RECOVERIES AND RESIGHTINGS OF RELEASED REHABILITATED RAPTORS

by
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Abstract

Our raptor rehabilitation program treated 1693 raptors between 1974–1980 and released 648. The purpose of this paper is to describe 38 recoveries or resightings of banded, color-marked or radio-tagged birds. Annual release rates (no. released/no. treated) showed a gradual increase during the period. These rates did not seem to be related to size of the patient but more to the relative severity of the injury or illness causing its admission. Release rates were lower for strigiforms (26.5%) than for falconiforms (37.2%) and a greater proportion of released strigiforms (8%) were recovered than of released falconiforms (2.4%). However, more falconiforms were recovered within 6 weeks post release (54.5% of releases vs. 21.4% for owls). On the average falconiforms were recovered over 10 times further (316.5 km) from the release site than were strigiforms (30.7 km). Length of post-release survival did not seem to be related to the severity of the original problem requiring rehabilitation. Color-marked Bald Eagles were resighted for up to 2 years after release, as far as 364 km from the release site, and two released birds were observed tending nests. Marked eagles released in wintering areas behaved similarly to other eagles already present in the area.

Introduction

In a recent survey (Duke, 1978) of holders of U.S. Fish and Wildlife Service wildlife rehabilitation permits, it was found that there are approximately 225 active raptor rehabilitation programs in the United States. These programs have a potential for handling over 7000 raptor patients per year (*Ibid.*), and, therefore, could release thousands of rehabilitated raptors annually. Only a few of these programs have been described in scientific journals (Wisecarver and Bogue, 1974; Fuller et al., 1974; Snelling, 1975; Redig and Duke, 1978) and there is little information available on the success of released, rehabilitated raptors (Servheen and English, 1976 and 1979; Olsen and Olsen, 1980).

Rehabilitation programs can perform several important functions and provide a number of worthwhile services. Rehabilitators learn to recognize, as well as to treat, many kinds of medical and surgical problems. This knowledge is of value in treating not only wildlife but also wild animals held in zoos, captive propagation programs and research projects. Information on the relative significance of common medical problems might be considered in management plans for wild populations. Perhaps most importantly, such knowledge provides direction and impetus for both basic and clinical research (e.g., Redig et al., 1980).

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Most rehabilitation programs are active in public education and those associated with colleges and universities may provide formal coursework and possibilities for graduate research projects. Rehabilitation programs provide crippled, but otherwise healthy animals for zoos, research projects, and captive propagation efforts and hold animals confiscated by law enforcement officials. Rehabilitation programs associated with public agencies or other institutions generally provide them with very positive publicity.

Lastly, wildlife rehabilitation saves lives and returns many animals to their respective breeding populations. These returns have their greatest biological significance when they involve endangered species, but saving non-endangered species is humane and provides experiences necessary to develop and maintain expertise for work on endangered species. Information on post-release success of rehabilitated birds is essential in evaluating this aspect of the significance of rehabilitation programs.

Our rehabilitation program grew out of physiological research on raptors begun in 1971. Between January 1, 1974, when we began maintaining more complete records, and December 31, 1980, 1693 raptors (Table 1) and nearly 1000 birds of other species have received care. These numbers include 144 Bald Eagles (*Haliaeetus leucocephalus*), 24 Peregrine Falcons (*Falco peregrinus*), 25 Ospreys (*Pandion haliaetus*) (Table 1) and one Whooping Crane (*Grus americana*). Most of the raptor patients we receive have been injured by humans (shooting or trapping, 32%), by accidents involving man-made obstacles (power lines, automobiles, plate-glass windows, etc., 38%), by contact with poisons, oil spills, etc. (2%), or by removal of nestlings from the nest or nest area (13%). Thus, we handle few cases involving illnesses or injuries associated with natural causes of raptor mortality and probably have little effect on natural selection pressures on raptor populations. An annual average of 37.5% of our patients die or are euthanized usually within the first 24 hours after they are received. About one-fourth (24.9%) become permanent cripples which are transferred to research or breeding programs or into zoos. The remaining proportion of our patients, approximately 38%, is released.

The objective of this paper is to describe the 38 recoveries or resightings so far obtained from the 648 raptors released by our program.

Methods

The specific procedures used in our clinical rehabilitation efforts will not be described herein because they have been described elsewhere (Fuller et al., 1974; Redig and Duke, 1978). We will, however, briefly discuss pre-release procedures.

Adults and free-flying immatures assumed to have developed hunting skills, etc. prior to admission are handled differently than birds received as nestlings. When adults are believed to have successfully recovered from injuries or illnesses they are fitted with jesses, attached to a 30 m leash and test flown. If their flight appears to be normal, daily test flights, or exercise periods, are continued until their flight is strong and they are capable of making extended flights without abnormal fatigue. Large falcons, which seem to lose physical condition more rapidly when not exercising than other falconiforms, are given more extended periods of reconditioning before release utilizing standard falconry techniques. Some birds are returned to their point of capture for release, or particularly in the case of endangered species, are transported or shipped via air freight to appropriate release points depending on the season. Most, however, are released in or near the metropolitan (Twin Cities) Minneapolis and St. Paul, Minnesota area in appropriate

Table 1. Species and total numbers of raptors treated/released per year by the University of Minnesota Raptor Research and Rehabilitation Program.

Species	1974	1975	1976	1977	1978	1979	1980	Totals°°	% released
Turkey Vulture	4/1		1/0	1/0		2/1	1/0	9/2	22.2
Goshawk	4/1	5/1	6/2	4/3	2/2	4/3	5/2 (1)°	30/14	46.7
Cooper's Hawk	1/1	2/2	3/2	3/3	7/5	5/3	1/1	22/17	77.3
Sharp-sh. Hawk		4/0		10/0	5/0	4/2	3/1	26/3	11.5
Marsh Hawk		2/1	4/2	3/1	2/0		5/1 (2)	16/6	37.5
Rough-leg. Hawk	9/1	10/1	4/2	15/6	9/5	7/1	12/1 (1)	66/17	25.8
Ferrugin. Hawk			3/0	1/0	1/0			5/0	0.0
Red-tail. Hawk	28/8	36/15	41/17	54/19	56/20	46/18	51/15 (14)	312/119	38.1
Red-shoul. Hawk	2/2	1/0	2/1	3/2	3/1	2/0		13/6	46.2
Swainson's Hawk			3/1		2/1	2/0	1/1	8/3	37.5
Broad-winged Hawk	5/1	13/6	12/3	36/6	28/7	19/8	18/3 (2)	131/35	26.7
Golden Eagle	1/1	1/0	4/1	5/2	7/4	10/2	8/2	36/12	33.3
Bald Eagle	7/0	14/8	16/8	24/11	27/12	25/14	31/9 (10)	144/67	46.5
Osprey	1/0	4/0	1/0	1/0	7/1	5/0	6/1	25/2	8.0
Gyrfalcon			2/1	1/1	2/1	1/0	3/3	9/6	66.7
Prairie Falcon		5/2	3/0	14/10	7/5	6/3	2/1	37/21	56.8
Peregr. Falcon	1/0	2/1	2/0	2/2	9/1	4/2	4/2	24/8	33.3
Merlin	1/0			1/0		1/0	1/1	4/1	25.0
Amer. Kestrel	7/4	18/9	24/11	37/23	53/25	36/15	50/27 (2)	225/115	51.1
Screech Owl	4/1	11/5	14/3	11/7	14/7	21/16	14/6 (1)	89/45	50.6
Gr. Horned Owl	22/10	27/6	36/8	45/23	38/13	36/11	50/9 (14)	254/77	30.3
Long-eared Owl	2/1	4/1	1/0	9/1	7/0	4/0	5/4	32/7	21.9
Short-eared Owl	2/0	4/0	1/0		9/1	4/1	2/0	22/2	9.1
Snowy Owl	3/0	6/1	4/1	4/2	3/2	5/1	18/1 (9)	43/12	27.9
Barred Owl	1/0	4/0	13/4	19/8	15/4	14/6	12/2 (3)	78/25	32.1
Great Gray Owl	1/0				3/0	2/1	1/0	7/1	14.3
Burrowing Owl		1/0						1/0	0.0
Boreal Owl				1/0				1/0	0.0
Saw-whet Owl		2/0	3/0	4/2	5/1	4/2	6/1 (1)	24/6	25.0
Totals°°	106/41	176/59	203/67	308/132	321/118	269/110	310/121	1693/648	
Release rate	38.7	33.5	33.0	42.9	36.8	40.9	39.0		

°Numbers in parentheses indicate cases whose outcome is pending at the time of this writing.
°°Total released includes one-half of those pending since this generally represents the outcome of pending cases.

habitat. The Twin Cities Arsenal Compound has been a common release site (Tables 2 and 3). It has an area of approximately 1340 ha, it has little human activity, it is largely undeveloped, and it is on the northern edge of the metropolitan area so it serves as a large refuge and an ideal release area.

Orphans or nestlings, without an illness or injury which are brought to our clinic are returned to their own nest or to a foster nest as soon as possible. Injured nestlings, or immatures believed to have had insufficient time to have developed adequate hunting skills, are "hacked" by standard procedures after a reconditioning program. Hacking has usually been handled by experienced falconers or biologists at refuges, nature centers or isolated rural areas.

All released birds were banded with U.S. Fish and Wildlife Service bands of appropriate sizes under the permit of one of the authors (W. Jones). Bald Eagles were banded and also color-marked or tagged with patagial or leg-band streamers by Dr. L. D. Frenzel of the Entomology, Fisheries and Wildlife Department, University of Minnesota, St. Paul, MN 55108. Four Bald Eagles were radio-tagged, released in wintering areas commonly used by eagles near Moline, IL, and subsequently observed and radiotracked by Dr. T. C. Dunstan and his graduate students of the Department of Biological Sciences, Western Illinois University, Macomb, IL 61455.

For purposes of evaluating the success or failure of released rehabilitated raptors described in this study, we considered 6 weeks of survival to be a minimum standard of success. Red-tailed Hawks (*Buteo jamaicensis*) die of starvation in 2-3 weeks without food (Dobbs, 1980). Presumably smaller birds would succumb more rapidly. Thus, 6 weeks survival indicates that a released bird has at least acquired the ability to forage and feed itself.

Results and Discussion

Our average annual release rate for all species (number released/number treated) appears to be better in the period 1977–80 than prior to that period (Table 1); we hope this is indicative of increased clinical skills and improved success in rehabilitation. The recent release rate is similar to those reported by Snelling (1975) (39.6%) and Wisecarver and Bogue (1974) (47%).

Size of the patient did not seem to be a factor in determining the success of rehabilitation or the average annual proportion of releases. Release rates for the smaller owls (*viz.* Screech Owl, *Otus asio;* Long-eared Owl, *Asio otus;* Short-eared Owl, *Asio flammeus;* Saw-whet Owl, *Aegolius acadicus*) excluding the Burrowing Owl (*Speotyto cunicularia*) and Boreal Owl (*Aegolius funereus*) because we've handled only one of each (Table 1), averaged 26.7% per year. For the larger owls (Great Horned Owl, *Bubo virginianus;* Snowy Owl, *Nyctea scandiaca;* Barred Owl, *Strix varia;* Great Gray Owl, *Strix nebulosa*) the mean rate was 26.2%. The average release rate for the smaller falconiforms (Cooper's Hawk, *Accipiter cooperii;* Sharp-shinned Hawk, *Accipiter striatus,* Red-shouldered Hawk, *Buteo lineatus;* Broad-winged Hawk, *Buteo platypterus;* Merlin, *Falco columbarius;* American Kestrel, *Falco sparverius*) was 39.6% and for the larger ones (Turkey Vulture, *Cathartes aura;* Goshawk, *Accipiter gentilis;* Marsh Hawk, *Circus cyaneus;* Rough-legged Hawk, *Buteo lagopus;* Ferruginous Hawk, *Buteo regalis;* Red-tailed Hawk; Swainson's Hawk, *Buteo swainsoni;* Golden Eagle, *Aquila chrysaetos;* Bald Eagle; Osprey; Gyrfalcon, *Falco rusticolus;* Prairie Falcon, *Falco mexicanus;* Peregrine Falcon) (Table 1) it was 34.8%. The average annual release rate for Bald Eagles, 46.5%,

Table 2. Recoveries and Recaptures of Released Rehabilitated Strigiforms.

Species	Original Problem	Release data date	site	Recovery data date	site	Elapsed time (days)	Reason for recov.°°
Gr. Horned Owl	Trap, foot amput.	mid 1/75°	T.C. Arsenal	mid 4/75	T.C.,1.7 Km,W.	ca. 120	Alive, wing fx, emac.
Gr. Horned Owl	Coll., auto, concussion	11/8/75	"	11/14/76	T.C.,21.7 Km,S.	371	Dead, Coll. power line
Gr. Horned Owl	Proj., both wing fx.	2/5/77	Is Lake Park St. Paul	2/20/77	T.C.,1.7 Km,N.E.	15	Alive, but emac., died
Gr. Horned Owl	Proj., wing fx	2/16/77	T.C. Arsenal	3/10/78	T.C.,6.7 Km,S.	387	Dead, Coll.? by R.R.
Gr. Horned Owl	Coll., auto, wing fx	3/7/77	T.C. Arsenal	3/22/80	81.8 Km,N.W.	1110	Dead, unk. cause
Gr. Horned Owl	Intes. parasites	6/8/77	T.C. Arsenal	10/77	71.8 Km,N.W.	ca. 120	Dead, proj.
Gr. Horned Owl	Eye inflamm., emac. from skunk	9/16/77	T.C. Arsenal	10/8/77	T.C.,1.7 Km,E.	22	Caught by hand. released
Gr. Horned Owl	Trap, foot injury	2/11/78	T.C. Arsenal	3/9/79	T.C.,8.4 Km,N.W.	391	Alive, leg fx, emac.
Gr. Horned Owl	Concussion	11/15/77	T.C. Arsenal	8/5/79	33.4 Km,N.W.	623	Caught in mamm. trap
Gr. Horned Owl	Kite string entangled	12/30/78	Is Lake Park St. Paul	mid 4/79	T.C.,4.2 Km,S.	ca. 106	Dead, unk. cause
Barred Owl	Nestling; (hacked)	9/4/76	Winona, MN	1/1/77	T.C.,178.7 Km,N.W.	87	Dead, unk. cause
Barred Owl	Nestling; (hacked)	early 6/78	Fridley, MN Nat. Center	4/3/79	T.C.,1.7 Km,S.	ca. 130	Found in warehouse; released
Barred Owl	Nestling; (hacked)	early 6/78	Fridley, MN Nat. Center	2/24/80	T.C.,15.9 Km,N.W.	ca. 620	Dead, Coll., auto
Screech Owl	Trap, leg fx	9/21/78	Como Park St. Paul	11/3/78	T.C.,1.7 Km,W.	14	Dead, emac.

°Often those recovering and releasing birds do not record exact dates.
°°Dead birds found in reasonably fresh condition.

Proj. = projectile injury; Coll. = collision injury; fx = fracture; T.C.—Twin Cities area; Trap = steel-jawed trap; emac. = emaciated

Table 3. Recoveries and Recaptures of Released Rehabilitated Falconiforms.

Species	Original Problem	Release data date	Release data site	Recovery data date	Recovery data site	Elapsed time (days)	Reason for recov.°°
Red-tail. Hawk	Proj., wing fx	1/3/76	T.C. Arsenal	3/20/76	T.C.,5 Km,E.	ca. 17	Alive but emac., died
Red-tail. Hawk	Coll., wing fx	2/26/77	T.C. Arsenal	4/25/77	T.C.,3.3 Km,S.	58	Alive but emac., died
Red-tail. Hawk	Undet. illness	10/31/78	T.C. Arsenal	3/29/79	Wyoming, IA, 330 Km,S.	149	Dead; unk. cause
Red-tail. Hawk	Proj., wing & leg fx	2/23/79	Anoka, MN	4/17/79	T.C.,18.4 Km,S.E.	53	Dead; unk. cause
Rough-legged Hawk	Trap, foot amput.	10/30/77	T.C. Arsenal	2/10/78	Jeff. City, MO 943.6 Km,S.	103	Dead; unk. cause
Rough-legged Hawk	Coll., auto wing & leg fx	3/4/79	T.C. Arsenal	mid 11/79°	No. Quebec, approx. 1625 Km,N.E.	ca. 255	Dead; in fox snare
Broad-winged Hawk	Coll., auto stunned	9/6/80	T.C. Arsenal	9/17/80	T.C.,14.2 Km,W.	11	Dead; Coll., auto (30 g wt gain)
Broad-winged Hawk	Proj., wing fx	9/73	Anoka MN airport	10/73	T.C.,14.2 Km,S.W.	ca. 35	Dead; Coll., auto
Bald Eagle	Proj., wing fx	11/29/77	Prescott, WI	12/20/77	Rochester, MN 90.2 Km,S.W.	21	Alive; proj. wing fx
Bald Eagle	Proj., wing fix	mid 9/75	Montezuma Refuge, NY	late 10/75	50 Km,N.W.	ca. 40	Dead, Barb-wire entangled
Bald Eagle	Proj., wing fx	1/24/77	Swan Lake Refuge MO	1/31/77	Swan Lake Refuge	7	Alive, weak, recaptured, released

°Often those recovering and releasing birds do not record exact dates.
°°Dead birds found in reasonably fresh condition.

Proj. = projectile injury; Coll. = collision injury; fx = fracture; T.C.—Twin Cities area; Trap = steel-jawed trap; emac. = emaciated

was higher than the mean for all falconiforms together but was not the highest release rate (Table 1) for individual species. A relatively higher rate might have been expected because eagles are large and somewhat easier to repair surgically. Also, endangered species are shipped to us via air freight so receive relatively more rapid attention to their injuries and receive "V.I.P." treatment while under our care.

Averages for release rate for certain species may be distorted upward or downward by a problem or situation peculiar to that species. Among the small species most commonly admitted for our care are Kestrels and Screech Owls. Both of these species have high average annual release rates (Table 1) due primarily to the large number of nestlings of these species received each year. They may be hacked-out with little or no medical attention, allowing a high release rate. Red-tailed Hawks, Great Horned Owls, and Bald Eagles are the commonest of the large species we handle. All three, but particularly the latter two species, seem to be prone to injury in mammal traps. Analysis of our records indicates that mortality is higher in trapped raptors than for raptors receiving any other type of injury. Additionally, trapping injuries invariably result in loss of toes, feet, or an entire limb so that victims may not be releasable. Death or loss of limbs both reduce release rates. Therefore, while release rates do reflect a measure of success (or lack of success) in rehabilitation, they do not necessarily directly reflect a level of expertise in medicine or in surgical repair, i.e., such rates may be obtained by hacking procedures requiring little or no surgical or medical expertise.

As indicated above, average annual release rates for strigiforms are lower than those for falconiforms. In our experience, owls in general are no better or poorer risks for rehabilitation than falconiforms. The poorer release rate of owls is probably due to their being admitted with more serious medical problems (e.g., trapping), and thus, problems more difficult to handle.

Using our criterion for success of 6 weeks survival post-release, only 21.4% of recovered owls were recovered within 6 weeks after release (Table 2). Over half (54.5%) of the recovered falconiforms were recovered within 6 weeks postrelease (Table 3). This should not, however, be interpreted as a greater success at rehabilitating owls than hawks nor as indication that rehabilitated owls are more likely to survive than hawks since an overall greater proportion of released owls (14 birds or 8% of those released) were recovered than of released falconiforms (11 birds or 2.4% of those released) (Tables 1, 2, and 3). We can't be sure of the reasons for this differential post release success. The falconiforms listed in Table 3 are likely to inhabit open or aquatic (Bald Eagles) areas, except for Broad-wings, so ought to be more easily found if dead or dying than the owls (Table 2) all of which tend to be more secretive and to inhabit more forested areas where visibility is limited. So, there may be no difference in post release success, but rather a difference in the likelihood of finding dead or dying owls vs. hawks.

The proportion of recoveries per released rehabilitated raptor (8 and 2.4% for falconiforms and strigiforms, respectively) may be higher for our project than in other projects. Snelling (1975), who banded and released 53 raptors, had one recovery, viz. a Red-tailed Hawk found 3 weeks post release at 5 km from the release site with a rebroken leg fracture. Wisecarver and Bogue (1974) released 76 raptors and had no recoveries. Our high recovery rate is hopefully mainly a result of the fact that most birds were released near a large human population center thus increasing the likelihood of dead or dying birds being discovered.

Length of post release survival does not seem to be related to the severity of the injury or illness requiring the original admission to our clinic. One of the two Great Horned Owls recovered in less than 6 weeks after release (Table 2) was admitted with fractures of both wings—an extremely serious problem. However, the other bird was admitted with an eye inflammation and emaciation—not nearly as serious nor requiring as long a period of treatment. Five of the six falconiforms recovered in less than 6 weeks after release had wing fractures when originally admitted for rehabilitation. Even slightly improper wing function after release could easily be cause for poor survivability. Again, however, one of the shortest survival times was recorded for the sixth recovered falconiform, a Broad-winged Hawk admitted with only a mild concussion (Table 3).

The data (Tables 2 and 3) indicate a higher proportion of recoveries from releases in 1974–1977 than from releases in 1978–1980 (16 vs. 9). This difference may indicate less medical expertise during the earlier period. It is more likely, however, an indication that longevity in released rehabilitated raptors is approximately equal to that in raptors not having experienced rehabilitation, i.e., most raptors, whether released following rehabilitation or naturally fledged during the period 1974–1977, probably would be expected to be dead, and thus recoverable, by 1980. A smaller proportion of birds released in 1978–1980 would be expected to have died from natural causes by the end of 1980.

Recovery data indicate, that, on the average, owls were recovered only 30.7 km from their point of release (Table 2) while falconiforms traveled more than 10 times farther, or 316.5 km on the average, between the release site and the point of their recovery (Table 3). However, hawks released during migration times moved, on the average, 496 km while those released during non-migration times moved only 23.4 km. So, this difference occurred because many species of hawks are migratory and many releases were during a migratory season.

No hacked hawks were recovered while three hacked Barred Owls were recovered from 87–620 days post release (Table 2). This difference is probably not significant relative to success of hacked hawks vs. owls and we have no explanation for it. Confirmation of success of a released nestling Barn Owl (*Tyto alba*) is provided by Marti and Wagner (1980) who discovered the owl nesting about 1 year after it and seven others had been placed in foster nests. The owl was found 60 km from the foster nest.

Color-marked Bald Eagles were resighted up to 2 years after release and as far as 364 km from the release site (Table 4). One-half of the resightings occurred within 2 weeks post-release so provide little information on post release survival. However, the other half of the resightings occurred from about 6 months to 2 years post-release and included two birds involved in nesting and raising young (Table 4). We feel that this resighting information, particularly that pertaining to the two birds observed tending nests, is excellent evidence of the value of rehabilitation.

The radiotracked Bald Eagles (Table 4) were also visually observed intensively on the wintering area. Their behavior, with respect to other wintering eagles, appeared to be normal with the exception of the one-footed bird. The latter tended to roost alone and to avoid conflicts over food (mostly waterfowl carcasses) although it did appear to find sufficient food and it remained healthy in appearance. Further observations of these radiotracked birds and of several others currently under observation will be reported in more detail elsewhere.

Servheen and English (1976 and 1979) also released rehabilitated color-marked and

Table 4. Resightings of Released Rehabilitated Color-Marked Eagles.

Species	Original Problem	Release data date	Release data site	Recovery data date	Recovery data site	Elapsed time (days)	How resighted
Golden Eagle	Eye infect., emac.	4/29/76	Prescott, WI	5/1/76	3.3 Km,S. Prescott	2	Observed markings
Golden Eagle	Proj., wing fx	12/14/77	Prescott, WI	11/18/78	Bl.R.Falls,WI 175.4 Km,N.E.	339	Observed markings
Bald Eagle	Trap, toes injured	12/28/73	Prescott, WI	6/74°	Nesting; Prentice, WI,240.5 Km,N.E.	ca. 170	Observed markings
Bald Eagle	Healthy orphan	8/75	into a nest; Sherborne Refuge, MN	same day	100.2 Km,S.		Observed markings
Bald Eagle	Inj. in eagle fight	3/9/76	Prescott, WI	6/78	Nesting; Harris, MN, 101.9 Km, N.W.	ca. 740	Observed markings
Bald Eagle	Proj., wing fx	9/4/76	Duluth, MN	9/5/76	5 Km,N. Duluth	1	Observed markings
Bald Eagle	Trap, toes inj.	12/14/77	Prescott, WI	11/78	Det. Lakes, MN 364.1 Km,N.W.	ca. 340	Observed markings
Bald Eagle	Healthy orphan	7/1/78	into a nest, Drummond, WI	7/6/78	seen near nest	5	Observed markings
Bald Eagle	Nestling, leg fx	7/15/78	into a nest, Minong, WI	7/28/78	seen near nest (fledged)	13	Observed markings
Bald Eagle	Crop perforation	mid 2/80	Moline, IL (radio)	6/11,18/80	St Croix Falls Pk, WI, 666.3 Km, N.	ca. 120	Radio tracked, seen
Bald Eagle	Coll., wing fx	4/27/80	Moline, IL (radio)	6/11,18/80	St Croix Falls Pk, WI, 666.3 Km, N.	51	Radio tracked, seen
Bald Eagle	Trap°°	mid 2/80	Moline, IL (radio)	3/11/80	flying N from Moline, lost	ca. 25	Radio tracked, seen
Bald Eagle	Trap, toes inj.	mid 2/80	Moline, IL (radio)	immed. flew away, radio signal lost			

°Often those recovering and releasing birds do not record exact dates.
°°Bird had only 1 foot, stump had received a 2nd trap injury when presented.

Proj. = projectile injury; Coll. = collision injury; fx = fracture; T.C.—Twin Cities area; Trap = steel-jawed trap; emac. = emaciated

radio-tagged Bald Eagles. Six birds released between 1972–1975 were observed or monitored from 6–83 days on the wintering area and were detected as far as 108.6 km from the release site. Birds which could be observed at the release site appeared to remain healthy and behaved similarly to wild birds at the release site. Eleven other eagles released on a wintering area between 1975–1978 remained in the area up to 45 days, also appeared to behave normally and were believed to have dispersed from the area at the same time and in the same general direction as the wild eagles. A total of 37 sightings was reported on these birds, one at 332 km from the release site. The availability of color-marked eagles provided valuable information on wintering and dispersal behavior as well as information on survival of released rehabilitated eagles.

Matters that might be considered in releasing rehabilitated or captive raptors have been offered by several authors. Snyder and Snyder (1974) found that mortality due to encounters with humans was greater in Cooper's Hawks which were closely observed as nestlings and/or weighed and handled, than in Cooper's Hawks with little exposure to man. This would indicate that captivity and the procedures necessary for rehabilitation might increase the vulnerability of rehabilitated birds upon release. We feel that this may be a greater problem in nestlings brought into captivity for rehabilitation than in adults since adults appear to associate humans with danger while nestlings usually do not. We return nestlings to their own or to foster nests as rapidly as possible to avoid undue tameness or imprinting on humans. However, while we make no effort to tame either nestlings or adults in our care, we know of no way of offering treatment without handling and exposure to humans.

Olsen and Olsen (1980) report that the release of a Wedge-tailed Eagle (*Aquila andax*) (previously held in a zoo and apparently not imprinted) failed because of the bird's aggressiveness towards humans and discussed the possibility that raptors be taught to fear humans before release. Again, we would expect a fear of humans to be normal in adult raptors with little or no previous exposure to man and we would object to most procedures producing outright fear of humans from patients in our care. We agree with Cooper and Gibson (1980) who describe medical and behavioral considerations important in evaluating a patient's preparedness for release, in that birds which are too tame or too imprinted to be expected to survive successfully after release should not be released. These birds can be turned over to captive propagation or research programs or to zoos or possibly hacked in very remote areas by experienced individuals. Even after such hacking some birds may still seek humans and injure them or be injured by them. On the other hand, despite the poorest of release conditions or pre-release considerations some birds may still do quite well. Marti and Wagner (1980) describe the case of a tame, Barn Owl, imprinted on humans, which escaped from an aviary and was found nesting 6 months later. This is remarkable, both that the bird survived without prior hunting experience and that she paired with an owl after imprinting on humans.

We have calculated the 1980 cost of raptor rehabilitation for our program, including all medications, x-rays, surgical costs, and nursing and veterinary salaries, to be $313.00 per bird released; considering only our most common endangered patient, the cost is $3885.00 per Bald Eagle released. Rehabilitation may be therefore, a relatively inexpensive management technique considering the cost per individual of translocations and captive propagation, which result in releases of fledglings several years away from breeding age, or even of habitat manipulation or nest protection for endangered species.

In conclusion, we believe that raptor rehabilitation is worthwhile even if it only helps

in learning to recognize medical problems in wild raptors, or even if it only helps to educate the public as to the value of birds of prey, or even if it only provides subjects for research and captive propagation efforts. However, as our data indicate, many rehabilitated birds are released, and recovery data indicate that many may sustain approximately normal longevity. Released birds may, as proven by observations of color-marked Bald Eagles, contribute to wild populations via reproduction.

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RAPTOR REHABILITATION WORKSHOP OFFERED

The Indianapolis Zoo is sponsoring a Raptor Medicine and Rehabilitation Workshop on April 24, 1982 from 9 a.m. to 6 p.m. Dr. Pat Redig of the College of Veterinary Medicine, University of Minnesota, will be the speaker. The workshop will include diagnostic procedures, anesthesia, surgery, medicine and more. The registration fee of $25.00 includes lunch; the registration deadline is April 19, 1982. For further information, please write to Indianapolis Zoo, Education Dept., 3120 E. 30th Street, Indianapolis, IN 46218.