

History and status of sea otters, *Enhydra lutris* along the coast of Hokkaido, Japan

Kaoru Hattori^{1,*}, Ichiro Kawabe^{2,**}, Ayako W. Mizuno^{1,†} and Noriyuki Ohtaishi^{1,‡}

¹ Laboratory of Wildlife Biology, Graduate School of Veterinary Medicine, Hokkaido University, Sapporo 060-0818, Japan

² Division of Marine Environment and Resources, Graduate School of Fisheries Science, Hokkaido University, Minato-cho Hakodate, 041-8611, Japan

Abstract. We assessed the original and recent distribution of sea otters (*Enhydra lutris*) along the coast of Hokkaido, Japan, based on information of remains from archeological sites, old hunting records, and records of recent sightings obtained from interviews. Some remains, including pups from one archeological site, suggested the possibility that some small aggregations had historically been distributed around Hokkaido. However, sea otters seem to have disappeared prior to commercial hunting in the 18th and 19th centuries, as no records could be found documenting the hunting of otters around Hokkaido during that period. Since 1973, intermittent sightings of otters have been made around Hokkaido, and since 1996, the sighting frequency has increased. Between 1962 and 2001, 119 sightings and six dead otters were recorded around Hokkaido. The source population of these otters is probably in the Habomai Islands of the southern Kurils. However, due to increasing anthropogenic habitat disturbance, it is unlikely that a stable habitat for sea otters can be established in the coastal waters of Hokkaido.

Key words: incidental harvests, original distribution, records of recent sightings, sea otter.

Historically, the sea otter (*Enhydra lutris*) has been distributed along northern Pacific coastlines. Due to commercial hunting in the 18th and 19th centuries, sea otters were extirpated from most of their historical range (Kenyon 1969). Under protection of the international Fur Seal Treaty of 1911, sea otter populations began to recover and re-colonize their historical range. However, they have yet to reoccupy some areas, and some local populations have been fragmented (Fig. 1). From present distributions, three subspecies of sea otters are commonly recognized: Asian (*Enhydra lutris lutris*), Alaskan (*E. l. kenyoni*), and Californian sea otters (*E. l. nereis*; Anderson et al. 1996).

The range of the Asian sea otter extends from the Kuril Islands to the Commander Islands (Fig. 1). In 1991, 1,053 otters were counted around Etorofu Island, but no otters were counted in the Kunashiri, Shikotan, and Habomai Islands, which are the more southern areas

of the Kurils (Chyupakhina and Panteleeva 1991). However, in 1992, five otters (including two pups) were observed forming a raft (resting group) in waters around Todo Island in the Habomai Islands (Fig. 1; Osada 1994). The extent of the otters' range is determined by the position of the outermost main population raft of otters (Wild and Ames 1974; Lubina and Levin 1988). Therefore, Todo Island may be the current southern limit of the range established by the Asian sea otter.

In 1996, sightings of sea otters were reported along the eastern coast of Hokkaido, mainly at Nosappu Cape, which is outside of the established range (Fig. 1). Several instances of such sightings have been featured in the media, and residents reported that sea otters had been observed during several years prior to the official reports. However, such information has been sporadic, and the present status of sea otters around Hokkaido is not well understood.

*To whom correspondence should be addressed. E-mail: khattori@affrc.go.jp

**Present address: The Suisan-Keizai Osaka Branch, Ebie 5-2-2-5-412, Fukushima, Osaka 553-0001, Japan

†Present address: SOYA MARINE MAMMAL NETWORK, JAPAN, PC03-No.304, Hamanasu 1-6-4, Wakkanai, Hokkaido 097-0011, Japan

‡Present address: Rakuno Gakuen University, Bunkyo-dai Midorimachi 582, Ebetsu, Hokkaido 069-8501, Japan

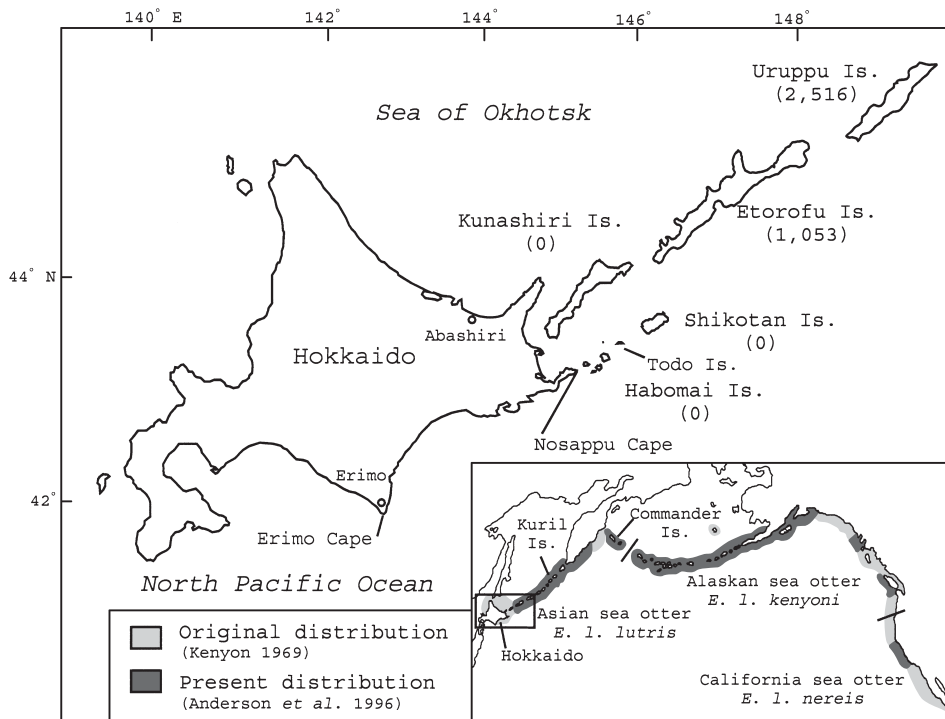


Fig. 1. Map of study area, Hokkaido, and original and present distribution of sea otters. Parentheses indicate the number of otters from Chyupakhina and Panteleeva (1991).

Hokkaido has generally been considered to be one of the original habitats of sea otters (Barabash-Nikiforov 1947; Kenyon 1969). However, Kitagamae (1980) suggested that Hokkaido may not have formed part of the original range because of the paucity of sea otter remains from archeological sites in Hokkaido and the lack of records of sea otters being commercially hunted around Hokkaido in the 18th and 19th centuries. Information from recently excavated remains therefore warrants detailed examination. Moreover, after assessment of these data, it may be necessary to reexamine Hokkaido as the possible original southern limit of the Asian sea otter.

In this study, we examined the original distribution of the Asian sea otter in Hokkaido using information from remains, including those newly excavated from archeological sites, and hunting records found in historical documents. We also compiled records of recent sightings from interviews. We discuss the possibility of range expansion by the Asian sea otter.

Material and methods

Study area

Hokkaido is located in the northern part of Japan. The

eastern part continued from the Kuril Islands and connects with the Habomai Islands and Kunashiri Island (Fig. 1). The northeastern coast faces the Sea of Okhotsk and is covered by drift ice in winter, while the southeastern coast faces the Pacific Ocean. Hokkaido has high levels of commercial fishing activity, sustained by rich marine resources.

Historical changes in occurrence

The historical distribution of otters during cultures such as Jomon, Epi-Jomon, Okhotsk, and Satsumon (from before the Common Era to about the 9–14th century) and in the 18th and 19th centuries (during the period of commercial hunting) was assessed using records of archeological remains and hunting records, respectively. Initially, we collected information about sea otter remains excavated from archeological sites in northern or eastern areas of Hokkaido. Scientific reports and articles (see Fig. 2 and Appendix 1), such as reports of archeological investigations, were used only when they mentioned marine mammal remains. We also examined descriptions of sea otter hunts around Hokkaido and the Kuril Islands using primary historical documents as well as reviews of such documents (see Appendix 2). The review articles were written by zoologists, archeolo-

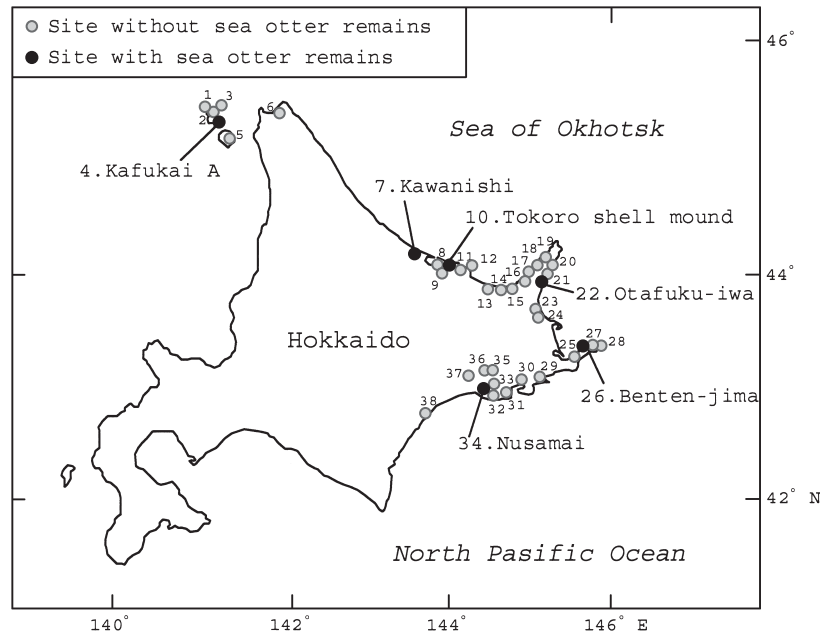


Fig. 2. Archeological sites with remains of marine mammals at the northern and eastern Hokkaido. The name of sites, location and sources of information are shown in Appendix 1.

Table 1. Sea otter remains excavated from archeological sites at the northern or eastern Hokkaido shown in Fig. 2.

Site, Location*	No. of fragments	Part of bone (No. of fragments)	Source of information
4 Kafukai A site, Rebun	3	Canine (3)	Nishimoto (1981)
7 Kawanishi site, Yubetsu	2	Limb bone (1), skull (1)	Nishimoto (1995)
10 Tokoro shell mound, Tokoro	1	Humerus(1)	Naora (1964)
22 Otafuku-iwa site, Rausu	1 (3?)**	Mandible (1) (humerus 1, scapula 1, coxa 1)**	Nishimoto & Sato (1991)
26 Benten-jima site, Nemuro	1	First premolar (1)	Kitagamae (1980)
34 Nusamai site, Kushiro	344†	Skull (8), proximal phalanx (62), ulna (26), femur (25) etc.	Kaneko (1996, 1999)

* Refer in Fig. 2.

** Parentheses indicate that the species estimate was considered unreliable.

† Including remains of pup.

gists, naturalists and historians, and considered topics such as natural history, history of the fur trade, and the culture of marine mammal hunting.

Based on these data, we discuss the possibility that sea otters were originally distributed around Hokkaido.

Modern occurrence

We obtained information on sea otter sightings by interviewing local residents, museum staff and researchers, and marine mammal and bird watchers. These were the core marine wildlife observers along the eastern coast of Hokkaido. Data obtained included dates, locations, number of individuals, and characteristics and behaviors of sea otters. Data were also collected from the mass media, scientific reports (Imaizumi 1984; Kondo and Hattori 1999; Ishikawa 2004), and our unpublished

observation data. Most of these data are owned by individuals and were provided to us voluntarily.

Results

Remains from archeological sites

Reports or articles concerning 38 Hokkaido sites with marine mammal remains were examined (Fig. 2, Appendix 1). Six of these 38 sites (Sites 4, 7, 10, 22, 26, and 34 in Fig. 2) contained sea otter remains. Table 1 shows sea otter remains excavated from archeological sites in Hokkaido. Five of the six sites contained very few bone fragments (Naora 1964; Kitagamae 1980; Nishimoto 1981, 1995; Nishimoto and Sato 1991); however, the Nusamai site in Kushiro (Site 34 in Fig. 2) had 344 fragments of sea otter bones from at least seven or eight

Table 2. Summary of recent sighting records of sea otters around Hokkaido for every location shown in Fig. 3. The number indicated the total days of otters observed. Numbers in parentheses represent the maximum number of otters observed at the same time. The record that two otters were observed concurrently was regarded as two days observed.

Year	Location [†]						Total	Remarks
	E	K	O	I	N	U		
1973		1(1) ^{ab}					1(1)	
1974		1(1) ^{*ab}					1(1)	*Hauling out
1980		1(1) ^{*ab}					1(1)	*Adult male feeding
1984			1(1) ^c				1(1)	
1985		1(1) ^c					1(1)	
1986	3(1) ^d	2(1) ^c		3(1) ^{*f}			8(1)	*Feeding on shellfish
1987	1(1) ^d	1(1) ^c		1(1) ^c	1(1) ^g		4(1)	
1988	1(1) ^d						1(1)	
1990	5(1) ^d						5(1)	
1993		2(1) ^c					2(1)	
1994					2(2) ^c		2(2)	
1996				12(2) ^{*h}	11(1) ^{**cgij}		23(2)	*Subadult; **Juvenile male attacking bird, hauling out and feeding on sea urchin
1997				3(1) ^{*ci}	19(1) ^{**cg}		22(1)	*Subadult; **Attacking bird, hauling out and feeding crab, scallop, starfish and sea urchin
1998					12(1) ^{*cgj}		12(1)	*Young attacking bird, and hauling out
1999				10(2) ^{*f}	2(1) ^g	1(1) ^k	13(2)	*Subadults feeding clam and crab
2000		1(1) ^c					1(1)	
2001	14(1) ^{*dj}			3(1) ^{**hj}	4(1) ^{el}		21(1)	*Hauling out; **Subadult male feeding clam and hauling out
Total	24	10	1	32	51	1	119	

[†] E, Erimo; K, Kiritappu; O, Ochiishi; I, Yururi, Moyururi and Habomaimoshiri Is.; N, Nosappu; U, Utoro shown in Fig. 3.

^a Imaizumi (1984).

^b Yomiuri Shinbun Press (1981).

^c Personal communication with H. Homma, Mainichi Newspapers.

^d Ishikawa (2004).

^e Personal communication with Y. Kataoka, Manager of Wildlife Sanctuary.

^f Personal communication with J. Chisima, Kuril Seal Research Group.

^g Personal communication with H. Takemura, Gift shop owner in Nosappu cape.

^h Personal communication with Y. Osa, Hokkaido Institute of Environmental Sciences.

ⁱ Personal communication with S. Kawasaki, Wild Bird Society of Japan.

^j Our unpublished data.

^k Personal communication with Y. Masuda, Shiretoko Museum.

^l Personal communication with N. Aoki, Wild Bird Society of Japan.

animals (Kaneko 1996, 1999). Fragments of bones from pups were also excavated at the Nusamai site.

Hunting records in old documents

Hunting of sea otters around Hokkaido and the Kuril Islands has been reviewed in several articles (e.g., Snow 1910; Kitagamae 1980; Kojima 1994; Wada 1997; Uni 2001, Appendix 2). Most of the articles describe production areas and the amount of otter pelts handled in Japan. None of these articles have included records of sea otters

being hunted around Hokkaido. Otters were hunted mainly at Etorofu and more northerly islands, and to a lesser extent at the Shikotan and Habomai Islands (Snow 1910). Before the era of commercial hunting in the 18th and 19th centuries, Hokkaido Ainu had visited the southern Kuril Islands (mainly Uruppu Island) and obtained sea otter pelts either from hunting or by bartering with Kuril Ainu (Inukai 1974; Niioka 1977; Kojima 1994; The Hokkaido International Trade and Industry Promotion Association 1995). From the late 18th century, sea

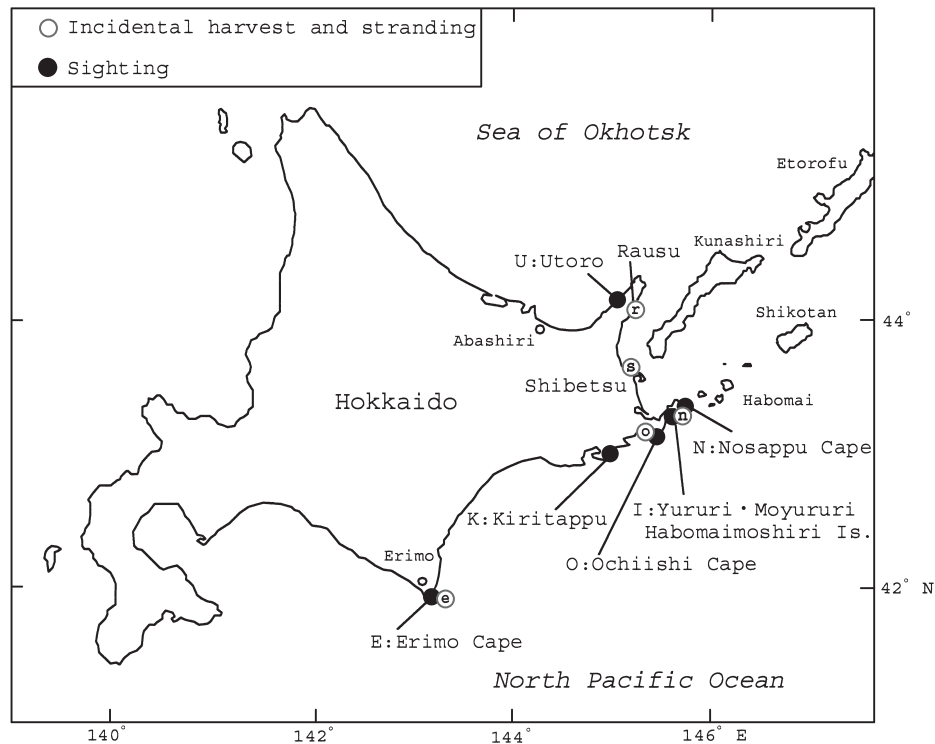


Fig. 3. Recent records of sea otters around Hokkaido shown in Table 2 and 3.

otters were hunted commercially in Uruppu and Etorofu Island by Russians (Snow 1910; Wada 1997). In 1873, the government of Japan began to hunt around Etorofu Island, and foreigners were excluded (Wada 1997; Uni 2001). Hunting by the government and some private Japanese companies continued until 1945 (Uni 2001). From the 17th to the mid-20th century, sea otter pelts were transported to Hokkaido and Honshu (the main island of the Japanese archipelago) from the Kuril Islands.

Records of recent sightings

Records of sea otter sightings were mainly obtained from researchers and seal and bird watchers, who had made relatively consistent observations each year. Some information was added by one local gift shop owner and by museum staff who were in possession of local information. Reports in the mass media also contributed to the records. Table 2 shows the recent records of sea otters observed along the coast of Hokkaido. The numbers in Table 2 indicate the total days on which otters were observed. If two or more otters were observed on one day, the sighting was treated as two or more days.

The first confirmed sighting of a live sea otter in Hokkaido was made in March 1973, at Kiritappu

(Imaizumi 1984; Yomiuri Shinbun Press 1981; Fig. 3). Thereafter, sea otters were observed intermittently, and since 1996, sightings have increased. In total, 119 sightings were recorded from 1973 to 2001 (Table 2).

Almost all records of sightings come from five locations along the Pacific coast between Nosappu and Erimo (Erimo Cape; the Kiritappu area; Ochiishi Cape; Yururi, Moyururi, and Habomaimoshiri Islands; and Nosappu Cape); only one sighting was recorded on the Okhotsk side, at Utoro (Fig. 3).

Two otters were observed together in three cases (1994, 1996, and 1999); all other sightings were of single animals (Table 2). There were no reports of females with pups. Three cases (1980, 1969, and 2001) were recorded as male otters based on observations of the external genitalia (Table 2).

Feeding behavior was recorded at Kiritappu, Moyururi Island, Nosappu Cape, and Erimo Cape (Table 2). At Moyururi Island, otters mainly ate clams (Chishima 2000; unpublished data). Otters also frequently foraged for sea urchins after short dives at Nosappu Cape (unpublished data).

Otters were observed hauling out and resting on rocks separated from the shore at Nosappu Cape, Moyururi Island, and Erimo Cape.

Table 3. Records of stranding and incidental harvests of sea otters around Hokkaido shown in Fig. 3.

Year	Month	Location	Remarks	Source of information	
1962	(Fall)	s*	Shibetsu	Incidental take by salmon trap net, adult	Kondo & Hattori (1999)
1983	May	r	Rausu	Incidental take by salmon trap net, female, adult	Kondo & Hattori (1999)
1987	Dec.	n	Nemuro	Stranding	Kondo & Hattori (1999)
1996	Aug.	o	Ochiishi	Incidental take by salmon trap net, male, 6 years old	Kondo & Hattori (1999)
1998	Oct.	n	Nemuro	Incidental take by salmon trap net	Kondo & Hattori (1999)
2001	Dec.	e	Erimo	Incidental take by gill net	Ishikawa (2004)

* Refer in Fig. 3.

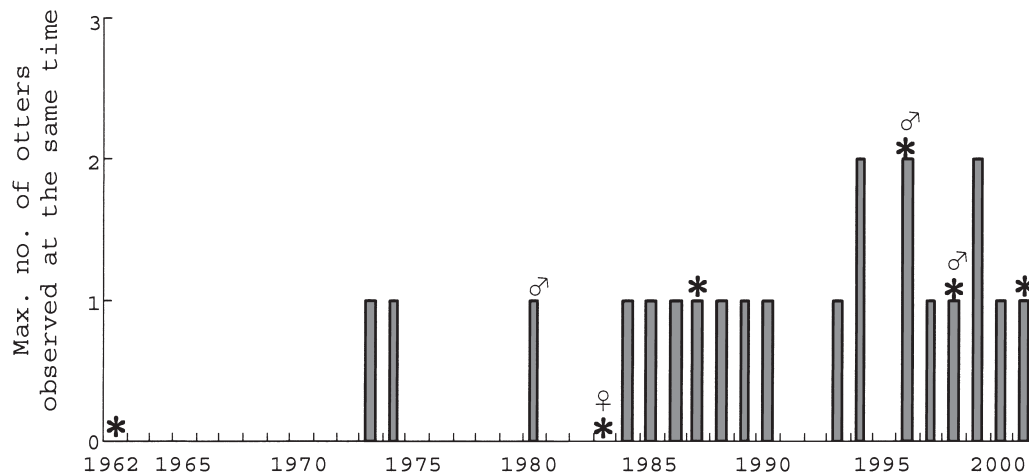


Fig. 4. Summary of records of sea otters visiting Hokkaido. *Incidental harvest or stranding occurred.

Stranding and incidental harvests

In addition to the sighting records, Kondo and Hattori (1999) and Ishikawa (2004) reported one stranded animal and five incidental harvests in fishing nets (Table 3, Fig. 3). The first case of an incidental harvest was recorded in 1962, well before the first confirmed sighting occurred in 1973. The latest incidental harvest occurred in 2001 offshore from Erimo (Ishikawa 2004). In total, six dead otters have been reported along the Hokkaido coast since 1963.

Records of sightings and dead animals are compiled in Figure 4. One or two otters were observed each year after a dead animal was reported, excluding 1963. The number of otters visiting Hokkaido, estimated from stranding events and the numbers of otters observed at the same time, seems to have been increasing since the late 1990s.

Discussion

Historical changes in occurrence

Compared to other marine mammals, sea otter remains

have been excavated from few sites. One site, however, contained the remains of otter pups, suggesting that this offshore site was a breeding ground for sea otters (Kaneko 1996, 1999).

We found no records of sea otters being hunted around Hokkaido between the 17th and 20th centuries. Most review articles describe otter hunting records, including commercial hunting, summaries of the trade, and the amount of harvest and production area of sea otter pelts. These records may not provide direct evidence of sea otter distributions. However, the lack of hunting records for Hokkaido suggests that insufficient numbers of otters occurred there to support hunting. During this period, sea otter pelts were of great value as trade items, and it is unlikely that some hunting would not have occurred if otters were present in the area. Hokkaido Ainu went as far as Uruppu or Etorofu Island, and occasionally to Kunashiri, Shikotan, and Habomai Islands, to obtain otter pelts.

Based on these facts, we infer the following: historically, in the period spanning the Jomon to the Satsumon culture, some small aggregations of otters existed around

Hokkaido. However, Hokkaido was not a stronghold in the sea otter range, and they disappeared before the onset of commercial hunting. In the 18th and 19th centuries, some otters inhabiting the southern Kuril Islands may have occasionally visited Hokkaido, as they have recently.

The timing of and the reason for the disappearance of the otters remain unclear. Simenstad et al. (1978) indicated that localized overexploitation by indigenous people apparently occurred in some areas, and a substantial reduction in sea otter populations may have resulted. Further excavations and analyses of remains from archaeological sites should provide more information about the historical distribution of the Asian sea otter.

Present status

During the period from 1962 to 2001, 119 sightings and six dead otters were recorded around Hokkaido. Since 1996, the number of sightings has increased, and at least four individual animals have visited Hokkaido. The increase in the number of sightings may reflect increased observation efforts and/or an increase in the number of otters visiting or and increase in the duration of their visits around Hokkaido.

Observation efforts vary by site, rather than by year. For example, most sighting records in Erimo (E in Table 2) and three islands (I in Table 2) were made by seal and bird researchers. In Erimo, little information on sea otters was available before 2000, although seal observations have been conducted there almost daily since 1988. Ishikawa (2004) reported that one otter was sighted on 14 days in 2001 and almost every day since 2002. In the Yururi and Moyururi Islands, which are the main locations of sighting records in the three islands, seal researchers have conducted periodic surveys for 2 weeks of each summer since 1983. Whereas the effort has remained constant, sightings have increased since 1996.

No periodic surveys are conducted in Nosappu Cape (N in Table 2), and sightings of sea otters there were mainly recorded by a gift shop owner who represents local information from various groups such as local residents, tourists, and bird watchers. Although some individuals may have searched intensively for sea otters since 1996 when frequent sightings were reported by the mass media, the overall annual observation effort seems relatively constant. Thus, it appears that sea otters have visited Nosappu Cape more frequently since 1996 than they did previously.

Although observation efforts have been comparatively

constant, few otters were observed in 2000. At this time, otters may have remained within their home ranges. The events that cause individual otters to visit Hokkaido are unclear, but drift ice around their home range may be a trigger.

In Hokkaido, sea otters were mainly observed on the Pacific coast between Nosappu Cape and Erimo Cape. The nearest established population of sea otters to these areas is located at Todo Island in the Habomai Islands (Osada 1994). The sea otter population in the southern region of the Kuril Islands has made a remarkable recovery from the overexploitation of the 18th and 19th centuries in the Etorofu and Uruppu Islands, but not in the Habomai, Shikotan, and Kunashiri Islands (Kuzin 1984). Since 1990s, sea otters have reoccupied Todo Island (Osada 1994). It seems that some individuals from the Etorofu population have dispersed and have recolonized the Todo Islands.

Nosappu cape is close (about 50 km) to Todo Island. This is a short enough distance for sea otters to move seasonally and disperse across (Riedman and Estes 1990). Therefore, the Habomai Islands are probably the source of the otters observed around Hokkaido. The recent increase in recorded sightings in Hokkaido may result from population growth in the Habomai Islands. The recovery of sea otter populations is primarily the result of range expansions initiated by peripheral groups of males (Riedman and Estes 1990). In this study, some of the otters observed and caught in fishing nets were males, and they could have been individuals that had dispersed from the Habomai Islands to Hokkaido. We think that otters will be observed more often in Hokkaido if the number of otters in the Habomai Islands continues to increase.

The possibility of range expansion

In Mexico, which represents the southernmost limit of sea otter distribution in the northeast Pacific, there have been sporadic sightings of otters for the last 30 years (Rodriguez-Jaramillo and Gendron 1996; Gallo-Reynoso and Rathbun 1997). Gallo-Reynoso and Rathbun (1997) discussed the possibility of re-establishing sea otters in Baja California, Mexico, and suggested that it would be difficult because the economic and social conditions were not good for maintaining sea otter habitats.

Here we discuss the possibility of establishing a stable habitat for sea otters in the coastal waters of Hokkaido. With regards to biological conditions, the southern limit of sea otters in the eastern Pacific coincides with the 20

to 22°C isotherm, which is also the approximate southern limit of cool water upwelling and the distribution of giant kelp (*Macrocystis pyrifera*; Kenyon 1969; Estes 1980). The kelp canopy is an important, although not essential, habitat component for otter foraging and resting (Riedman and Estes 1990). In eastern Hokkaido, the Oyashio cold current and upwelling emerges, and the surface kelp canopy is formed in the summer by annual *Laminaria* species, as it is in the western Aleutian Islands.

The shallow rocky coast of eastern Hokkaido is expected to contain food resources for otters. Sea otters could use the rocks off the coast for resting, as they do at Nosappu Cape, Moyururi Island, and Erimo Cape.

However, disturbance by current human activities, especially fisheries, is likely to make it difficult for otters to establish colonies around Hokkaido. Sea urchins appear to be one of the first species consumed by sea otters when they expand their range into new area. Furthermore, in areas inhabited by otters, there is abundant evidence that predation reduces the density and mean size of urchins (Duggins 1980). Estes and VanBlaricom (1985) suggested that there is little doubt that the presence of sea otters is incompatible with urchin fisheries. Nosappu Cape maintains a cultural sea urchin fishery, and otters have been observed foraging for sea urchins in this area. The establishment of sea otters in areas around Hokkaido would certainly impact shell-fisheries.

At least five otters have been caught in fishing nets around Hokkaido. The only law in Japan concerning sea otters is the “Law of Hunting Control of Sea Otters and Fur Seals”, which prohibits only intentional capture. The law does not necessarily work effectively to conserve and manage this species.

Sea otters are a keystone species in the nearshore environment, and they promote the growth of kelp, which in turn has a variety of community- and ecosystem-level consequences (Estes 1996). Although marine communities would benefit from the establishment of a sea otter population on Hokkaido, the present status of the Hokkaido coastline is not considered suitable for the establishment of a sea otter population.

Further studies are required to assess the impact of sea otter predation on marine ecosystems and fishery activities, including: (1) collecting and accumulating more information about sea otters visiting Hokkaido, (2) collecting observation records of foraging behavior to estimate food availability, and (3) monitoring the status of the source population in the Habomai Islands. Dead otters around Hokkaido will also give us a valuable

opportunity to study genetic and morphological features and dietary habits. These analyses are important for the conservation and management of the Asian sea otter.

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Appendix 1.

Name of archeological sites, locations and references examined.

1. Hamanaka II site, Rebun; Sato, T. and Nishimoto, T. 1992. Faunal remains. In (U. Maeda and K. Yamaura, eds.) *Archeological Investigation in Hamanaka II, Rebun island, Hokkaido*. Pp. 108–123. Rebun Municipal Board of Education, Rebun (in Japanese with English abstract).
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6. Onkoromanai Shell Mound, Wakkanai; Kaneko, H. 1973. Faunal remains of Onkoromanai Shell Mound. In (T. Oba and H. Ooi, eds.) *Research of Okhotsk Culture I: Onkoromanai Shell Mound*. Pp. 187–246. Tokyo University Press, Tokyo (in Japanese).
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8. Sakaeura I site, Tokoro; Kaneko, H. 1985. Faunal remains of Sakaeura I site. In (The Institute of Archaeology and Tokoro Field Laboratory, eds.) *Sakaeura I Site: the Report of the Archeological Investigation in the Lower Tokoro River Region, Northern Hokkaido*. Pp. 320–327. University of Tokyo, Department of Literature, Tokyo (in Japanese with English abstract).
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11. Tokorogawa-kakou site, Tokoro; Niimi, N. 1996. Faunal remains excavated from XIV, XV and XVI settlements in Tokorogawa-kakou site. In *Tokorogawa-kakou Site I*. Pp. 599–614. Tokoro Municipal Board of Education, Tokoro (in Japanese).

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23. Ichani Chishine I site, Shibetsu; Nishimoto, T. 1992. Faunal remains of Ichani Chishine I Site. In Ichani Chishine I Tateanagun Site. Pp. 138–142. Shibetsu Municipal Board of Education, Shibetsu (in Japanese).
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Appendix 2.

References examined about hunting records.

References	Field	Hunting area described
Inukai (1974) (see in References)	natural history	Uruppu
Isono, N. 2002. Chronology of natural history in Japan. Heibonsha, Tokyo, 944 pp (in Japanese).	natural history, history of fur trade	Etorofu
Kitagamae (1980) (see in References)	archeology, sealing culture	Uruppu and more northern islands
Kojima (1994) (see in References)	history of fur trade	Kamchatka, northern Kuril Islands
Niioka (1977) (see in References)	natural history, history of fur trade	Uruppu and more northern islands
Snow (1910) (see in References)	natural history, travel report	Etorofu and more northern islands, Shikotan, Habomai
Terashima, R. 1987. Wakan Sansai Zue 6. Heibonsha, Tokyo, 388 pp (in Japanese, translated by Shimada, I, A. Takeshima and M. Higuchi).	encyclopedia	Uruppu
The Hokkaido International Trade and Industry Promotion Association (1995) (see in References)	history of fur trade	Etorofu
Ueno, M. 1973. History of natural history in Japan. Heibonsha, Tokyo, 680 pp (in Japanese).	natural history, history of fur trade	Etorofu
Uni (2001) (see in References)	history of fur trade, sealing industry	Uruppu and more northern islands
Wada (1997) (see in References)	history of fur trade, sealing industry	Etorofu