

The first attempt at Brood Manipulation of the Golden Eagle *Aquila chrysaetos* in Japan

Takehiko Inoue

INTRODUCTION

The Society for Research on the Golden Eagle (SRGE) has recorded 124 pairs and estimated the total to be less than 400 birds for the whole of Japan (SRGE 1986). Figure 1 shows the number in each local area in Japan. The Golden Eagle is resident in Japan, with an average home range of 60.8km² per pair (SRGE 1987).

It preys especially on the Japanese Hare (*Lepus brachyurus*), Copper Pheasant (*Phasianus soemmerringii*) and Blue-green Snake (*Elaphe climacophora*). In a few cases, eagles take foxes and the young of Japanese Serow (SRGE 1984).

The breeding success rate is low. From 1986 to 1990, this rate decreased to 40.7% by comparison with the rate for the previous five years (SRGE 1992).

In most cases, two eggs are laid and both hatch but only one fledgling survives due to sibling aggression. As a result, the maximum number of eagles fledged in Japan each year is around 20 birds. The eagle population is also seriously affected by human impacts such as road construction, power line tower construction, logging and deforestation. As a result of these factors, habitat abandonment, breeding failures and a decline in frequency of appearance have been found. Twenty-one such cases have been reported, representing 17% of all pairs living in Japan (SRGE 1991).

At this rate, the Golden Eagle in Japan will be faced with extinction. It is calculated that to maintain the present population, 75 fledglings per year are needed.

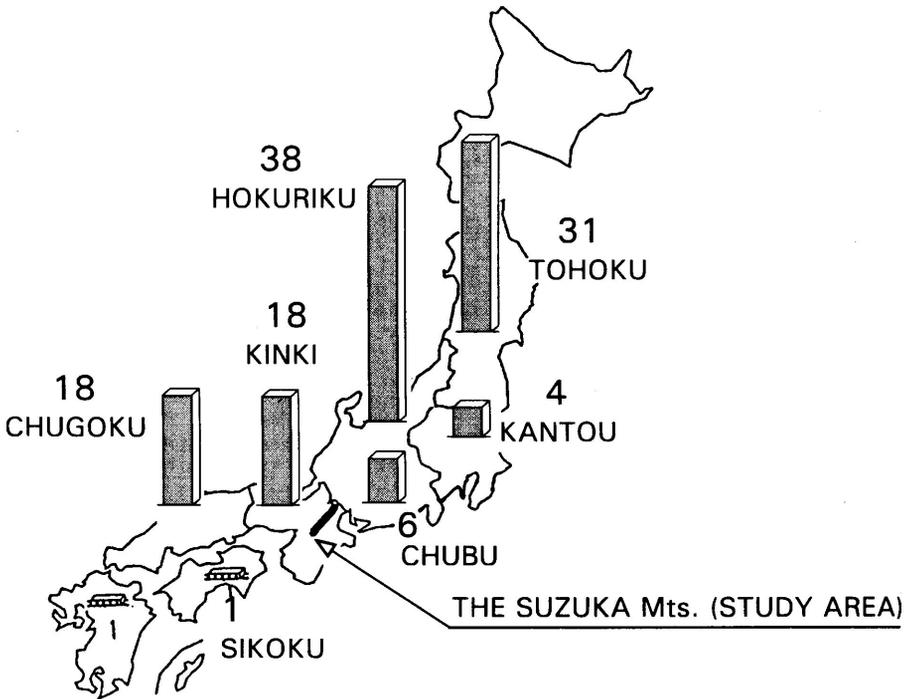
Despite having been designated a National Monument, a Special Bird for Protection and an Endangered Bird, no practical projects have been carried out to conserve the species. Therefore, as a test case, we attempted brood manipulation in April 1987, using the foster method with birds of the same species, in order to increase the number of fledglings. This project was submitted to the prefectural government and legally approved.

METHOD

We have six pairs of Golden Eagle in our study area in the Suzuka mountains (775km² at an altitude of 300m and over) in central Honshu island. The nest of the pair providing the chick in this project is 19 miles from the nest of the foster pair.

Table 1 shows the progress of this project. The foster chick was the younger one

Figure 1. Number of Golden Eagle pairs in Japan (1990).



and was taken from the nest in an injured condition, due to sibling aggression, at seven days of age. After removal, this chick was reared for a week by hand, using an eagle-shaped puppet to prevent imprinting.

At 14 days of age the chick was placed in the foster nest; we also placed broken chicken eggshells and a rabbit carcass as food on the nest.

The two unhatched eggs in the foster nest were removed because it was 10 days after the anticipated date of hatching. Both eggs were infertile and addled.

On May 28, a patagial marker was attached to the chick's wing. This was the first time that a patagial marker was attached to a Golden Eagle in Japan for the purpose of study.

Table 1. Progress of the project.

	<i>Chick-providing pair area</i>	<i>Fostering pair area</i>
1987		
Feb. 1	Copulation, Building nest. Attack against <i>Spizaetus nipalensis</i> .	
Feb. 8	Building nest.	
Feb. 15	Eggs laid.	Breeding successfully.
Mar. 28	First chick hatched.	
Mar. 31	Second chick hatched.	
Apr. 4	Second chick removed.	Scheduled hatching date.
Apr. 14		*Foster chick placed. *Unhatched eggs removed.
May. 28		Patagial marker attached.
Jun. 6	First eaglet fledged.	
Jun. 17		Fledged.
1988		
May 14		Last seen in home range.
1989		
Oct. 16		Seen 62 miles distant from nest.

RESULTS

Table 2 records the progress of the chick's acceptance by the foster pair. It took about three hours for them to accept this chick, which finally fledged successfully at the end of June.

Since May 14, 1988, the young marked eagle disappeared from its home range. On Oct 16, 1989, it was seen by a hawkwatcher 60 miles away from the foster nest site, two years after fledging.

DISCUSSION

This first attempt at brood manipulation of a Golden Eagle in Japan was successful. The foster pair accepted the chick within a few hours. Peregrine Falcons (*Falco peregrinus*) can accept foster chicks immediately (Burnham *et al.* 1977).

There are few papers on the use of this fostering method with Golden Eagles. Usually, in genus *Aquila*, the technique of removal from and replacement in the same nest has been applied (Meyburg 1977; Meyburg & Pielowski 1991; Olendorff 1985).

But in this project, the technique of cross-fostering within the same species was used because there was a pair laying infertile eggs. This technique will be useful in Japan because several cases of infertility have been reported and we have had success with captive breeding (SRGE 1986).

Table 2. Observations recorded on Fostering Day (April 4,1987).

<i>Time</i>	<i>Reactions of foster pair</i>
11:00	• Female flew out from the nest.
:10	• Chick placed in the nest.
:33	• Female returned after display flights and perched on ridge near the nest.
:48	• Male returned to the nest.
:52	• Male became broody without chick.
13:33	• Female returned to the nest with nest materials.
:39	• Female began feeding the chick.
:43	• Female began feeding male (6 times). Male flew out from the nest. Back to nest with nest materials 3 times.
14:23	• Female began brooding the chick.

This technique has been used in the Bald Eagle *Haliaeetus leucocephalus* reintroduction project in the U.S.A., using fertilized eggs, not chicks (IWS 1990).

Both adults of the foster pair showed substitute behaviour such as mutual feeding and brooding the broken eggshells before acceptance. Substitute behaviour in a breeding pair of Golden Eagles has been reported (Inoue 1986), but not in a foster pair.

Replacing the eggs with broken eggshells and leaving a rabbit carcass as food may have stimulated the parents to accept the foster chick.

The area where the young marked eagle was observed two years later is on the route of hawk migration in autumn and there is no occupied home range of Golden Eagle near it, but in the hawk migration season only young eagles were sometimes observed in this area (Kato & Shinmura 1986). So I think that this observation is the first record of a young eagle's dispersion in Japan.

We plan further useful projects to maintain the Golden Eagle population in Japan, because we have to hand this graceful bird down to the next generation.

ACKNOWLEDGMENTS

This project was undertaken by the following members of SRGE: Toru Yamazaki,

Masahiko Fujita, Ken Mazaki, Koki Kato, Tadasi Hosoi and the author. Toru Yamazaki greatly improved this manuscript. To all of them I wish to express gratitude.

REFERENCES

- BURNHAM, J. GRAIG, J.H. ENDERSON & W.R. HEINRICH 1978.** Artificial increase in reproduction of wild peregrine falcons. *Wild. Manage.* 42:625-628.
- INOUE, T. 1986.** Substitute behaviour in a breeding pair of Golden Eagles. *Aquila chrysaetos* (4):20-21.
- IWS (INSTITUTE FOR WILDLIFE STUDIES) 1990.** Catalina Island Bald Eagle reintroduction project. Newsletter (Fall).
- KATO, K. & M. SHINMURA 1986.** An immature Golden Eagle in winter at Imoh in south-eastern Aichi prefecture. *Aquila chrysaetos* (4):25.
- MEYBURG, B.-U. 1977.** Sibling aggression and cross-fostering of eagles. In S.A. Temple (Ed.) *Endangered Birds*:195-200. University of Wisconsin press.
- MEYBURG, B.-U. & Z. PIELOWSKI 1991.** Cainism in the Greater Spotted Eagle *Aquila clanga*. *Birds of Prey Bulletin*. 4:143-148. WWGBP, Berlin.
- OLENDORFF, R.R. 1985.** The potential for management of raptor populations in western grassland. In F.N. Hamerstrom, Jr, et al. (Eds.) *Management of Raptors*. Raptor Res. Rep. 2:47-88.
- SRGE (SOCIETY FOR RESEARCH ON THE GOLDEN EAGLE) 1984.** Food habits of the Golden Eagle in Japan. *Aquila chrysaetos* (2):1-6.
- SRGE 1986.** Population and breeding success of the Golden Eagle in Japan *Aquila chrysaetos* (4):8-16.
- SRGE 1986.** Captive Golden Eagle in Japan. *Aquila chrysaetos* (4):1-7.
- SRGE 1987.** Home range of the Golden Eagle in Japan. *Aquila chrysaetos* (5):1-9.
- SRGE 1991.** Human impacts on the Golden Eagle in Japan. *Aquila chrysaetos* (8):1-9.
- SRGE 1992.** Population and breeding success of the Golden Eagle in Japan. *Aquila chrysaetos* (8):1-9. (press).

Takehiko Inoue
1-25-9 Asahigaoka, Otsu-City
Shiga prefecture, 520. Japan.