

# Recent sightings of the North Pacific Right (*Eubalaena japonica*) whales in the western North Pacific based on JARPN and JARPN II surveys (1994 to 2013)

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## ABSTRACT

We report here the sighting information of North Pacific right whale collected by JARPN and JARPNII from May to September in the period 1994-2013. A total of 189,487.4 n.miles were surveyed in the JARPN and JARPNII research area. Monthly maps of the Density Index (DI: individuals / 100 n.miles) by 1°X 1°square are provided. They were mainly distributed north of 42°N in the research area (55 schools and 77 individuals; observed mean school size: 1.40, including 10 mother and calf pairs. Surface temperature in the location of the sightings ranged from 2.7 to 16.6°C. A northward migration pattern of whales was observed. A total of 48 individuals photographed and a total of 26 biopsy samples were collected in the research area. This information is useful to investigate the offshore distribution and migration pattern of this species in the western North Pacific. Further continuation of the systematic sighting surveys including in foreign EEZ areas are required to improve information on seasonal distribution of this species.

KEY WORDS: PACIFIC OCEAN, SURVEY VESSEL, DISTRIBUTION, NORTH PACIFIC RIGHT WHALE

## INTRODUCTION

The JARPN II (Japanese Whale Research Program under special permit in the western part of North Pacific-Phase II) was designed with the aim to elucidate the a) feeding ecology and ecosystem studies, b) Monitoring environmental pollutant in cetaceans and the marine ecosystem, c) Stock structure of large whales (Common minke, Bryde's, sei and sperm whales).

The JARPN (1994-1999) and JARPN II (2000-2013, ongoing) have been conducted the systematic whale sighting survey with and without the sampling activity. Research area of the JARPN and JARPN II is the Pacific waters north of 35°N in sub-areas 7, 8 and 9 except the 200 n.miles EEZ of foreign countries. In the Sea of Okhotsk, it covered only sub-area 11 also except the Russian EEZ. All whale species sighted are recorded during the sighting surveys. Details of the outline of the JARPN and JARPN II surveys were reviewed by Fujise (2000), Tamura *et al.* (2008) and Kiwada *et al.*, (2008). Sighting data by JARPN for blue (*Balaenoptera musculus*), fin (*B. physalus*), humpback (*B. musculus*), right (*Eubalaena japonica*) and common minke whales (*B. acutorostrata*) were reported to the JARPN review meeting which held by the IWC/SC in 1999 (Matsuoka *et al.*, 2000, Okamura *et al.*, 2001). In this paper, we examined North Pacific right whale distribution patterns using the JARPN and JARPN II sighting data.

## MATERIAL AND METHODS

Sighting data used in this analysis

In this paper, we used all JARPN (1994-1999) and JARPN II (2000-2013) systematic sighting survey data (effort and primary sightings) collected by sighting and sampling vessel (SSV) and dedicated sighting vessel (SV). Outline of sighting survey are followings;

### Sighting procedure

The sighting procedure of JARPN II (2000-2013) was not largely changed during the JARPN (1994-1999) surveys with some minor changes of the sighting procedure, which were reviewed by Fujise (2000), Tamura *et al.* (2008) and Kiwada *et al.* (2008). The research vessels equipped with barrel, where three top men conducted sighting observation. On the upper bridge, a captain, a gunner, a helmsman and a researcher also conducted the sighting. The sighting activity was continued if weather permitted during daytime from 30 minutes after sunrise to 30 minutes before the sunset.

### Survey modes

Searching was conducted under closing mode. Furthermore, two survey modes were adopted as NSC (Normal Search Closing, effort code was BC) mode and NSS (Normal Search closing with Special, effort code was BS) modes by taking into consideration the sea condition at the time of the searching. The NSC (BC) mode was under the normal weather conditions defined as visibility of 2 n.miles or more and wind velocity 4 or below. The NSS (BS) was under the unfavorable conditions defined as except the BC mode, but under which, the collection of whale samples was possible (Tamura *et al.* ,2008). Searching was conducted two survey modes (closing (ASP) and passing (NSP) modes) by the dedicated sighting vessel (SV) (Kiwada *et al.* 2008).

### Confirmation of the sightings

When the cetacean school of which species seemed to be minke whales or other large cetaceans was sighted in the research area, the ship closed to the school in order to identify the species, estimate the school size and get other biological information (number of calf, estimated body length etc.). To improve the estimation of the distance to the school and the angle from the bow, the training was conducted in the early time of each cruise by each vessel. Distance was estimated by referring the scale in the binocular and angle was also estimated referring the angle board. Surface temperatures were recorded by each whale sighting.

## RESULTS AND DISCUSSIONS

### Primary searching efforts

A total of 189,487.4 n.miles were surveyed in the research area between 1994 and 2013. Figure 1 show the research area and the primary searching effort (n,mile) of JARPN and JARPN II by Lat.1°× Long.1°square. Research area was covered completely during the surveys from mainly May to September (Figure 1).

### North Pacific Right whale sightings

This species was most rare baleen whale sighted in the research area. Table 1 shows the summary of the primary whale sightings during 1994 to 2013. Table 2 shows the summary of primary whale sightings in each sub-area. Figure 2 shows the distribution of the density index (number of the primary sightings of individuals / 100 n.miles) using all primary searching efforts and number of primary sightings (individuals) of whales from May to September. This species were mainly distributed north of 39°N in the research area from May to September (55 schools and 77 individuals). Observed mean schools size was 1.40 individuals including 10 mother and calf pairs. Surface temperature was ranged from 2.7°C to 16.6°C (Table 1).The main distribution area was north of 42°N during May to August in the eastern part of the research area (Table 2, Figure 2). Photo-ID data and biopsy samples were opportunistically collected during the surveys. A total of 48 individuals were photographed and 26 biopsy samples were collected (Table1, Figures 3a to 3c).

The monthly changes of the whale distributions with the search effort from April to September were calculated. Although the sighting effort of the northern part of the research area was not enough in June, a northward migration pattern of whales were observed from May to August. The sighting areas of this species were seemed moving from coastal region to the offshore regions and number of sighting areas was decreasing from May to September (Figure 4).

#### New information and further survey requirements

For the western North Pacific, recent information is limited. Distribution pattern of this species were reported using historical catch record (e.g. Nishiwaki, 1966, Omura, 1986, Clapham *et al.*, 2006) and JSV data (5°X 5° square analyses; Miyashita *et al.*, 1995, Miyashita and Kato, 1998). There are two migration routes along both sides of Japanese main Island, based on historical whaling data (Omura, 1986). And several scientists have suggested that the Kuril Islands and Kamchatka coasts are likely to be major summer feeding regions, based on historical and recent new information (Matsuoka *et al.*, 2000 and 2009, Brownell *et al.*, 2001. Clapham *et al.*, 2004, Jefferson *et al.*, 2008, Sekiguchi *et al.*, 2014). Present information of whale distributions provided by JARPN and JARPN II during 1994 to 2013 is support these feeding regions and valuable as new information for this species. Overall, this information is more detailed rather than previous data. This result confirmed that existence of this species in the offshore region during 1994-2013 especially outside of Okhotsk Sea in July to August. According to Miyashita *et al.* (1995), there were no sightings in outside of the Okhotsk Sea in August. As a whole, the main distribution areas of this species were moved northward from 39°N to 49°N from April to September in the western North Pacific, which coincided with previous large-scale distribution pattern by Miyashita *et al.* (1995).

The latest sighting data of the foreign 200 n.miles EEZ in the Sea of Okhotsk and the east of Kurile Islands during July and August were reported by Buckland *et al.*, (1992) using Japanese whale sighting survey data conducted by the National Research Institute of Far Seas Fisheries in Japan. Sightings information near the foreign 200 n.miles EEZ boundary in the east of Kurile Islands in June was also reported by Japanese University research vessel (Hokkaido University, *Oshoro-Marui*) in 2012 and 2013 (Sekiguchi *et al.*, 2014). Further survey and analysis including international collaboration research are required to improve for seasonal distribution of this species.

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Table. 1. Summary of North Pacific right whale sightings during the JARPN and JARPNII (1994-2013). Sch.: Number of the primary sightings of schools. Ind.: Number of the primary sightings of individuals. Calf: Number of calves including Ind.. Mss: observed mean school size (Ind. / Sch.). DIS: Density Index (schools / 100 n.miles). DIW: Density Index (individuals / 100 n.miles). WT: Range of surface temperature of the sighting position. Photo-ID: number of individuals, Biopsy sample: number of samples.

Year	Western North pacific						
	Sch.	Ind.	Calf	Mss	WT	Photo-ID	Biopsy sample
1994	1	2	1	2.00	17.0°C	1	0
1995	2	2	0	1.00	6.8 - 13.2°C	1	0
1996	0	0	0	-	-	-	-
1997	2	3	0	1.50	3.5 - 7.5°C	0	0
1998	4	6	2	1.50	3.3 - 13.3°C	0	0
1999	0	0	0	-	-	-	-
2000	0	0	0	-	-	-	-
2001	2	3	1	1.50	12.0 - 16.9°C	2	0
2002	2	2	0	1.00	13.4 - 16.0°C	0	0
2003	5	6	1	1.20	3.0 --15.7°C	4	1
2004	2	4	0	2.00	10.3 - 12.7°C	2	2
2005	2	4	2	2.00	12.3 - 16.6°C	2	2
2006	10	14	0	1.40	7.8 - 10.3°C	9	2
2007	1	1	0	1.00	13.3°C	0	0
2008	5	6	1	1.20	8.8 - 15.1°C	4	4
2009	1	1	0	1.00	7.5°C	1	0
2010	0	0	0	-	-	-	-
2011	13	20	2	1.54	2.7 - 4.2°C	20	14
2012	2	2	0	1.00	8.3 - 13.9°C	1	1
2013	1	1	0	1.00	13.4°C	1	0
Total	55	77	10	1.40	2.7 - 16.6°C	48	26

Table. 2. Summary of North Pacific right whale sightings by sub-area during the JARPN and JARPNII (1994-2013).

Sea	Western North pacific					
	35N-43N		35N - 45N		35N - 51N	
Latitude	35N-43N		35N - 45N		35N - 51N	
Longitude	Japanese coast - 150E		150E - 157E		157E - 170E	
Depth (m)	200-4000m<		4000 m <		4000 m <	
Species	Sch.	Ind.	Sch.	Ind.	Sch.	Ind.
N. P. Right whale	11	12	8	12	36	53

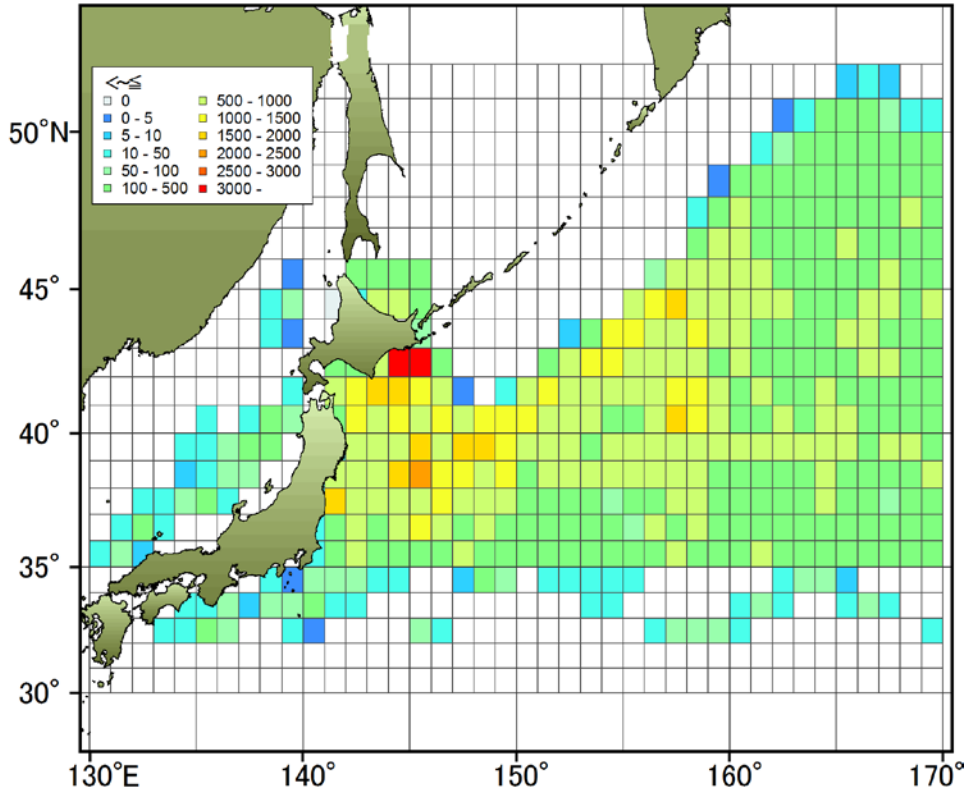


Figure 1. Distribution of the primary searching effort (n.mile) during JARPN and JARPN II (1994 to 2013) surveys by Lat.1°× Long.1°square.

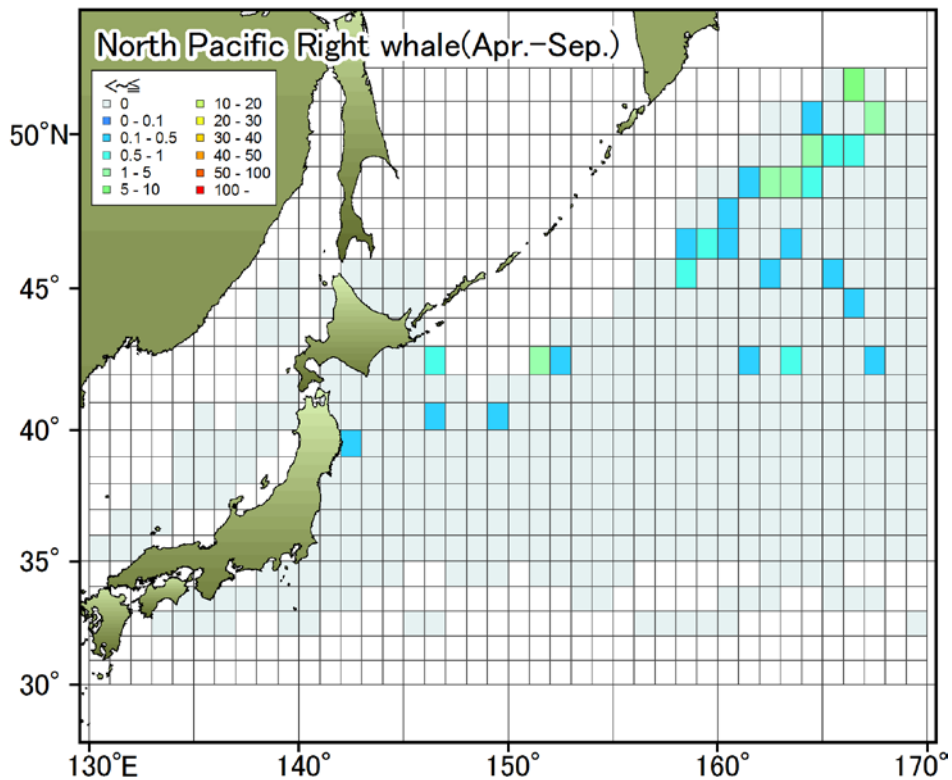


Figure 2. Distribution of the Density Index (number of primary sightings of individuals / 100 n.mile ) of North Pacific right whales during April to September of JARPN and JARPN II from 1994 to 2013 surveys by Lat.1°× Long.1°square.



Figure 3a. A mother and calf pair of North Pacific right whale, sighted in the western North Pacific on 2 August 2008.



Figure 3b. Surfacing of North Pacific right whale, sighted in the western North Pacific on 31 May 2012.



Figure 3c. Scars on back of North Pacific right whale, sighted in the western North Pacific on 6 June 2012.



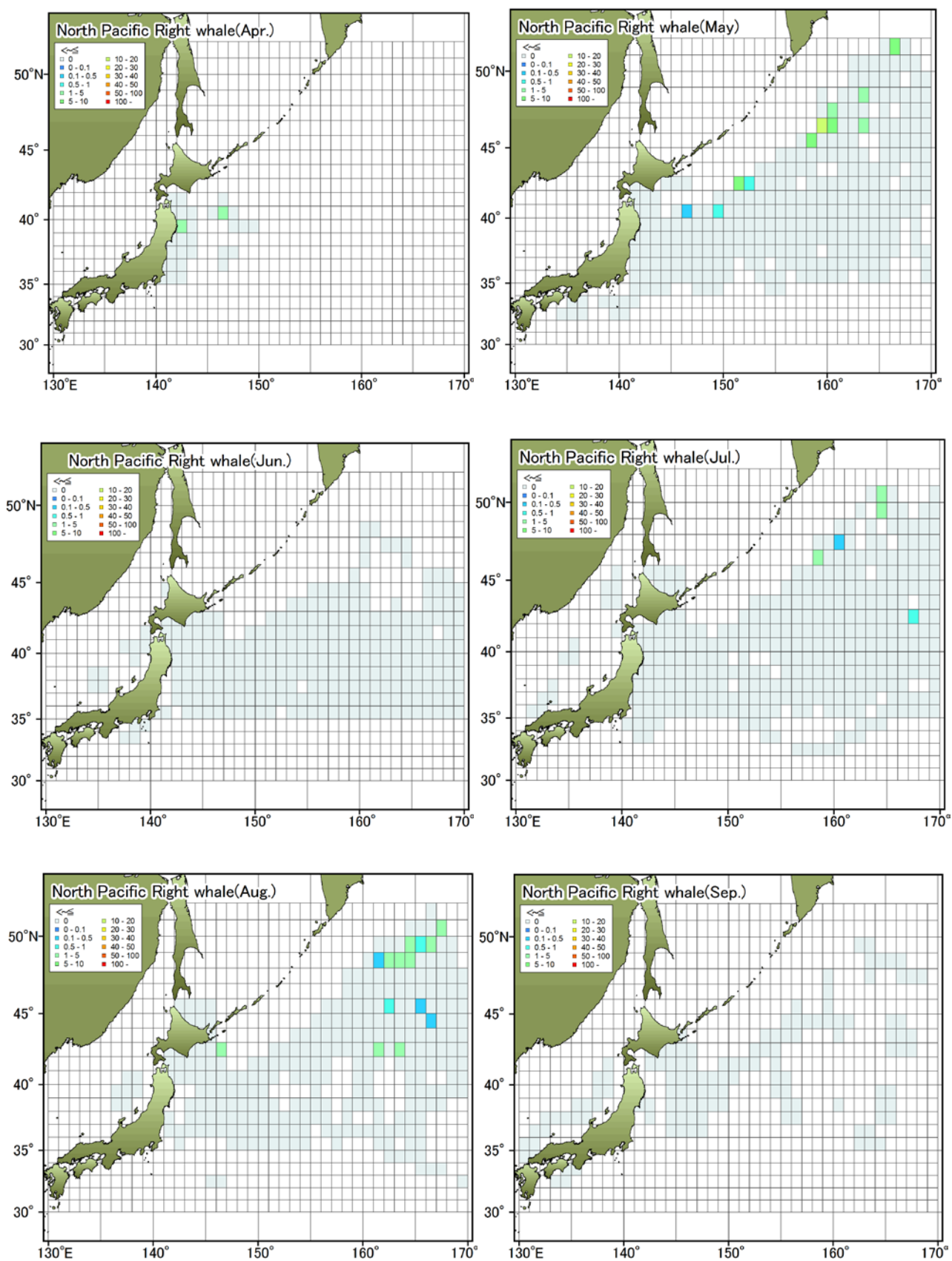


Figure 4. Monthly change of the Density Index (number of primary sightings of whales / 100 n.mile ) of North Pacific right whales during JARPN and JARPN II from 1994 to 2013 surveys by Lat.1°× Long.1°square.