_{38}	0	0	0	0	2	$2\gamma_{29}$	$4\gamma_1$	$2\gamma_4$	0	0	0	0	0	γ_6	$2\gamma_7$	γ_8	γ_8	0	0
	May	0	0	γ_{38}	0	0	0	0	2	$2\gamma_{29}$	$4\gamma_2$	$2\gamma_4$	0	0	0	0	0	$2\gamma_6$	$2\gamma_7$	γ_8	$2\gamma_8$	0	0
	Jun.	0	0	γ_{38}	0	0	0	0	2	$2\gamma_{29}$	$2\gamma_3$	$4\gamma_4$	0	0	0	0	0	$2\gamma_6$	$2\gamma_7$	γ_9	$2\gamma_9$	0	0
	Jul.	0	0	γ_{38}	0	0	0	0	2	$2\gamma_{29}$	$2\gamma_3$	$4\gamma_5$	0	0	0	0	0	γ_6	γ_7	γ_9	$2\gamma_9$	0	0
	Aug.	0	0	γ_{38}	0	0	0	0	2	$2\gamma_{29}$	$2\gamma_3$	$4\gamma_5$	0	0	0	0	0	γ_6	γ_7	γ_9	$2\gamma_9$	0	0
	Sep.	0	2	γ_{38}	0	0	0	0	4	$4\gamma_{29}$	$2\gamma_3$	$4\gamma_5$	0	0	0	0	0	γ_6	γ_7	0	0	0	0
	O-D	0	4	γ_{38}	0	0	0	0	2	0	$2\gamma_3$	$2\gamma_5$	0	0	0	0	0	0	0	0	0	0	0
Ad.F	J-M	0	2	γ_{38}	0	0	0	0	4	$4\gamma_{29}$	γ_1	γ_4	0	0	0	0	0	γ_6	γ_7	0	0	0	0
	Apr.	0	0	γ_{38}	0	0	0	0	2	$2\gamma_{29}$	$2\gamma_1$	γ_4	0	0	0	0	0	$2\gamma_6$	$2\gamma_7$	γ_{10}	γ_{10}	0	0
	May	0	0	γ_{38}	0	0	0	0	2	$2\gamma_{29}$	$2\gamma_2$	γ_4	0	0	0	0	0	$2\gamma_6$	$2\gamma_7$	γ_{11}	$2\gamma_{11}$	0	0
	Jun.	0	0	γ_{38}	0	0	0	0	2	$2\gamma_{29}$	γ_3	γ_4	0	0	0	0	0	$2\gamma_6$	$2\gamma_7$	γ_{12}	$2\gamma_{12}$	0	0
	Jul.	0	0	γ_{38}	0	0	0	0	2	$2\gamma_{29}$	γ_3	γ_5	0	0	0	0	0	γ_6	γ_7	γ_{12}	$2\gamma_{12}$	0	0
	Aug.	0	0	γ_{38}	0	0	0	0	2	$2\gamma_{29}$	γ_3	γ_5	0	0	0	0	0	γ_6	γ_7	γ_{12}	$2\gamma_{12}$	0	0
	Sep.	0	2	γ_{38}	0	0	0	0	4	$4\gamma_{29}$	γ_3	γ_5	0	0	0	0	0	γ_6	γ_7	0	0	0	0
	O-D	0	4	γ_{38}	0	0	0	0	2	0	γ_3	γ_5	0	0	0	0	0	0	0	0	0	0	0

Trial 28 (Number of 1+ whales in 2009 in sub-area 2C in any month <200): Hypothesis C
Y Stock, JW Stock, OW Stock and OE Stock: as for Baseline C (Matrix Y-BC, JW-C, OW-C, OE-C)
JE Stock Trial C28 (Matrix JE-C28) Differences from the Baseline trial are highlighted.

Age/ sex	Mon	1W	1E	2C	2R	3	4	5	6W	6E	7CS	7CN	7WR	7E	8	9	9N	10W	10E	11	12SW	12NE	13
		Sub-Area																					
Juv	J-M	0	0	$2\gamma_{38}$	0	0	0	0	0	0	γ_{31}	$2\gamma_{16}$	0	0	0	0	0	0	0	0	0	0	0
	Apr.	0	0	$2\gamma_{38}$	0	0	0	0	0	0	$2\gamma_{31}$	$3\gamma_{16}$	0	0	0	0	0	0	0	0	0	0	0
	May	0	0	$2\gamma_{38}$	0	0	0	0	0	0	$2\gamma_{31}$	$3\gamma_{16}$	0	0	0	0	0	0	0	0	0	0	0
	Jun.	0	0	$2\gamma_{38}$	0	0	0	0	0	0	$2\gamma_{31}$	$3\gamma_{16}$	0	0	0	0	0	0	0	0	0	0	0
	Jul.	0	0	$2\gamma_{38}$	0	0	0	0	0	0	$2\gamma_{31}$	$6\gamma_{16}$	0	0	0	0	0	0	0	0	0	0	0
	Aug.	0	0	$2\gamma_{38}$	0	0	0	0	0	0	$2\gamma_{31}$	$6\gamma_{16}$	0	0	0	0	0	0	0	0	0	0	0
	Sep.	0	0	$2\gamma_{38}$	0	0	0	0	0	0	$2\gamma_{31}$	$6\gamma_{16}$	0	0	0	0	0	0	0	0	0	0	0
	O-D	0	0	$2\gamma_{38}$	0	0	0	0	0	0	γ_{31}	$2\gamma_{16}$	0	0	0	0	0	0	0	0	0	0	0
Ad.M	J-M	0	0	γ_{38}	0	0	0	0	0	0	γ_{31}	$2\gamma_{16}$	0	0	0	0	0	0	0	0	0	0	0
	Apr.	0	0	γ_{38}	0	0	0	0	0	0	$4\gamma_{31}$	$3\gamma_{16}$	0	0	0	0	0	0	0	0	0	0	0
	May	0	0	γ_{38}	0	0	0	0	0	0	$4\gamma_{31}$	$3\gamma_{16}$	0	0	0	0	0	0	0	0	0	0	0
	Jun.	0	0	γ_{38}	0	0	0	0	0	0	$4\gamma_{31}$	$8\gamma_{16}$	0	0	0	0	0	0	0	0	0	0	0
	Jul.	0	0	γ_{38}	0	0	0	0	0	0	$4\gamma_{31}$	$8\gamma_{16}$	0	0	0	0	0	0	0	0	0	0	0
	Aug.	0	0	γ_{38}	0	0	0	0	0	0	$4\gamma_{31}$	$8\gamma_{16}$	0	0	0	0	0	0	0	0	0	0	0
	Sep.	0	0	γ_{38}	0	0	0	0	0	0	$4\gamma_{31}$	$8\gamma_{16}$	0	0	0	0	0	0	0	0	0	0	0
	O-D	0	0	γ_{38}	0	0	0	0	0	0	γ_{31}	$2\gamma_{16}$	0	0	0	0	0	0	0	0	0	0	0
Ad.F	J-M	0	0	γ_{38}	0	0	0	0	0	0	γ_{31}	$2\gamma_{16}$	0	0	0	0	0	0	0	0	0	0	0
	Apr.	0	0	γ_{38}	0	0	0	0	0	0	$4\gamma_{31}$	$3\gamma_{16}$	0	0	0	0	0	0	0	0	0	0	0
	May	0	0	γ_{38}	0	0	0	0	0	0	$4\gamma_{31}$	$3\gamma_{16}$	0	0	0	0	0	0	0	0	0	0	0
	Jun.	0	0	γ_{38}	0	0	0	0	0	0	$4\gamma_{31}$	$8\gamma_{16}$	0	0	0	0	0	0	0	0	0	0	0
	Jul.	0	0	γ_{38}	0	0	0	0	0	0	$4\gamma_{31}$	$8\gamma_{16}$	0	0	0	0	0	0	0	0	0	0	0
	Aug.	0	0	γ_{38}	0	0	0	0	0	0	$4\gamma_{31}$	$8\gamma_{16}$	0	0	0	0	0	0	0	0	0	0	0
	Sep.	0	0	γ_{38}	0	0	0	0	0	0	$4\gamma_{31}$	$8\gamma_{16}$	0	0	0	0	0	0	0	0	0	0	0
	O-D	0	0	γ_{38}	0	0	0	0	0	0	γ_{31}	$2\gamma_{16}$	0	0	0	0	0	0	0	0	0	0	0

REFERENCE

Allison, C. and De Moor, C. 2010. NPM mixing matrices - a strawman (in 2 parts). Paper SC/D10/NPM14 presented to the First Intersessional Workshop for Western North Pacific Common Minke Whales, 14-17 December 2010, Pusan, Republic of Korea (unpublished). 28pp. [Paper available from the Office of this Journal].

Adjunct 3

Calculation of stock mixing proportions, including correction for 'missing alleles': unpooled results

C.L. de Moor

This document details the stock mixing proportions by month and sex as circulated to the Steering Group for the *Implementation Review* of western North Pacific common minke whales on 26th August 2011 together with an update to those circulated results for sub-area 6W following comments from the 'G3 Review Group'.

In anticipation of sensitivity tests to Hypothesis C assuming a single J-stock with Y-, OW- and OE-stocks, and a single O-stock with Y-, JW- and JE-stocks, mixing proportions in sub-areas affected by this alternative have been included at the end of the document.

This adjunct is a cut down version of De Moor (2011)(rev). Details of an alternative O-stock (the O2 stock) are given in De Moor (2011)(rev) but are not included here because the results for the two O-stock definitions were essentially identical, trials would only be conducted using the original definition of the O-stock (IWC, 2013).

PURE STOCK DEFINITIONS

Table 1
The nomination of samples representative of 'pure' stocks for the purpose of estimating mixing proportions.

Hypotheses A and B		Hypothesis C	
Stock	Location/months to define pure sample	Stock	Location/months to define pure sample
Y-stock	5 (all months)	Y-stock	5 (all months)
J-stock	6E (all months)	JW-stock	6E (all months)
O-stock	7WR, 7E, 8 (all months)	JE-stock	2C (Jul.-Dec.)
		OW-stock	7CN [Jun.] [>8.8NM]
		OE-stock	8 and 9 (all months) [excluding 9 in 1995]

Table 2
Pure stock sample sizes.

Stock	Sample size Haplotypes	Sample size Loci
Pure Y	58	58 58 58 58 58 58 56 58 58 58 54
Pure J	392	392 392 392 392 392 392 392 392 392 392 392 (392 391 392 392 392)
Pure O	341	342 342 342 342 342 341 342 342 342 342 342 342 342 342 342 342
Pure JW	392	392 392 392 392 392 392 392 392 392 392 392 (392 391 392 392 392)
Pure JE	83	83 83 83 83 83 83 83 83 83 83 83 83 83 83 83 83
Pure OW	99	99 99 99 99 99 99 99 99 99 99 99 99 99 99 99 99
Pure OE	590	589 590 589 589 589 590 590 590 589 589 589 589 589 589 589 589

Notation in this document:

(1) In most cases samples are obtained from 16 loci. In sub-areas 5 and 6W samples from the first 11 loci only are available. In each table a (x16) or (x11) is given next to the Loci Sample Size indicating the number of loci used in the calculation of the mixing proportion. In some cases there was a missing value in a sample at a particular loci. Thus, for example if the total sample size were 50, for one of the loci (the 10th) the sample size is 49. This is noted by saying eg '50 with 49 at 10th')

(2) In cases where a mixing proportion should indicate a pure stock, it is given in ***bold italic***. A one-sided t-test has been carried out on all of these cases. If the hypothesis of a pure stock (proportion = 1 or 0) is rejected with α=0.05, then the proportion is underlined. For sub-areas where the mixing matrix assumes only a single stock, even though the sub-area is not used in the definition of a pure stock, similar tests are carried out and given in grey highlight. The one-sided t-test is not conducted if the sample size is 1 or if SE<0.001, but if the mixing proportion is 1.000 or 0.000 as expected the hypothesis of a pure stock is taken to not be rejected.

(3) In cases where a pooled mixing proportion is directly comparable to that in Working Paper 2 from SC/63, a '&' is used to denote cases where the updated mixing proportion differs from that previously used in conditioning by more than 0.05.

SUB-AREA 5 (bycatch data only, 58 samples)
Pure Y defined in sub-area 5 in all months for Hypotheses B and C
Mixing matrices assume J-stock present in all months in sub-area 5 for Hypothesis A

Hyp A: Proportion of J mixing with O		Sample size	Proportion Haplotypes	SE	Sample size (x11)	Proportion Loci	SE
Jan-Mar	Males	5	1.000	0.005	5 with 4 at 7th and 11th	1.000	0.000
Apr		1	1.000	0.009	1	0.981	0.267
May		9	1.000	0.001	9	0.943	0.052
Jun		12	1.000	0.001	12 with 11 and 11th	0.950	0.042
Jul		6	1.000	0.004	6	0.904	0.076
Aug		4	1.000	0.005	4	0.857	0.087
Sep		3	1.000	0.025	3 with 2 at 11th	0.303	0.164
Oct-Dec		11	1.000	0.001	11 with 10 at 7th &11th	0.939	0.054
Jan-Mar	Females	3	1.000	0.005	3	0.999	0.000
Apr		0			0		
May		1	1.000	0.010	1	0.999	0.000
Jun		1	1.000	0.009	1	1.000	0.000
Jul		0			0		
Aug		0			0		
Sep		0			0		
Oct-Dec		2	1.000	0.007	2	1.000	0.000
Summary: all data		58	1.000	0.000	58 with 56 at 7th and 54 at 11th	0.919	0.023

Hyp B & C: Proportion of J/JW mixing with Y		Sample size	Proportion Haplotypes	SE	Sample size (x11)	Proportion Loci	SE
Jan.-Mar.	Males	5	***0.000***	0.007	5 with 4 at 7th and 11th	0.001	0.000
Apr.		1	0.990	8.911	1	0.001	0.000
May		9	***0.000***	0.007	9	***0.447***	0.210
Jun.		12	***0.268***	0.398	12 with 11 and 11th	0.001	0.000
Jul.		6	***0.000***	0.007	6	0.001	0.000
Aug.		4	***0.000***	0.009	4	***0.027***	0.287
Sep.		3	***0.000***	0.027	3 with 2 at 11th	0.001	0.000
Oct.-Dec.		11	***0.000***	0.026	11 with 10 at 7th &11th	0.001	0.000
Jan.-Mar.	Females	3	***0.000***	0.010	3	***0.445***	0.425
Apr.		0			0		
May		1	**0.000**	0.041	1	0.001	0.000
Jun.		1	0.998	0.208	1	0.052	0.531
Jul.		0			0		
Aug.		0			0		
Sep.		0			0		
Oct.-Dec.		2	***0.000***	0.056	2	***0.000***	0.000
Summary: all data		58	***0.000***	0.004	58 with 56 at 7th and 54 at 11th	**0.000**	0.000

SUB-AREA 1E (bycatch data only, 22 samples)
Not used for definition of a pure stock
Mixing matrices assume no mixing in this sub-area - only J/JW
Comments: Low sample size, but some mixing in Apr./May.

Hyp A: Proportion of J mixing with O		Sample size	Proportion Haplotypes	SE	Sample size (x16)	Proportion Loci	SE
Jan.-Mar.	Males	4	1.000	0.005	4	0.977	0.076
Apr.		4	0.750	0.212	4	0.652	0.107
May		0			0		
Jun.		1	1.000	0.009	1	0.999	0.000
Jul.		0			0		
Aug.		0			0		
Sep.		0			0		
Oct.-Dec.		0			0		
Jan.-Mar.	Females	7	1.000	0.002	7	0.999	0.000
Apr.		1	1.000	0.009	1	0.999	0.000
May		3	1.000	0.005	3	0.999	0.000
Jun.		0			0		
Jul.		0			0		
Aug.		0			0		
Sep.		0			0		
Oct.-Dec.		2	1.000	0.007	2	0.999	0.000
Summary: all data		22	0.954	0.045	22	0.930	0.030

Hyp B & C: Proportion of J mixing with Y		Sample size	Proportion Haplotypes	SE	Sample size (x11)	Proportion Loci	SE
Jan.-Mar.	Males	4	0.000	0.010	4	0.999	0.000
Apr.		4	0.464	0.380	4	0.600	0.216
May		0			0		
Jun.		1	0.000	0.031	1	0.999	0.000
Jul.		0			0		
Aug.		0			0		
Sep.		0			0		
Oct.-Dec.		0			0		
Jan.-Mar.	Females	7	1.000	0.022	7	0.559	0.253
Apr.		1	0.998	0.208	1	1.000	0.000
May		3	0.755	0.954	3	0.397	0.336
Jun.		0			0		
Jul.		0			0		
Aug.		0			0		
Sep.		0			0		
Oct.-Dec.		2	1.000	0.032	2	1.000	0.000
Summary: all data		22	0.655	0.268	22	0.776	0.109

Hyp C: Proportion of JW mixing with JE		Sample size	Proportion Haplotypes	SE	Sample size (x16)	Proportion Loci	SE
Jan.-Mar.	Males	4	1.000	0.01	4	1.000	0.000
Apr.		4	0.469	0.308	4	0.432	0.250
May		0			0		
Jun.		1	1.000	0.033	1	0.000	0.000
Jul.		0			0		
Aug.		0			0		
Sep.		0			0		
Oct.-Dec.		0			0		
Jan.-Mar.	Females	7	0.980	0.581	7	0.444	0.274
Apr.		1	1.000	0.011	1	0.000	0.000
May		3	0.000	0.030	3	0.184	0.526
Jun.		0			0		
Jul.		0			0		
Aug.		0			0		
Sep.		0			0		
Oct.-Dec.		2	1.000	0.029	2	1.000	0.000
Summary: all data		22	0.708	0.206	22	0.598	0.124

SUB-AREA 6W (bycatch data only, 415 samples)
Not used for definition of a pure stock.
Mixing matrices assume only J stock for Hyp A.
Mixing matrices assume mixing in this sub-area between J/JW and Y year round for Hyp B and C.
Comments: Some mixing from Oct.-Jun.

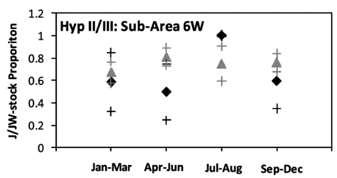
Hyp A: Proportion of J mixing with O		Sample size	Proportion Haplotypes	SE	Sample size (x11)	Proportion Loci	SE
Jan.-Mar.	Males	83	0.993	0.013	83 with 81 in 11th	0.937	0.018
Apr.		37	1.000	0.001	37 with 36 in 1st	0.978	0.019
May		41	1.000	0.001	41 with 40 in 8th	0.982	0.017
Jun.		43	1.000	0.001	43	0.966	0.022
Jul.		21	1.000	0.001	21	0.898	0.049
Aug.		16	1.000	0.001	16 with 15 in 11th	0.999	0.000
Sep.		20	1.000	0.001	20 with 18 in 11th	0.793	0.053
Oct.-Dec.		97	1.000	0.000	97 with 96 in 7th and 94 in 11th	0.971	0.015
Jan.-Mar.	Females	13	0.921	0.077	13 with 12 in 6th	0.778	0.061
Apr.		3	1.000	0.005	3	0.931	0.072
May		7	1.000	0.004	7	0.860	0.083
Jun.		10	1.000	0.003	10	0.820	0.072
Jul.		1	1.000	0.009	1	0.959	0.338
Aug.		4	1.000	0.005	4	0.958	0.049
Sep.		6	1.000	0.004	6 with 5 in 9th	0.872	0.078
Oct.-Dec.		13	1.000	0.003	13 with 12 in 11th	1.000	0.000
Summary: all data		415	0.997	0.003	415 with 414 in 1st, 6-9th and 406 in 11th	0.937	0.008

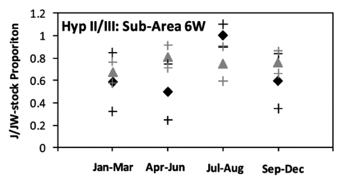
Hyp B and C: Proportion of J/JW mixing with Y		Sample size	Proportion Haplotypes	SE	Sample size (x11)	Proportion Loci	SE
Jan.-Mar.	Males	83	0.555	0.142	83 with 81 in 11th	0.745	0.050
Apr.		37	0.449	0.253	37 with 36 in 1st	0.963	0.083
May		41	0.749	0.243	41 with 40 in 8th	0.926	0.062
Jun.		43	0.534	0.245	43	0.787	0.080
Jul.		21	0.830	0.38	21	0.788	0.089
Aug.		16	1.000	0.004	16 with 15 in 11th	0.726	0.137
Sep.		20	0.533	0.335	20 with 18 in 11th	0.475	0.107
Oct.-Dec.		97	0.629	0.140	97 with 96 in 7th and 94 in 11th	0.859	0.049
Jan.-Mar.	Females	13	0.730	0.314	13 with 12 in 6th	0.284	0.128
Apr.		3	0.002	0.139	3	0.751	0.301
May		7	0.000	0.006	7	0.529	0.148
Jun.		10	0.364	0.309	10	0.583	0.167
Jul.		1	1.000	0.009	1	0.999	0.000
Aug.		4	1.000	0.024	4	0.457	0.323
Sep.		6	0.415	0.636	6 with 5 in 9th	0.773	0.143
Oct.-Dec.		13	0.409	0.455	13 with 12 in 11th	0.806	0.130
Summary: all data		415	0.625	0.069	415 with 414 in 1st, 6-9th and 406 in 11th	0.776	0.109

Pooling for input to conditioning:

Hyp B and C: Proportion of J/JW mixing with Y		Sample size	Proportion Haplotypes	SE	Sample size (x11)	Proportion Loci	SE
Jan.-Mar.	M F	96	0.584	0.131	96 with 95 in 6th, 94 in 11th	0.672	0.047
Apr.-Jun.	M F	141	0.496	0.126	141 with 140 in 1st, 8th	0.812	0.04
Jul.-Aug.	M F	42	1.000	0.004	42 with 41 in 11th	0.749	0.077
Sep.-Dec.	M F	136	0.593	0.123	136 with 135 in 7th, 9th, 130 in 11th	0.761	0.04

Plots of pooled mixing proportions for J/JW-stock with O/Y-stock. RH plots are with a minimum 0.05 SE:





SUB-AREA 6E (bycatch data only, 392 samples)
Pure J/JW-stock defined in sub-area 6E in all months for all Hypotheses

Hyp A & B: Proportion of J mixing with O		Sample size	Proportion Haplotypes	SE	Sample size (x16)	Proportion Loci	SE
Jan.-Mar.	Males	63	***1.000***	0.000	63	***1.000***	0.000
Apr.		24	***1.000***	0.001	24	***1.000***	0.000
May		23	***1.000***	0.001	23	***1.000***	0.000
Jun.		9	***1.000***	0.005	9	0.999	0.000
Jul.		9	***1.000***	0.001	9	***1.000***	0.000
Aug.		12	***1.000***	0.001	12	***1.000***	0.000
Sep.		9	***1.000***	0.001	9	***1.000***	0.000
Oct.-Dec.		39	***1.000***	0.001	39	0.999	0.000
Jan.-Mar.	Females	64	***1.000***	0.008	64	0.999	0.000
Apr.		31	***1.000***	0.001	31	0.999	0.000
May		22	***1.000***	0.001	22	0.999	0.000
Jun.		16	***1.000***	0.001	16	0.999	0.000
Jul.		7	***1.000***	0.002	7	***1.000***	0.000
Aug.		12	***1.000***	0.001	12	***1.000***	0.000
Sep.		4	***1.000***	0.002	4	0.999	0.000
Oct.-Dec.		48	***1.000***	0.001	48	***1.000***	0.000
Jan.-Dec.	M+F	392	***1.000***	0.000	392, 391 in 13th	***1.000***	0.000

Hyp B & C: Proportion of J/JW mixing with Y		Sample size	Proportion Haplotypes	SE	Sample size (x11)	Proportion Loci	SE
Jan.-Mar.	Males	63	***1.000***	0.003	63	0.999	0.000
Apr.		24	***1.000***	0.015	24	***0.956***	0.143
May		23	***1.000***	0.004	23	0.999	0.000
Jun.		9	***0.720***	0.609	9	***0.967***	0.230
Jul.		9	***1.000***	0.031	9	0.999	0.000
Aug.		12	***1.000***	0.006	12	0.999	0.000
Sep.		9	***1.000***	0.019	9	0.999	0.000
Oct.-Dec.		39	***1.000***	0.005	39	0.999	0.000
Jan.-Mar.	Females	64	***1.000***	0.003	64	***1.000***	0.000
Apr.		31	***0.927***	0.261	31	0.999	0.000
May		22	***0.950***	0.326	22	0.999	0.000
Jun.		16	***0.506***	0.535	16	0.999	0.000
Jul.		7	***1.000***	0.027	7	***1.000***	0.000
Aug.		12	***1.000***	0.007	12	***0.991***	0.172
Sep.		4	***0.000***	0.028	4	0.999	0.000
Oct.-Dec.		48	***0.893***	0.197	48	0.999	0.000
Jan.-Dec.	M+F	392	***1.000***	0.002	392	***1.000***	0.000

Hyp C: Proportion of JW mixing with JE		Sample size	Proportion Haplotypes	SE	Sample size (x16)	Proportion Loci	SE
Jan.-Mar.	Males	63	***1.000***	0.002	63	***1.000***	0.000
Apr.		24	***1.000***	0.003	24	0.999	0.000
May		23	***1.000***	0.004	23	***1.000***	0.000
Jun.		9	***0.859***	0.375	9	***0.562***	0.302
Jul.		9	***0.734***	0.429	9	***1.000***	0.000
Aug.		12	***1.000***	0.007	12	***1.000***	0.000
Sep.		9	***1.000***	0.032	9	***0.494***	0.308
Oct.-Dec.		39	***1.000***	0.004	39	***1.000***	0.000
Jan.-Mar.	Females	64	***0.993***	0.099	64	0.999	0.000
Apr.		31	***0.906***	0.204	31	0.999	0.000
May		22	***0.856***	0.227	22	0.999	0.000
Jun.		16	***0.264***	0.472	16	***1.000***	0.000
Jul.		7	***0.000***	0.032	7	0.999	0.000
Aug.		12	***0.317***	0.554	12	***0.983***	0.191
Sep.		4	***1.000***	0.009	4	0.999	0.000
Oct.-Dec.		48	***1.000***	0.004	48	0.999	0.000
Jan.-Dec.	M+F	392	***1.000***	0.002	392, 391 in 13th	***0.999***	0.000

SUB-AREA 10E (bycatch data only, 9 samples)
Not used for definition of a pure stock.
Mixing matrices assume no mixing in this sub-area - only J/JW-stock year-round.

Hyp A & B: Proportion of J mixing with O		Sample size	Proportion Haplotypes	SE	Sample size (x16)	Proportion Loci	SE
Jan.-Mar.	Males	0					
Apr.		0					
May		0					
Jun.		0					
Jul.		0					
Aug.		0					
Sep.		0					
Oct.-Dec.		5	1.000	0.004	5	0.999	0.000
Jan.-Mar.	Females	0					
Apr.		0					
May		0					
Jun.		0					
Jul.		0					
Aug.		0					
Sep.		0					
Oct.-Dec.		4	1.000	0.005	4	0.886	0.098
Jan.-Dec.	M+F	9	1.000	0.001	9	0.985	0.051

Hyp C: Proportion of JW mixing with JE		Sample size	Proportion Haplotypes	SE	Sample size (x16)	Proportion Loci	SE
Jan.-Mar.	Males	0			0		
Apr.		0			0		
May		0			0		
Jun.		0			0		
Jul.		0			0		
Aug.		0			0		
Sep.		0			0		
Oct.-Dec.		5	0.791	0.648	5	0.999	0.000
Jan.-Mar.	Females	0			0		
Apr.		0			0		
May		0			0		
Jun.		0			0		
Jul.		0			0		
Aug.		0			0		
Sep.		0			0		
Oct.-Dec.		4	1.000	0.022	4	0.999	0.000
Jan.-Dec.	M+F	9	1.000	0.039	9	0.999	0.000

Hyp C: Proportion of JW mixing with OW		Sample size	Proportion Haplotypes	SE	Sample size (x16)	Proportion Loci	SE
Jan.-Mar.	Males	0			0		
Apr.		0			0		
May		0			0		
Jun.		0			0		
Jul.		0			0		
Aug.		0			0		
Sep.		0			0		
Oct.-Dec.		5	1.000	0.004	5	0.999	0.000
Jan.-Mar.	Females	0			0		
Apr.		0			0		
May		0			0		
Jun.		0			0		
Jul.		0			0		
Aug.		0			0		
Sep.		0			0		
Oct.-Dec.		4	1.000	0.005	4	0.912	0.092
Jan.-Dec.	M+F	9	1.000	0.001	9	0.994	0.043

SUB-AREA 2C (bycatch data only, 180 samples)

Pure JE defined in sub-area 2C in Jul.-Dec. for Hypothesis C.

Hyp A and B – mixing between J and O assumed in Oct.-Mar. for adults and year-round for juveniles (bycatch data is primarily from juveniles)

Hyp C – mixing matrices assume mixing between JE and OW-stock from Jan.-Jun.

Hyp A & B: Proportion J mixing with O		Sample size	Proportion Haplotypes	SE	Sample size (x16)	Proportion Loci	SE
Jan.-Mar.	Males	22	0.796	0.091	22	0.756	0.043
Apr.		5	0.390	0.224	5	0.279	0.123
May		5	0.447	0.250	5	0.533	0.100
Jun.		1	1.000	0.009	1	0.979	0.174
Jul.		3	1.000	0.005	3	0.999	0.000
Aug.		2	1.000	0.007	2	1.000	0.000
Sep.		0			0		
Oct.-Dec.		27	0.866	0.070	27	0.844	0.037
Jan.-Mar.	Females	46	0.902	0.047	46 with 45 in 1^{st}, 3^{rd}, 4^{th}, 7^{th}, 13^{th}, 14^{th}	0.917	0.028
Apr.		3	1.000	0.005	3	0.989	0.080
May		10	0.707	0.150	10	0.679	0.077
Jun.		5	0.781	0.249	5	0.763	0.093
Jul.		10	1.000	0.001	10	0.999	0.000
Aug.		3	0.664	0.296	3	0.784	0.126
Sep.		0			0		
Oct.-Dec.		38	0.943	0.039	38	0.949	0.020
Jan.-Dec.	M+F	180	0.863	0.027	180 with 179 in 1^{st}, 3^{rd}, 4^{th}, 7^{th}, 13^{th}, 14^{th}	0.853	0.014

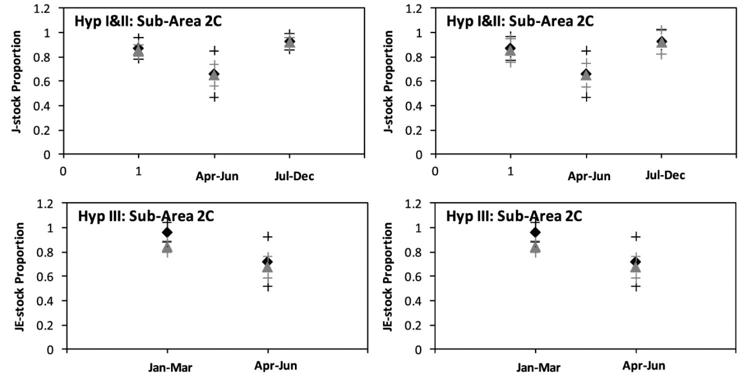
Hyp C: Proportion JE mixing with OW		Sample size	Proportion Haplotypes	SE	Sample size (x16)	Proportion Loci	SE
Jan.-Mar.		22	0.897	0.077	22	0.962	0.011
Apr.		5	0.452	0.29	5	0.935	0.029
May		5	0.744	0.236	5	0.912	0.035
Jun.		1	1.000	0.01	1	0.959	0.046
Jul.		3	***1.000***	0.006	3	***1.000***	0.000
Aug.		2	***1.000***	0.008	2	0.999	0.000
Sep.		0					
Oct.-Dec.		27	***1.000***	0.001	27	0.999	0.000
Jan.-Mar.	Males	46	0.932	0.045	46 with 45 in 1^{st}, 3^{rd}, 4^{th}, 7^{th}, 13^{th}, 14^{th}	0.983	0.005
Apr.		3	1.000	0.006	3	0.987	0.019
May		10	0.648	0.174	10	0.979	0.013
Jun.		5	0.766	0.217	5	0.949	0.025
Jul.	Females	10	***1.000***	0.001	10	***1.000***	0.000
Aug.		3	***1.000***	0.006	3	0.999	0.000
Sep.		0			0		
Oct.-Dec.		38	***1.000***	0.001	38	***1.000***	0.000
Jan.-Dec.	M+F	180	0.938	0.025	180 with 179 in 1^{st}, 3^{rd}, 4^{th}, 7^{th}, 13^{th}, 14^{th}	0.887	0.014

Pooling for input to conditioning:

Hyp A & B: Proportion J mixing with O		Sample size	Proportion Haplotypes	SE	Sample size (x16)	Proportion Loci	SE
Jan.-Mar.	M F	68	0.868	0.043	67,68,67,67,68,68,67,68, 68,68,68,68,67,67,68,68	0.853	0.023
Apr.-Jun.	M F	29	0.660	0.095	29	0.648	0.043
Jul.-Dec.	M F	83	0.923	0.032	83	0.920	0.017

Hyp C: Proportion JE mixing with OW		Sample size	Proportion Haplotypes	SE	Sample size (x16)	Proportion Loci	SE
Jan.-Mar.	M F	68	0.960	0.039	67,68,67,67,68,68,67,68, 68,68,68,68,67,67,68,68	0.840	0.023
Apr.-Jun.	M F	29	0.721	0.103	29	0.672	0.044

Plots of pooled mixing proportions for J/JE-stock with O/OW-stock. RH plots are with a minimum 0.05 SE:



SUB-AREA 7CS (bycatch data, 116 samples; scientific permit data, 321 samples; used separately)

Not used for definition of a pure stock.

Mixing matrices assume mixing between J/JE and O/OW year-round for all hypotheses.

Hyp A and B (BYCATCH): Proportion of J mixed with O		Sample size	Proportion Haplotypes	SE	Sample size (x16)	Proportion Loci	SE
Jan.-Mar.	Males	7	0.914	0.147	7	0.999	0.000
Apr.		9	0.076	0.110	9	0.245	0.078
May		15	0.192	0.108	15	0.236	0.062
Jun.		5	0.156	0.189	5	0.256	0.105
Jul.		2	0.496	0.357	2	0.527	0.150
Aug.		2	1.000	0.007	2	0.999	0.000
Sep.		1	1.000	0.009	1	1.000	0.000
Oct.-Dec.		14	0.793	0.114	14	0.819	0.053
Jan.-Mar.	Females	10	0.493	0.160	10	0.454	0.079
Apr.		10	0.327	0.161	10	0.202	0.078
May		9	0.112	0.106	9	0.050	0.067
Jun.		13	0.399	0.143	13	0.421	0.069
Jul.		4	0.740	0.225	4	0.658	0.106
Aug.		2	0.501	0.354	2	0.518	0.167
Sep.		1	0.000	0.009	1	0.014	0.238
Oct.-Dec.		12	0.916	0.083	12	0.923	0.047
Jan.-Dec.	M+F	116	0.473	0.048	116	0.494	0.022

Hyp C (BYCATCH): Proportion of JE mixed with OW		Sample size	Proportion Haplotypes	SE	Sample size (x16)	Proportion Loci	SE
Jan.-Mar.	Males	7	0.953	0.186	7	0.878	0.062
Apr.		9	0.165	0.151	9	0.305	0.084
May		15	0.175	0.158	15	0.252	0.066
Jun.		5	0.000	0.022	5	0.275	0.103
Jul.		2	0.000	0.023	2	0.481	0.154
Aug.		2	1.000	0.008	2	0.999	0.000
Sep.		1	1.000	0.010	1	0.751	0.168
Oct.-Dec.		14	0.905	0.093	14	0.806	0.059
Jan.-Mar.	Females	10	0.597	0.210	10	0.459	0.078
Apr.		10	0.494	0.217	10	0.244	0.080
May		9	0.001	0.074	9	0.069	0.080
Jun.		13	0.358	0.175	13	0.457	0.070
Jul.		4	0.816	0.333	4	0.685	0.111
Aug.		2	1.000	0.020	2	0.494	0.191
Sep.		1	0.000	0.009	1	0.181	0.255
Oct.-Dec.		12	1.000	0.001	12	0.824	0.055
Jan.-Dec.	M+F	116	0.546	0.062	116	0.498	0.023

Hyp A and B (SP): Proportion of J mixed with O		Sample size	Proportion Haplotypes	SE	Sample size (x16)	Proportion Loci	SE
Jan.-Mar.	Males	0			0		
Apr.		44	0.250	0.072	44	0.289	0.037
May		85	0.184	0.047	85	0.258	0.027
Jun.		40	0.000	0.001	40	0.026	0.034
Jul.		0			0		
Aug.		3	0.297	0.288	3	0.338	0.153
Sep.		1	0.000	0.009	1	0.241	0.268
Oct.-Dec.		0			0		
Jan.-Mar.	Females	0			0		
Apr.		66	0.069	0.035	66	0.098	0.027
May		72	0.205	0.052	72	0.196	0.028
Jun.		9	0.111	0.105	9	0.153	0.064
Jul.		0			0		
Aug.		1	0.000	0.012	1	0.147	0.232
Sep.		0			0		
Oct.-Dec.		0			0		
Jan.-Dec.	M+F	321	0.144	0.022	321	0.185	0.013

Hyp C (SP): Proportion of JE mixed with OW		Sample size	Proportion Haplotypes	SE	Sample size (x16)	Proportion Loci	SE
Jan.-Mar.	Males	0			0		
Apr.		44	0.208	0.083	44	0.299	0.036
May		85	0.198	0.057	85	0.270	0.027
Jun.		40	0.000	0.001	40	0.055	0.033
Jul.		0			0		
Aug.		3	1.000	0.02	3	0.348	0.160
Sep.		1	0.998	0.112	1	0.001	0.000
Oct.-Dec.		0			0		
Jan.-Mar.	Females	0			0		
Apr.		66	0.056	0.039	66	0.141	0.029
May		72	0.220	0.063	72	0.188	0.029
Jun.		9	0.200	0.182	9	0.192	0.072
Jul.		0			0		
Aug.		1	0.000	0.011	1	0.093	0.209
Sep.		0			0		
Oct.-Dec.		0			0		
Jan.-Dec.	M+F	321	0.149	0.027	321	0.201	0.013

Pooling for input to conditioning:

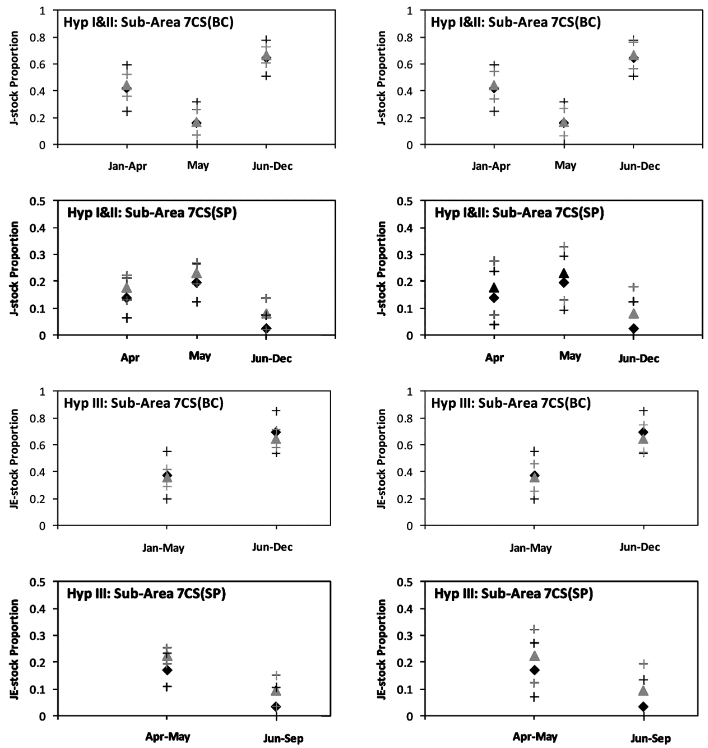
Hyp A and B (BC): Proportion of J mixed with O		Sample size	Proportion Haplotypes	SE	Sample size (x16)	Proportion Loci	SE
Jan.-Apr.	M F	36	0.419	0.086	36	0.441	0.041
May	M F	24	0.160	0.078	24	0.168	0.047
Jun.-Dec.	M F	56	0.645	0.067	56	0.664	0.030

Hyp A and B (SP): Proportion of J mixed with O		Sample size	Proportion Haplotypes	SE	Sample size (x16)	Proportion Loci	SE
Apr.	M F	110	0.138	0.037	110	0.176	0.023
May	M F	157	0.194	0.035	157	0.230	0.019
Jun.-Sep.	M F	54	0.025	0.024	54	0.079	0.029

Hyp C (BC): Proportion of JE mixed with OW		Sample size	Proportion Haplotypes	SE	Sample size (x16)	Proportion Loci	SE
Jan.-May	M F	60	0.375	0.088	60	0.356	0.032
Jun.-Dec.	M F	56	0.696	0.078	56	0.646	0.032

Hyp C (SP): Proportion of JE mixed with OW		Sample size	Proportion Haplotypes	SE	Sample size (x16)	Proportion Loci	SE
Apr.-May	M F	267	0.171	0.031	267	0.223[&]	0.015
Jun.-Sep.	M F	54	0.034	0.036	54	0.093[&]	0.029

Plots of pooled mixing proportions for J/JE-stock mixing with O/OW-stock. RH plots are with a minimum 0.05 SE:



SUB-AREA 7CN (bycatch data, 96 samples; scientific permit data (>2nm), 502 samples; used separately)

Not used for definition of a pure stock

Hyp A and B – mixing between J and O year-round

Hyp C – mixing between JE and OW Apr-Dec.

Comments: Higher proportion of O/OW in SP (offshore) samples compared to BC (coastal) samples. Lower proportion of O/OW in BC&SP (coastal and offshore) during the 2nd half of the year.

Hyp A & B (BYCATCH): Proportion of J mixed with O		Sample size	Proportion Haplotypes	SE	Sample size (x16)	Proportion Loci	SE
Jan.-Mar.	Males	3	1.000	0.005	3	0.993	0.122
Apr.		4	0.481	0.259	4	0.333	0.122
May		4	0.754	0.236	4	0.751	0.124
Jun.		7	0.291	0.202	7	0.502	0.095
Jul.		5	0.601	0.232	5	0.555	0.115
Aug.		3	0.301	0.291	3	0.260	0.127
Sep.		2	1.000	0.023	2	0.633	0.164
Oct.-Dec.		9	1.000	0.001	9	0.977	0.027
Jan.-Mar.	Females	3	1.000	0.005	3	1.000	0.000
Apr.		6	0.296	0.205	6	0.450	0.094
May		12	0.153	0.110	12	0.180	0.067
Jun.		15	0.593	0.130	15	0.612	0.060
Jul.		8	0.393	0.201	8	0.286	0.086
Aug.		2	1.000	0.007	2	1.000	0.000
Sep.		2	0.482	0.373	2	0.632	0.212
Oct.-Dec.		11	1.000	0.003	11	0.824	0.060
Jan.-Dec.	M+F	96	0.591	0.054	96	0.582	0.025

Hyp C (BYCATCH): Proportion of JE mixed with OW		Sample size	Proportion Haplotypes	SE	Sample size (x16)	Proportion Loci	SE
Jan.-Mar.	Males	3	1.000	0.006	3	0.848	0.107
Apr.		4	0.100	0.421	4	0.307	0.129
May		4	0.806	0.363	4	0.734	0.133
Jun.		7	0.165	0.291	7	0.453	0.098
Jul.		5	0.554	0.287	5	0.532	0.112
Aug.		3	0.492	0.550	3	0.242	0.125
Sep.		2	1.000	0.021	2	0.664	0.164
Oct.-Dec.		9	1.000	0.003	9	0.957	0.040
Jan.-Mar.	Females	3	1.000	0.005	3	0.999	0.000
Apr.		6	0.358	0.269	6	0.434	0.107
May		12	0.220	0.139	12	0.138	0.062
Jun.		15	0.778	0.144	15	0.597	0.062
Jul.		8	0.230	0.281	8	0.290	0.089
Aug.		2	1.000	0.008	2	0.867	0.127
Sep.		2	0.330	0.480	2	0.559	0.222
Oct.-Dec.		11	1.000	0.005	11	0.846	0.060
Jan.-Dec.	M+F	96	0.650	0.065	96	0.566	0.026

Hyp A & B (SP): Proportion of J mixed with O		Sample size	Proportion Haplotypes	SE	Sample size (x16)	Proportion Loci	SE
Jan.-Mar.	Males	0			0		
Apr.		0			0		
May		0			0		
Jun.		86	0.060	0.032	86	0.045	0.021
Jul.		23	0.198	0.094	23	0.287	0.051
Aug.		21	0.098	0.087	21	0.190	0.048
Sep.		185	0.114	0.027	185	0.178	0.017
Oct.-Dec.		78	0.168	0.048	78	0.182	0.026
Jan.-Mar.	Females	0			0		
Apr.		0			0		
May		0			0		
Jun.		13	0.100	0.109	13	0.101	0.062
Jul.		4	0.000	0.005	4	0.067	0.085
Aug.		1	0.000	0.010	1	0.612	0.222
Sep.		66	0.111	0.044	66	0.128	0.028
Oct.-Dec.		25	0.076	0.061	24	0.126	0.047
Jan.-Dec.	M+F	502	0.112	0.016	501	0.151	0.010

Hyp C (SP): Proportion of JE mixed with OW		Sample size	Proportion Haplotypes	SE	Sample size (x16)	Proportion Loci	SE
Jan.-Mar.	Males	0			0		
Apr.		0			0		
May		0			0		
Jun.		86	0.000	0.001	86	0.000	0.000
Jul.		23	0.196	0.113	23	0.268	0.052
Aug.		21	0.075	0.071	21	0.189	0.051
Sep.		185	0.101	0.031	185	0.195	0.018
Oct.-Dec.		78	0.188	0.06	78	0.194	0.027
Jan.-Mar.	Females	0			0		
Apr.		0			0		
May		0			0		
Jun.		13	0.000	0.004	13	0.074	0.063
Jul.		4	0.000	0.005	4	0.005	0.125
Aug.		1	0.000	0.009	1	0.473	0.217
Sep.		66	0.096	0.05	66	0.172	0.028
Oct.-Dec.		25	0.104	0.087	24	0.116	0.048
Jan.-Dec.	M+F	502	0.092	0.018	501	0.152	0.010

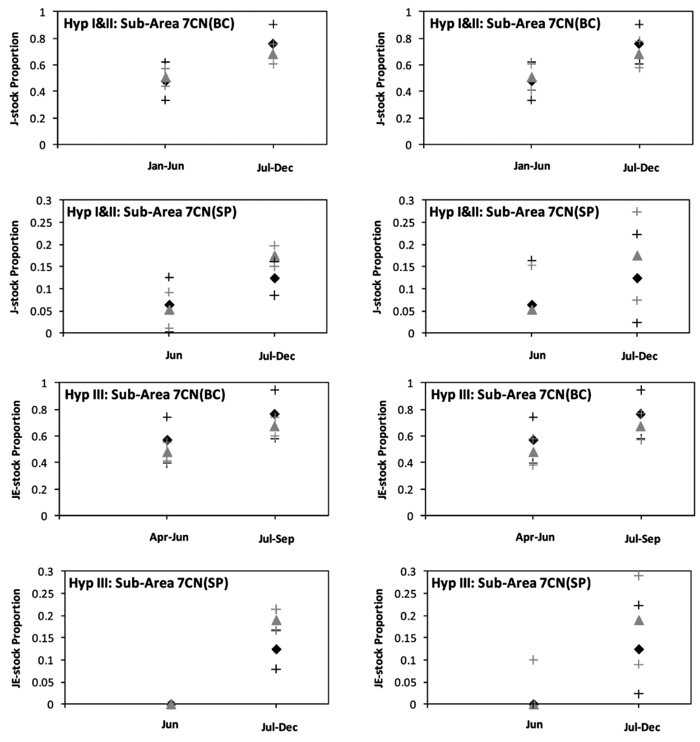
Pooling for input to conditioning:

Hyp A & B (BYCATCH): Proportion of J mixed with O		Sample size	Proportion Haplotypes	SE	Sample size (x16)	Proportion Loci	SE
Jan.-Jun.	M F	54	0.477	0.071	54	0.507	0.033
Jul.-Dec.	M F	42	0.758	0.074	42	0.680	0.036

Hyp C (BYCATCH): Proportion of JE mixed with OW		Sample size	Proportion Haplotypes	SE	Sample size (x16)	Proportion Loci	SE
Jan.-Mar.[1]	M F	6	1.000	0.004	6	0.905	0.070
Apr.-Jun.	M F	48	0.486&	0.095	48	0.426	0.037
Jan.-Jun.	M F	54	0.569	0.087	54	0.480	0.035
Jul.-Dec.	M F	42	0.764	0.091	42	0.670	0.036

Hyp C (SP): Proportion of JE mixed with OW		Sample size	Proportion Haplotypes	SE	Sample size (x16)	Proportion Loci	SE
Jun.	M F	99	0.000	0.000	99	0.000	0.000
Jul.-Dec.	M F	403	0.119	0.022	403	0.190&	0.012

Plots of pooled mixing proportions for J/JE-stock mixing with O/OW-stock. RH plots are with a minimum 0.05 SE:



[1]This proportion corresponded to the original assumption of no OW-stock in 7CN in Jan-Mar. Trial C31 tests sensitivity to alternative mixing proportions corresponding to this assumption.

SUB-AREA 7CN >8.8nm (scientific permit data, 435 samples)
Pure OW defined in sub-area 7CN (>8.8NM) in June for Hypothesis C.
(This 'sub-' sub-area is not used in the trials.)

Hyp C (SP): Proportion of JE mixed with OW		Sample size	Proportion Haplotypes	SE	Sample size (x16)	Proportion Loci	SE
Jan.-Mar.	Males	0			0		
Apr.		0			0		
May		0			0		
Jun.		86	***0.000***	0.001	86	***0.000***	0.000
Jul.		20	0.150	0.119	20	0.207	0.055
Aug.		20	0.069	0.067	20	0.109	0.054
Sep.		160	0.056	0.027	159	0.138	0.018
Oct.-Dec.		69	0.102	0.053	69	0.161	0.028
Jan.-Mar.	Females	0			0		
Apr.		0			0		
May		0			0		
Jun.		13	***0.000***	0.004	13	***0.074***	0.063
Jul.		2	0.000	0.007	2	0.000	0.000
Aug.		1	0.000	0.009	1	0.473	0.217
Sep.		47	0.091	0.058	47	0.189	0.032
Oct.-Dec.		17	0.030	0.115	16	0.108	0.055
Jan.-Dec.	M+F	435	0.054	0.016	433	0.118	0.011
Jun.	M+F	99	***0.000***	0.000	99	***0.000***	0.000

SUB-AREA 7WR (scientific permit data, 70 samples)
Pure O defined in sub-area 7WR in all months for Hypothesis A and B (for original, but not alternative O definition).
Mixing of OW and OE in sub-area 7WR in Apr.-Sep. for Hypothesis C, otherwise only OW-stock.

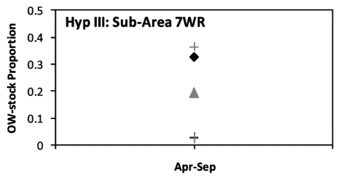
Hyp A & B: Proportion of J mixed with O		Sample size	Proportion Haplotypes	SE	Sample size (x16)	Proportion Loci	SE
Jan.-Mar.	Males	0			0		
Apr.		0			0		
May		39	***0.000***	0.001	39	0.001	0.000
Jun.		20	***0.000***	0.001	20	0.001	0.000
Jul.		2	***0.000***	0.007	2	0.001	0.000
Aug.		1	***0.000***	0.012	1	0.001	0.000
Sep.		0			0		
Oct.-Dec.		0			0		
Jan.-Mar.	Females	0			0		
Apr.		0			0		
May		7	***0.120***	0.162	7	***0.000***	0.000
Jun.		0			0		
Jul.		1	***0.000***	0.010	1	0.139	0.172
Aug.		0			0		
Sep.		0			0		
Oct.-Dec.		0			0		
Jan.-Dec.	M+F	70	***0.000***	0.001	70	***0.000***	0.000

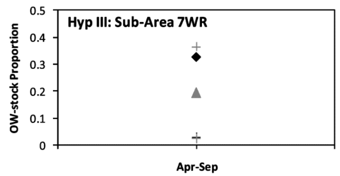
Hyp C: Proportion of OW mixed with OE		Sample size	Proportion Haplotypes	SE	Sample size (x16)	Proportion Loci	SE
Jan.-Mar.	Males	0			0		
Apr.		0			0		
May		39	0.166	0.161	39	0.206	0.108
Jun.		20	0.618	0.300	20	0.056	0.166
Jul.		2	1.000	0.010	2	0.000	0.000
Aug.		1	1.000	0.058	1	0.937	1.139
Sep.		0			0		
Oct.-Dec.		0			0		
Jan.-Mar.	Females	0			0		
Apr.		0			0		
May		7	0.970	0.571	7	0.526	0.300
Jun.		0			0		
Jul.		1	0.000	0.048	1	0.981	0.754
Aug.		0			0		
Sep.		0			0		
Oct.-Dec.		0			0		
Jan.-Dec.	M+F	70	0.327	0.149	70	0.195	0.085

Pooling for input to conditioning:

Hyp C: Proportion of OW mixed with OE		Sample size	Proportion Haplotypes	SE	Sample size (x16)	Proportion Loci	SE
May-Aug.	M F	70	0.327[&]	0.149	70	0.195	0.085

Plots of pooled mixing proportions for OW-stock mixing with OE-stock. RH plots are with a minimum 0.05 SE:





SUB-AREA 7E (scientific permit data, 48 samples)
Pure O defined in sub-area 7E in all months for Hypotheses A and B.
Mixing matrices assume no mixing in this sub-area - only O/OE in sub-area 7E in all months for all Hypotheses.

Hyp A & B: Proportion of J mixed with O		Sample size	Proportion Haplotypes	SE	Sample size (x16)	Proportion Loci	SE
Jan.-Mar.	Males	0					
Apr.		0					
May		32	***0.081***	0.062	32 with 31 in 5th	0.001	0.000
Jun.		9	***0.000***	0.001	9	***0.000***	0.000
Jul.		2	***0.000***	0.007	2	0.001	0.000
Aug.		0			0		
Sep.		0			0		
Oct.-Dec.		0			0		
Jan.-Mar.	Females	0			0		
Apr.		0			0		
May		4	***0.000***	0.005	4	***0.085***	0.117
Jun.		1	***0.000***	0.009	1	***0.000***	0.000
Jul.		0			0		
Aug.		0			0		
Sep.		0			0		
Oct.-Dec.		0			0		
Jan.-Dec.	M+F	48	***0.037***	0.042	48 with 47 in 5th	***0.001***	0.000

Hyp C: Proportion of OW mixed with OE		Sample size	Proportion Haplotypes	SE	Sample size (x16)	Proportion Loci	SE
Jan.-Mar.	Males	0			0		
Apr.		0			0		
May		32	0.224	0.165	32	0.058	0.114
Jun.		9	0.149	0.293	9	0.300	0.206
Jul.		2	0.000	0.007	2	1.000	0.000
Aug.		0			0		
Sep.		0			0		
Oct.-Dec.		0			0		
Jan.-Mar.	Females	0			0		
Apr.		0			0		
May		4	0.000	0.041	4	0.180	0.280
Jun.		1	0.000	0.013	1	0.001	0.000
Jul.		0			0		
Aug.		0			0		
Sep.		0			0		
Oct.-Dec.		0			0		
Jan.-Dec.	M+F	48	0.149	0.131	48 with 47 in 5th	0.163	0.087

SUB-AREA 8 (scientific permit data, 48 samples)
Pure O/OE defined in sub-area 8 in all months for Hypotheses I, B and C.

Hyp A & B: Proportion of J mixed with O		Sample size	Proportion Haplotypes	SE	Sample size (x16)	Proportion Loci	SE
Jan.-Mar.	Males	0			0		
Apr.		0			0		
May		30	***0.000***	0.001	31	0.001	0.000
Jun.		88	***0.000***	0.000	88	***0.000***	0.000
Jul.		74	***0.000***	0.001	74	***0.033***	0.023
Aug.		12	***0.000***	0.001	12	***0.008***	0.041
Sep.		1	***0.000***	0.009	1	0.001	0.000
Oct.-Dec.		0			0		
Jan.-Mar.	Females	0			0		
Apr.		0			0		
May		7	***0.000***	0.002	7	***0.045***	0.067
Jun.		6	***0.000***	0.004	6	***0.063***	0.106
Jul.		5	***0.000***	0.004	5	0.001	0.000
Aug.		0			0		
Sep.		0			0		
Oct.-Dec.		0			0		
Jan.-Dec.	M+F	223	***0.000***	0.000	224	***0.010***	0.012

Hyp C: Proportion of OW mixed with OE		Sample size	Proportion Haplotypes	SE	Sample size (x16)	Proportion Loci	SE
Jan.-Mar.	Males	0			0		
Apr.		0			0		
May		30	***0.000***	0.004	31	***0.201***	0.142
Jun.		88	***0.000***	0.002	88	***0.000***	0.000
Jul.		74	***0.000***	0.004	74	***0.004***	0.082
Aug.		12	***0.000***	0.017	12	***0.000***	0.000
Sep.		1	0.990	0.713	1	0.284	0.751
Oct.-Dec.		0			0		
Jan.-Mar.	Females	0			0		
Apr.		0			0		
May		7	***0.392***	0.858	7	**0.134**	0.312
Jun.		6	***0.282***	0.404	6	**0.008**	0.177
Jul.		5	***0.130***	1.391	5	0.001	0.000
Aug.		0			0		
Sep.		0			0		
Oct.-Dec.		0			0		
Jan.-Dec.	M+F	223	***0.000***	0.002	224	**0.001**	0.000

SUB-AREA 9 (scientific permit data, 467 samples)
Pure OE defined in sub-area 9 in all months (Apr-Sep) for Hypothesis C.
Mixing matrices allow for only O/OE in sub-area 9 in Apr-Sep for all Hypotheses.
Mixing matrices allow for mixing with C-stock in sensitivity tests to Hypotheses A and C.

Hyp A & B: Proportion of J mixed with O		Sample size	Proportion Haplotypes	SE	Sample size (x16)	Proportion Loci	SE
Jan.-Mar.	Males	0			0		
Apr.		0			0		
May		28	0.000	0.001	28	0.026	0.031
Jun.		75	0.000	0.000	75	0.034	0.020
Jul.		142	0.000	0.000	142	0.041	0.019
Aug.		168	0.005	0.009	167	0.020	0.015
Sep.		10	0.000	0.003	10 with 9 in 3rd , 5th 9th -16th	0.001	0.000
Oct.-Dec.		0			0		
Jan.-Mar.	Females	0			0		
Apr.		0			0		
May		9	0.063	0.112	9	0.018	0.054
Jun.		8	0.000	0.001	8	0.187	0.097
Jul.		12	0.000	0.001	12	0.026	0.047
Aug.		15	0.000	0.001	15	0.103	0.057
Sep.		0			0		
Oct.-Dec.		0			0		
Jan.-Dec.	M+F	467	0.000	0.000	466 with 465 in 1st, 3-5th, 9th -14th, 16th and 464 in 14th	0.032	0.009

Hyp C: Proportion of OW mixed with OE		Sample size	Proportion Haplotypes	SE	Sample size (x16)	Proportion Loci	SE
Jan.-Mar.	Males	0			0		
Apr.		0			0		
May		28	***0.000***	0.004	28	0.001	0.000
Jun.		75	***0.000***	0.004	75	***0.045***	0.076
Jul.		142	***0.045***	0.076	142	***0.056***	0.060
Aug.		168	***0.065***	0.089	167	***0.046***	0.058
Sep.		10	***0.000***	0.007	10 with 9 in 3rd , 5th 9th -16th	***0.106***	0.220
Oct.-Dec.		0			0		
Jan.-Mar.	Females	0			0		
Apr.		0			0		
May		9	***0.078***	0.280	9	***0.000***	0.000
Jun.		8	***0.020***	0.650	8	***0.000***	0.000
Jul.		12	***0.000***	0.028	12	***0.023***	0.158
Aug.		15	***0.000***	0.003	15	***0.282***	0.178
Sep.		0			0		
Oct.-Dec.		0			0		
Jan.-Dec.	M+F	467	***0.001***	0.020	466 with 465 in 1st , 3-5th, 9th -14th, 16th and 464 in 14th	***0.035***	0.033

SUB-AREA 11 (bycatch data, 15 samples, Japanese commercial whaling data, 173 samples, scientific permit data, 80 samples)

No pure stocks defined in sub-area 11.
Mixing matrices allow for mixing between J and O stocks from Apr.-Sep. in Hypotheses A and B.
Mixing matrices allow for mixing between JW, OW and OE stocks from Apr.-Sep. in Hypothesis C.

Hyp A & B: Proportion of J mixed with O		Sample size	Proportion Haplotypes	SE	Sample size	Proportion Loci	SE
Jan.-Mar.	Males	0			0		
Apr.		2	1.000	0.007	0		
May		14	0.070	0.069	0		
Jun.		9	0.000	0.001	0		
Jul.		30	0.171	0.072	28	0.228	0.045
Aug.		22	0.359	0.111	19	0.461	0.058
Sep.		5	0.168	0.186	1	0.796	0.205
Oct.-Dec.		6	1.000	0.005	6	0.999	0.000
Jan.-Mar.	Females	0			0		
Apr.		55	0.645	0.069	0		
May		51	0.013	0.036	0		
Jun.		25	0.258	0.093	1	0.906	0.240
Jul.		24	0.401	0.105	22	0.458	0.050
Aug.		16	0.010	0.065	11	0.206	0.067
Sep.		2	0.000	0.007	0		
Oct.-Dec.		7	1.000	0.002	7	0.960	0.036
Jan.-Dec.	M+F	268	0.304	0.030	95	0.448	0.025

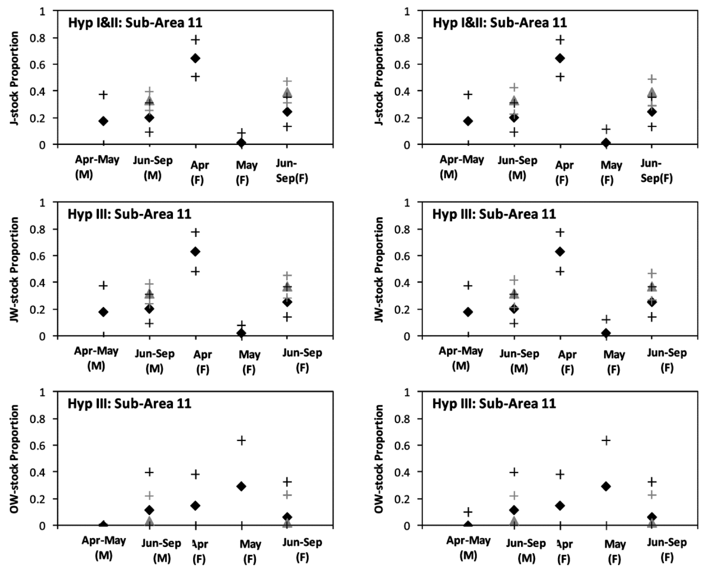
Hyp C: Proportion of JW and OW mixed with OE		Sample size	Prop JW (Haplotypes)	SE	Prop OW	SE	Sample size	Prop JW (Loci)	SE	Prop OW	SE
Jan.-Mar.	Males	0					0				
Apr.		2	1.000	0.005	0.000	0.001	0				
May		14	0.070	0.069	0.000	0.001	0				
Jun.		9	0.000	0.000	0.000	0.013	0				
Jul.		30	0.176	0.073	0.000	0.003	28	0.215	0.045	0.026	0.119
Aug.		22	0.346	0.114	0.186	0.196	19	0.457	0.060	0.049	0.171
Sep.		5	0.195	0.180	0.364	0.778	1	0.801	0.213	0.000	0.002
Oct.-Dec.		6	1.000	0.002	0.000	0.001	6	1.000	0.001	0.000	0.000
Jan.-Mar.	Females	0					0				
Apr.		55	0.628	0.073	0.147	0.117	0				
May		51	0.023	0.028	0.290	0.173	0				
Jun.		25	0.270	0.092	0.062	0.227	1	0.824	0.235	0.000	0.004
Jul.		24	0.409	0.104	0.000	0.002	22	0.444	0.052	0.000	0.002
Aug.		16	0.000	0.006	0.330	0.269	11	0.175	0.065	0.157	0.209
Sep.		2	0.000	0.001	1.000	0.020	0				
Oct.-Dec.		7	1.000	0.001	0.000	0.001	7	0.959	0.037	0.000	0.001
Jan.-Dec.	M+F	268	0.299	0.031	0.145	0.068	95	0.435	0.026	0.000	0.001

Pooling for input to conditioning:

Hyp A & B: Proportion of J mixed with O		Sample size	Proportion Haplotypes	SE	Sample size	Proportion Loci	SE
Apr.-May	M	16	0.175	0.099	0		
Jun.-Sep.	M	66	0.201	0.054	48	0.327	0.036
Apr.	F	55	0.645	0.069	0		
May	F	51	0.013	0.036	0		
Jun.-Sep.	F	67	0.245	0.056	34	0.390	0.041

Hyp C: Proportion of JW and OW mixed with OE		Sample size	Prop JW (Haplotypes)	SE	Prop OW	SE	Sample size	Prop JW (Loci)	SE	Prop OW	SE
Apr.-May	M	16	0.180	0.099	0.000	0.003	0				
Jun.-Sep.	M	66	0.204	0.054	0.114	0.142	48	0.316&	0.037	0.032&	0.095
Apr.	F	55	0.628	0.073	0.147&	0.117	0				
May	F	51	0.023	0.028	0.290&	0.173	0				
Jun.-Sep.	F	67	0.254	0.056	0.062&	0.132	34	0.367&	0.041	0.018&	0.106

Plots of pooled mixing proportions for JW-stock (1st) and OW-stock (2nd) mixing with OE-stock.
RH plots are with a minimum 0.05 SE:



ADDITIONAL MIXING PROPORTIONS REQUIRED FOR SENSITIVITY TESTS TO HYPOTHESIS C, ASSUMING EITHER A SINGLE J-STOCK OR A SINGLE O-STOCK

SUB-AREA 2C (bycatch data only, 180 samples)

Pure JE defined in sub-area 2C in Jul.-Dec. for Hypothesis C.
Hyp C – mixing matrices assume mixing between JE and OW-stock from Jan.-Jun.
Hyp C (single J-stock) – mixing matrices assume mixing between J and OW-stock from Jan.-Jun., only J-stock present from Jul.-Dec.
Hyp C (single O-stock) – mixing matrices assume mixing between JE and O-stock from Jan.-Jun., only JE-stock present from Jul.-Dec.

Hyp C (single J-stock): Proportion J mixing with OW		Sample size	Proportion Haplotypes	SE	Sample size (x16)	Proportion Loci	SE
Jan.-Mar.		22	0.809	0.097	22	0.768	0.044
Apr.		5	0.432	0.235	5	0.299	0.124
May		5	0.469	0.287	5	0.564	0.100
Jun.		1	1.000	0.009	1	0.999	0.000
Jul.		3	***1.000***	0.005	3	1.000	0.000
Aug.		2	***1.000***	0.007	2	1.000	0.000
Sep.		0			0		
Oct.-Dec.		27	***0.852***	0.074	27	***0.851***	0.038
Jan.-Mar.	Males	46	0.905	0.050	46 with 45 in 1st, 3rd, 4th,7th ,13th,14th	0.929	0.026
Apr.		3	1.000	0.006	3	0.999	0.000
May		10	0.707	0.151	10	0.685	0.078
Jun.		5	0.618	0.281	5	0.756	0.094
Jul.	Females	10	***1.000***	0.001	10	0.999	0.000
Aug.		3	***0.633***	0.313	3	***0.791***	0.124
Sep.		0			0		
Oct.-Dec.		38	***0.939***	0.042	38	***0.949***	0.020
Jan.-Dec.	M+F	180	0.864	0.029	180 with 179 in 1st, 3rd, 4th,7th , 13th,14th	0.865	0.014

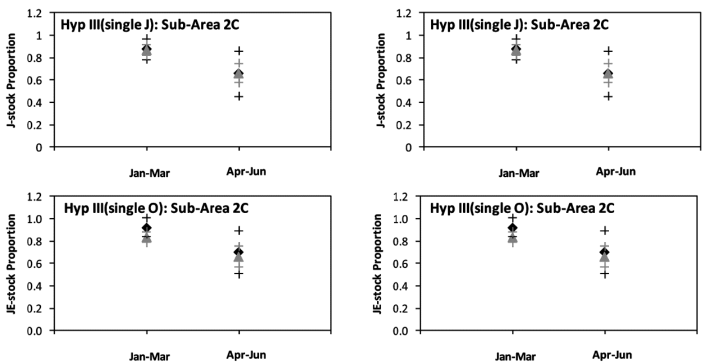
Hyp C (single O-stock): Proportion JE mixing with O		Sample size	Proportion Haplotypes	SE	Sample size (x16)	Proportion Loci	SE
Jan.-Mar.		22	0.824	0.096	22	0.751	0.046
Apr.		5	0.425	0.239	5	0.352	0.125
May		5	0.461	0.258	5	0.510	0.107
Jun.		1	1.000	0.009	1	0.821	0.164
Jul.		3	***1.000***	0.005	3	0.999	0.000
Aug.		2	***1.000***	0.007	2	1.000	0.000
Sep.		0					
Oct.-Dec.		27	***1.000***	0.001	27	***0.997***	0.038
Jan.-Mar.	Males	46	0.966	0.038	46 with 45 in 1st, 3rd, 4th,7th,13th,14th	0.874	0.026
Apr.		3	1.000	0.005	3	0.923	0.076
May		10	0.701	0.15	10	0.732	0.081
Jun.		5	1.000	0.008	5	0.739	0.094
Jul.	Females	10	***1.000***	0.001	10	0.999	0.000
Aug.		3	***0.850***	0.38	3	**0.897**	0.136
Sep.		0			0		
Oct.-Dec.		38	***1.000***	0.001	38	0.999	0.000
Jan.-Dec.	M+F	180	0.922	0.025	180 with 179 in 1st, 3rd, 4th,7th, 13th,14th	0.885	0.014

Pooling for input to conditioning:

Hyp C (single J-stock): Proportion J mixing with OW		Sample size	Proportion Haplotypes	SE	Sample size (x16)	Proportion Loci	SE
Jan.-Mar.	M F	68	0.875	0.046	67,68,67,67,68,68,67,68, 68,68,68,68,67,67,68,68	0.868	0.023
Apr.-Jun.	M F	29	0.656	0.102	29	0.661	0.044

Hyp C (single O-stock): Proportion JE mixing with O		Sample size	Proportion Haplotypes	SE	Sample size (x16)	Proportion Loci	SE
Jan.-Mar.	M F	68	0.920	0.042	67,68,67,67,68,68,67,68, 68,68,68,68,67,67,68,68	0.834	0.0 24
Apr.-Jun.	M F	29	0.699	0.097	29	0.662	0.0 45

Plots of pooled mixing proportions for J/JE-stock with O/OW-stock. RH plots are with a minimum 0.05 SE:



SUB-AREA 7CS (bycatch data, 116 samples; scientific permit data, 321 samples; used separately)
Not used for definition of a pure stock.
Mixing matrices assume mixing between J/JE and O/OW year-round for all hypotheses.

Hyp C (single J-stock) (BYCATCH): Proportion of J mixed with OW		Sample size	Proportion Haplotypes	SE	Sample size (x16)	Proportion Loci	SE
Jan.-Mar.	Males	7	0.863	0.154	7	1.000	0.000
Apr.		9	0.119	0.112	9	0.288	0.080
May		15	0.173	0.113	15	0.248	0.063
Jun.		5	0.065	0.209	5	0.293	0.107
Jul.		2	0.485	0.365	2	0.512	0.155
Aug.		2	1.000	0.074	2	0.999	0.000
Sep.		1	1.000	0.010	1	1.000	0.000
Oct.-Dec.		14	0.914	0.125	14	0.810	0.055
Jan.-Mar.	Females	10	0.466	0.180	10	0.457	0.079
Apr.		10	0.307	0.166	10	0.233	0.078
May		9	0.000	0.008	9	0.058	0.073
Jun.		13	0.379	0.152	13	0.431	0.070
Jul.		4	0.695	0.262	4	0.661	0.106
Aug.		2	0.585	0.535	2	0.483	0.175
Sep.		1	0.000	0.009	1	0.112	0.217
Oct.-Dec.		12	1.000	0.003	12	0.904	0.050
Jan.-Dec.	M+F	116	0.461	0.053	116	0.499	0.023

Hyp C (single O-stock) (BYCATCH): Proportion of JE mixed with O		Sample size	Proportion Haplotypes	SE	Sample size (x16)	Proportion Loci	SE
Jan.-Mar.	Males	7	1.000	0.005	7	0.880	0.061
Apr.		9	0.094	0.117	9	0.265	0.081
May		15	0.152	0.113	15	0.227	0.064
Jun.		5	0.128	0.208	5	0.255	0.106
Jul.		2	0.338	0.469	2	0.487	0.152
Aug.		2	1.000	0.007	2	0.999	0.000
Sep.		1	1.000	0.009	1	0.733	0.174
Oct.-Dec.		14	0.777	0.116	14	0.815	0.058
Jan.-Mar.	Females	10	0.553	0.178	10	0.441	0.079
Apr.		10	0.420	0.182	10	0.195	0.081
May		9	0.127	0.120	9	0.050	0.074
Jun.		13	0.403	0.159	13	0.439	0.071
Jul.		4	0.834	0.259	4	0.666	0.111
Aug.		2	0.504	0.356	2	0.536	0.182
Sep.		1	0.000	0.009	1	0.008	0.259
Oct.-Dec.		12	0.923	0.084	12	0.851	0.051
Jan.-Dec.	M+F	116	0.500	0.052	116	0.489	0.023

Hyp C (single J-stock) (SP): Proportion of J mixed with OW		Sample size	Proportion Haplotypes	SE	Sample size (x16)	Proportion Loci	SE
Jan.-Mar.	Males	0			0		
Apr.		44	0.214	0.072	44	0.288	0.037
May		85	0.146	0.044	85	0.284	0.027
Jun.		40	0.000	0.001	40	0.045	0.035
Jul.		0			0		
Aug.		3	0.335	0.411	3	0.348	0.153
Sep.		1	0.000	0.024	1	0.000	0.000
Oct.-Dec.		0			0		
Jan.-Mar.	Females	0			0		
Apr.		66	0.057	0.033	66	0.136	0.028
May		72	0.181	0.053	72	0.185	0.028
Jun.		9	0.121	0.116	9	0.165	0.066
Jul.		0			0		
Aug.		1	0.000	0.013	1	0.229	0.232
Sep.		0			0		
Oct.-Dec.		0			0		
Jan.-Dec.	M+F	321	0.120	0.021	321	0.199	0.013

Hyp C (single O-stock) (SP): Proportion of JE mixed with O		Sample size	Proportion Haplotypes	SE	Sample size (x16)	Proportion Loci	SE
Jan.-Mar.	Males	0			0		
Apr.		44	0.279	0.083	44	0.293	0.037
May		85	0.236	0.056	85	0.247	0.027
Jun.		40	0.000	0.001	40	0.018	0.032
Jul.		0			0		
Aug.		3	0.269	0.305	3	0.332	0.161
Sep.		1	0.000	0.009	1	0.001	0.000
Oct.-Dec.		0			0		
Jan.-Mar.	Females	0			0		
Apr.		66	0.065	0.038	66	0.098	0.028
May		72	0.224	0.056	72	0.189	0.028
Jun.		9	0.117	0.112	9	0.163	0.069
Jul.		0			0		
Aug.		1	0.000	0.011	1	0.066	0.211
Sep.		0			0		
Oct.-Dec.		0			0		
Jan.-Dec.	M+F	321	0.164	0.025	321	0.181	0.013

Pooling for input to conditioning:

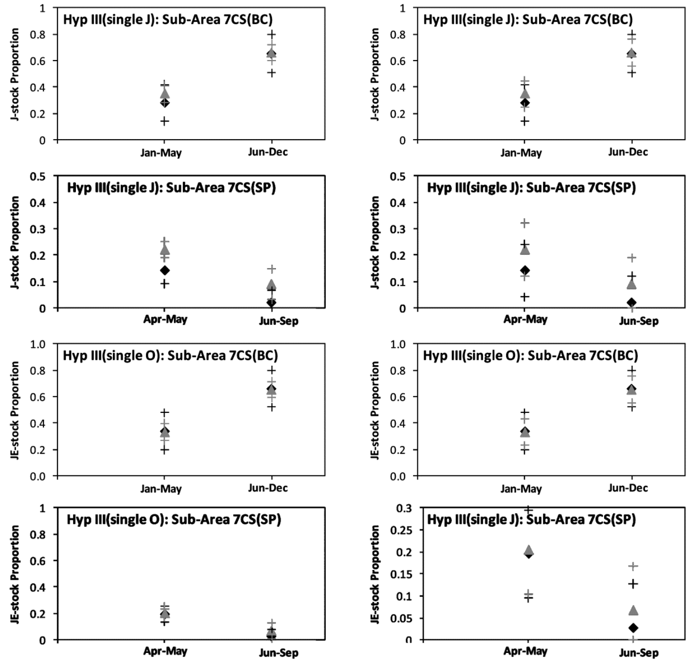
Hyp C (single J-stock) (BC): Proportion of J mixed with OW		Sample size	Proportion Haplotypes	SE	Sample size (x16)	Proportion Loci	SE
Jan.-May	M F	60	0.280	0.069	60	0.348	0.032
Jun.-Dec.	M F	56	0.652	0.073	56	0.661	0.031

Hyp C (single O-stock) (BC): Proportion of JE mixed with O		Sample size	Proportion Haplotypes	SE	Sample size (x16)	Proportion Loci	SE
Jan.-May	M F	60	0.338	0.070	60	0.331	0.032
Jun.-Dec.	M F	56	0.660	0.070	56	0.654	0.031

Hyp C (single J-stock) (SP): Proportion of J mixed with OW		Sample size	Proportion Haplotypes	SE	Sample size (x16)	Proportion Loci	SE
Apr.-May	M F	267	0.142	0.025	267	0.221	0.015
Jun.-Sep.	M F	54	0.021	0.023	54	0.090	0.029

Hyp C (single O-stock) (SP): Proportion of JE mixed with O		Sample size	Proportion Haplotypes	SE	Sample size (x16)	Proportion Loci	SE
Apr.-May	M F	267	0.195	0.029	267	0.204	0.015
Jun.-Sep.	M F	54	0.027	0.027	54	0.067	0.029

Plots of pooled mixing proportions for J/JE-stock mixing with O/OW-stock. RH plots are with a minimum 0.05 SE:



SUB-AREA 7CN (bycatch data, 96 samples; scientific permit data (>2nm), 502 samples; used separately)
Not used for definition of a pure stock.
Hyp C – mixing between JE and OW Apr.-Dec.
Hyp C (single J-stock) – mixing between J and OW Apr.-Dec
Hyp C (single O-stock) – mixing between JE and O Apr.-Dec.

Hyp C (single J-stock) (BYCATCH): Proportion of J mixed with OW		Sample size	Proportion Haplotypes	SE	Sample size (x16)	Proportion Loci	SE
Jan.-Mar.	Males	3	1.000	0.005	3	1.000	0.000
Apr.		4	0.439	0.340	4	0.336	0.124
May		4	0.709	0.269	4	0.730	0.134
Jun.		7	0.180	0.208	7	0.488	0.099
Jul.		5	0.551	0.263	5	0.565	0.113
Aug.		3	0.224	0.321	3	0.239	0.121
Sep.		2	0.586	0.534	2	0.637	0.180
Oct.-Dec.		9	1.000	0.001	9	0.978	0.027
Jan.-Mar.	Females	3	1.000	0.005	3	1.000	0.000
Apr.		6	0.283	0.216	6	0.397	0.099
May		12	0.175	0.114	12	0.161	0.064
Jun.		15	0.634	0.136	15	0.627	0.061
Jul.		8	0.260	0.216	8	0.304	0.088
Aug.		2	1.000	0.008	2	0.999	0.000
Sep.		2	0.417	0.414	2	0.681	0.201
Oct.-Dec.		11	1.000	0.004	11	0.849	0.060
Jan.-Dec.	M+F	96	0.570	0.058	96	0.583	0.025

Hyp C (single O-stock) (BYCATCH): Proportion of JE mixed with O		Sample size	Proportion Haplotypes	SE	Sample size (x16)	Proportion Loci	SE
Jan.-Mar.	Males	3	1.000	0.005	3	0.841	0.110
Apr.		4	0.499	0.279	4	0.305	0.129
May		4	0.958	0.310	4	0.759	0.126
Jun.		7	0.402	0.243	7	0.481	0.094
Jul.		5	0.608	0.244	5	0.520	0.116
Aug.		3	0.421	0.427	3	0.258	0.135
Sep.		2	1.000	0.007	2	0.633	0.156
Oct.-Dec.		9	1.000	0.001	9	0.956	0.037
Jan.-Mar.	Females	3	1.000	0.005	3	0.999	0.000
Apr.		6	0.315	0.224	6	0.496	0.103
May		12	0.166	0.116	12	0.162	0.067
Jun.		15	0.657	0.141	15	0.593	0.061
Jul.		8	0.475	0.220	8	0.278	0.086
Aug.		2	1.000	0.007	2	0.838	0.129
Sep.		2	0.449	0.391	2	0.458	0.219
Oct.-Dec.		11	1.000	0.004	11	0.821	0.062
Jan.-Dec.	M+F	96	0.646	0.057	96	0.568	0.025

Hyp C (single J-stock) (SP): Proportion of J mixed with OW		Sample size	Proportion Haplotypes	SE	Sample size (x16)	Proportion Loci	SE
Jan.-Mar.	Males	0			0		
Apr.		0			0		
May		0			0		
Jun.		86	0.000	0.001	86	0.000	0.000
Jul.		23	0.134	0.085	23	0.295	0.052
Aug.		21	0.072	0.067	21	0.181	0.049
Sep.		185	0.093	0.026	185	0.191	0.017
Oct.-Dec.		78	0.140	0.045	78	0.188	0.027
Jan.-Mar.	Females	0			0		
Apr.		0			0		
May		0			0		
Jun.		13	0.000	0.007	13	0.091	0.063
Jul.		4	0.000	0.005	4	0.006	0.110
Aug.		1	0.000	0.01	1	0.649	0.207
Sep.		66	0.075	0.041	66	0.156	0.027
Oct.-Dec.		25	0.059	0.055	24	0.122	0.049
Jan.-Dec.	M+F	502	0.080	0.015	501	0.150	0.010

Hyp C (single O-stock) (SP): Proportion of JE mixed with O		Sample size	Proportion Haplotypes	SE	Sample size (x16)	Proportion Loci	SE
Jan.-Mar.	Males	0			0		
Apr.		0			0		
May		0			0		
Jun.		86	0.079	0.041	86	0.044	0.022
Jul.		23	0.274	0.113	23	0.258	0.051
Aug.		21	0.127	0.106	21	0.195	0.050
Sep.		185	0.109	0.029	185	0.177	0.018
Oct.-Dec.		78	0.232	0.059	78	0.180	0.027
Jan.-Mar.	Females	0			0		
Apr.		0			0		
May		0			0		
Jun.		13	0.095	0.14	13	0.082	0.062
Jul.		4	0.000	0.005	4	0.066	0.093
Aug.		1	0.000	0.009	1	0.448	0.228
Sep.		66	0.122	0.049	66	0.134	0.029
Oct.-Dec.		25	0.108	0.076	24	0.113	0.044
Jan.-Dec.	M+F	502	0.131	0.019	501	0.148	0.010

Pooling for input to conditioning:

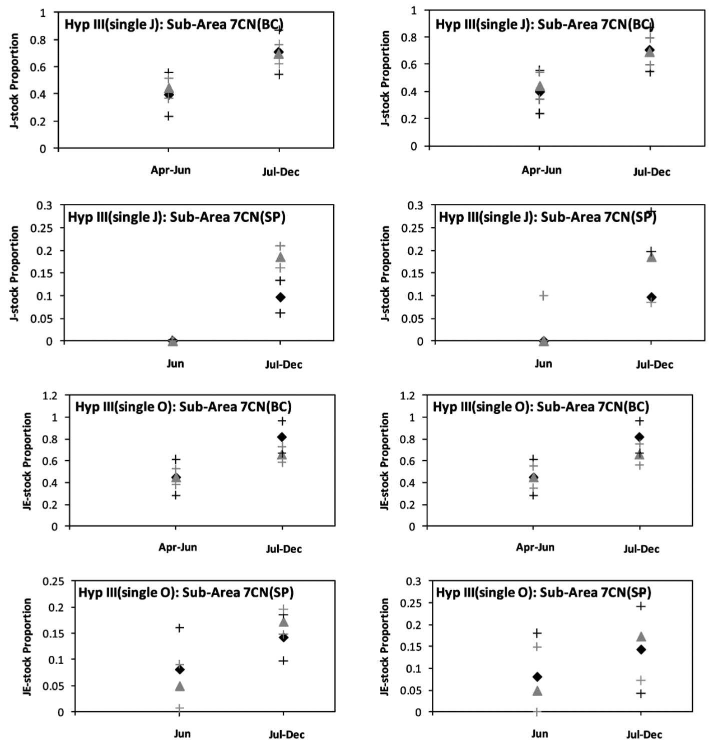
Hyp C (single J-stock) (BYCATCH): Proportion of J mixed with OW		Sample size	Proportion Haplotypes	SE	Sample size (x16)	Proportion Loci	SE
Apr.-Jun.	M F	48	0.396	0.080	48	0.441	0.037
Jul.-Dec.	M F	42	0.707	0.082	42	0.693	0.036

Hyp C (single O-stock) (BYCATCH): Proportion of JE mixed with O		Sample size	Proportion Haplotypes	SE	Sample size (x16)	Proportion Loci	SE
Apr.-Jun.	M F	48	0.447	0.082	48	0.450	0.036
Jul.-Dec.	M F	42	0.817	0.073	42	0.658	0.037

Hyp C (single J-stock) (SP): Proportion of J mixed with OW		Sample size	Proportion Haplotypes	SE	Sample size (x16)	Proportion Loci	SE
Jun.	M F	99	0.000	0.001	99	0.000	0.000
Jul.-Dec.	M F	403	0.097	0.018	402	0.185	0.012

Hyp C (single O-stock) (SP): Proportion of JE mixed with O		Sample size	Proportion Haplotypes	SE	Sample size (x16)	Proportion Loci	SE
Jun.	M F	99	0.080	0.040	99	0.049	0.021
Jul.-Dec.	M F	403	0.142	0.022	402	0.172	0.012

Plots of pooled mixing proportions for J/JE-stock mixing with O/OW-stock. RH plots are with a minimum 0.05 SE:



SUB-AREA 11 (bycatch data, 15 samples, Japanese commercial whaling data, 173 samples, scientific permit data, 80 samples)
No pure stocks defined in sub-area 11.
Mixing matrices allow for mixing between J and O stocks from Apr.-Sep. in Hypotheses A and B.
Hyp C: Mixing matrices allow for mixing between JW, OW and OE stocks from Apr.-Sep.
Hyp C (single J-stock): Mixing matrices allow for mixing between J, OW and OE stocks from Apr.-Sep.
Hyp C (single O-stock): Mixing matrices allow for mixing between JW and O-stocks from Apr.-Sep.

Hyp C (single J-stock): Proportion of J and OW mixed with OE		Sample size	Prop JW	SE Haplotypes	Prop OW	SE	Sample size	Prop JW	SE Loci	Prop OW	SE
Jan.-Mar.	Males	0					0				
Apr.		2	1.000	0.005	0.000	0.001	0				
May		14	0.070	0.069	0.000	0.001	0				
Jun.		9	0.000	0.000	0.000	0.013	0				
Jul.		30	0.176	0.073	0.000	0.003	28	0.215	0.045	0.026	0.119
Aug.		22	0.346	0.114	0.186	0.196	19	0.457	0.060	0.049	0.171
Sep.		5	0.195	0.180	0.364	0.778	1	0.801	0.213	0.000	0.002
Oct.-Dec.		6	1.000	0.002	0.000	0.001	6	1.000	0.001	0.000	0.000
Jan.-Mar.	Females	0					0				
Apr.		55	0.628	0.073	0.147	0.117	0				
May		51	0.023	0.028	0.290	0.173	0				
Jun.		25	0.270	0.092	0.062	0.227	1	0.824	0.235	0.000	0.004
Jul.		24	0.409	0.104	0.000	0.002	22	0.444	0.052	0.000	0.002
Aug.		16	0.000	0.006	0.330	0.269	11	0.175	0.065	0.157	0.209
Sep.		2	0.000	0.001	1.000	0.020	0				
Oct.-Dec.		7	1.000	0.001	0.000	0.001	7	0.959	0.037	0.000	0.001
Jan.-Dec.	M+F	268	0.299	0.031	0.145	0.068	95	0.435	0.026	0.000	0.001

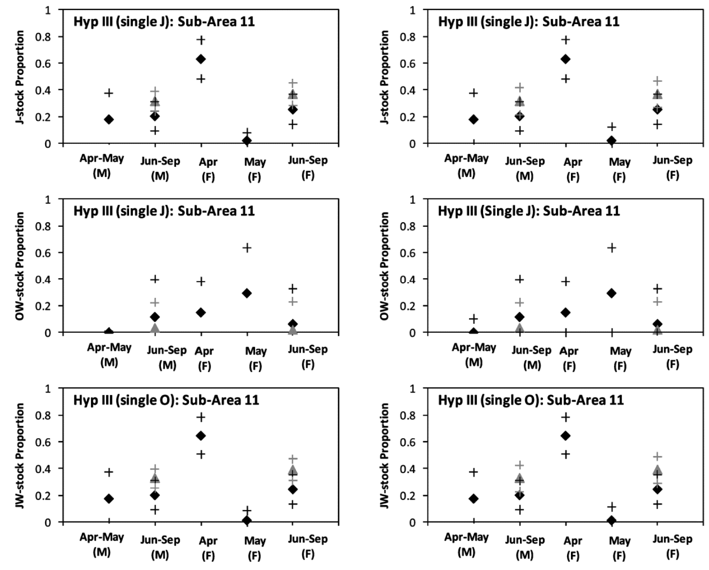
Hyp C (single O-stock): Proportion of JW mixed with O		Sample size	Proportion Haplotypes	SE	Sample size (x16)	Proportion Loci	SE
Jan.-Mar.	Males	0			0		
Apr.		2	1.000	0.007	0		
May		14	0.070	0.069	0		
Jun.		9	0.000	0.001	0		
Jul.		30	0.171	0.072	28	0.228	0.045
Aug.		22	0.359	0.111	19	0.461	0.058
Sep.		5	0.168	0.186	1	0.796	0.205
Oct.-Dec.		6	1.000	0.005	6	0.999	0.000
Jan.-Mar.	Females	0			0		
Apr.		55	0.645	0.069	0		
May		51	0.013	0.036	0		
Jun.		25	0.258	0.093	1	0.906	0.240
Jul.		24	0.401	0.105	22	0.458	0.050
Aug.		16	0.010	0.065	11	0.206	0.067
Sep.		2	0.000	0.007	0		
Oct.-Dec.		7	1.000	0.002	7	0.960	0.036
Jan.-Dec.	M+F	268	0.304	0.030	95	0.448	0.025

Pooling for input to conditioning:

Hyp C (single J-stock): Proportion of J and OW mixed with OE		Sample size	Prop J	SE Haplotypes	Prop OW	SE	Sample size	Prop J	SE Loci	Prop OW	SE
Apr.-May	M	16	0.180	0.099	0.000	0.003	0				
Jun.-Sep.	M	66	0.204	0.054	0.114	0.142	48	0.316	0.037	0.032	0.095
Apr.	F	55	0.628	0.073	0.147	0.117	0				
May	F	51	0.023	0.028	0.290	0.173	0				
Jun.-Sep.	F	67	0.254	0.056	0.062	0.132	34	0.367	0.041	0.018	0.106

Hyp C (single O-stock): Proportion of JW mixed with O		Sample size	Proportion Haplotypes	SE	Sample size (x16)	Proportion Loci	SE
Apr.-May	M	16	0.175	0.099	0		
Jun.-Sep.	M	66	0.201	0.054	48	0.327	0.036
Apr.	F	55	0.645	0.069	0		
May	F	51	0.013	0.036	0		
Jun.-Sep.	F	67	0.245	0.056	34	0.39	0.041

Plots of pooled mixing proportions for JW-stock (1st) and OW-stock (2nd) mixing with OE-stock.
RH plots are with a minimum 0.05 SE:



ADDITIONAL MIXING PROPORTIONS REQUIRED FOR SENSITIVITY TESTS TO HYPOTHESIS C, ASSUMING EITHER NO OW-STOCK OR NO OE-STOCK IN SUB-AREA 11

SUB-AREA 11 (bycatch data, 15 samples, Japanese commercial whaling data, 173 samples, scientific permit data, 80 samples)
No pure stocks defined in sub-area 11.
Mixing matrices allow for mixing between J and O stocks from Apr.-Sep. in Hypotheses A and B.
Hyp C: Mixing matrices allow for mixing between JW, OW and OE stocks from Apr.-Sep.
Hyp C (No 'OW' in 11 or 12SW): Mixing matrices allow for mixing between JW and OE stocks from Apr.-Sep.
Hyp C (No 'OE' in 11 or 12SW): Mixing matrices allow for mixing between JW and OW stocks from Apr.-Sep.

Hyp C (no OW-stock): Proportion of JW mixed with OE		Sample size	Proportion Haplotypes	SE	Sample size (x16)	Proportion Loci	SE
Jan.-Mar.	Males	0			0		
Apr.		2	1.000	0.007	0		
May		14	0.070	0.069	0		
Jun.		9	0.000	0.001	0		
Jul.		30	0.176	0.073	28	0.216	0.045
Aug.		22	0.374	0.110	19	0.459	0.059
Sep.		5	0.191	0.181	1	0.801	0.213
Oct.-Dec.		6	1.000	0.005	6	0.999	0.000
Jan.-Mar.	Females	0			0		
Apr.		55	0.654	0.068	0		
May		51	0.032	0.033	0		
Jun.		25	0.271	0.091	1	0.824	0.235
Jul.		24	0.409	0.104	22	0.444	0.052
Aug.		16	0.033	0.062	11	0.179	0.065
Sep.		2	0.000	0.007	0		
Oct.-Dec.		7	1.000	0.002	7	0.959	0.037
Jan.-Dec.	M+F	268	0.312	0.030	95	0.435	0.026

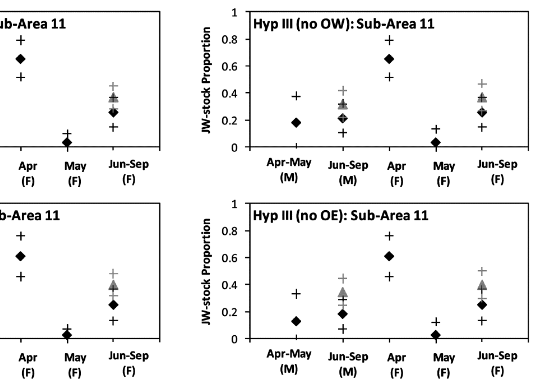
Hyp C (no OE-stock): Proportion of JW mixed with OW		Sample size	Proportion Haplotypes	SE	Sample size (x16)	Proportion Loci	SE
Jan.-Mar.	Males	0			0		
Apr.		2	1.000	0.007	0		
May		14	0.067	0.072	0		
Jun.		9	0.000	0.001	0		
Jul.		30	0.167	0.075	28	0.251	0.045
Aug.		22	0.307	0.115	19	0.474	0.058
Sep.		5	0.200	0.179	1	0.824	0.220
Oct.-Dec.		6	1.000	0.005	6	0.999	0.000
Jan.-Mar.	Females	0			0		
Apr.		55	0.610	0.075	0		
May		51	0.024	0.024	0		
Jun.		25	0.268	0.095	1	0.839	0.257
Jul.		24	0.419	0.115	22	0.480	0.051
Aug.		16	0.000	0.003	11	0.203	0.067
Sep.		2	0.000	0.007	0		
Oct.-Dec.		7	1.000	0.002	7	0.965	0.033
Jan.-Dec.	M+F	268	0.272	0.031	95	0.464	0.025

Pooling for input to conditioning:

Hyp C (no OW-stock): Proportion of JW mixed with OE		Sample size	Proportion Haplotypes	SE	Sample size (x16)	Proportion Loci	SE
Apr.-May	M	16	0.126	0.103	0		
Jun.-Sep.	M	66	0.181	0.054	48	0.346	0.036
Apr.	F	55	0.610	0.075	0		
May	F	51	0.024	0.024	0		
Jun.-Sep.	F	67	0.249	0.058	34	0.399	0.041

Hyp C (no OE-stock): Proportion of JW mixed with OW		Sample size	Proportion Haplotypes	SE	Sample size (x16)	Proportion Loci	SE
Apr.-May	M	16	0.180	0.099	0		
Jun.-Sep.	M	66	0.212	0.054	48	0.317	0.037
Apr.	F	55	0.654	0.068	0		
May	F	51	0.032	0.033	0		
Jun.-Sep.	F	67	0.256	0.055	34	0.368	0.041

Plots of pooled mixing proportions for JW-stock (1st) mixing with OW/OE-stock. RH plots are with a minimum 0.05 SE:



REFERENCES

De Moor, C.L. 2011. Calculation of stock mixing proportions, including correction for 'missing alleles': unpooled results. Paper SC/D11/NPM4 presented to the First Intersessional Workshop for the *Implementation Review* of western North Pacific common minke whales, 12-16 December 2011, Tokyo, Japan (unpublished). [Paper available from the Office of this Journal].

International Whaling Commission. 2013. Report of the Second 'First Intersessional Workshop' for the *Implementation Review* of Western North Pacific Common Minke Whales. *J. Cetacean Res. Manage. (Suppl.)* 14:357-70.

Appendix 3

SUMMARY OF ABUNDANCE ESTIMATES OF THE NORTH PACIFIC COMMON MINKE WHALES IN RMP/*IST*

Tomio Miyashita and Takahashi Hakamada

To correspond to the request from the Second Intersessional Workshop for the North Pacific common minke whale RMP/*IST* review in March 2013, we presented the figures showing primary effort, primary position, survey block, sub-area and area definition for abundance estimation. We also present the table including area size, research distance and number of primary sightings, effective search and references.

Table 1

Summary of abundance estimates of the western North Pacific common minke whales in RMP/*IST*s.

Sub-area	Year	Aerial coverage (%)	Timing	Area size (n.miles^2)	effort (n.mile)	*n*	Encounter rate (/100 n.miles)	ESW (n.miles)	Mean school size	*P*	CV(P)	Fig.	Reference
6E	2002	79.1	May-Jun.	71,914	2,605	21	0.806	0.361	1.11	891	0.608	10	Miyashita *et al.* (2009)
	2003	79.1	May-Jun.	71,914	2,483	19	0.846	0.361	1.11	935	0.357	11	Miyashita *et al.* (2009)
	2004	79.1	May-Jun.	71,914	1,064	7	0.658	0.361	1.11	727	0.372	12	Miyashita *et al.* (2009)
7CS	2004	36.7	May	9,853	129	7	5.435	0.606	1.14	504	0.291	3	Agreed at 2013 Workshop, IWC (2014)
	2006	100.0	Jun.- Jul.	26,826	264	23	8.718	0.431	1.36	3,690	1.199	5	Hakamada and Kitakado (2010rev)
	2012	100.0	May-Jun.	26,826	851	16	1.880	0.349	1.23	890	0.393	7	Hakamada *et al.* (2013rev)
7CN	2003	75.4	May	18,281	247	3	1.214	0.604	1.00	184	0.805	2	Hakamada and Kitakado (2010rev)
	2012	66.7	May-Jun.	16,171	649	17	2.619	0.863	1.23	302	0.454	7	Hakamada *et al.* (2013rev)
	2012	66.7	Sep.	16,171	550	19	3.453	0.863	1.23	398	0.507	7	Hakamada *et al.* (2013rev)
7WR	2003	26.7	May-Jun.	21,939	668	7	1.048	0.431	1.00	267	0.700	2	Agreed at 2013 Workshop, IWC (2014)
	2004	88.8	May-Jun.	72,991	789	7	0.887	0.484	1.29	863	0.648	3	Hakamada and Kitakado (2010rev)
	2007	88.8	Jun.-Jul.	72,991	465	3	0.645	0.431	1.00	546	0.953	6	Hakamada and Kitakado (2010rev)
7E	2004	57.1	May-Jun.	48,208	390	3	0.770	0.422	1.00	440	0.779	3	Hakamada and Kitakado (2010rev)
	2006	57.1	May-Jun.	48,208	461	2	0.433	0.422	1.00	247	0.892	5	Hakamada and Kitakado (2010rev)
	2007	57.1	Jun.-Jul.	48,208	-	0	0.000	-	-	0	-	6	Hakamada and Kitakado (2010rev)
8	1990	62.2	Aug.-Sep.	-	-	-	-	-	-	1,057	0.706	8,9	IWC (1997, p.203; p.211)
	2002	65.0	Jun.-Jul.	162,689	1,184	0	0.000	-	-	0	-	1	Hakamada and Kitakado (2010rev)
	2004	40.5	Jun.	101,373	917	8	0.872	0.461	1.14	1,093	0.576	3	Hakamada and Kitakado (2010rev)
	2005	65.0	May-Jul.	162,789	1,434	1	0.070	0.431	1.00	132	1.047	4	Hakamada and Kitakado (2010rev)
	2006	65.0	May-Jul.	162,789	1,039	3	0.289	0.761	1.00	309	0.677	5	Hakamada and Kitakado (2010rev)
	2007	65.0	Jun.-Jul.	162,789	914	2	0.219	0.456	1.00	391	1.013	6	Hakamada and Kitakado (2010rev)
9	1990	35.1	Aug.-Sep.	-	-	-	-	-	-	8,264	0.396	8,9	IWC (2004)
	2003	33.2	Jul.-Sep.	190,676	2,533	40	1.579	0.609	1.03	2,546	0.276	2	Hakamada and Kitakado (2010rev)
9N	2005	67.8	Aug.-Sep.	188,452	605	1	0.165	0.371	1.00	420	0.969	15	Miyashita and Okamura (2011)
10W	2006	59.9	May-Jun.	69,009	1,542	36	2.335	0.361	1.11	2,476	0.312	16	Miyashita and Okamura (2011)
10E	2002	100.0	May-Jun.	27,823	629	12	1.908	0.361	1.11	816	0.658	10	Miyashita *et al.* (2009)
	2003	100.0	May-Jun.	27,823	422	4	0.948	0.361	1.11	405	0.566	11	Miyashita *et al.* (2009)
	2004	100.0	May-Jun.	27,823	631	7	1.109	0.361	1.11	474	0.537	12	Miyashita *et al.* (2009)
	2005	64.6	May-Jun.	27,823	513	8	1.559	0.361	1.11	599	0.441	13	Agreed at 2013 Workshop, IWC (2014)
11	1990	100.0	Aug.-Sep.	-	-	-	-	-	-	2,120	0.449	8,9	Agreed in 2003, extract from Buckland *et al.* (1992)
	1999	100.0	Aug.-Sep.	-	-	-	-	-	-	1,456	0.565	20	IWC (2004)
	2003	33.9	Aug.-Sep.	15,243	265	10	3.774	0.361	1.11	882	0.820	14	Miyashita and Okamura (2011)
	2007	20.2	Aug.-Sep.	9,064	535	19	3.551	0.473	1.11	377	0.389	17	Miyashita and Okamura (2011)
12SW	1990	100.0	Aug.-Sep.	-	-	-	-	-	-	5,244	0.806	8,9	Agreed in 2003, extract from Buckland *et al.* (1992)
	2003	100.0	Aug.-Sep.	84,015	493	13	2.637	0.361	1.11	3,401	0.409	14	Miyashita and Okamura (2011)
12NE	1990	100.0	Aug.-Sep.	-	-	-	-	-	-	10,397	0.364	8,9	Agreed in 2003, extract from Buckland *et al.* (1992)
	1992	89.4	Aug.-Sep.	-	-	-	-	-	-	11,544	0.380	21	IWC (2004); Miyashita and Shimada (1994)
	1999	63.8	Aug.-Sep.	-	-	-	-	-	-	5,088	0.377		Agreed at 2013 Workshop, IWC (2014)
	2003	46.0	Aug.-Sep.	151,111	694	39	5.620	0.361	1.11	13,067	0.287	14	Miyashita and Okamura (2011)