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Authors: Fix, Andrew S., and Barrows, Susan Z.

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RAPTORS REHABILITATED IN IOWA DURING 1986 AND 1987: A RETROSPECTIVE STUDY

Andrew S. Fix[1] **and Susan Z. Barrows**[2,3]

[1] Department of Veterinary Pathology, College of Veterinary Medicine, Iowa State University, Ames, Iowa 50011, USA
[2] Veterinary Teaching Hospital, College of Veterinary Medicine, Iowa State University, Ames, Iowa 50011, USA
[3] Present address: 3400 Waterhole Trail, Bozeman, Montana 59715, USA

ABSTRACT: A retrospective study was conducted on 60 raptors representing 13 species treated at the Iowa State University College of Veterinary Medicine during 1986–1987. Eight species (31 individuals) were Falconiformes and five species (29 individuals) were Strigiformes. Seventy-five percent of all injuries were due to trauma and 65% of these were injuries arising from human activity, including car collisions (28%), shooting (17%) and trapping (11%). Thirty-four percent of all raptors admitted were treated and released, 25% were permanently crippled and 41% died during treatment or were euthanized. Data from this study implicate trauma resulting from human activity as a major reason for injury in free-ranging raptors presented for treatment in Iowa.

Key words: Raptors, birds of prey, Falconiformes, Strigiformes, rehabilitation, treatment, disposition, trauma, survey.

INTRODUCTION

Raptor rehabilitation is increasingly important in worldwide conservation of birds of prey, yet much of the information gained through these efforts remains unpublished (Cooper, 1987). In the last several decades, considerable progress has been made in the area of rehabilitation, to the point now where it is an interdisciplinary field with contributions from scientists of diverse backgrounds and training (Cooper and Greenwood, 1981). As a result of the increased interest in raptors, a substantial volume of good medical information is currently available on the care, treatment and rehabilitation of raptors (Cooper, 1978; Coles, 1985; Fowler, 1986; McKeever, 1987). In addition, several reports present comprehensive data on post mortem findings in captive birds of prey (Cooper, 1972; Keymer, 1972; Schröder, 1981). However, analyses concerning the causes of mortality in free-ranging raptors are limited (Keran, 1981; Redig et al., 1983) and have primarily been done on single or limited numbers of species (Hirions et al., 1979; Kenward, 1981; Keymer et al., 1981).

In an effort to understand the factors that produce morbidity and mortality in free-ranging birds of prey, a retrospective study of the raptors admitted to the Wildlife Care Clinic (Iowa State University, Ames, Iowa 50011, USA) was conducted. The objectives of this study were to (1) summarize the primary clinical diagnoses for cases treated, (2) correlate this information with possible human activity, and (3) summarize the dispositions of all cases.

MATERIALS AND METHODS

Raptors admitted to the Iowa State University Veterinary Teaching Hospital (Ames, Iowa 50011, USA) during 1986–1987 were obtained primarily from central Iowa. Sources included the Iowa Department of Natural Resources, conservation officers, veterinarians, local rehabilitators and other individuals. After obtaining a history, birds were given a physical examination and housed in the hospital's Wildlife Care Clinic. Emergency treatment was given when necessary. Standard diagnostic procedures, including hematology, serum chemistry, radiology, parasitology, microbiology and toxicology were performed. After a primary clinical diagnosis was made, appropriate therapy was instituted. Treatment depended on the individual case diagnosis and ranged from surgical correction of fractures to medical therapy for infectious diseases. In some cases, additional clinical diagnoses were made as the case progressed, or as more data became available. Cases with poor prognoses were euthanized. These cases plus those that died during treatment were necropsied and appropriate tissues evaluated histologically. In some instances, additional diagnoses were also made at necropsy.

For the study, a list of all the raptors treated was compiled and the primary clinical diagnoses summarized. Specific causes of trauma were de-

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TABLE 1. Raptors treated at Iowa State University during 1986–1987.

Falconiformes	
American kestrel (*Falco sparverius*)	9
Bald eagle (*Haliaeetus leucocephalus*)	5
Red-tailed hawk (*Buteo jamaicensis*)	4
Rough-legged hawk (*Buteo lagopus*)	4
Osprey (*Pandion haliaetus*)	4
Broad-winged hawk (*Buteo platypterus*)	3
Northern harrier (*Circus cyaneus*)	1
Peregrine falcon (*Falco peregrinus*)	1
Strigiformes	
Great horned owl (*Bubo virginianus*)	10
Barred owl (*Strix varia*)	6
Eastern screech owl (*Otus asio*)	5
Barn owl (*Tyto alba*)	5
Short-eared owl (*Asio flammeus*)	3
Total	60

termined whenever possible. The disposition of all raptors treated was evaluated.

RESULTS

A total of 60 individual raptors, representing 13 species, were treated at Iowa State University during 1986–1987 (Table 1). Of these, eight species (31 individuals) were Falconiformes and five species (29 individuals) were Strigiformes. The distribution of birds presented for treatment generally reflected their abundance in central Iowa, except for red-tailed hawks (*Buteo jamaicensis*), which were underrepresented in the hospital population. In addition, the common barn owls (*Tyto alba*) were over-represented since they were part of a local reintroduction project and were subsequently presented for treatment of problems that resulted after their release.

A summary of the primary clinical diagnoses for all raptors is presented in Table 2. Of these cases, 75% (45 of 60) involved trauma that mostly resulted in fractures. There were no significant differences between species for the occurrence of trauma. However, it was occasionally difficult to tell if the injury itself was primary or if it was secondary to some other pre-existing condition. Two of the four orphaned birds

TABLE 2. Summary of primary clinical diagnoses for raptors treated at Iowa State University during 1986–1987.

Condition	Number of cases	Percent of cases
Fracture	30	50
Soft tissue trauma	7	11
Dislocation	4	7
Head trauma	4	7
Orphaned or imprinted	4	7
Starvation	3	5
Suspected toxicosis	2	3
Other	6	10
Total	60	100

indicated in Table 2 had been hand-reared prior to presentation. Organophosphate toxicity was suspected in the cases of toxicoses, but those remained unconfirmed. Additional primary clinical conditions not specified in Table 2 included single cases of capillariasis, candidiasis, ocular perforation and cloacal impaction. Two cases had no primary diagnosis.

Of the trauma cases, 65% (29 of 45) could be directly related to human activity by history or circumstance. Human activities that produced the most injuries included vehicle collisions (28%), shooting (17%) and trapping (11%). Shooting injuries were highest in the fall of the year. Additional injuries indirectly related to human activity included a dog bite during rehabilitation elsewhere, a wire fence laceration and a pathologic fracture secondary to inadequate nutrition during rehabilitation.

The disposition of cases was as follows: 34% released, 25% permanently crippled, 26% died during treatment and 15% euthanized. Several of the raptors that died during treatment developed fulminating infections secondary to surgical procedures and hospitalization (*Streptococcus* sp., *Escherichia* sp.), or suffered exacerbation of probable pre-existing conditions (*Aspergillus* sp., *Mycobacterium* sp.). Thirty-eight percent (23 of 60) of the birds had multiple diagnoses either from additional clinical data or from necropsy find-

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ings. The relative frequency of these additional diagnoses included 18% respiratory disease (aspergillosis, bacterial airsacculitis), 10% bumblefoot (*Staphylococcus aureus*), 6% helminth parasitism (*Porrocaecum* sp., *Strigea* sp., *Capillaria* sp.), 4% hemoparasitism (*Hemoproteus* sp., *Leucocytozoon* sp.), 3% candidiasis and 2% hypovitaminosis A.

DISCUSSION

The majority of free-ranging raptors in this study were admitted with evidence of trauma. Other authors have reported similar findings when surveying causes of raptor injury and mortality (Newton, 1979; Duke et al., 1981; Keran, 1981; Redig et al., 1983). This is in direct contrast to the relative low incidence of trauma reported by others from post mortem examinations of birds of prey in captivity (Keymer, 1972; Cooper, 1972; Schröder, 1981).

Humans have become increasingly important in the decline of raptor populations throughout many parts of the world. Although past reports have emphasized the impact habitat destruction and pesticide toxicity have had on raptor populations (Newton, 1979; Curry-Lindahl, 1981; Cooper, 1983), other human activities such as vehicle collisions, shooting and trapping should not be ignored (Curry-Lindahl, 1981; Cooper, 1983). The data from the raptors in the present report substantiate this, since 65% of the traumatic injuries were attributable to human activities. This compares well with what has been found by others. Both Duke et al. (1981) and Keran (1981) reported an approximate 85% rate of human-related raptor mortalities. In addition, 47% of barn owls rehabilitated at seven facilities in California presented with evidence of trauma related to human activities (Schulz, 1986). Furthermore, the relative impact of specific human activities (vehicle collisions, shooting, trapping) is similar between the data of the present report and what has previously been reported (Newton, 1979; Duke et al., 1981; Keran, 1981; Redig et al., 1983). Although vehicle collisions are important in raptor morbidity and mortality, it should be noted that birds killed or injured along roads are easily detected by humans. Therefore, the population reviewed in the present report is probably not representative of morbidity and mortality among free-ranging raptors.

The disposition of the 60 raptors in the present report was quite comparable to the results of other rehabilitation efforts. Data from 1,693 raptors rehabilitated during 1974 to 1980 (University of Minnesota, St. Paul, Minnesota 55108, USA) indicate that an average of 38% of hospitalized birds die or are euthanized, 25% are permanently crippled and 38% are released (Duke et al., 1981). Similar release rates are also reported by Wisecarver and Bogue (1974) and Snelling (1975).

Although the advantages and disadvantages of raptor rehabilitation can be argued, there is little doubt that rehabilitation efforts serve to heighten human awareness of birds of prey and the influence man continues to have on their populations. Particularly, the attention given to raptors during rehabilitation provides insight into causes of disease that have not been previously assessed. Perhaps through additional reports such as this, a larger volume of data can be generated to determine the causes of morbidity and mortality among free-ranging raptors.

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