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Species and rehabilitation of seabirds oiled in the accident of the Nakhodka, in Fukui *

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INTRODUCTION

Oil pollution causes ecological damage, especially to wildlife. For example, a great number of birds was oiled to death in the accident of the supertanker, Exxon Valdez in 1989 (Piatt et al. 1990) and during the Gulf War in 1990 (Symens & Al Salamah 1993, Evans et al. 1993). The effect of the oil spill and the change of the bird community, habitat use and behaviours were analysed in many reports (e.g. Jackson 1993, Day et al. 1995, Wiens et al. 1996). However, there have been few documents and analyses of the oil pollution damage to seabirds and the rehabilitation of rescued birds except reports by Ohata (1988) and Ohata et al. (1993) in Japan.

The oil spill accident of the Nakhodka happened in the Japan Sea in 1997. The oil reached along the seacoasts of Fukui Prefecture. It is useful to document the status of oiled birds and rehabilitation.

Oil spill and seabird rescue in Fukui

The Nakhodka, a Russian tanker, sank with 19,000kl of C - type heavy fuel oil in the Japan Sea, off the shore of Shimane Pref. on 2 January, 1997. About 6,240kl of oil leaked in the accident and floated toward the east. The bow section of the wrecked tanker, with about 2,800kl of oil, ran aground on the shore of Anto area (36° 15'N, 136° 08'E) in Mikuni Town, Sakai Municipality, Fukui Pref. on 7 January. The oil, including the oil leaking from the bow section, reached all the coasts of Fukui Pref. and was removed by people from 7 to about 27 in January.

The government of Fukui Prefecture organized the patrol, transportation, medical treatment and rehabilitation of the oiled seabirds on 7 January in cooperation with the municipal office, Fukui Veterinary Medical Association and the Wild Bird Society of Japan.

The rescued birds were medically treated and cleaned in an animal hospital or the animal

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hygiene center in Fukui City, which was about 17 km from the nearest seacoast. After cleaning, they were rehabilitated at Fukui Nature Conservation Center in Ono City, which was another 31km from the hospitals.

The recovered birds were transported by airplane to Hokkaido and were released on the shore of Yufutsu Coast, where the oil had not yet spread. The oil stocked in the bow section was extracted out until 25 February. The stranded bow of the tanker was lifted onto the ground on 20 April.

METHODS

The municipal staff, the members of the Fukui branch of the Wild Bird Society of Japan and volunteers patrolled the seashores in Fukui from 8 June to 10 March. The species and number of rescued (live) or collected (dead) seabirds were recorded every day in each municipality.

The rescued birds were cleaned and medically treated in animal hospitals and rehabilitated in Fukui Nature Conservation Center. The birds were kept separately in a box (60cm(l) × 60cm(w) × 90cm(h)) with a net bottom. Hand made pools (ca.200cm(l) × 200cm(w) × 40 cm(d)) were prepared for swimming and the bathing of the birds. The pools were filled with fresh water. During the rehabilitation, the weight of the birds, and the volume (weight and number) of food given to them were recorded almost every day.

RESULTS

1. Species and number of oiled seabirds

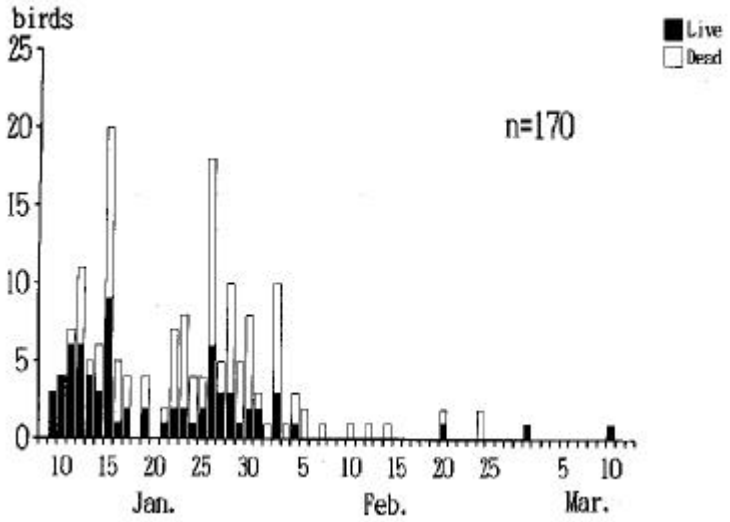


Fig. 1. Daily change in the number of seabirds rescued (live) and collected (dead).

A total of three birds of Kittiwake *Larus tridactylus*, Ancient Murrelet *Synthliboramphus antiquus* and Red - necked Grebe *Podiceps grisegena* was first rescued on 9 January. The number of retrieved birds increased, reaching the maximum (20 birds) on 15 January. The number decreased once, but increased again. From 3 February, three birds at most were daily found (Fig. 1). One bird of Black - tailed Gull *Larus crassirostris* was finally rescued

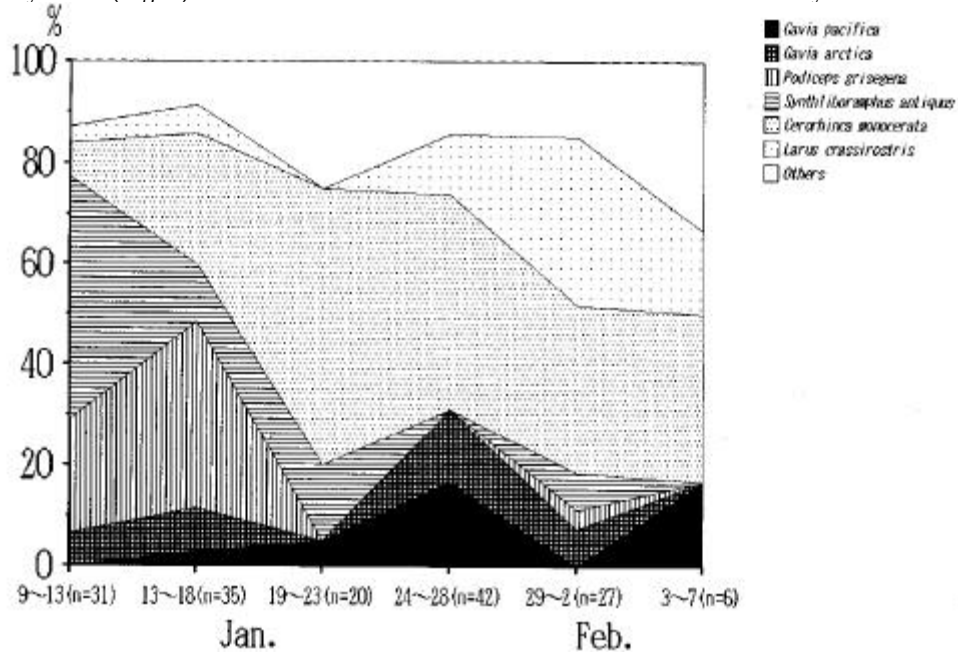


Fig. 2. Change in the species composition of seabirds rescued and collected.

on 10 March. Red - necked Grebes and Ancient Murrelets predominated during the first 5 day - period, followed by Hornbilled Puffins *Cerorhinca monocerata* and Pacific *Gavia pacifica* or Black - throated Divers *G. arctica* 10 days later and Black - tailed Gulls 20 days later (Fig.

Table 1. Species and number of the oiled seabirds rescued and collected in Fukui.

Order	Family	Species	Scientific name	Alive (birds)	Dead (birds)	Subtotal (birds)	Ratio (%)
Gaviiformes	Gaviiae	Red-throated Diver	*Gavia stellata*	1	0	1	0.6
		Pacific Diver	*Gavia pacifica*	5	6	11	6.5
		Black-throated Diver	*Gavia arctica*	11	2	13	7.6
Podicipediformes	Podicipedidae	Red-necked grebe	*Podiceps grisegena*	14	7	21	12.4
		Black-necked Grebe	*Podiceps nigricollis*	2	2	4	2.4
Plecaniformes	Phalacrocoracidae	Japanese Cormorant	*Phalacrocorax filamentosus*	2	4	6	3.5
		Pelagic Cormorant	*Phalacrocorax pelagicus*	0	2	2	1.2
Anseriformes	Anatidae	European Pochard	*Aythya ferina*	0	1	1	0.6
		Harleguin Duck	*Histrionicus histrionicus*	0	1	1	0.6
		Red-breasted Merganser	*Mergus serrator*	1	0	1	0.6
Charadriiformes	Laridae	Herring Gull	*Larus argentatus*	1	1	2	1.2
		Slaty-backed Gull	*Larus schistisagus*	0	2	2	1.2
		Common Gull	*Larus canus*	1	0	1	0.6
		Black-tailed Gull	*Larus crassirostris*	17	3	20	11.8
		Kittiwake	*Larus tridactylus*	1	1	2	1.2
	Alcidae	Common Guillemot	*Uria aalge*	0	1	1	0.6
		Ancient Murrelet	*Synthliboramphus antiquus*	14	11	25	14.7
		Least Auklet	*Aethia pusilla*	1	1	2	1.2
		Hornbilled Puffin	*Cerorhinca monocerata*	1	52	53	31.2
Unknown				0	1	1	0.6
5 orders	4 families	19 species	Total(birds)	72	98	170	100.0
			Ratio(%)	42.4	57.6	100.0	

2).

A total of 170 birds consisting of 19 species (six families of five orders) was found oiled along the seashore of Fukui Pref.: 72 live birds (42.4%) and 98 dead birds (57.6%). The majority of oiled birds was occupied by oceanic seabirds of Hornbilled Puffins (31.2%), Ancient Murrelets (14.7%), Pacific and Black-throated Divers (14.1% in total) and Red-necked Grebes (12.4%), which totally covered 86.4% of all the oiled birds (Table 1).

The average mortality of each species was 54.1 ± 36.3(SD)% (n=19 species). The patrol proved the mortality of Hornbilled Puffins was the highest (98.1%) (Table 1).

Oiled birds were found in a total of 12 municipalities in Fukui Pref., mainly in Awara Town (27.1%), Mikuni Town (22.4%) and Fukui City (15.9%) (Fig. 3).

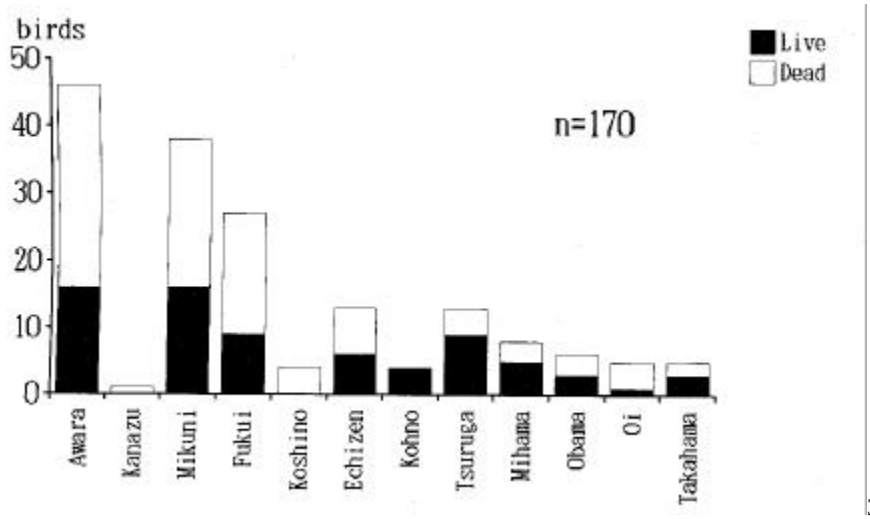


Fig. 3. Municipality where oiled seabirds were rescued and collected in Fukui.

2. Rehabilitation and change in the body weight of birds

A total of 72 birds (42.4% of all birds) of 14 species was rescued, of which 65 birds were medically treated and rehabilitated. The birds were cared for every day as follows:

1. Checking the remaining food set on the previous day
2. Checking the health condition and weighing the body
3. Feeding and medical prescription
4. Self bathing or cleaning
5. Self preening or drying
6. Keeping warmth (in winter)

The treatments of 3 to 6 were repeated if necessary.

Most of the birds were unable to intake water or food due to dehydration, oil pollution and stress of cleaning, so they were fed by hand with a mixture of minced fish, vitamins, glucose and so on. A few days later, the birds accepted fish themselves, mainly *Hypomesus*

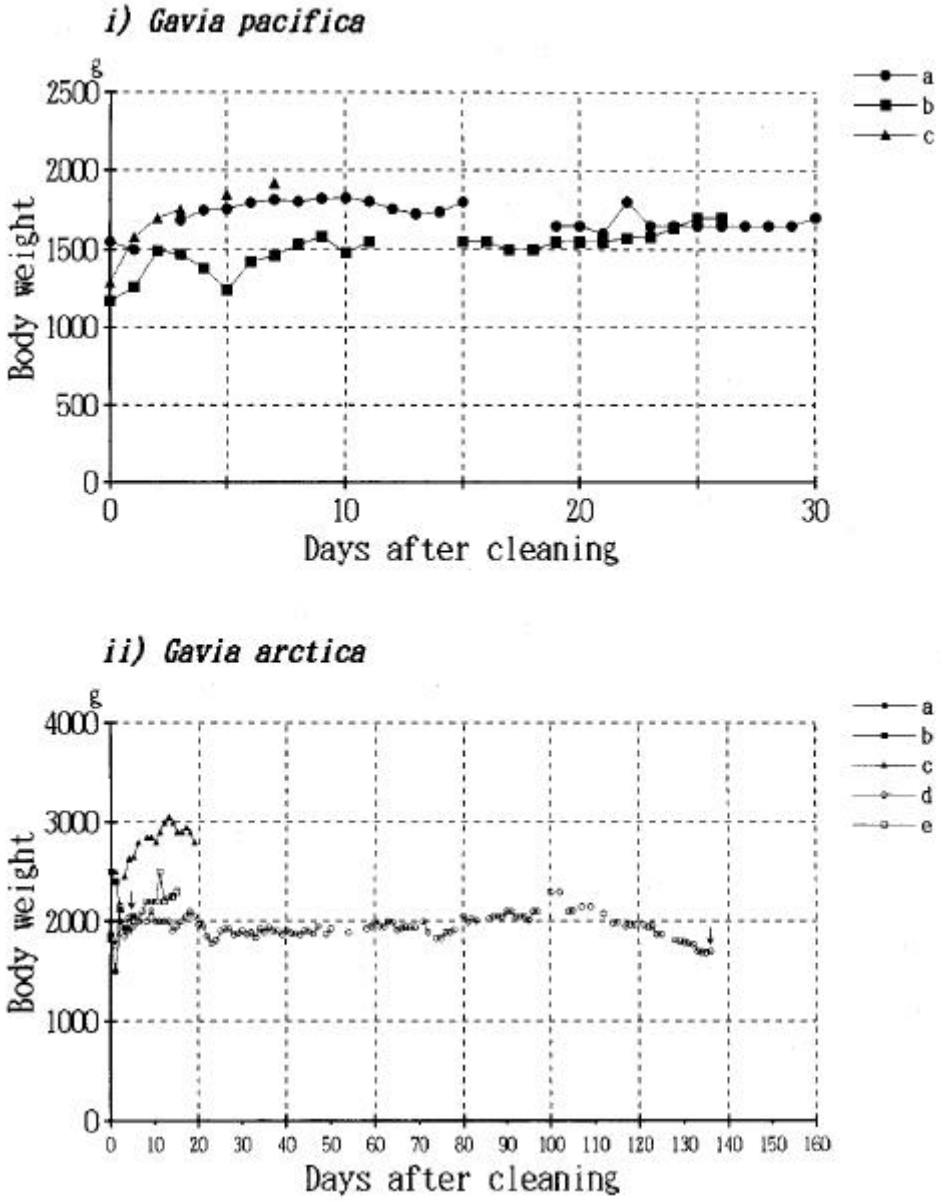
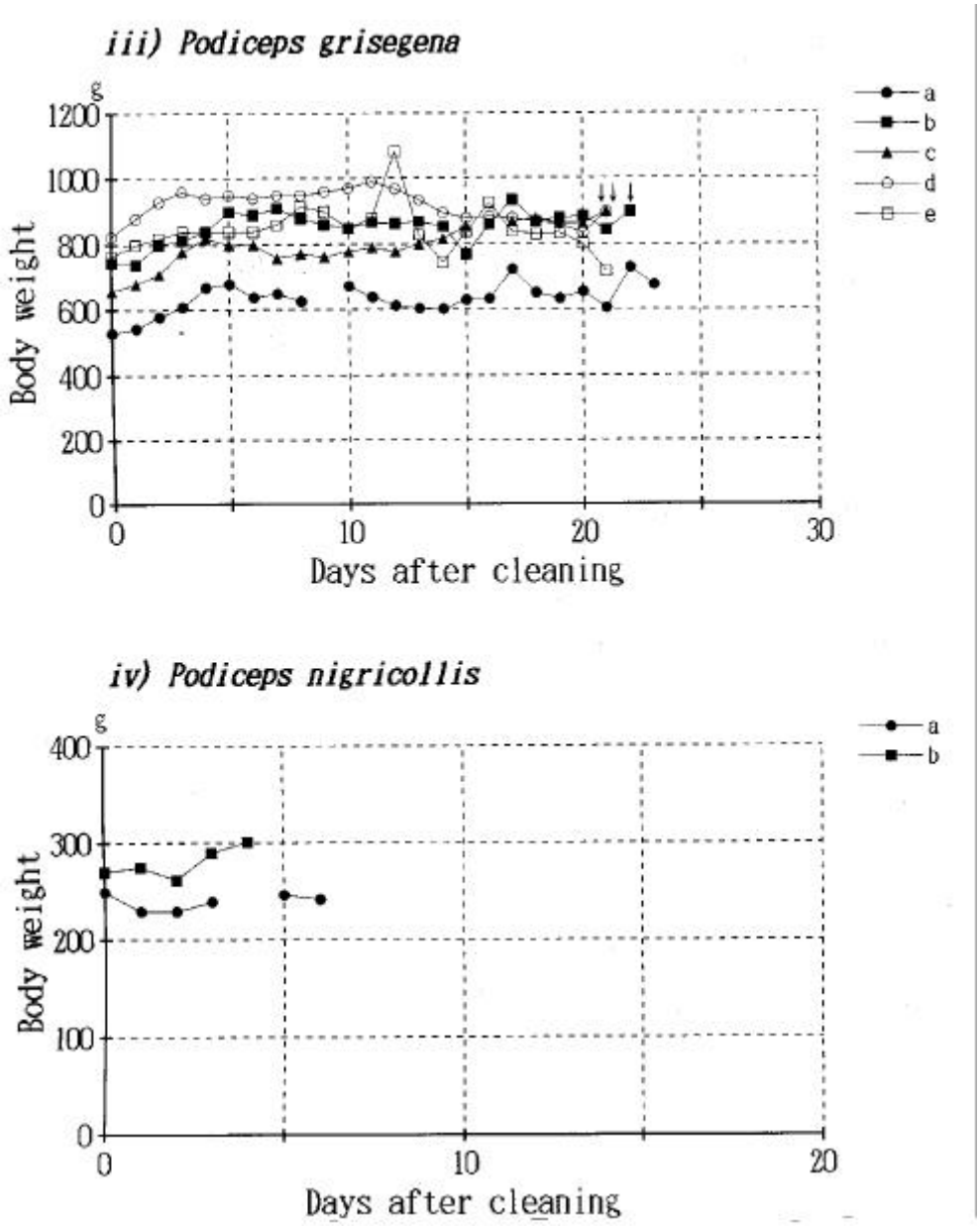


Fig. 4. Daily change in the body weight of seabirds after cleaning (continued).



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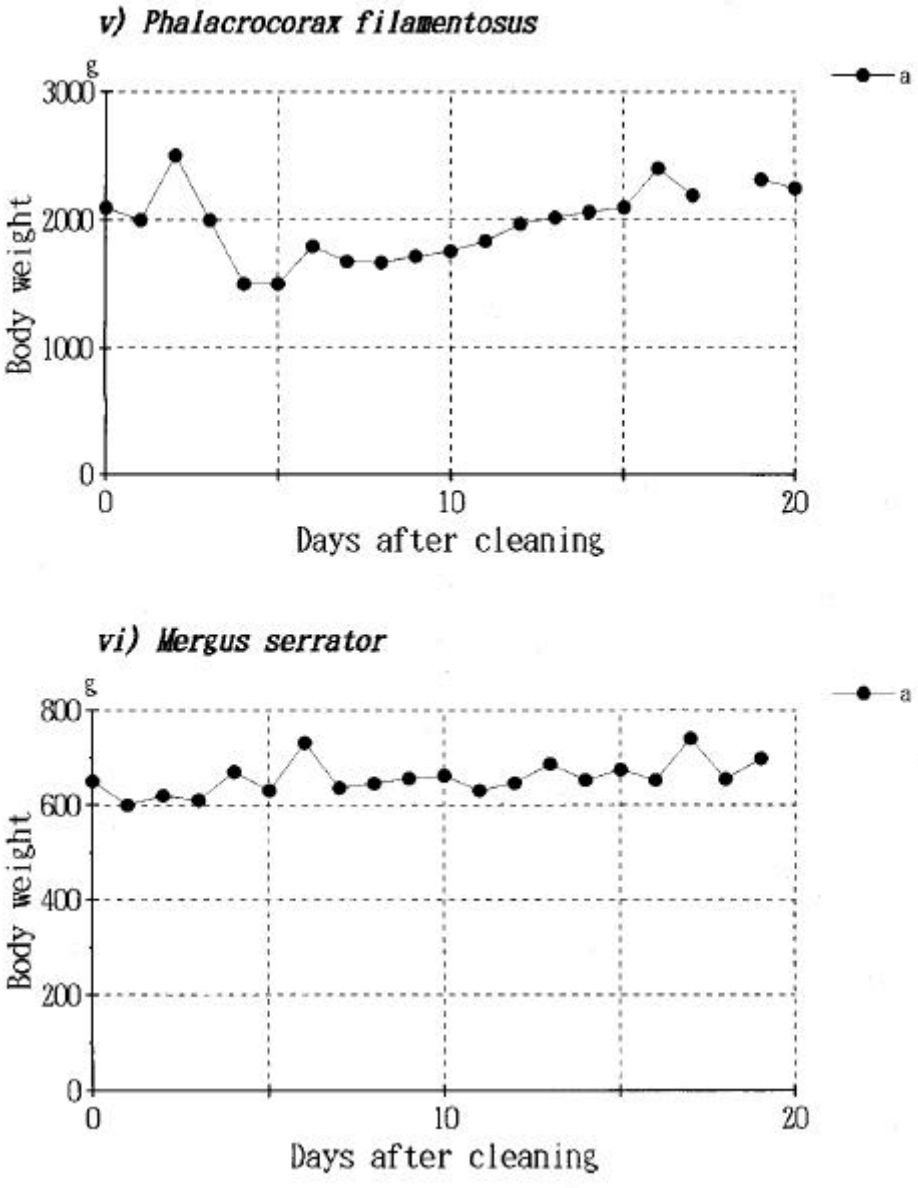

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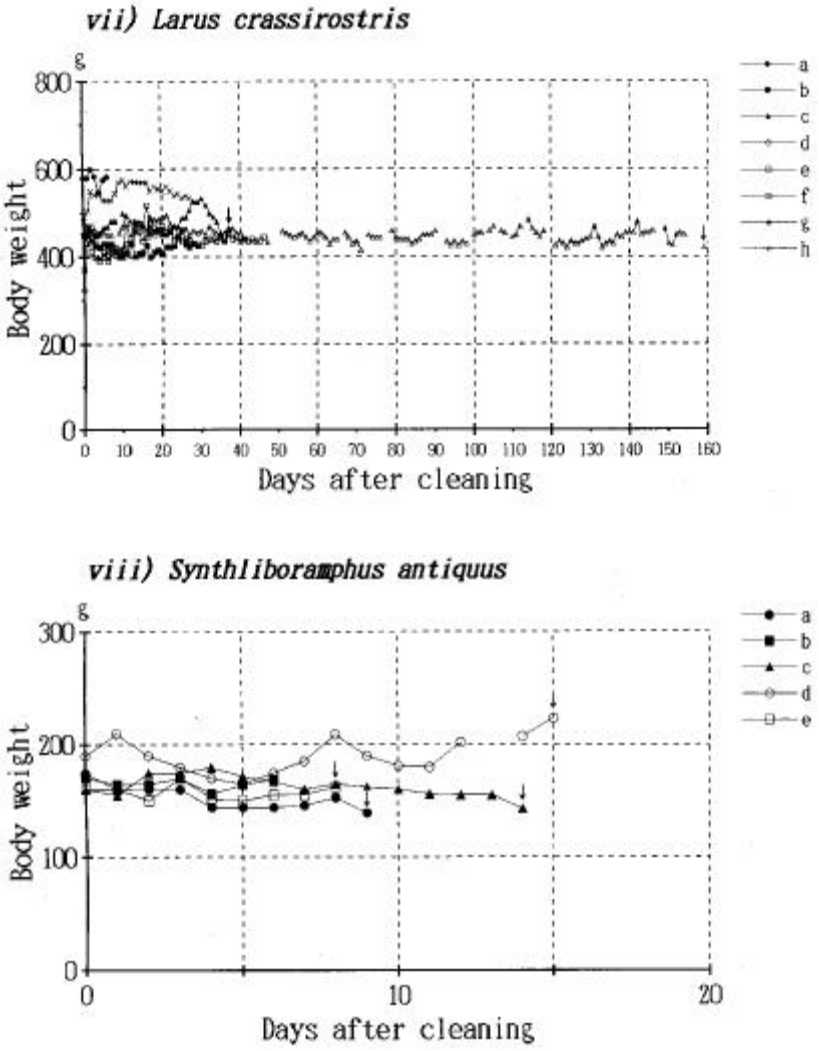

Fig. 4. Daily change in the body weight of seabirds after cleaning (continued).

nipponensis (pond smelts) and *Engraulis japonicus*, sometimes *Sardinops melanostictus*. Birds were fed sufficiently every day. The birds recovered their loss of body weight within several days (Fig. 4). There was a tendency that birds losing their body weight again ended in death. The weight (y g) of fish given for food was correlated with the body weight (x g) of the birds (Fig. 5) as follows:

$y = 23.4 + 0.28x$ ($r = 0.94$, $P < 0.001$, $n = 27$)

The average weight of a pond smelt was 7 g. The number (y fish) of fish given to birds

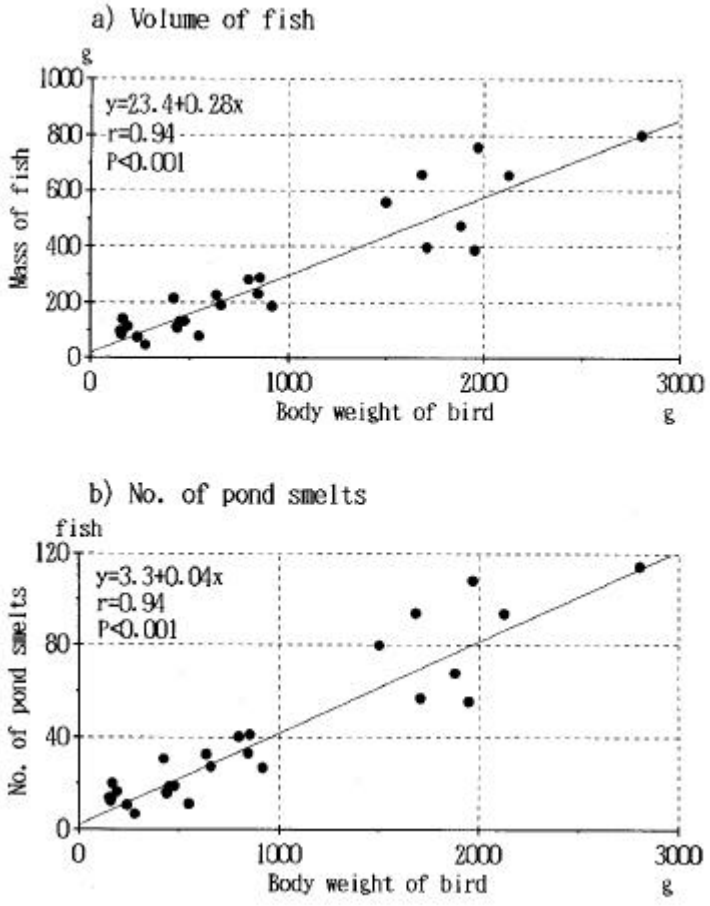

Fig. 5. Correlation of the volume (a) and number (b) of fish given to the body weight of the seabirds.

Table 2. Means (± SD) of the body weight of seabirds, the volume and number of pond smelts given to birds.

Species	Body weight of bird (g)	Volume of fish (g)	Number of fish (pond smelt)	n (birds)
Gavia pacifica	1,629 ± 114	539 ± 131	77 ± 19	3
Gavia arctica	2,189 ± 422	580 ± 185	83 ± 26	4
Podiceps grisegena	810 ± 106	243 ± 42	35 ± 6	5
Podiceps nigricollis	260 ± 28	61 ± 19	9 ± 3	2
Phalacrocorax filamentosus	1,969	757	108	1
Mergus serrator	657	191	27	1
Larus crassirostris	462 ± 46	129 ± 46	18 ± 7	6
Synthliboramphus antiquus	166 ± 15	107 ± 21	15 ± 3	5

was correlated with the body weight (x g) of birds significantly (Fig. 5) as follows:

$y = 3.3 + 0.04x$ ($r = 0.94$, $P < 0.001$, $n = 27$)

Birds of each species were fed with a food volume of 26.5 ～ 64.5% of their body weight (Table 2).

A total of 34 birds (20.0% of all birds) was transported to the releasing site after a mean of 11.7 ± 11.3(SD) days (range = 1 - 37 days, n = 34 birds). Birds which were physically handicapped during the rehabilitation died in a mean of 13.8 ± 36.2(SD) days (range = 0 - 160 days, n = 31 birds).

DISCUSSION

1. High mortality of oiled birds

Oil pollution extended over a total of 12 prefectures as a result of the accident of the Nakhodka. A total of 1,315 birds was retrieved from polluted areas (Japan Environment Agency, pers. comm.), of which a total of 170 birds (12.9%) was found in Fukui Pref. Of those 170 birds, 98 birds (57.6%) were collected as casualties. The high mortality seemed to be caused by bad weather conditions (high waves, coldness in winter).

Cleaning and rehabilitation recovered a total of 34 birds (20.0%) in Fukui, which was 47.2% of the rescued birds and 20.0% of all the birds. The low recovery rate was mainly due to insufficient facilities and to the lack of experts for seabird rescue. Furthermore, the hospitals for medical treatment and the center for rehabilitation were very far from the seacoast. It took a long time to transport the oiled or weakened birds, so resulted in high mortality of the birds.

It is difficult to provide a seabird rehabilitation center in every prefecture. It is realizable for the Environment Agency to have the center in Tokyo and to arrange the transportation system. Municipalities should prepare preliminary facilities and volunteers (veterinarian, keeper and ecologist) for rescuing wildlife.

2. Rehabilitation

It is necessary to rehabilitate seabirds paying attention to the points below.

1. Species identification and habit of birds
2. Size of cage and pool
3. Air - and water - conditioning
4. Lighting

The species of oiled birds were identified, which gave us the information of their habitat and habits. Most of the seabirds have a specific food diet and feeding behaviour (Nelson 1980). The birds were given several species of fish as food. Of them, Pond smelts were the most suitable: Birds swallowed the fish easily because the pond smelts have a long, slender and compact body. Some species foraged the fish in the pools better than in the boxes.

It was difficult for seabirds to walk on the ground because their legs were attached at the

rear of the body. This sometimes developed into injury and arthritis in the legs. Each bird was kept separately in the small wooden boxes (60cm(l) × 60cm(w) × 90cm(h)) with a net bottom, which restricted the mobility of the birds. However, the legs are apt to get dry, so we need to wet them with water. It is better for swimming pools to be wide and deep because the birds can relieve and bathe themselves, which reduces stress. If available, the pools should be filled with salt water; Fresh water might make seabirds sensitive to disease.

The room for keeping birds should be kept warm (ca. 25 ℃) and the air well circulated. The swimming birds got saturated in about ten minutes because the birds cleaned feathers could not repel the water. Such birds need to be cleaned again. It was necessary to dry out the feathers and down soon after bathing and swimming. Furthermore, high powered light helps to induce self preening.

Once the birds were injured or weakened in their legs, they could not get well, resulting in death. It was most important for us to recover birds for releasing as soon as possible.

ACKNOWLEDGEMENT

I am grateful to the staff of the municipalities, the members of the Wild Bird society and the volunteers who rescued and rehabilitated birds oiled in the accident. Also to Ms. Claire Meacock who read this manuscript and corrected my English.

SUMMARY

The Nakhodka, a Russian tanker, sank with C - type heavy fuel oil in the Sea of Japan, off the shore of Shimane Pref. on 2 January, 1997. The oil reached the coasts of Fukui Pref. between 7 and about 27 in January. A total of 170 birds, 19 species (six families of five orders) was found oiled along the seashore from 9 January to 10 March: 72 live birds (42.4%) and 98 dead birds (57.6%). The majority of the oiled birds was oceanic seabirds, Hornbilled Puffins (31.2%), Ancient Murrelets (14.7%), Pacific and Black - throated Divers (14.1% in total) and Red - necked Grebes (12.4%), which totalled 86.4% of all birds. The average mortality of each species was 54.1%, of which the rate of Hornbilled Puffins was the highest (98.1%). The weight and number of fish given were correlated with the body weight of the rehabilitated birds accordingly. Birds of each species were fed with a food volume of 26.5 ～ 64.5% of their body weight. A total of 34 birds (20.0% of all the birds) was transported to the releasing site after a mean of 11.7 days. Birds which were physically handicapped died in a mean of 13.8 days during the rehabilitation. The high mortality of the oiled birds seemed to be due to the bad weather conditions, insufficient facilities and a lack of experts for bird rescue in the area.

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福井県におけるナホトカ号沈没事故による重油汚染を受けた海鳥類の種とリハビリテーション

大迫義人[1]

ロシア船籍のタンカー，ナホトカ号が，1997 年 1 月 2 日に島根県沖の日本海で C 重油を積んだまま沈没した．船から流れ出た油が，1 月 8 日から 27 日頃にかけて福井県に漂着し，この事故で，1 月 9 日から 3 月 10 日までに，5 目 6 科 19 種 170 羽（72 羽の生体と 98 羽の死体）の海鳥が保護または回収された．その多くは，海洋性の鳥類であるウトウ（31.2%），ウミスズメ（14.7%），シロエリオオハムまたはオオハム（14.1% ）とアカエリカイツブリ（12.4% ）であった．死体で回収された個体数の割合は，種あたり平均 54.1%で，中でもウトウの死亡率は 98.1%と最も高かった．リハビリテーションで与えた餌の魚類の重量と尾数は，鳥類の体重と有意な正の相関があった．また，餌の重量は鳥類の体重の 26.5 〜 64.5%に相当した．全体の 20.0%にあたる 34 羽の鳥類が，保護されてから平均 11.7 日後に放鳥された．リハビリテーションの間に負傷した鳥類は，平均 13.8 日で死亡した．保護・回収およびリハビリテーションの時の高い死亡率は，事故時の悪天候および海鳥類救護の施設の不備と専門家の不足によるものと考えられる．

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