

Adélie Penguin Census in the 1984–85 Breeding Season Near Syowa Station, Antarctica with Reference to the Banding Effect on the Population¹

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昭和基地付近での 1984–85 年の繁殖期におけるアデリーペンギンの
個体群調査と標識付けの回帰率に及ぼす影響¹

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要旨: 第 25 次南極地域観測隊の生物環境モニタリング計画の一つとして、東南極のプリンスオラフ海岸および宗谷海岸にあるアデリーペンギンの集団営巣地の個体群の計数を行った。全体的にみて、過去 4 年間では個体数の大きな変動は見られなかったが、袋浦、水くぐり浦およびオングルカルベンの各集団営巣地では、1983–84 年の繁殖期には前年の約 2/3–1/2 に減少し、1984–85 年に再び回復するという変動が見られた。オングルカルベンおよび豆島の集団営巣地では、1982–83 年の繁殖期にフリッパーバンドによって標識された個体の回帰率と、他の集団営巣地への移動を調べた。その結果、オングルカルベンでは、1983–84 年の回帰率よりも、1984–85 年のそれの方が高く、1983–84 年に帰巣した個体の 91% は 1984–85 年にも帰巣していた。これは標識をつける時の人為的かく乱が回帰率に影響したものと考えられる。

Abstract: Population census on the Adélie penguin in the 1984–85 breeding season on the Prince Olav Coast and the Sôya Coast, East Antarctica was carried out as part of the biological monitoring programs of the 25th Japanese Antarctic Research Expedition. The record of a newly found rookery in Meholmen is described. In most of the rookeries, the maximum numbers of the Adélie penguin populations did not show heavy fluctuations during the last four seasons, though in some rookeries such as Hukuro Cove, Mizukuguri Cove and Ongulkalven, the population sizes fluctuated between the range of the largest size to one-half size of that. In the Ongulkalven and Mame-zima Island rookeries, the recovery rate and migration to other rookeries of banded penguins are discussed.

1. Introduction

As part of the biological monitoring programs of the 25th Japanese Antarctic Research Expedition (JARE-25), the population census of the Adélie penguin (*Pygoscelis adeliae*) was carried out, in response to the programs of International Survey of Antarctic Seabirds (ISAS) in the framework of the Biological Investigations of Marine Antarctic Systems and Stocks (BIOMASS).

In this paper, we report the results of investigation by the wintering party of JARE-25 in the 1984–85 breeding season in the 14 rookeries on the Prince Olav Coast

¹ JARE-25 BIOLOGY Cont. No. 9.

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and the Sôya Coast. In the Ongulkalven rookery, the location of each nest and the marked penguins were recorded and discussed as compared with the result of KANDA *et al.* (1986).

2. Results and Discussion

2.1. Population trend

The result of the population census which was taken by both the aerial photography and the ground survey is shown in Table 1.

Several oblique aerial photographs of the rookeries of Cape Hinode, Akarui Point, Cape Omega, Benten Island, Ytrehovdeholmen, Nöckelholmane, Torinosu Cove and Kuzira Point were taken from an aircraft, Cessna A-185, on November 14, 1984. Those rookeries are situated far from Syowa Station and the sea-ice condition is usually bad in this season when the Adélie penguin population seems to become maximum, consequently it was impossible to reach there by a snow vehicle. However, it is often hard to count penguins in a aerial photograph. We determined the population number in each rookery by counting the penguins in several aerial photographs taken from different directions, thereby eliminating any errors of underestimation.

Figure 1 shows the annual fluctuation of the Adélie penguin populations of these rookeries during the last four breeding seasons using the data of HOSHIAI *et al.* (1984) and KANDA *et al.* (1986). Generally speaking, in most of these rookeries, the maximum numbers of the Adélie penguin populations did not show heavy fluctuations, though in some rookeries such as Hukuro Cove, Mizukuguri Cove and Ongulkalven, the population sizes fluctuated between the range of the maximum size to one-half size of that. It seems that the maximum population numbers of the Hukuro Cove rookery in the 1981–82 and 1983–84 seasons and the Mizukuguri Cove rookery in the 1983–84 season were larger than those reported by HOSHIAI *et al.* (1981) and KANDA *et al.* (1986), hence the fluctuation ranges of these rookeries seem to become narrower. This is because the population censuses of these rookeries were carried out on November 24 in the 1981–82 season and on November 22 in the 1983–84 season, and the Adélie penguin population in this region generally shows the maximum size in mid-November and begins to decrease after 20 November (MATSUDA, 1964).

We could count 7 penguins on November 14 in the Kuzira Point rookery where no penguins were observed in the 1981–82 season, though the population size was smaller than that (20–40) estimated by HOSHIAI *et al.* (1981).

On November 30, 1984, we discovered a small rookery in Meholmen, a small island situated about 5 km northwest of Syowa Station. We recognized three new nests, one of which was empty, two adults and four eggs. These nests were located at the central part of the island. Many old collapsed nests and tail feathers of the Adélie penguin were recognized in the surrounding area, which indicates that this rookery was sometimes used in the past breeding seasons. We could not observe any adults and chicks there on January 28 by the aerial observation from the helicopter of the icebreaker SHIRASE, hence the chicks might have failed to grow up in this season. Further observation is necessary to monitor the breeding activity of the Adélie penguin in such a small rookery, and to study the mechanism of establishment and vanishment of a rookery.

Table 1. Population number of the Adélie penguin observed in the 1984-85 breeding season in each rookery near Syowa Station.

Rookery name	Cape Hinode	Akarui Point	Cape Omega	Me-holmen	Ongulkalven		Mamezima Island		Benten Island	Rumpa	Mizukuguri Cove	Hukuro Cove		Ytre-hovdeholmen	Nökkelholmane	Torinosu Cove	Kuzira Point
					a	c	a	c				a	c				
17 Oct. 1984	—	—	—	—	—	—	—	—	—	2	—	—	—	—	—	—	—
21 Oct.	—	—	—	—	—	—	—	—	—	—	0	0	—	—	—	—	—
23 Oct.	—	—	—	—	—	—	—	—	—	60	4	37	—	—	—	—	—
28 Oct.	—	—	—	—	—	—	—	—	—	—	40	185	—	—	—	—	—
*29 Oct.	—	—	—	—	5	—	7	—	—	—	—	—	—	—	—	—	—
*30 Oct.	—	—	—	—	—	—	—	—	5	—	—	—	—	8	30	—	—
4 Nov.	—	—	—	—	18	—	—	—	—	980	—	—	—	—	—	—	—
10 Nov.	—	—	—	—	54	—	45	—	—	1470	—	—	—	—	—	—	—
11 Nov.	—	—	—	—	—	—	—	—	—	—	177	502	—	41	—	—	—
12 Nov.	—	—	—	—	—	—	—	—	—	1550	—	—	—	—	—	—	—
*14 Nov.	433	187	562	—	—	—	—	—	6	—	—	—	—	40	91	128	7
18 Nov.	—	—	—	—	77	—	53	—	—	—	—	—	—	—	—	—	—
29 Nov.	—	—	—	2	—	—	—	—	—	—	—	—	—	—	—	—	—
1 Dec.	—	—	—	—	39	—	—	—	—	800	—	—	—	—	—	—	—
2 Dec.	—	—	—	—	—	—	—	—	3	—	—	—	—	—	—	—	—
23 Dec.	—	—	—	—	—	—	20	14	—	—	—	—	—	—	—	—	—
30 Dec.	—	—	—	—	24	28	—	—	—	—	—	—	—	—	—	—	—
2 Jan. 1985	—	—	—	—	—	—	39	34	—	—	—	—	—	—	—	—	—
22 Jan.	—	—	—	—	—	—	—	—	—	—	—	200	280	—	—	—	—
28 Jan.	—	—	—	0	3	30	—	—	—	—	—	—	—	—	—	—	—
Maximum number	433	187	562	2	77	30	53	34	6	1550	177	502	280	41	91	128	7

a: adult, c: chick, *: aerial observation.

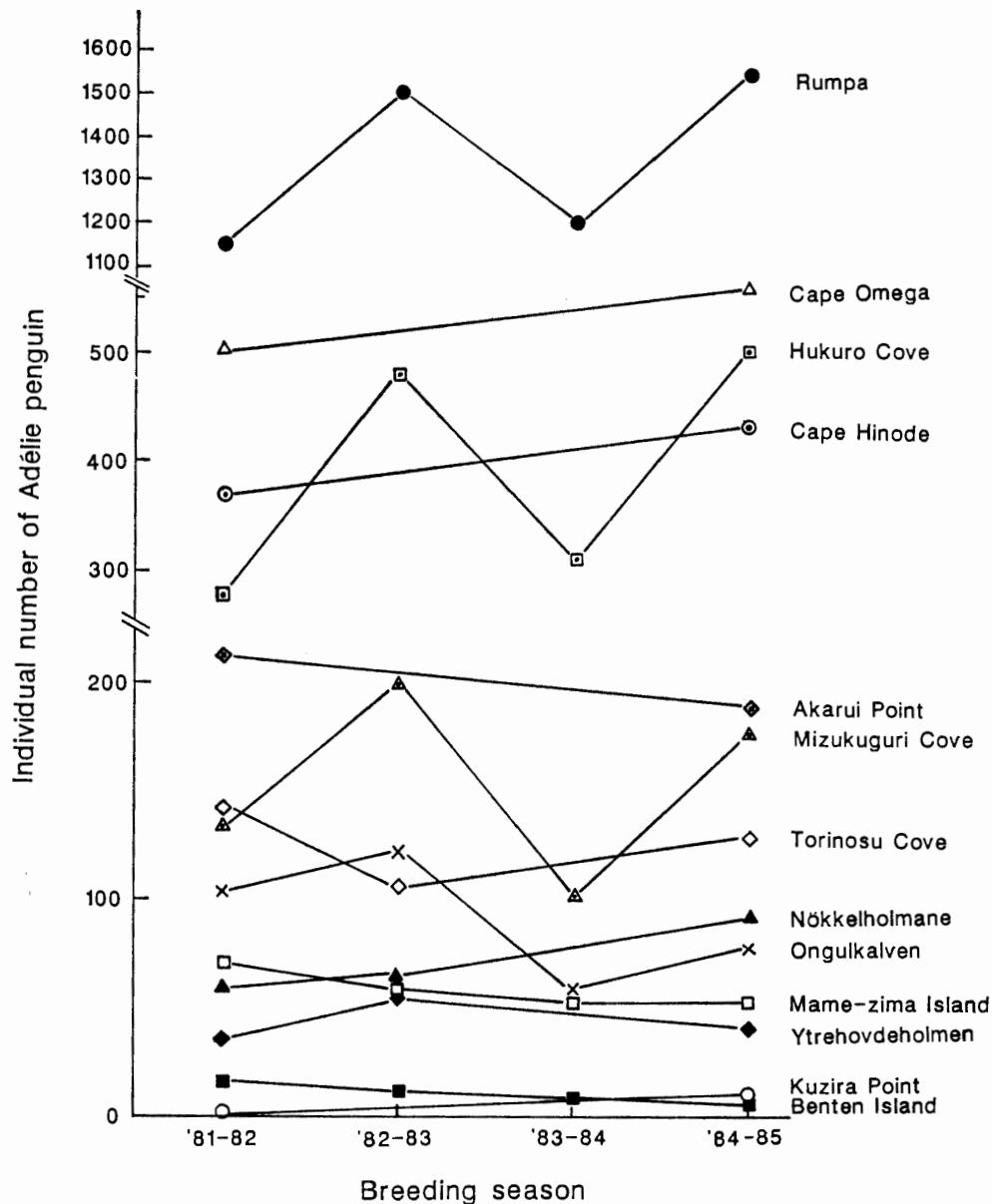


Fig. 1. Annual fluctuation of individual numbers of the Adélie penguin in each rookery near Syowa Station.

2.2. Effect of banding on the population

In the Ongulkalven rookery, the location of each nest and the banded penguins were recorded in the map drawn by KANDA *et al.* (1986) (Fig. 2).

Twelve penguins out of 21 penguins which were observed in the 1983-84 season, returned to the same place as the last season. All of the four breeding pairs (band numbers 344 & 0057, 355 & 358, 321 & 379, 403 & 461) which were with the same mates as the last season, made their nests in exactly the same places. On the contrary, four penguins (band numbers 356 & 359, 365 & 366) which were two breeding pairs in the last season, and each of which took with a new mate in this season, shifted their nests from each other.

KANDA *et al.* (1986) reported that the penguins banded at Ongulkalven in the 1982-

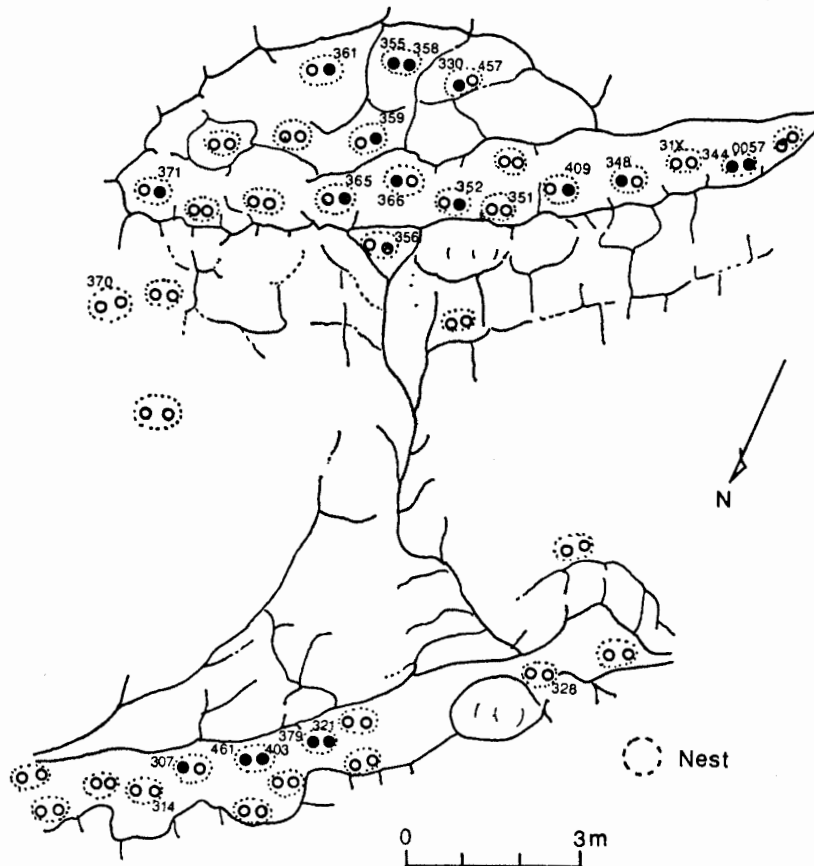


Fig. 2. Location of the Adélie penguin population in the Ongulkalven rookery showing the number of the banded penguins in the observation in November 1984. The rookery map used was the same one drawn by KANDA *et al.* (1986). Solid circles indicate the individuals which occupied the same places where they were observed in the 1983-84 season, and open circles with a cross and open circles indicate the penguins which were recognized and not recognized in the Ongulkalven rookery in the 1983-84 season, respectively.

83 season returned to their rookery in the 1983-84 season with the low rate of 23.4%. However, the recovery rate of the banded penguins in the 1984-85 season to those in the 1983-84 season was very high, 91.3%, and that of the 1984-85 season to the 1982-83 season was 25.8%, which was higher than the rate of the 1983-84 season to the 1982-83 season (Fig. 3). Eleven penguins were banded in the 1983-84 season, and only two penguins out of them returned to their rookery. Its recovery rate was also very low, 18.2%.

The migration of banded penguins from the Ongulkalven and Mame-zima Island rookeries to other rookeries is shown in Fig. 3. Three penguins banded at Ongulkalven in the 1982-83 season were found in the Rumpa rookery, two penguins in the Hukuro Cove rookery and one penguin in the Meholmen rookery.

Judging from these facts, it seemed that the recovery rate of the banded penguins in the Ongulkalven rookery, was decreased by the human disturbances like marking by flipper band. However, other causes which decreased the Adélie penguin popula-

Breeding season	Ongulkalven	Other rookeries or dead	Mame-zima Island
1971-72	55	54	
1982-83	1+97=98		54
1983-84	11+1+23=35	70 3+2=5(R) 1(H) 25	27
1984-85	2+1+21+4=28	9+2+62+2=75 2+1=3(R) 1+1=2(H) 1(M) 30	24
Recovery rate (%)			
1983-84/1982-83	23.4(23/97) (Kanda et al. 1986)		50.0(27/54)
1984-85/1982-83	25.8(25/97)		44.4(24/54)
1984-85/1983-84	91.3(21/23)		?

R:Rumpa, H:Hukuro Cove, M:Meholmen

Fig. 3. The number of banded penguins which returned to their rookeries and migrated to other rookeries.

tion, such as the sea-ice conditions unfavorable to the breeding activity of the Adélie penguin, should be considered as pointed out by HOSHIAI *et al.* (1981), because the similar fluctuation patterns in population size as in Ongulkalven were observed also in the rookeries of Hukuro Cove, Mizukuguri Cove and Rumpa during the last four breeding seasons.

Acknowledgments

We wish to record our thanks to Prof. T. HIRASAWA of the National Institute of Polar Research, the leader of JARE-25, for his helpful arrangement and encouragement. Thanks are also due to Messrs. M. GUNJI, K. NAGANO and T. TANIGUCHI for their cooperation in the aerial observation, and all of the wintering members of JARE-25 for their support in the field work.

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(Received September 8, 1988; Revised manuscript received October 4, 1988)