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A REPORT ON UNUSUAL MASS OCCURRENCES OF RIBBON SEAL PUPS ALONG THE NORTHEASTERN COAST OF HONSHU AND SOUTHERN HOKKAIDO, JAPAN*

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Abstract: To collect information on unusual occurrences of seals along the coast of northern Japan, the questionnaire survey was conducted through the museum, zoos, aquariums and fisheries experimental stations. It revealed that ribbon seal pups unusually occurred along the coast northern Japan in 1984. The white coated pups began to occur in northern area in mid April and after about half month they appeared in southern area. Analysis on both pack ice and oceanographic information suggested that the seal pup dispersion was brought by strong cold current which was particularly prominent in that year.

1. Introduction

The ribbon seal, Phoca fasciata, is usually found in both inner and marginal zones of pack ice of the North Pacific, and its range varies according to the seasonal ice movement. It is distributed in the Sea of Okhotsk, the Chukchi Sea and the Bering Sea, including the coastal waters of the Kamchatka Peninsula, the Kuril Islands, and the Aleutian Islands (BURNS, 1981). An exceptional occurrence of this species was reported only from Moro Bay, California (ROEST, 1964). According to NAITO (1976), the southward expansion of ice-breeding seals occurs in relation to pack ice movement. He reported exceptional occurrence of the largha seal (Phoca *largha*; harbour seal), the ringed seal (Phoca hispida) and the bearded seal (Erignathus barabartus) outside their main habitats in Japan. In his report, however, there was no record of exceptional occurrence of ribbon seal.

During the spring of 1984, six ribbon seal pups were caught alive and kept at the Asamushi Aquarium, Aomori, Aomori Prefecture, for protection. This incidence was unusual to the aquarium which is located far south to the main habitat of this species. Therefore, we tried to gather information on unusual occurrences of pups of ribbon seals and other phocid seals by the questionnaire to the local museum, zoos, aquariums and Prefectural fisheries experimental stations in central and northern Japan (Kanto

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district to Hokkaido). We report here the information on unusual occurrence of ribbon seal pups obtained through the questionnaire and some other background information on pack ice extension and the Kuril Current condition during the same season.

Table 1. The list of seal pups caught and sighted along the coast of northern Japan during the spring of 1984.

Species	Date of catch	Locality	Sex	Body length (cm)	Weight (kg)	Fur conditions
Phoca	Apr. 8	sands, Nishisyoro, Shiranuka-cho, Hokkaido	F	90*	18	lanugo
fasciata	Apr. 11	sands, mouth of Kushiro River, Kushiro, Hokkaido	M	69*	23	lanugo
	Apr. 12	sands, Hamataiki, Taiki-cho, Hokkaido	F	105	18	lanugo
	Apr. 14	sands, Niino Beach, Kushiro, Hokkaido	M	79*	16	lanugo
	〃	sands, near the port of Miyako, Iwate	F	67	9	lanugo
	Apr. 18	set-net, off Usujiri, Minamikayabe-cho, Hokkaido	M	90	30	lanugo
	Apr. 21	sands, Niino Beach, Kushiro, Hokkaido	M	79*	16	moulted
	〃	sands, Sashiushi, Shiranuka-cho, Hokkaido	F	83	32	moulted
	Apr. 22	reefs, Izumihama, Erimo-cho, Hokkaido	M	103*	16.5	lanugo
	〃	reefs, Oshirabetsu, Hiroo-cho, Hokkaido	M	106	19	moulting
	Apr. 23	sands, Mukawa-cho, Hokkaido	F	85	12	moulting
	〃	sands, Funakoshi Bay, Yamada-cho, Iwate	M	77	16	lanugo
	Apr. 24	sands, Hyakuninhama, Hiroo-cho, Hokkaido	M	110	23	moulted
	〃	sands, Onbetu Beach, Onbetu-cho, Hokkaido	F	65*	15	moulted
	〃	sands, Tokotan Beach, Atsukeshi, Hokkaido	M	78*	21.5	lanugo
	Apr. 25	sands, Higashi-cho, Muroran, Hokkaido	M	90	15	lanugo
	〃	sands, Shiogama, Misawa, Aomori	M	77	14	lanugo
	Apr. 26	sands, Tyokubetu Beach, Onbetu-cho, Hokkaido	M	92*	25	moulted
	Apr. 27	sands, mouth of Syoro River, Shiranuka, Hokkaido	F	94*	27	moulting
	May 1	sands, Shiogama, Misawa, Aomori	M	65	16.5	lanugo
	May 3	sands, Oippe Beach, Higashidori-mura, Aomori	M	—	13.5	lanugo
	May 4	— , Monbetu, Hokkaido	F	103	36.5	moulting
	May 6	sands, Tomari Beach, Rokkasho-mura, Aomori	F	—	11.5	lanugo
	May 7	sands, Kamaishi Bay, Kamaishi, Iwate	F	—	12	lanugo
	May 9	sands, Dejima, Onagawa-cho, Miyagi	—	90	15	lanugo
	May 10	sands, Syoubuda Beach, Shichigahama-cho, Miyagi	M	74	16	lanugo
	May 11	sands, Tomata Beach, Atsukeshi-cho, Hokkaido	M	91*	20	moulting
	Jun. 25	set-net, off Watenbetu, Shiranuka-cho, Hokkaido	F	70*	12.5	moulting
Phoca	Apr. 19	reefs, Sizukari, Osyamanbe-cho, Hokkaido	F	83	10	moulting
vitulina	May 4	— , Monbetu, Hokkaido	M	84	13	moulting
	May 9	set-net, off Hamataiki, Taiki-cho, Hokkaido	F	101	14	moulted
	May 14	set-net, off Oshirabetsu, Hiroo-cho, Hokkaido	M	105	15.5	moulted
	May 15	set-net, off Oshirabetsu, Hiroo-cho, Hokkaido	M	100	14.5	moulted
	May 26	— , Monbetsu, Hokkaido	F	97	36.5	moulted

* direct measure at death; F: female; M: male

2. Materials and Methods

To summarize information on unusual occurrences of seals, we sent questionnarie to one museum, four zoos, 10 aquariums and 11 Prefectural fisheries experimental stations in central and northern Japan (Kanto district to Hokkaido). The questionnaire included biological question items such as species, data of capture or sighting, locality, standard body length or its estimation, body weight, moulting condition of lanugo coat, sex, etc. To understand the environmental background which might have close relation to unusual occurrences, we also collected information on the pack ice distribution and the oceanographic condition in the area from Ryuhyo-Sokuho (quick report on pack ice movement) and Gyokaikyo-Sokuho (quick report on fishing and oceanic condition) issued by the Sapporo Meteorological Station and the Fisheries Information Center respectively.

3. Results and Discussion

3.1. Catch or sight records of seal pups

The results of the questionnaire survey are summarized in Table 1 and Fig. 1. Catches or sightings of thirty-four seals were reported, of which 28 were ribbon seal pups (88.9%) and 6 were largha seal pups which were reported only from Hokkaido where largha seals are rather common in autumn and in the post-breeding season (NAITO and KONNO, 1979). According to FAY (1974), NAITO and NISHIWAKI (1972) and NAITO (1976), the shift of habitat from ice floes of marginal pack ice zone to coastal open water occurs rather in earlier season in largha seals than ribbon seals which are distributed in inner and marginal zones of pack ice (BURNS, 1970). In this report, we could not

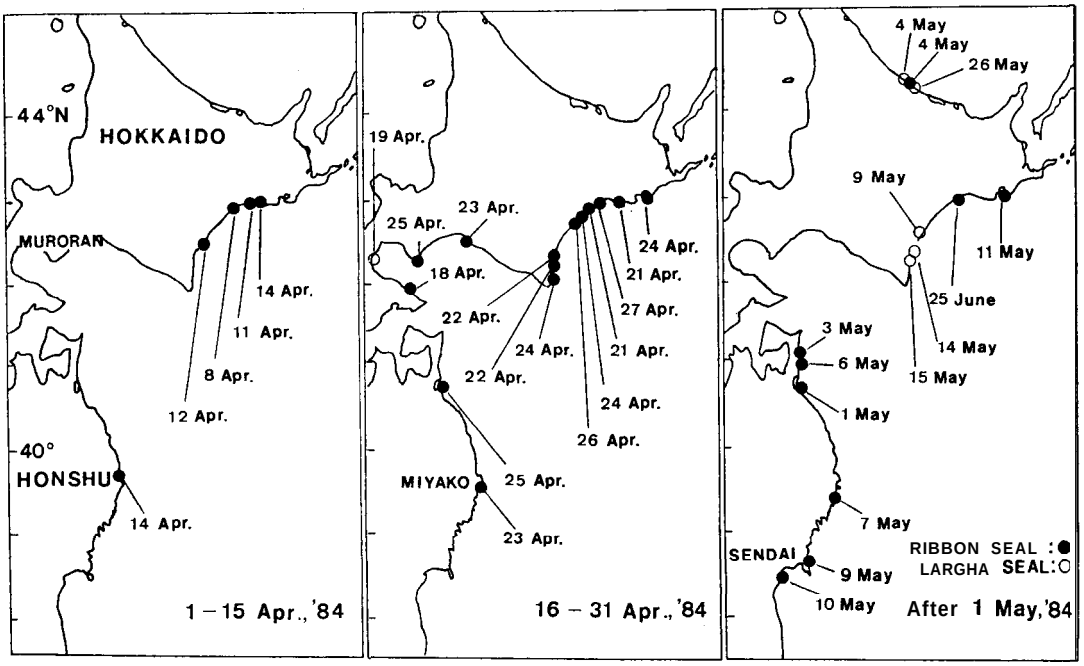

Fig. 1. Catch records of ribbon seal and largha seal pups from the coast of Honshu and Hokkaido of Japan during the spring of 1984.

determine whether these records of largha seal pups were unusual incidence or not. On the other hand, it was very clear that the occurrences of ribbon seal pups along the Pacific coast of Hokkaido and northern Honshu were very unusual. Such incidents have not been reported by the local fishermen in the area (personal information by Y. NAITO).

Most of the ribbon seal pups of this study were reported in the second half of April and few in the first half of May along the Pacific coast of Hokkaido. Along the Pacific coast of northern Honshu, pups began to occur in the first half of April and their occurrence gradually increased attaining to a peak in the former half of May, or about a half month later than that in Hokkaido (Fig. 1). The time difference between the two peaks will indicate a period required for pups to be drifted from Hokkaido to northern Honshu. The same time difference of occurrences between different areas was reported by NAITO (1976).

3.2. *Pack ice condition and water temperature distribution*

Questions where these pups came from and how such dispersal of the pups occurred should be considered in relation to breeding ecology of these species, ice movement and oceanic current. Ribbon seal pups are born in lanugo coat on the ice floe (BURNS, 1981; KING, 1983) in mid March to early April (TIKHOMIROV, 1971). Moulting of lanugo coat occurs within 5 weeks after birth (BURNS, 1981). Seventy one percent of the total 28 ribbon seal pups of this study retained the lanugo coat and 18% were under moulting condition. In this respect, we consider that most of these pups were less than 5 weeks old and born before early April or at the latest mid April.

As regard to ice distribution in April 1984, according to Ryuhyo-Sokuho, Japan Meteorological Agency, pack ice prevailed in the southern Sea of Okhotsk but no pack ice was observed off the Japan Sea coast of Hokkaido (Fig. 2). This pack ice condition may suggest that ribbon seal pups in this report were born in the marginal area of

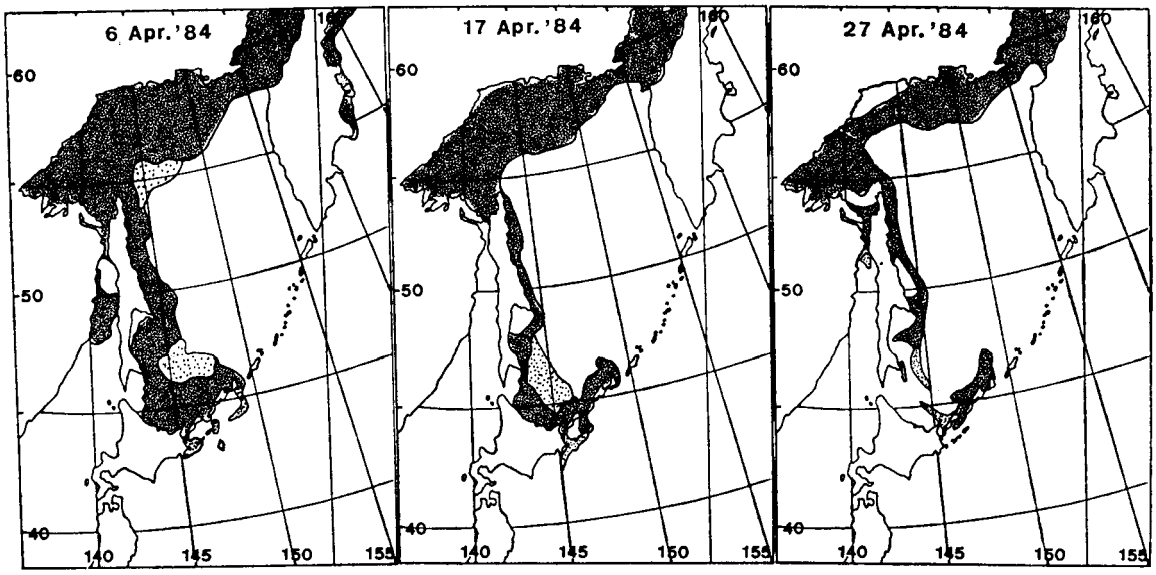

Fig. 2. Distribution of the pack ice in the Sea of Okhotsk observed by the meteorological satellite during April of 1984. Dark and dotted areas denote the dense and loose areas of the pack ice, respectively. Cited from the Ryuhyo-Sokuho by the Sapporo Meteorological Station.

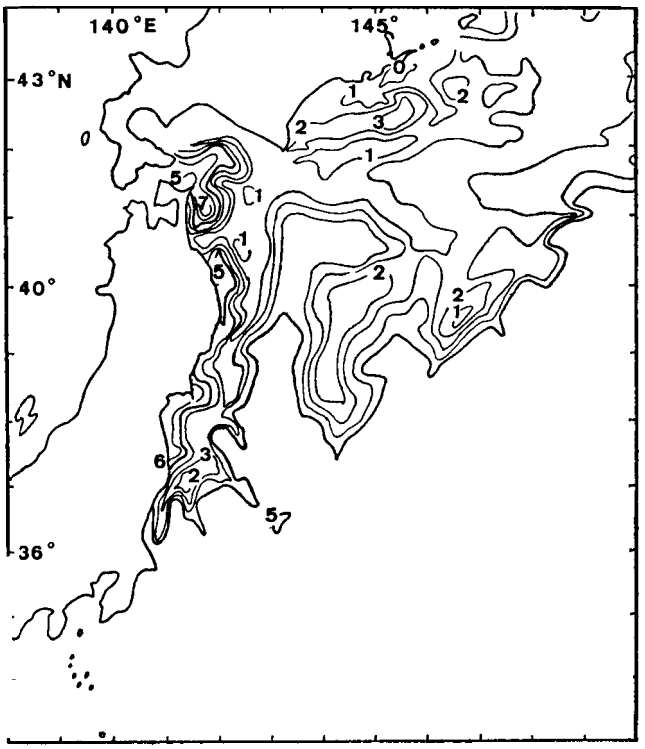

*Fig. 3. Horizontal distribution of water temperature in the North Pacific from **21** to **26** April in **1984.** Cited from the **Gyokaikyo-Sokuho** by the Fisheries Information Service Center.*

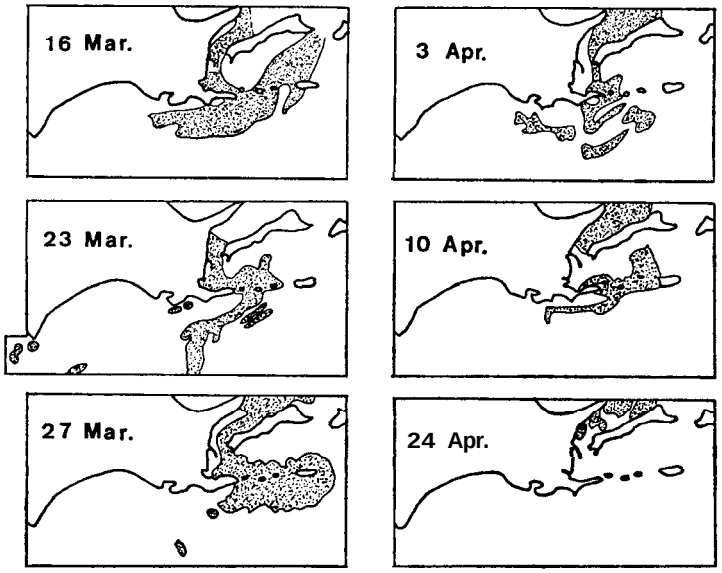

*Fig. **4.** Distribution of the pack ice in the Pacific Ocean of southeastern Hokkaido and the **Nemuro** Strait during the spring of **1984.** Cited from the Ryuhyo-Sokuho by the Sapporo Meteorological Station.*

pack ice zone in the southern Sea of Okhotsk and drifted to the south along the Pacific coast of Hokkaido. There is no possibility for the pups to be drifted to the Japan Sea through the Tsugaru Strait, because in this strait a strong warm current is prevailing from west to east (Fig. 3). The detailed distribution of pack ice in the area between the southern Sea of Okhotsk and the Pacific Ocean in March and April 1984 is shown in Fig. 4. The southern range of the Okhotsk Sea pack ice certainly extends to the Pacific Ocean in March to mid April. This may cause the dispersal of pups on ice floes. Once pack ice appeared in the Pacific area, it would tend to be drifted eastward by the cold west-bound current along the Pacific coast of eastern Hokkaido (Fig. 3). Thus, it is supposed that after ice floe melting, pups moved further south along the Pacific coast of Hokkaido Island where the cold current still prevails. However, it is uncertain how pups crossed the warm outflow area from the Tsugaru Strait. However, pups clearly avoided the Tsugaru Strait area where warm water prevails. There was no occurrence report from this area.

We discussed where ribbon seal pups were from and how they occurred in unusual areas. However, it is still uncertain why dispersal occurred only on ribbon seal pups. It is known that in the southern Sea of Okhotsk not only ribbon seals but largha seals, ringed seals, bearded seals are distributed in pack ice area (NAITO and KONNO, 1979; BIGG, 1981; BURNS, 1981). Pack ice extension to Pacific Ocean was not extremely prominent this year compared with average years. However, the cold Kuril Current extremely developed in the winter of 1984 (Gyokaikyo-Sokuho). We do not know how the cold current contributed to the dispersal of ribbon seal pups.

The cold current might have a stronger influence on the dispersal of ribbon seal pups than on ice-breeding seals, compared with the pack ice movement. We still have a very small amount of data to discuss this problem much deeper. We need more information.

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