Summary Information on sighting surveys undertaken by Japan during JARPN/JARPNII that are intended for consideration for use in the *Implementation Simulation Trials* for the RMP and the RMP itself

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This paper summarises the information on Japanese dedicated sightings surveys for consideration in providing abundance estimates for the forthcoming *Implementation* for western North Pacific common minke whales. The relevant surveys are those conducted as part of JARPN (1994-95) and JARPN II (2002-07). All surveys were carried out using standard line-transect methodology. The JARPN II surveys were carried out in accord with the Scientific Committee's requirements and guidelines for surveys (they had not been developed in time for the 1994-95 surveys). All of the data are available in electronic format and have been validated by Japanese scientists.

The focus of this document is on:

(1) the survey periods;
(2) information on tracklines proposed and actually surveyed;
(3) the survey area to which estimate is applicable; and
(4) the order of the surveys for sub-areas.

JARPN (1994-95)

Cruise design: In 1994, the survey course adopted the billiard method by means of the fixed angle of reflection using the line-transect methodology, which was similar to those in the feasibility studies of JARPA in 1987/88 season (Kato *et al.*, 1989). In 1995, the survey was carried out three periods. In each period a different method to establish survey course, was employed. In the first period (13-30 Jun.), the trackline was established as in 1994 survey. In the second and the third periods (1 Jul. - 6 Aug. and 7 Aug. - 22 Aug., respectively), sub-areas established within the research area, in which zigzag research course was established on an arbitrary basis, reflecting the sighting of the minke whales and sea weather condition in the first period. (Fujise, 2000).
Definition of 'acceptable' sightings conditions: Sighting effort was occurred unless visibility was less than 2 n.miles and/or the wind force was greater than Beaufort 5 (Miyashita and Fujise, 1997).
Survey mode conducted: The sighting and sampling vessels (SSVs) conducted the surveys in closing mode in both 1994 and 1995.
Distance between the tracklines: Sub-tracks were established at a distance of 6 n.miles on the both sides in 1994. Two SSVs were allocated on the two sub-tracks and rotated for each research day. Distance between two sub-tracks was changed from 12 n.miles to 6 n.miles on 26 July 1994.(Fujise *et al.*, 1995). In 1995, the survey course consisted of three tracks. The main track was established as mentioned in the above procedure and two parallel sub-tracks were established 6 n.miles aprt from on both sides of the main track. (Fujise *et al*, 1996)

Survey period for each year was shown in Table 1. Table 2 shows the number of primary sightings, searching effort realised, effective seach half-width (ESW), mean school size (MSS) for each area to which estimate is applicable (Miyashita and Fujise, 1997). Plot of track line actually surveyed and area to which estimate is applicable were shown in Fig 1 for JARPN 1994 and in Fig. 2 for JARPN 1995. Planned cruise track by research base vessel (*Nisshin-maru*; *NM*) in 1994 and 1995 JARPN were shown in Fig. 3 and 4, respectively (Fujise *et al.*, 1995; 1996). Tracklines of SSVs were allocated parallel to that of *NM*.

JARPN II (2002-07)

The sighting data collected by the dedicated sighting survey vessel (SV) from only offshore component is intended for use in the *IST*s.
Cruise design: Design of track lines and allocation of vessels were made in the same manner as in previous JARPN. The zigzag-shaped track line was established on an arbitrary basis in each sub-area

and month. These lines were established independently from those for sampling surveys (*NM* unit). (Kiwada *et al.*, 2009)

Definition of 'acceptable' sightings conditions: To ensure an accuracy of sighting survey, the survey was operated under optimal research conditions when the wind speed was below 17 knots and visibility was over 2.0 n.miles (Kiwada *et al*, 2009).

Survey mode: The sighting survey by the SV was conducted under the closing and the passing mode (Kiwada *et al*, 2009).

Survey period for each year were shown in Table 3. Table 4 shows the number of primary sightings, searching effort realised, ESW and MSS for each area to which estimate is applicable (Hakamada *et al.*, 2009). Data were pooled to estimate ESW and MSS in 2002 and 2003 and those in 2004, 2005 and 2007 because the number of the detection is too small to estimate them in good precision. Plot of planned and surveyed tracklines were shown in Fig.5. This figure suggested that most of the planned tracklines were actually surveyed. Fig. 5 also shows order of the survey using arrows and remarks. The order were different among the years surveyed. This could provide information of distribution and density of the minke whales in surveyed area for each month.

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Table 1. Survey period, vessels and surveyed sub-area during JARPN (1994-95).

year	sub-areas	vessles	period
1994	9	T18,T25	5 Jul. - 7 Sep.
1995	9	K01,T18,T25	3 Jul. - 22 Aug.

T18: *Toshi-maru* No 18, T25: *Toshi-maru* No. 25 K01: *Kyo-maru* No. 1.

Table 2. Numbers of the primary sightings of the common minke whales (n), realized survey distance (effort), effective search half width (ESW) and mean school size by area to which estimate is applicable. Numbers in the parentheses are standard error of the estimate (Miyashita and Fujise, 1997).

year	period	Date	Area size (n.miles^2)	effort (n.miles)	n	ESW (n.miles)	Encounter rate (/100n.mles)	Mean school size
1994	First	5 Jul. - 6 Aug.	244,172	1,608	12	0.321 (0.091)	0.746 (0.228)	1.08 (0.08)
1994	Second	7 Aug. - 7 Sep.	189,012	2,118	7	0.321 (0.091)	0.330 (0.185)	1.00 (-)
1995	First	13 Jun. - 30 Jun.	314,082	2,907	12	0.481 (0.095)	0.406 (0.076)	1.00 (-)
1995	Second	1 Jul. - 6 Aug.	75,635	791	10	0.481 (0.095)	1.263 (0.436)	1.00 (-)
1995	Third	7 Aug. - 22 Aug.	163,610	1,706	4	0.481 (0.095)	0.234 (0.142)	1.00 (-)

Table 3. Survey period, vessels and surveyed sub-area during JARPN II offshore component by a dedicated sighting vessel.

year	sub-areas	vessles	period
2002	7,8,9	KS2	5 Jun. - 8 Sep.
2003	7,8,9	KS2	14 May - 5 Sep.
2004	7,8,9	KS2	14 May - 5 Sep.
2005	7,8,9	KS2	15 May - 24 Aug.
2006	7,8,9	KS2	16 May - 29 Aug.
2007	7,8,9	KS2	13 May - 30 Jul.

KS2: *Kyosin-maru* No. 2.

Table 4. Numbers of the primary sightings of the common minke whales (n), realized survey distance (effort), effective search half width (ESW) and mean school size by area to which estimate is applicable for sighting survey during JARPN II surveys. Numbers in the parentheses are standard error of the estimate (Hakamada *et al*., 2009).

year	sub-area	Date	Area size ($n.miles^2$)	effort (n.miles)	n	ESW (n.miles)	Encounter rate (/100n.miles)	Mean school size
2002	7	11 Aug. - 20 Aug.	66,059	244	0	0.439 (0.064)	0.000 (-)	1.07 (0.03)
2002	8N	25 Jul. - 30 Jul.	62,628	749	0	0.439 (0.064)	0.000 (-)	1.07 (0.03)
2002	8S	8 Jun -18 Jun	100,060	676	0	0.439 (0.064)	0.000 (-)	1.07 (0.03)
2002	9N	3 Jul. -25 Jul.	172,697	1,028	2	0.439 (0.064)	0.194 (0.193)	1.07 (0.03)
2002	9S	18 Jun. -2 Jul.	185,834	838	1	0.439 (0.064)	0.119(0.221)	1.07 (0.03)
2003	7N	21 May - 25 May	25,459	349	3	0.439 (0.064)	0.860 (0.880)	1.07 (0.03)
2003	7SW	14 May - 21 May	28,847	604	7	0.439 (0.064)	1.082 (1.019)	1.07 (0.03)
2003	7SE	28 May - 11 Jun.	46,957	1,180	15	0.439 (0.064)	1.186 (0.576)	1.07 (0.03)
2003	8	2 Jul. - 6 Jul.	32,857	272	1	0.439 (0.064)	0.368 (0.304)	1.07 (0.03)
2003	9	15 Jul. - 5 Sep.	190,676	2,530	40	0.439 (0.064)	1.535 (0.370)	1.07 (0.03)
2004	7SW	14 May - 29 May	50,471	638	12	0.678 (0.115)	1.843 (0.667)	1.06 (0.04)
2004	7SE	30 May - 8 Jun.	80,576	744	5	0.678 (0.115)	0.672 (0.274)	1.06 (0.04)
2004	8N	10 Jun. - 30 Jun.	101,373	917	8	0.678 (0.115)	0.763 (0.354)	1.06 (0.04)
2004	9N	3 Aug. - 23 Aug.	136,504	577	4	0.678 (0.115)	0.693 (0.420)	1.06 (0.04)
2004	9S	30 Jun. - 31 Jul.	108,255	977	0	0.678 (0.115)	0.000 (-)	1.06 (0.04)
2005	8N	12 Jul. - 16 Jul.	43,413	358	0	0.678 (0.115)	0.000 (-)	1.06 (0.04)
2005	8S	17 May -25 May, 27 Jun. - 5 Jul	119,251	1,076	2	0.678 (0.115)	0.186 (0.099)	1.06 (0.04)
2005	9N	16 Jul. - 22 Aug.	140,647	1,534	12	0.678 (0.115)	0.469 (0.318)	1.06 (0.04)
2005	9S	26 May - 27 Jun.	221,466	2,007	0	0.678 (0.115)	0.000 (-)	1.06 (0.04)
2006	7	17 May -19 May, 24 Jun. - 6 Jul	148,219	834	25	0.582 (0.184)	2.056 (1.687)	1.19 (0.06)
2006	8N	11 Jul. - 17 Jul.	43,413	273	1	0.582 (0.184)	0.259 (0.166)	1.19 (0.06)
2006	8S	19 May - 25 May, 18 Jun. - 24 Jun.	119,251	626	2	0.582 (0.184)	0.374 (0.224)	1.19 (0.06)
2006	9N	17 Jul. - 26 Aug.	277,711	1,306	8	0.582 (0.184)	0.519 (0.190)	1.19 (0.06)
2006	9S	27 May - 18 Jun.	221,466	761	9	0.582 (0.184)	0.459 (0.235)	1.19 (0.06)
2007	7	22 Jun. - 27 Jun., 25 Jul. -30 Jul.	148,219	1,136	3	0.678 (0.115)	0.360 (0.203)	1.06 (0.04)
2007	8N	10 Jun. - 15 Jun.	43,413	267	2	0.678 (0.115)	0.734 (0.628)	1.06 (0.04)
2007	8S	27 Jun. - 2 Jul., 20 Jul. - 24 Jul.	119,251	772	0	0.678 (0.115)	0.000 (-)	1.06 (0.04)
2007	9N	16 May - 10 Jul.	277,711	1,741	0	0.678 (0.115)	0.000 (-)	1.06 (0.04)
2007	9S	10 Jul. - 20 Jul.	221,466	1,497	1	0.678 (0.115)	0.131 (0.132)	1.06 (0.04)

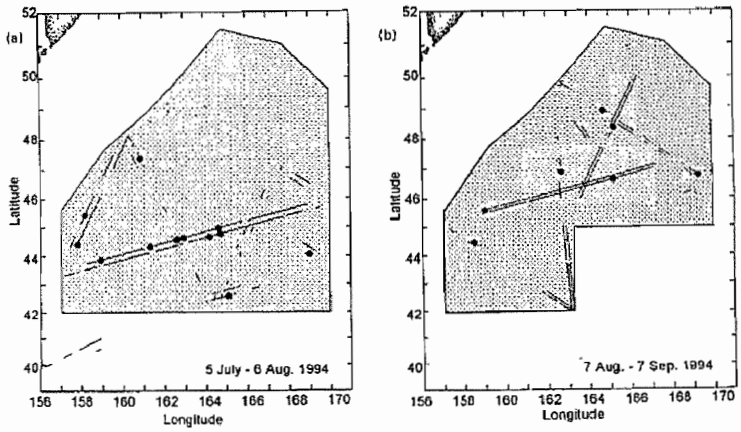


Fig. 1. Searching effort during JARPN 1994. Solid line indicates trackline actually surveyed by T18 and T25. Closed circle indicates primary sightings of the common minke whales. Dotted area indicates the area for abundance estimate in Miyashita and Fujise (1997).

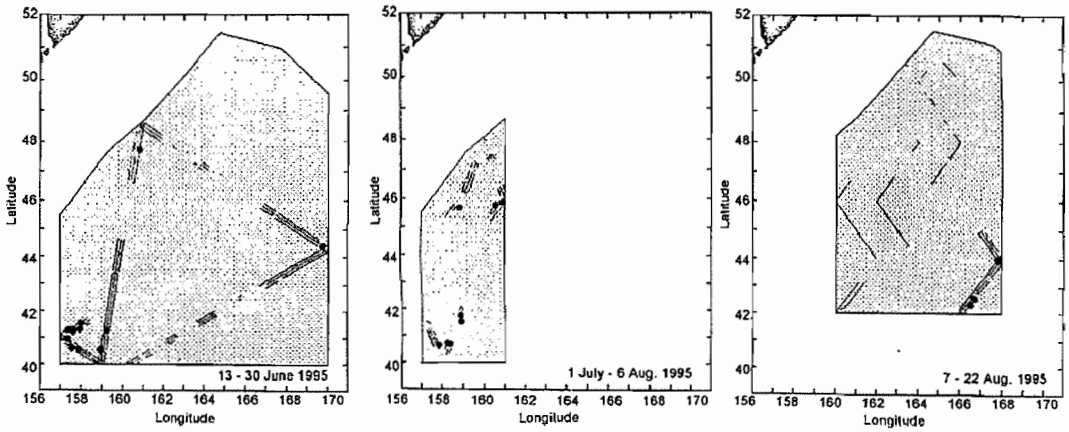


Fig.2 Search effort during the JARPN in 1995. Solid line indicates trackline actually surveyed by *Toshi-maru* No.18, *Toshi-maru* No. 25 and *Kyo-maru* No. 1. Dotted area indicates the area for abundance estimate in Miyashita and Fujise (1997)

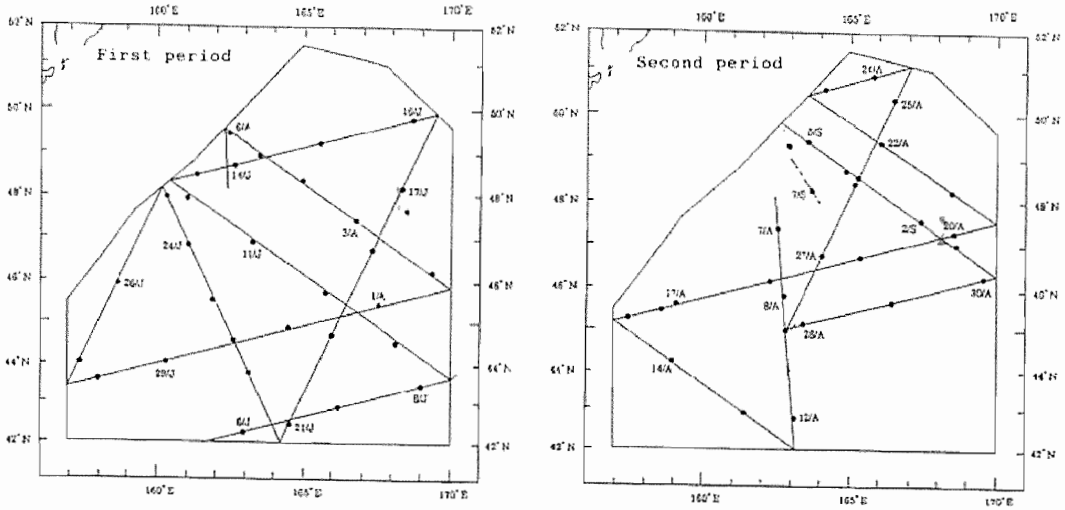
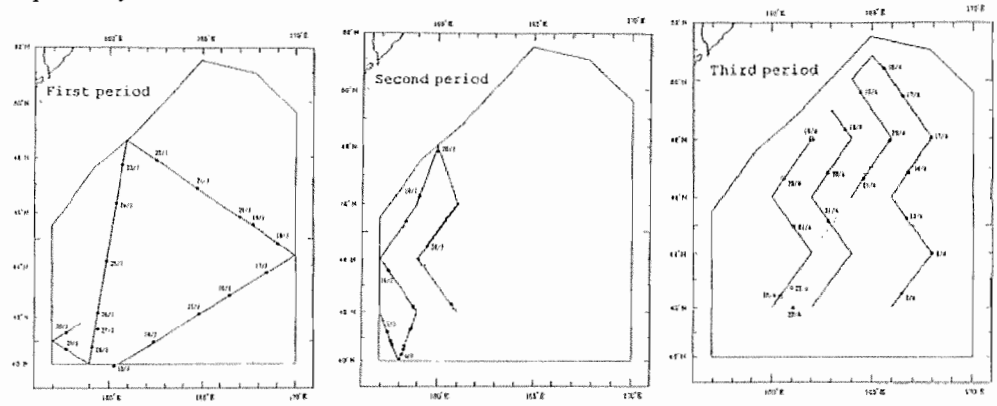


Fig. 3. Cruise track (Solid lines) and noon position of the research base (*Nisshin-maru*) for the JARPN 1994 referred from Cruise report (Fijise *et al.*, 1995 revised). Dotted lines indicates transit to an appointed position. The first and the second periods are 5 Jul. – 6 Aug. and 7 Aug. - 7 Sep., respectively.



(a) First period (13 – 30 Jun.) (b) Second period (1 Jul. – 6 Aug.) (c) Third period (7 – 22 Aug.)

Fig. 4. Planned cruise trackline (Solid lines) with noon position of the research base (*Nisshin-maru*) and three SSVs after completion of sampling activety (Third period) during JARPN 1995 so as to illustrate order of strata surveyed (Fujise, 1996 revised). Dotted lines indicate transit to an appointed position..

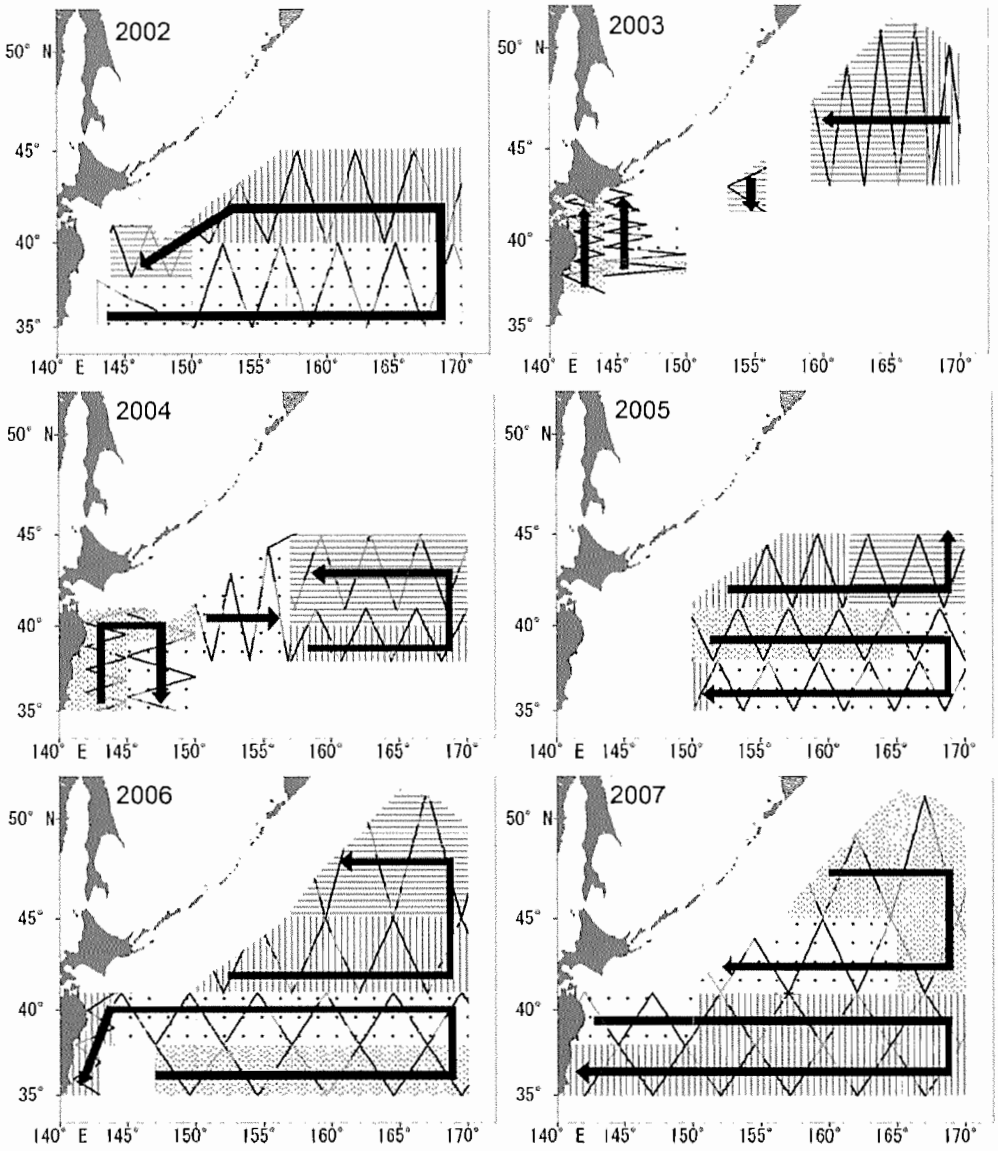


Fig.5. Distribution of planned and actually surveyed cruise track and the survey area for each month by the dedicated sighting vessel (KS2) during JARPN II offshore component 2002 – 2007 (Kiwada *et al.*, 2009 revised). Red lines indicate planned but not surveyed tracklines Black lines indicate trackline actually surveyed. Arrows indicate