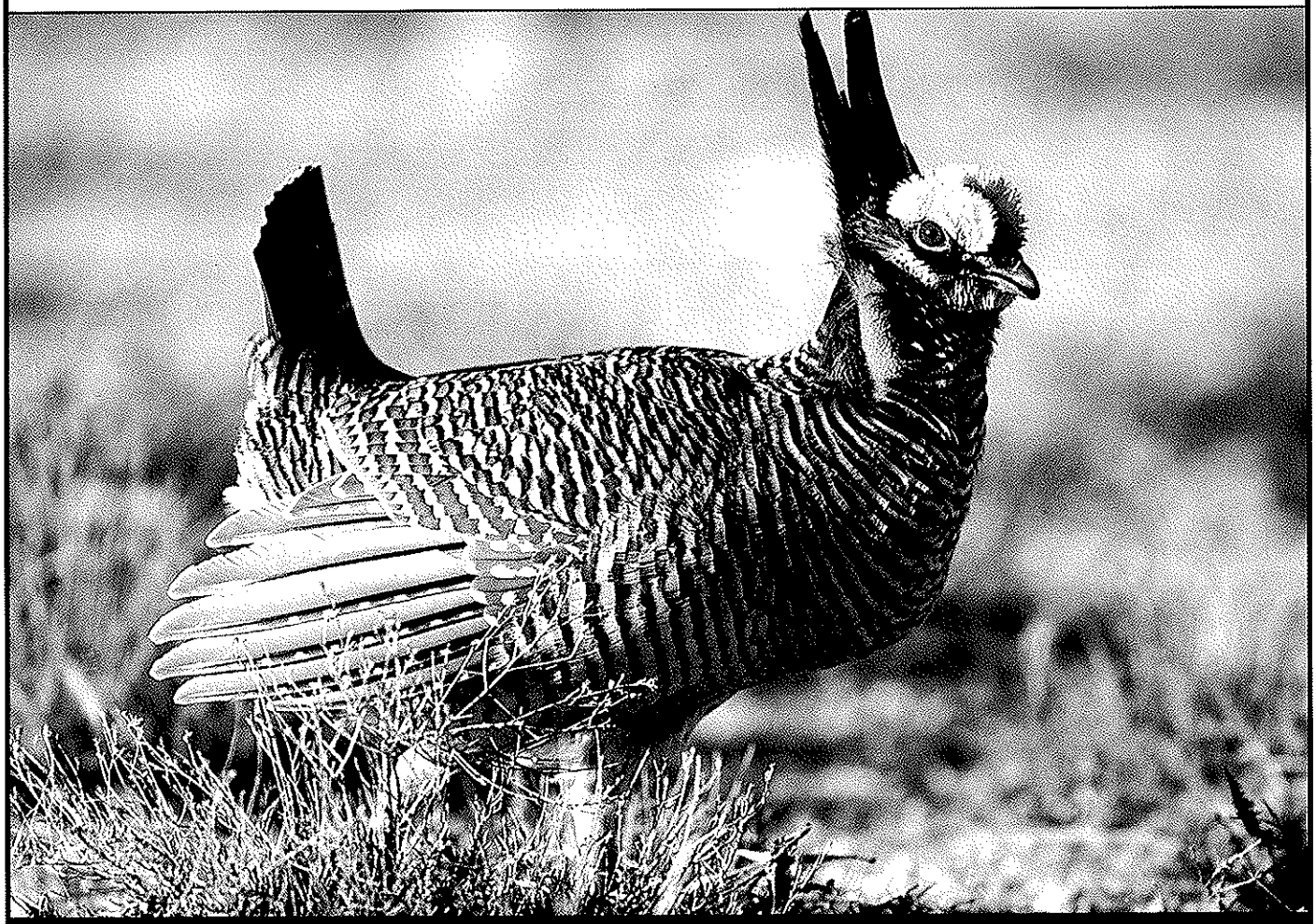
INTERNATIONAL WILDLIFE REHABILITATION COUNCIL

Volume 28, Number 1 2006

JOURNAL OF WILDLIFE REHABILITATION



IN THIS ISSUE

The case for sampling eastern screech owls (*Megascops asio*) for evidence of exposure to pesticides and persistent contaminants ... Collection, value, and use of wildlife rehabilitation data ... Recognizing and treating avian trichomoniasis ... A voice from abroad ... Minimum Standards for Wildlife Rehabilitation ... abstracts, news, and more

ABOUT THE JOURNAL . . .

THE JOURNAL OF WILDLIFE REHABILITATION is designed to provide useful information to wildlife rehabilitators and others involved in the care and treatment of native wild species, with the ultimate purpose of returning them to the wild. The journal is published by the International Wildlife Rehabilitation Council (IWRC), which invites your comments on this issue. Through this tri-annual publication, rehabilitation courses offered in numerous locations, and an annual conference, IWRC works to disseminate information and improve the quality of care provided to wildlife.

ON THE COVER:
Due to intense conservation efforts by the New Mexico Department of Game and Fish (and partnering groups), the lesser prairie chicken (*Tympanuchus pallidicinctus*) has remained a "species of concern" in New Mexico, thereby escaping uplisting to "threatened" or "endangered" status in the state. [Photo courtesy of the New Mexico Department of Game and Fish]

BELOW:
An eastern screech owl (*Megascops asio*) peers from a tree cavity at Parc Summit in Montreal, Quebec. See page 4. [photo: Jean-Sébastien Guénette]



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JOURNAL OF WILDLIFE REHABILITATION

CONTENTS VOL. 28, NO. 1

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Printing
Modern Litho-Print Co.
Jefferson City, Missouri

The *Journal of Wildlife Rehabilitation* is published by the International Wildlife Rehabilitation Council, IWRC, P.O. Box 8187, San Jose, CA 95155, USA,

©2006

(ISSN: 1071-2232).

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Articles from this publication are abstracted and cited in Focus On: Veterinary Science and Medicine, SCI-SEARCH, and RESEARCH ALERT.

WILDLIFE MEDICINE AND REHABILITATION

4
The Case for Sampling Eastern Screech Owls (*Megascops asio*) Admitted to Rehabilitation Facilities for Evidence of Exposure to Pesticides and Persistent Contaminants
by Ngaio L. Richards, Pierre Mineau, and David M. Bird

10
Collection, Value, and Use of Wildlife Rehabilitation Data
by Janelle Harden, Robert W. Dickerman, and Elizabeth Penn Elliston

DEPARTMENTS

Editorial by Dan Martinelli	2
Bugs & Drugs by Kathy Dolan	30
Success Story by Betty O'Leary	33
MSWR Call for Comments	34
A Voice from Abroad by Eric Terzaghi	37
Selected Abstracts	37
Book Review	41
Forester's Log by Mary Steuver	42
News Briefs	44
Ditto	47
Tail Ends by Penny Elliston	48

A NOTE FROM THE EDITOR

Historically, volume number of the *Journal of Wildlife Rehabilitation* and the year of publication have coincided. However, due to circumstances beyond the control of the publisher, publication schedule no longer tracks the calendar year. Henceforth the volume and issue number will sequence independent of publication date.

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EDITORIAL

Call a Spade a Spade

Once upon a time, wildlife rehabilitation was primarily an individualistic endeavor, performed by caring and committed people but with only the knowledge and the tools available locally. The actual care provided was, therefore, highly variable. Some was excellent, but some was less so. Clearly, there was a need for both peer review of methods and techniques, and a means whereby the resultant information could be shared.

More than 25 years ago this situation was addressed by a collaboration of authors, including the International Wildlife Rehabilitation Council and the National Wildlife Rehabilitators Association. The result of their work was titled *Minimum Standards for Wildlife Rehabilitation* (MSWR). First published in 1989, today's Third Edition 2000 continues to set benchmarks for state-of-the-art practices in wildlife rehabilitation. Novice rehabilitators use it to develop their own systems and skills, while experienced rehabilitators and institutions refer to it when new or unusual species are first presented. Now undergoing review once again, preparatory to publication of a Fourth Edition, the input and commentary of all practicing rehabilitators is solicited (see pp. 34–35).

Some sections, like guidelines for a thorough and comprehensive examination on presentation, are indeed the least a patient should expect. Other sections provide important background information. Species-specific housing requirements are also included. As valuable as this compendium truly is, now that the U.S. Fish and Wildlife Service and some state and local government regulators have adopted MSWR as a "standard" or a "guideline," one aspect has met with controversy and even some resistance in the rehabilitation community.

The focus of the trepidation revolves primarily around the specifics of cage and furnishings dimensions. The MSWR's Statement of Purpose declares, "This document is not intended to be an enforcement program....The wildlife rehabilitator is encouraged to alter techniques for housing...so long as basic natural history, comfort, and hygiene needs are met. Cage dimensions can be modified to accommodate special needs of the facility, animal or new advancements in the field." However, it then goes on to state, "The procedures and cage sizes described herein...are considered to be MINIMUM standards—i.e., more detailed procedures or larger cages are certainly acceptable and encouraged!" These contradictory statements have led a number of rehabilitators to worry that some regulators may abandon qualitative evaluation and rely upon cold, hard measurements instead. The choice of the term "minimum standards," while perfectly legitimate in proper context, seems unfortunate in hindsight.

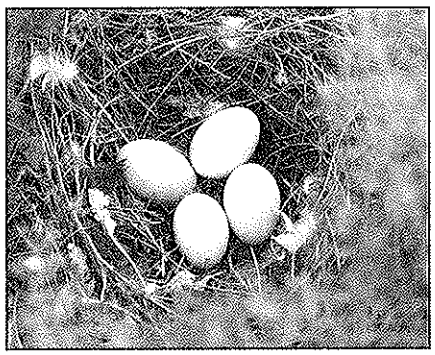
In point of fact, it can be argued that these potentially problematic measurements are not really "minimum standards" at all. For instance, does crow rehabilitation require a cage 10 x 30 x 15 feet as an absolute minimum? What if it was "only" 28 feet long? Or "only" 13 or 14 feet high? Would crow rehab be impossible? Or even be badly impacted?

Or do brown pelicans actually require a pool 24 inches deep? Most recuperating pelicans cannot reach fish that sink to the bottom in 2 feet of water. Is 2 feet deep then really the absolute minimum pool depth?

That is the problem with the descriptor "minimum standards" when applied to hardware without reference to knowledge, skills, or techniques. In the first case someone could indeed choose to rehabilitate crows in a flight much larger than the 10 x 30 x 15 foot "minimum" specified by MSWR. As a standard that rehabilitators are encouraged to exceed (a "strive higher" intent), it's a laudable idea. But I strongly suspect that a crow cage built to any of the dimensions above would suffice for a skilled rehabilitator. So the given size isn't really a minimum after all. Almost any roughly equivalent dimensions should be equally acceptable. And in the case of pelicans, providing a pool 6 or 8 feet deep (the same "strive higher" philosophy) serves absolutely zero positive purpose, and may even be counterproductive. So 2 feet deep isn't really a minimum either, and perhaps rehabilitators should not be encouraged to exceed it.

We must come to some agreement on what we are actually offering here. Are all of the particulars in MSWR actually "minimum standards" as the title declares? I submit that in some areas, like examinations and information recording, indeed they are. But in many cases, like specific cage sizes, pond dimensions, choice of cleaning agents, vaccinations of staff, rodent control programs, etc., they are flexible elements of a comprehensive rehabilitation program. How then may we properly describe the wealth and full diversity of information provided in this document if not as minimum standards?

Today we have available another widely accepted and understood name for management systems that incorporate the best skills, the best processes, the best solutions, and the most appropriate resources into a comprehensive program. We call them *Best Management Practices* (BMPs). BMPs have been developed for everything from stormwater runoff to endangered species recovery, from crop rotation to forestry management, from dairy farming to critical habitat maintenance. As the name indicates, these are comprehensive tools that include minimum requirements where appropriate, plus consideration for special needs, flexibility of application, and current advances in knowledge and technique.



I submit that MSWR is misnamed. It is not simply a compendium of minimums; but it is in fact a *Best Management Practices for Wildlife Rehabilitation,* and should be renamed as such. "Best" in this context refers to the peer reviewed and agreed upon systems that will allow for proper maintenance of the animal and facilitate recovery to the point of release. "Best" for an emaciated, nonwaterproofed pelican would not be an Olympic-sized pool. And "best" crow care will still be governed more by local climatic conditions, experience, husbandry practices, and rehabilitator knowledge than simple linear dimensions. There need be no guilt associated with "meeting only the minimum." No pressure to "exceed" some minimum, perhaps without beneficial effect. The application of that totality of skills, processes, solutions, and resources needed to provide the greatest possible chance for recovery and release is the ultimate goal of this volume, and the very essence of Best Management Practices.

Recognition of the scope, the intent, and the proper use of the document and the information it contains would resolve the present confusion. An understanding that the recommendations are offered as Best Management Practices with allowance for flexibility due to specific circumstances and/or special knowledge would encourage acceptance and participation. It would redirect wasteful argument over particulars of measurement into constructive discussion of substantive improvements in technique. The sole purpose of a BMP is to provide an agreed upon guideline of conditions and techniques that are "best" for the animals. That is exactly what the present volume actually intends. Nothing more—and certainly nothing less.

So please let us call a spade a spade—and rename the forthcoming edition not *Minimum Standards,* but *Best Management Practices for Wildlife Rehabilitation.*

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The Case for Sampling Eastern Screech Owls (*Megascops asio*) Admitted to Rehabilitation Facilities for Evidence of Exposure to Pesticides and Persistent Contaminants

by Ngaio L. Richards, Pierre Mineau, and David M. Bird

ABSTRACT: Certain species may be particularly suitable as indicators of the integrity of their respective habitats. The authors believe the eastern screech owl (*Megascops asio*) is one such species. A previous study to evaluate this was constrained by lack of toxicological analyses and a dearth of information about concurrent pesticide use. Here, the authors argue for more extensive sampling of screech owls admitted to rehabilitation facilities and describe how this information could apply in the context of a long-term study, based in the province of Quebec, Canada, that evaluates the risks of habitat loss and pesticide exposure to the species.

KEY WORDS: eastern screech owl, *Megascops asio*, case file, admission record, wildlife rehabilitation, pesticide exposure, insecticide, rodenticide, organochlorine, injury, mortality

NGAIO L. RICHARDS is currently developing forensic methodology to detect nonsteroidal anti-inflammatory drugs, including diclofenac, in the integumentary system (feathers, talons, and hair) of vultures and livestock animals.

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J. Wildlife Rehab. 28(1): 4–9
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Introduction

A number of studies have documented exposure of raptors to pesticides and persistent contaminants in the environment (e.g., Henny et al. 1987, Hegdal and Colvin 1988, Blus et al. 1989, Wilson et al. 1991, Okoniewski and Noveski 1993, Mineau et al. 1999, Gill et al. 2000, Harris et al. 2000, Gill et al. 2003, Stone et al. 2003). Anecdotal evidence suggests that exposure to at least one class of pesticides (i.e., cholinesterase-inhibiting insecticides) may predispose birds to mishaps such as hitting stationary objects and entanglement in fences, and there is a documented link between insecticide exposure and raptor admission to rehabilitation facilities (Mineau et al. 1999).

In 2002 the authors requested eastern screech owl (*Megascops asio*) case files from facilities in the United States and Canada to evaluate whether exposure to pesticide(s) was an underlying or direct cause of admissions. This information was intended to complement a study examining the exposure of the species to selected contaminants in apple orchards of Quebec, Canada. Three classes of agro-chemicals: cholinesterase-inhibiting insecticides, anticoagulant rodenticides, and organochlorines, were of particular interest because of their implication in incidents of wildlife mortality and/or their impact on the stability of avian populations.

Cholinesterase-inhibiting insecticides are used in numerous agricultural settings. Exposure may be primary (e.g., flying through a spray, or, more likely, perching on contaminated surfaces), or secondary (e.g., consuming contaminated prey) (see Richards et al. 2003). This class of pesticide depresses the level of cholinesterase enzymes in the body. Acetylcholinesterase (AChE), one form of cholinesterase, is necessary for timely breakdown of the neuromessenger acetylcholine. When AChE levels become depressed, acetylcholine accumulates and the nervous system becomes overstimulated, at which point it often shuts down completely (Mineau and Tucker 2002). Any ensuing fatalities usually result from respiratory failure (Porter 1993).

Anticoagulant rodenticides are applied against small mammal pests that threaten food stores or crops, such as the mouse (*Mus musculus*) and the vole (*Microtus* sp.), respectively. Anticoagulants interfere with vitamin K recycling, which plays a role in the production of blood-clotting factors in the liver. Predators are exposed to anticoagulants when they consume contaminated prey. Organisms exposed to anticoagulants are predisposed to fatal hemorrhaging (Stone et al. 1999). However, for some anticoagulants to be effective, target species must consume a sufficiently large dose or a series of consistent small doses at the appropriate concentration of active ingredient (Marsh et al. 1977, Askham and Poché 1992). Several days or even weeks may elapse between consumption of bait and mortality (Mendenhall and Pank 1980, Merson et al. 1984). The increasingly lethargic and eventually moribund state that precedes death (Prier and Derse 1962) facilitates capture by opportunistic predators.

Although theoretically no longer in use, residues of organochlorines persist in the environment. Historically, DDT was intensively applied in orchards and DDE, its breakdown product, has been implicated in eggshell thinning and subsequent population declines, perhaps most famously that of the peregrine falcon (*Falco peregrinus*) (Cooke et al. 1982). DDE inhibits carbonic anhydrase (Bitman et al. 1970), an enzyme that is involved in the supply of calcium to the shell as it forms in the oviduct. Inhibition slows or halts delivery of calcium, and the eggshell is correspondingly thinned (Peakall 1970). Elevated levels of DDE have been, and continue to be, observed in earthworms and in the wildlife that consume them, in orchard environments (Dimond and Sherburne 1969, Bailey et al. 1974, Blus et al. 1987, Richards et al. 2005).

Why Monitor the Eastern Screech Owl?

The eastern screech owl is found in urban, suburban, rural, and agricultural areas (Gehlbach 1995). In contrast to many other raptors also found in these areas, the screech owl is a year-round resident. Thus, individuals in agricultural areas are present during the entire growing and pesticide application season, and may be repeatedly exposed to a variety of pesticides every year. Ongoing exposure to residues of persistent contaminants, remnants from previous applications in agricultural and suburban areas, is also possible. Where risk assessment and remedial measures are concerned, the owls' nonmigratory status and relatively small territory (about 1.0 km^2) may also help to pinpoint the source and location of any observed exposure.

The screech owl is a generalist, feeding on birds, insects, small mammals, reptiles, and fish (Gehlbach 1994). In agricultural settings, the first three prey types may be targeted with pesticides to minimize damage to crops, and nontarget organisms may be unintentionally exposed during applications. The screech owl is also highly opportunistic, favoring prey that are plentiful and readily captured. Pesticide applications are likely to peak as populations of pest organisms do and, once exposed, organisms often adopt conspicuous behaviors or are lethargic (Benke and Murphy 1974, Stehn 1976).

All these factors may predispose the screech owl to adopt a diet of contaminated prey.

The Case Files

In 2002 the authors received more than 950 files for admitted eastern screech owls from rehabilitation facilities in the United States (n = 7) and Canada (n = 1), spanning 1998 to 2001. None of the screech owls had been sampled for exposure to contaminants.

To address whether exposure was an underlying or contributing cause of admission, and to evaluate whether the species could serve as a suitable monitor for environmental contamination, we attempted to make the best use of the available information. For the U.S. files, we noted the county from which each owl was admitted and examined generalized data on agriculture and agricultural pesticide use from the National Agricultural Statistics Service's Census of Agriculture website (http://www.nass.usda.gov). The proportion of county area in cropland, the proportion in orchards, and the proportion of the combined area of cropland and orchards—which is sprayed with insecticides—were all examined as well.

Unfortunately it was not possible to obtain Canadian data strictly comparable to that available in the U.S., and the most recent available data were for 1997. Further, only insecticide-related information was available. Persistent organochlorines are theoretically no longer in use, whereas rodenticide applications are considered to be of minimal economic importance and are, therefore, not covered by the census. Finally, the proportion of land sprayed is a measure of total insecticide use without regard to toxicity or risk of exposure. While there is evidence that many currently registered insecticides cause mortality and, presumably, sublethal intoxication in birds (see Mineau and Tucker 2002, Parts I, II), products vary in their toxicity and use patterns and must be examined individually.

Admission Circumstances and Confounding Variables

The two primary causes of admission were age- and road-related circumstances. This was not surprising, given that analyses of this type are biased toward cases involving human contact, where birds are visible and readily captured (Glue 1971).

Age-related Admission Circumstances

Admissions for adults, young of the year, and birds of undetermined age peaked markedly in May, June, and July, which corresponds to the fledging stage. During this period, when young learn to fly and hunt and adults hover in the vicinity, there are many opportunities for mishap and for discovery by humans. Another admission peak, albeit less pronounced, was observed in the late fall and early winter, during the dispersal phase, when yearlings face tremendous pressure to provision themselves while finding suitable territory. These admission peaks, which appeared fairly universal across rehabilitation facilities, might also coincide with periods of pesticide application. For example, in apple orchards of southern Quebec, insecticides are sprayed from early spring to late summer,



JEAN-SÉBASTIEN GUÉNETTE

An eastern screech owl (*Megascops asio*) peers discretely from a tree cavity at Parc Summit in Montreal, Quebec. With increasing development pressure, habitats that contain mature trees such as this one are becoming scarcer in southern Quebec, the northernmost tip of the species' North American range.

and in the late fall rodenticides are applied. However, without concrete toxicological evidence, we could only speculate as to whether exposure played a role in any of these admissions or in the observed admission peaks.

Road-related Circumstances

Raptors may be drawn to roads and roadsides because these areas provide good hunting prospects (Glue 1971). Indeed, the edge habitat found along street and road embankments is one favored by the screech owl (Gehlbach 1994). Cholinesterase-inhibiting insecticides have been shown to cause visual and motor impairment (Porter 1993), suggesting that pesticide exposure predisposes raptors to incidents such as car strikes. However, many raptors hunt by light, and an owl seeing its prey in headlights may focus on the prey and ignore the approaching vehicle. Again, without sampling individuals injured or killed by cars as well as those found along roadsides, it is not possible to evaluate the role sublethal intoxication and compromised reflexes may play in the high number of car strikes sustained by screech owls.

An Unusual Admission Circumstance

Some birds exposed to insecticides develop paralysis while perching and fall to the ground (Shlosberg 1976). A very small subset of owls (three of the 950) were actually observed falling from a tree before they were picked up and brought to the facility. Analysing exposure in these individuals and those found on the ground would have been of interest to the authors as well.

Proposed Long-term Monitoring Study

The screech owl is one of the most ubiquitous owls in North America (Gehlbach 1995). Indeed, many rehabilitation facilities are flooded with screech owls every year, particularly during the spring and summer, which may convey the impression that the population is abundant and stable. The authors believe that the

size of the yearly influx obscures the issue of *why* such a large number of owls are admitted to rehabilitation facilities and what it might reflect in terms of habitat quality. Habitat loss and deterioration may represent an underestimated threat to the species and may in some cases make individuals more vulnerable to exposure. In southern Quebec, for example, an increasing number of "pristine" woodland habitats are succumbing to development. Agricultural regions are now among the few areas that contain all the habitat components favored by the screech owl, including mixed forest, open areas adjacent to forests (which provide "safe" hunting), mature trees with cavities, and water courses. Yet pesticides may be intensively applied in these areas, and there may be residues of contaminants from previous applications. Suburban areas offer some suitable hunting and nesting areas, but may also present risks, not the least of which is increased contact with humans as well as the potential for exposure to residues of persistent contaminants (Okoniewski and Noveski 1993). Thus, we suspect that the observed peaks in admission are attributable to a combination of life stage vulnerability and to occupation of suboptimal habitat.

The eastern screech owl is currently considered "Very Common" and designated as "Not at Risk" (http://www.cosewic.gc.ca). However, this is based on an assessment conducted 20 years ago for the Committee on the Status of Endangered Wildlife in Canada. In the face of this uncertainty, co-author N. L. Richards has initiated a long-term study to monitor the species in eastern North America, particularly in the province of Quebec, where most of its Canadian range occurs. Objectives are to:

1) Obtain a better sense of the screech owl's distribution and population status within the province;
2) Evaluate the type and quality of habitat available to the species;
3) Establish, for monitoring purposes, a baseline quantification and delineation of "suitable" habitat remaining;
4) Evaluate the risk of pesticide exposure across these habitats.

Sampling at Rehabilitation Facilities

Owls exposed to insecticides or other pesticides may perish in fields or other remote locations. The number of pesticide exposure cases reported to rehabilitation facilities might not reflect the number of actual cases, serving instead as a lower-case estimate. Even so, it is important to sample as many owls as possible, acknowledging the biased or skewed nature of the data, because valuable information may be gleaned from even a small number of samples and patterns may emerge over time.

The general aspects of screening individuals for pesticide exposure were outlined in two back-to-back issues of the *Journal of Wildlife Rehabilitation* by Mineau and Tucker (2002). In broad terms, blood samples may be taken for analysis of organophosphorus insecticides, while carcasses may be set aside for analysis of persistent contaminants and rodenticides in tissues. Even if carcasses are recovered in poor condition, insecticide residues may be detected via toxicological analysis of the feet (Vyas et al. 2005).

Co-author N. L. Richards invites rehabilitation facilities and wildlife research/pathology facilities throughout the screech owl's range in North America to collaborate in a long-term sampling and analysis of individuals admitted to rehabilitation facilities. Funding is currently being sought to cover the cost of training for staff at rehabilitation facilities, as well as sampling and storage materials, shipment and analyses.

The authors are aware that ethical concerns may arise because certain aspects of sampling may appear at odds with the mandate of the rehabilitation facility, for example the need to evaluate potential exposure as soon as possible versus the need to stabilize the patient and minimize stress upon admission. We fully recognize the validity of such concerns and would be pleased to draw up an individual protocol with each collaborating facility to ensure its staff are fully comfortable with sampling and that a reasonable number of useable samples are collected.

Conclusion

Habitat preference, hunting mode, and diet may predispose raptors to exposure to pesticides or residues of persistent contaminants. There is an association between exposure of raptors to pesticides and admission to rehabilitation facilities. An analysis of birds admitted to these facilities may therefore provide valuable information on the integrity of the habitats they occupy.

The authors were unable to evaluate whether pesticide exposure was a contributing or underlying cause of screech owl admissions in the 950 case files received from rehabilitation facilities in 2002 because none were sampled for toxicological or biochemical analyses. It is believed, however, that the eastern screech owl, which is a year-round resident in a variety of habitats and has a highly varied diet, might be especially suitable to monitor pesticide use and environmental contamination in the overall context of habitat quality. We suspect that the species is not as ubiquitous as widely thought, and extend a plea for rehabilitators to increase sampling efforts to more conclusively identify or eliminate pesticide exposure as a contributing factor in screech owl admissions.

Facilities are invited to contact N. L. Richards if they wish to participate in the long-term monitoring study of the screech owl; if they would like more information on the study and its context within the Quebec habitat quality study; if they have comments and/or feedback either about the species' suitability as a monitor of environmental contamination or regarding issues that may arise from sampling at rehabilitation facilities.

Acknowledgements

The clinical component of our research on screech owls in Quebec could not have been accomplished without the support and guidance of the staff at the collaborating rehabilitation facilities. In particular, Dr. Guy Fitzgerald from the Clinique des oiseaux de proie de l'Université de Montréal provided useful commentary on the logistics of conducting such studies at rehabilitation facilities. We wish to thank the following: Joanna Fitzgerald and Dave Osbourne at the Conservancy of Southwest Florida, Robin Shearer at Tufts University Wildlife Clinic, Sarah Snead at the Wildlife Center of Virginia, Mathias Engelmann at the Carolina Raptor Centre, Dody Wyman at River Raisin Raptor Center, Sallie Welte at Tri-State Raptor Rehabilitation and Research, Drs. Claude Lacasse and Stéphane Lair at the Clinique des oiseaux de proie, and Dr. Patrick Redig and Lori Arent at the Raptor Center of the University of Minnesota. Thanks are also extended to Annemarie and Anke Roth from the Center for the Rehabilitation of Injured Birds, and to Gwenn Johnston, Allyson Lee, and Judy Hilton. Christine Bourque and Jessus Karst provided technical support and assisted with data entry. Pierre Dutilleuil and Benjamin Gilbert provided invaluable statistical advice.

This work was made possible by the financial support of the Canadian Wildlife Service, Fonds québécois de recherche sur la nature et les technologies (FQRNT), and Bird Protection of Quebec (formerly the Province of Quebec Society for the Protection of Birds (PQSPB).

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Collection, Value, and Use of Wildlife Rehabilitation Data

by Janelle Harden, Robert W. Dickerman, and Elizabeth Penn Elliston

Introduction

The diversity of recorded data gathered by wildlife rehabilitators, when properly collected and made available, may meet a wide range of research needs. These data can be valuable not only to rehabilitators but also to wildlife management professionals and scientific museum collections. This study was undertaken to determine what information is actually available and accessible to the interested community. A search for rehabilitation intake data in the literature and on the Internet yielded very little useful information. Of the three Internet sites found (University of Minnesota 2005; Bird by Bird 2005; Casey and Casey, unpublished data), none presented information in a uniform manner that facilitates accurate comparison. This paper hopes to provide impetus for uniformity, consistency, and accuracy.

Study Area and Methods

New Mexico was the focus of this study because the authors live and work in that state and because annual reports were available for all of the state's rehabilitators through the New Mexico Department of Game and Fish (NMDGF). In addition, the authors are associated with Wildlife Rescue, Inc. of New Mexico (WRINM), the organization that provided the 15-year span of intake data.

Annual reports of every avian rehabilitator in New Mexico were obtained for report year 2001 from the files of the NMDGF, wherein they are public record. A taxonomic list was created to identify the number of each species received and the number that died that year (Harden 2003).

To obtain a longitudinal view of the subject, 15 years of avian acquisition data (1990–2004) from WRINM were then examined (Appendix A, page 19). This taxonomic list records the number of avian individuals, by species and year received, from this organization.

In addition, periodic reports to NMDGF's Share with Wildlife program were reviewed for relevance. Lastly, the accession records of the Museum of Southwestern Biology (MSB) at the University of New Mexico were consulted to determine the percentage and importance of museum specimens obtained through rehabilitators.

Discussion

Acquisition (Intake) Data

Avian rehabilitation activities can only be legally conducted under permit from the U.S. Fish and Wildlife Service (USFWS) (Title16 United States Code, Section 703; Title 50 Code of Federal Regulations, Section 21 et seq.; and the 18 Standard Conditions [USFWS 2004] pursuant to 50 CFR 21.27). The USFWS provides rehabilitators with forms on which to file the mandatory annual reports. These forms detail species, quantity, and their final disposition (i.e., released, euthanized, expired, disposition pending, or transferred to another permitted activity). Although not required on the annual report form, keeping a record of the contact information of the person

ABSTRACT: Annual reports filed in New Mexico are used as examples of nationally available rehabilitation data. Data on birds from one rehabilitation organization over 15 consecutive years are included. This paper discusses the types of information to be gathered during wildlife rehabilitation intervention, problems associated with collection, and suggestions for making the information uniform, consistent and accurate. Some potential values of data, if properly recorded and made available to the appropriate persons, are also addressed. Specimens in the Museum of Southwestern Biology, acquired from rehabilitators, are discussed as a primary example of the use of accurate rehabilitation data.

KEY WORDS: acquisitions, annual report, data, mortality, rehabilitation, wildlife management

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J. Wildlife Rehab. 28(1): 10–28
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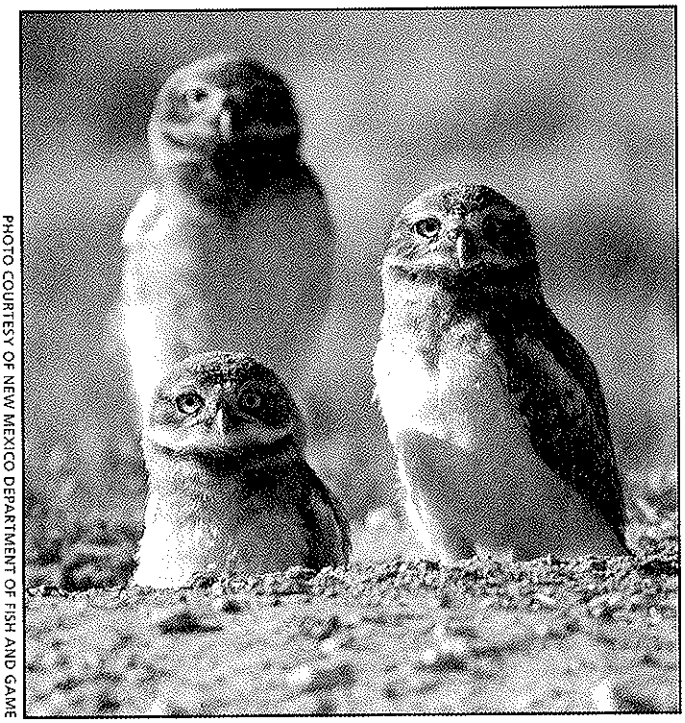


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FIGURE 1. The western burrowing owl (*Athene cunicularia hypugea*) has become a species of concern because it depends on burrows dug by prarie dogs (*Cynomys* spp.), an animal that is being eradicated in many areas.

who initially found the animal makes follow-up possible. The federal permit (Standard Condition 11) requires reporting, within 48 hours, of any criminal activity, such as gunshots or poisoning (Standard Condition No. 10), although this may be difficult for a rehabilitator to determine.

Data Retrieval

The Privacy Act of 1974 (Title 5. United States Code, Section 552a) is provided to all applicants during the federal permitting process. This act makes obtaining federal reports for analysis very difficult. Like many state agencies that require that rehabilitation activities be reported annually, NMDGF accepts duplicates of the annual reports filed with the USFWS. These duplicate reports were made available to the authors.

Many problems arose when the 2001 New Mexico annual reports were reviewed. Most were handwritten and included illegible sections. Levels of detail varied between reports. While some had been produced in a database, NMDGF only had printouts that could not be electronically sorted. One nearly-50-page report listed intakes one by one in chronological order. Determining the total number of each identified species required a page-by-page hand count. Due to time constraints, all rehabilitators' data were then hand tallied on a specially designed form rather than by creating a combined database. Many numeric discrepancies arose (and were never resolved) that could have been corrected in an electronic database. The same types of problems were observed by Casey and Casey (unpublished data) in their examination of 5 years of rehabilitation demographics and caseloads.

It is clear there is much room for improvement in our data collection and reporting methods. An examination of potential improvements may best be undertaken by returning to the types of information that rehabilitators should gather, only some of which are required in federal annual reports. These include, but are not limited to: date received, exact location found, reason for admission, species identification and quantity received, and final disposition. (The annual acquisition log created by Wildlife Rescue, Inc. of New Mexico requests these categories of information. For a reproducible intake log, modeled on WRINM's, see "Ditto," page 47).

Date Received

Because federal permits require the final disposition of an animal within 180 days of initial intake, accurate intake dates are necessary. In addition, they can be important for tracking medical concerns such as the anticipated time-frame for healing of fractures or the apparent 5-day response to "cat-caught" injuries. For deposit into a scientific collection, an accurate intake date should be accompanied by the date of death. If discrepancies arise in connection with a particular case, the original written record is the reference. Co-author R. W. Dickerman of the Museum of Southwestern Biology points to an example of a merlin (falcon) specimen from a rehabilitation group. The data card indicated the bird was received in October 2002 and held until its death in October 2004. However, based on plumage the bird was clearly a juvenile; it could not have been in rehabilitation for 2 years. Museum collections cannot incorporate specimens, no matter how important the species may be, unless they have accurate information. An intake log that records dates in chronological order solves problems. Inaccurate dates, or blocks of them, will be found eventually and the correct date can be reconstructed. Maintaining an ongoing spreadsheet that electronically enters the date for each acquisition also helps keep the dates in order.

Exact Location Found

The "relative" location may provide clues as to what brought down an animal in the first place. An animal found on the side of the road may be a victim of vehicle collision; if under a window, a window strike. When many animals are found in the same area, a disease or

poison might be suspected. This could be important information if reported to the appropriate authorities; secondary poisoning of nontarget species is sometimes identified this way. However, it is important that this type of locational data be used only as a starting point for full evaluation of actual pathology. For example, some raptors found under power poles are later determined to be poisoned, not electrocuted, as first reported.

Geographic location is the second piece of information critical to scientific collections in assessing a specimen's value. Sometimes the person logging the data is so concerned about the injured animal that the location of the road or window is neither requested nor noted. Many animals are found by people who are jogging, picnicking, cycling, or driving. Recording that the animal was found on "the roadside" is only part of the information; knowing *which* road is also necessary. In New Mexico, animals have been received that originated in Arizona, Colorado, Missouri, Oklahoma, and Texas. Knowing the location and activities of wildlife in the immediate area ensures that releases are made in appropriate habitat. In addition, not introducing a disease carrier or "exotic" species to new territory helps control the spread of chronic wasting disease, Newcastle's disease, and other problems that afflict wildlife populations.

A distinct column for "Exact Location Found" in the intake log serves as a reminder to request and record the most detailed information possible (e.g., "2/10 of a mile south of mile-marker 416 on Hwy 27" or "in my back yard" with the address of the finder). Space for this information should be included when designing progress notes, an electronic database, a hotline, and volunteer-maintained intake logs. If the same information request is visible everywhere, it becomes an unconscious habit for volunteers to request and record it.

Reason for Admisson

"Reason for Admission" is an ambiguous category that should be more precisely examined. Although no longer required on federal forms, the information is valuable. There are two distinct types of reason for admission: "cause of encounter" and "nature of injury."

Cause of Encounter

Cause of encounter data, such as "cat caught" or "hit by car" may identify the numbers of animals at risk from those hazards. Harden (2002) found that only 22% of known causes could be classed as "natural" (e.g., disease, storms, caught by predator, and so forth) which gives substance to the oft-repeated assertion that approximately 80% of injuries received in rehabilitation are human caused.

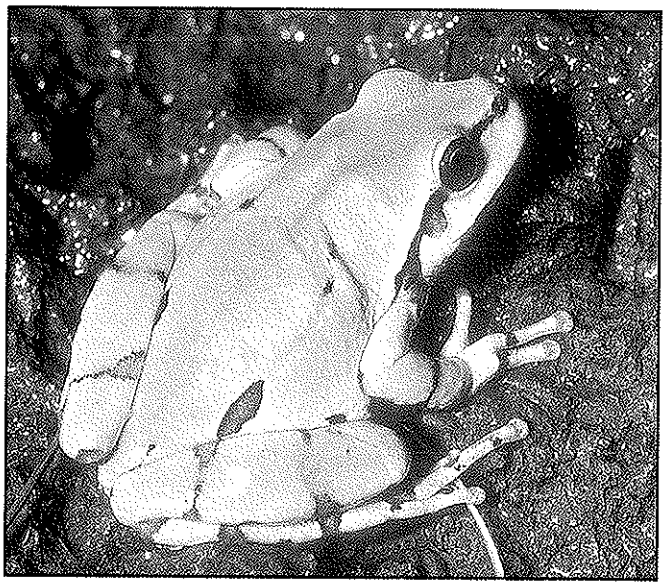


PHOTO COURTESY OF NEW MEXICO DEPARTMENT OF FISH AND

FIGURE 2. The mountain treefrog (*Hyla wrightorum*) is one of more than 500 species in New Mexico listed as a "Species of Greatest Conservation Need."

Well-collected data can be used to alert the public to injuries and deaths caused by vehicles, windows, lighted buildings at night, pets, children with BB guns, electrical wires, transmission towers, and other hazards. The long list may vary by region or state. Accurate records enable partnerships with individuals and industries that effect changes on the broad scale. For example, utility companies across the U.S. are capping transformers and making other structural changes to protect wildlife, based in part on data received from rehabilitators (J. Acklen, pers. comm. 2005).

Another problem that arises with these data sets is a lack of clarity in how the information is reported. The University of Minnesota website (http://www.tc.umn.edu/~devo0028/stats.htm) provides an interesting, detailed list of reasons for admission. There is, however, no mention of the number of intakes for which the cause is *not* known. This gives the impression, however unintentionally, that rehabilitators are always able to determine what happened. Harden (2002) reported that, in the 5 years 1994–98, 43% of the cases recorded had unknown causes for admission.

Helpful information for this category is obtained by skillful questioning of the people who bring wildlife to a rehabilitation facility and ensuring that intake logs and progress notes have distinct columns in which to record this information.

Nature of Injury

Nature of injury is different from the apparent cause of encounter. Injuries can be quantified: e.g., fractured

right humerus, crepitus in chest, left eye swollen shut, trichomoniasis visible in throat. Cat encounters may result in minor or major injury. When discussing with cat owners the effects of their pets on wildlife, citing the actual injuries sustained expands the argument beyond mortality data and may be of use in persuading modified behavior for the owner of the cat.

Each type of injury requires its own set of medication, supplies, and treatment protocols. Accurate records that quantify the types of situations dealt with most consistently enable planning ahead. This applies not only to purchases and facilities, but also to "hot topics" for rehabilitator training programs and/or educational programs to the community. These presentations provide a great opportunity to explain how human activities may have a negative impact on wildlife.

Species Identification and Quantity Received

Wildlife management agencies, both state and federal, are responsible for population-level protection of wildlife resources. This can be a difficult concept for many rehabilitators to embrace because, by the very nature of the avocation, we focus on individual creatures. If species are changing in population size or health, accurate long-term datasets from rehabilitators could be valuable to management agencies, developing partners in the conservation of the resource. Examination of the 15 years of WRINM intake data (presented in Appendix A) shows the quantity and diversity of species received over a long period, in addition to revealing trends that may only appear when comparing acquisitions over many contiguous years.



USFWS

FIGURE 3. Canada goose (*Branta canadensis*) populations have exploded in the northeastern United States in recent decades, and the birds are held responsible for considerable property damage.

In addition, these data can reflect both local and regional impacts (e.g., mortality induced by flood or drought, bio-magnification of pesticides, or epizootics, to name just a few). Incidents that begin locally may expand to a regional or national level. Examples include raccoon rabies in the eastern United States, chronic wasting disease in ungulate populations, and West Nile virus, which has spread continent-wide in just 3 years. Population explosions may be responsible for property damage in cases such as northeastern populations of white-tailed deer (*Odocoileus virginianus*) and Canada goose (*Branta canadensis*), and elk (*Cervus elaphus*) in parts of the west. Rehabilitators who attend national and regional conferences are well aware that a large amount of rehabilitation occurs in urban settings. These areas are not typically surveyed by fly-over counts or other traditional methods used by wildlife managers. Breeding bird surveys and annual Christmas counts do provide a seasonal snapshot of bird populations in some urban areas, but rehabilitators are in a unique position to provide year-round information unavailable from other sources.

Species identification is, perhaps, the most crucial element for both rehabilitation and data reporting. Issues such as appropriate diet, anticipated schedule for injuries to heal, and captive management must be determined in order to provide species-appropriate care. In spite of the professional skills exhibited by many rehabilitators, few have formal training in biology or taxonomy. One frequently hears statements such as, "It's just a sparrow... pigeon...dove...mouse." New Mexico provides habitat for 26 native sparrow species. Unlike the nonprotected house sparrow (*Passer domesticus),* these New World sparrows are in the family Emberizidae, which is typified by "little brown birds." The state also has 13 other non-sparrow, visually similar Emberizidae. This gives New Mexico rehabilitators at least 39 chances to misidentify a protected species. Inca doves (*Columbina inca*) may be expanding their historic range in the southwestern United States, but this can only be verified with proper

species identification. When hantavirus is endemic in the area, it might be of value to know if the "mouse" is *Peromyscus maniculatus*, the deer mouse held responsible for human contraction of the virus.

There are a variety of methods to assist in proper identification of wildlife species.

- Conduct a web-search by common name. (Many sites provide pictures.)
- Take pictures of all intakes for future reference. This includes youngsters, particularly birds: juvenal plumage may vary greatly from adult coloration.
- Form affiliations with natural history museum curators, university and wildlife agency biologists, and local specialist clubs.
- Consult several field guides, including Peterson, Sibley, the Audubon Society, and the National Geographic Society. The different presentations (illustrations versus photographs) can help narrow down the species you have in hand. (While the most recent editions are nice, any year's guide is useful.)
- Beyond species identification, consult the field guides to ensure that correct spelling and common names of species are recorded on logs and progress notes.

Examination of the reports submitted to NMDGF revealed acquisition of a "febi" (apparently a "phoebe," but was it an eastern, Say's, black phoebe, or unknown?) and a "red-necked loon" that was perhaps a red-throated loon.

Final Disposition

Rehabilitators like to know exactly how many animals they received during any given year. The outcome of each case is of even greater interest to measure the efficacy of treatment. Tracking this information is not unlike balancing a checkbook: what comes in and what goes out must tally up on the bottom line. The larger a center, the more difficult it can be to obtain accurate dispositions. WRINM's data manager reported that when she analyzed 2003 acquisitions, she found 6.42% of protected birds had missing disposition data. An improved and standardized protocol by which rehabilitators could report data was instituted, and the 2004 data showed only 1.64% unreported dispositions—a 75% decrease in omission errors over the previous year (A. Russell, pers. comm. 2005).

In summation, well-designed intake logs and/or progress notes will assist in getting complete data for reports. Protocols can be established that suit the type of permittee, be they home-based individuals or centralized organizations: create standard forms for use by all subpermittees and establish a monthly, bimonthly, quarterly, or bi-annual schedule by which you retrieve (from volunteers) and enter all annual report data. Lastly, if working with a scientific collection, create a data tag that can be attached to the leg of animals that were DOA, euthanized, or die during rehabilitation (Figure 4). This tag carries the crucial information that is required before a specimen can be accessioned into a museum collection. It may seem difficult to establish this practice, but it quickly becomes rewarding as your center is able to contribute valuable resources to educational institutions.

Acquisition # _____

Species _____

Location found (be specific): _____

_____

Date found _____ **Death date** _____

Provider name _____

Phone ( ) _____

FIGURE 4. This data tag carries all pertinent mortality information in the space of a business card. Tags can be hole-punched and attached to the leg with a string or heavy thread; twist-ties and rubber bands can break when frozen.

Salvaged Birds as a Resource for Ornithology

In the mid-1980s WRINM established a relationship with the University of New Mexico's Museum of Southwestern Biology (MSB). Co-author R. W. Dickerman assumed responsibility for the museum's avian collection in 1989. In recent years he has worked to facilitate a similar partnership for rehabilitators and museums across the United States. In a 1999 paper Dickerman told rehabilitators:

> "The contribution of salvaged material is great.... Several colleagues stressed the importance of salvaged birds in two areas: (a) Raptors, a group I believe that most, if not all (even those of us with fully legal and scientifically justifiable reasons) are reluctant to collect; and (b) Urban-adapted species which are virtually 'out-of-bounds' to scientific collecting" (Dickerman 1999).

Rehabilitators, and members of the general public who bring birds to them or other wildlife professionals, greatly outnumber ornithologists. Their contributions to museums are incalculable, if accompanied by accurate data as to where and when the bird was found.

Birds "out of place" in season or geography are more apt to become a casualty than birds that are in place in time and geography. An out-of-place migrant, an exceptionally early or late migrant, or an erratic wanderer are all in greater jeopardy than a local bird. For example, in fall 2004 WRINM received what was recognized as an unusual sparrow, not found in New Mexico (See sidebar, Rehabilitation Contributions 1990–2004, page 16). When the identification was confirmed (Williams 2004), it became a first record of that sparrow species in the state. Such records only occur when carcasses are collected and taken to appropriate facilities, such as museums.

Once a relationship has been established between rehabilitators and a museum, this contribution can be tracked in the data. It should be noted that not all animals become part of museum collections, but only those that are needed to fill out the series of any given species. Dickerman estimates that about 10% of the animals provided by WRINM became specimens in the MSB collection. Some results of a review of the MSB bird database from 1990–2004 are provided here (see sidebar, page 16). In some instances, rarities are found only when one is able to examine masses of the same species, while knowing what to look for. When teaching specimen preparation several years ago, Dickerman used MSB birds obtained from rehabilitators. These included several sharp-shinned hawks (*Accipiter striatus*). In helping one student who was having a difficult time, Dickerman looked closely at the bird she was working on and realized it was a representative of the Pacific Northwest population not previously recorded south of Oregon during the winter.

When Dickerman arrived at the Univeristy of New Mexico, there were 25 great horned owls in the MSB collection. There are currently about 225; all but five of the added birds came from salvage. In the past, the museum used one subspecific name for New Mexico great horned owls; they now must use six subspecific names. It is also now known that, in some winters, New Mexico receives migrants from the Rocky Mountains north of the Snake River in Idaho or the aspen parklands of at least Montana and Wyoming. The museum was able to decipher this story only because it has been able to handle so many causalities. Often the common birds are most revealing. It should be noted that complete and accurate data can be retrieved for every bird accessioned into the MSB collection, or the museum would have been unable to use them. Another benefit to a museum relationship is that this provides an on-going source for identification or confirmation of acquired species that are difficult to identify.

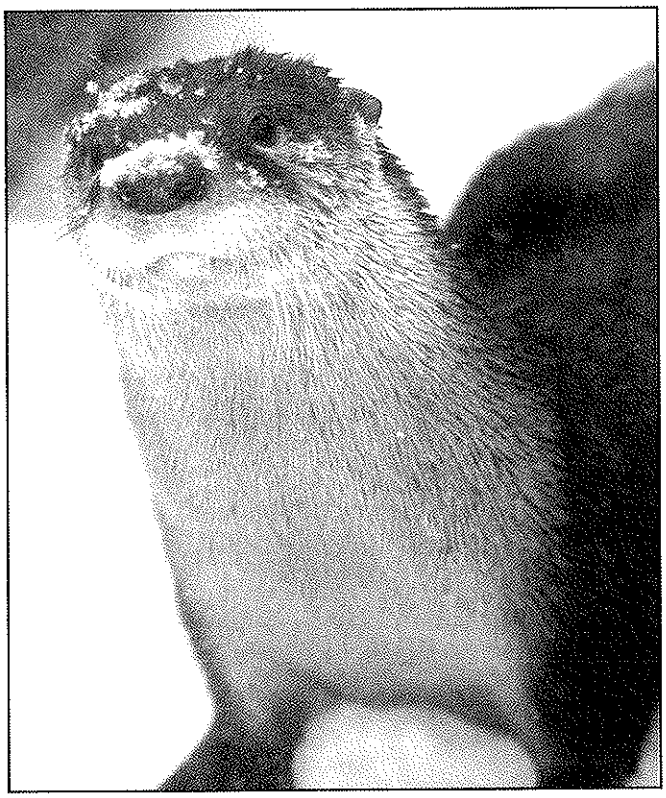


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FIGURE 5. River otters (*Lutra canadensis*) are presently considered extirpated from New Mexico.

Caveats for Use of Data

Through many years of analyzing annual report data, WRINM recognized that raw release rates, by themselves, are not very enlightening. Although Casey and Casey (unpublished data) found release rates inversely correlated with total intake load, other factors may influence release rate considerably. In a given year, release rates may be influenced by big differences among species received, in the type of injury sustained, or in the number of juveniles versus adults. There is a substantial difference in the release rates of uninjured dependant young animals (orphans) versus injured independent animals (adults). Release of orphaned or "kidnapped" animals in WRINM records maintained a fairly steady rate of about 75%, while adults with injuries were released at a rate of only 35%. Injured adults have generally been "down" for several days as a result of their condition. Emaciation, infection, or dead bone(s) at fracture sites are just some of the situations that may be beyond successful treatment. Table 1 summarizes selected data from WRINM's 1996 acquisitions. Similar to the Minnesota data (http://www.tc.umn.edu/~devo0028/stats.htm), these combined release rates range from 29–56%. However, the uninjured dependant young release data show a 65–100% release rate, while that for injured adults is only 8–42%.

REHABILITATION CONTRIBUTIONS 1990–2004
MUSEUM OF SOUTHWESTERN BIOLOGY, UNIVERSITY OF NEW MEXICO

There are a total of 4808 Museum of Southwest Biology bird specimens for this period, based on the occurrences of wild birds of native and naturalized taxa with at least basic data (e.g., state, year, and preferably exact locality, day, month, and collector). This means that occurrences of captive and non-naturalized non-natives are not included, such as zoo birds, raptors known to have been kept for falconry, and propagated game birds. In 1990–2004 New Mexico wildlife rehabilitators contributed 1320 birds to the MSB (27.5% of the 4808 specimens during those years). These birds represented 202 species, or 56.9% of the 355 species accessioned into the collection for that period. The most notable include:

Least Storm Petrel: First record of this order (Procellariiformes), family (Hydrobatidae), and genus/species (*Oceanodroma microsoma*) from New Mexico was found alive by a "student" (name unknown?) at Silver City, Grant County on 28 August 1992 and later obtained by MSB via Dennis Miller (specimen prepared by Dale A. Zimmerman). This maritime species nests in Baja California and otherwise ranges along the Pacific coast from California to Ecuador, with birds sometimes ranging inland to the Salton Sea and the lowermost Colorado River.

Scarlet Tanager: First winter record and only the fourth overall (spring and fall) specimen of this species (*Piranga olivacea*) in New Mexico was first seen by Page Draper on 4 January 2002 and found dead 5 days later at Rio Rancho, Sandoval County, and apparently obtained by MSB via WRINM. According to Dickerman and Draper (2003) this is the first January specimen of this species from the United States, where it nests in the eastern half and adjacent Canada and migrates southward to winter mainly in South America.

Nelson's Sharp-Tailed Sparrow: First record of this species (*Ammodramus nelsoni*) from New Mexico was found alive by Kris Asmussen near the State Fairgrounds in Albuquerque on 22 September 2003 and obtained by MSB through the efforts of Denise Coil and Elizabeth Penn Elliston of WRINM. This species nests from eastern Canada westward to northeastern British Columbia and in the adjacent U.S. from Montana to Maine, wintering mainly on the Atlantic and Gulf coasts from at least Maryland to Texas.

Another first specimen for the state was a red-shouldered hawk (*Buteo lineatus*) obtained near Albuquerque on 28 November 1991, provided by WRINM. Even more important were contributions of extensive series of several geographically variable species of birds, including 98 great horned owls (*Bubo virginianus*), 34 flammulated owls (*Otus flammeolus*), 33 each red-tailed hawks (*Buteo jamaicensis*) and western screech owls (*Megascops kennicottii*), 29 common nighthawks (*Chordeiles minor*), 25 common poorwills (*Phalaenoptilus nuttallii*), and 21 merlins (*Falco columbarius*).

In addition to the above, specimens of several relatively rare-in-New Mexico species characteristic of the eastern U.S. were among the 1990–2004 material donated by rehabilitators to MSB, including the eighth yellow-crowned night heron (*Nyctanassa violacea*), third purple gallinule (*Porphyrio martinica*), fourth yellow-throated vireo (*Vireo flavifrons*), eighth red-eyed vireo (*V. olivaceus*), and third hooded warbler (*Wilsonia citrina*). Conversely, series of several more frequent and/or common species were obtained that help clarify their status in the state, such as about two dozen merlins (*Falco columbarius*).

— **John P. Hubbard**
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TABLE 1. COMPARISON OF NUMBER RECEIVED (N) AND RELEASED (R) OF UNINJURED, DEPENDANT YOUNG (ORPHANS) VERSUS INJURED INDEPENDENT INDIVIDUALS (ADULTS) FOR SELECTED WRINM 1996 ACQUISITIONS

Species	Uninjured Orphans			Injured Adults			Combined Totals		
	N	R	% R	N	R	% R	N	R	% R
American Kestrel (*Falco sparverius*)	8	7	88	19	8	42	27	15	56
American Robin (*Turdus migratorius*)	18	13	72	78	17	22	96	30	31
Barn Owl (*Tyto alba*)	17	11	65	10	3	30	27	14	52
Black-chinned Hummingbird (*Archilochus alexandri*)	25	24	96	27	4	15	52	28	54
Common Grackle (*Quiscalus quiscula*)	4	4	100	13	1	8	17	5	29
Greater Roadrunner (*Geococcyx californianus*)	8	6	75	15	3	20	23	9	39

SOURCE: WRINM data, as reported to Share with Wildlife grantor, NMDGF, in the 1996 Funding Annual Report

Conclusions

The authors, along with New Mexico state conservation agent Chuck Hayes (pers. comm. 2005), feel that it is important for rehabilitators to (1) enter all acquisition data in a software program; (2) choose a program that is relatively inexpensive and readily available, such as Microsoft Excel; and (3) record information uniformly and comparably. Such a system would afford an accurate, well-timed ability to provide data to rehabilitators, wildlife managers, and other interested parties. In addition, it would benefit rehabilitators, wildlife managers, and the scientific community to form ongoing associations with each other and to make their specific mutual needs known. This would assist rehabilitators in the collection and reporting of data that are accurate, complete, and of greatest use to other disciplines.

In addition, the availability of salvaged rehabilitation birds to educational institutions is an unquestioned value of rehabilitation activities, if appropriate data is collected on each specimen. Many state records have been acquired in this matter. Beyond museum specimens, however, all other scientific uses will be determined by the veracity of data generated by rehabilitators.

Acknowledgements

We wish to acknowledge the cooperation of the New Mexico Department of Game and Fish, which made New Mexico rehabilitators' 2001 annual reports available, and the Department's Share with Wildlife program, which has provided annual grant funding to WRINM throughout the 15 years analyzed herein. Anne Russell of WRINM provided the 15 years of report data (1990–2004). We also thank rehabilitator Shirley Kendall for providing her 1995–2001 acquisition data and ornithologist John P. Hubbard for reviewing MSB records on our behalf.

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Regulatory Context

16 U.S.C. 703. Migratory Bird Treaty Act of 1918 (MBTA). As Amended. United States Code.

50 C.F.R. §21.27 Special purpose permits. Code of Federal Regulations. U. S. Department of the Interior. U.S. Fish and Wildlife Service.
50 C.F.R. §21.31 Rehabilitation permits. Code of Federal Regulations. U.S. Department of the Interior. U.S. Fish and Wildlife Service.
5 U.S.C. 552a. The Privacy Act of 1974. Title 5. Government Organization and Employees.
Chapter 5—Administrative Procedure, Subchapter II, Sec. 552a.
USFWS. 2004. Standard Conditions, Rehabilitation Permits [pursuant to:] 50 CFR 21.27. U.S. Fish and Wildlife Service.

Personal Communications Authorities

Acklen, J. 2005. Senior Environmental Scientist, Public Service Company of New Mexico. Albuquerque, N.M.
Hayes, C. 2005. State Conservation Agent, Conservation Services Division, New Mexico Department of Game and Fish. Santa Fe, N.M.
Russell, A. 2005. Data Manager, Wildlife Rescue, Inc. of New Mexico. Albuquerque, N.M.

Suggested Resources

Websites Reporting Raw Data

University of Minnesota. http://www.tc.umn.edu/~devo0028/stats.htm. Provides statistics compiled from information sent in from various wildlife rehabilitation centers for the years 1989–1997.
Bird by Bird. (Accessed 2005) http://www.birdxbird.org/birdXbirdRehab05.htm. Provides minimal "Indepenent Rehabbers' Bird Data for 2005."
WildAgain Wildlife Rehabilitation Inc. http://www.ewildagain.org/wildlife_rehabilitator_record_st.htm. Provides the Casey and Casey report of 5 years of rehabilitator demographics and caseloads; also has a study of 150,000 animals, identifying the most commonly encountered conditions in rehabilitation.

Websites at Which Rehabilitators Can Report Data

University of Minnesota. http://www.tc.umn.edu/~devo0028/statform.htm
Wildlife International. http://www.wildlife-international.org/EN/rehab/profiles.cfm
Tufts University. http://www.wpi.edu/Projects/Tufts/survey.html

Animal Field Guides

The Audubon Society Field Guide to North American Birds. New York: Alfred A. Knopf, Inc.
The Audubon Society Master Guide to Birding (3 volumes of photographs). New York: Alfred A. Knopf, Inc.
Field Guide to the Birds of North America. Washington, D.C.: National Geographic Society.
Peterson Field Guides. Roger Tory Peterson. Boston: Houghton Mifflin Company.
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Note: Updates and revisions periodically occur for all field guides; any volume is useful and therefore dates are not given above.

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APPENDIX A. WILDLIFE RESCUE, INC. OF NEW MEXICO: 15 YEARS OF ACQUISITIONS, 1990–2004

Order/Family Common Name	Scientific Name	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	Totals
GAVIIFORMES																	
Gaviidae																	
Pacific Loon	*Gavia pacifica*															1	1
Common Loon	*Gavia immer*	1				1						1		1			4
Loon species	Gavia sp.							1									1
PODICIPEDIFORMES																	
Podicipedidae																	
Pied-billed Grebe	*Podilymbus podiceps*	1	1			1		1		1	2			1	1	1	10
Horned Grebe	*Podiceps auritus*									1							1
Eared Grebe	*Podiceps nigricollis*		1	1		2		1	5	1					1	1	13
Western/Clark's Grebe	*Aechmophorus occidentalis/clarkii*	2	1		1	2		3		2		1	1	2	1	1	17
PELECANIFORMES																	
Pelecanidae																	
American White Pelican	*Pelecanus erythrorhynchos*			1				1						1	1		4
Brown Pelican	*Pelecanus occidentalis*	1		1													2
Phalacrocoracidae																	
Double-crested Cormorant	*Phalacrocorax auritus*								1								1
Cormorant species	Phalacrocorax sp.												1				1
CICONIIFORMES																	
Ardeidae																	
American Bittern	*Botaurus lentiginosus*		1														1
Great Blue Heron	*Ardea herodias*			1	3	1	2		1		1	2	1	2	1		15
Snowy Egret	*Egretta thula*									1				5	2	1	9
Cattle Egret	*Bubulcus ibis*		1							1			1			4	7
Green Heron	*Butorides virescens*										1	1					2
Black-crowned Night Heron	*Nycticorax nycticorax*					1	1	1	3	7	3	2	1	8	5	4	36
Yellow-crowned Night Heron	*Nyctanassa violacea*					1								1			2
Unknown Heron/Egret	Ardeidae sp.											1		1			2
Threskiornithidae																	
White-faced Ibis	*Plegadis chihi*	1		1			1		1			2	1		1		8

...continued

APPENDIX A. WILDLIFE RESCUE, INC. OF NEW MEXICO: 15 YEARS OF ACQUISITIONS, 1990–2004

Order/Family Common Name	Scientific Name	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	Totals
CICONIIFORMES, *continued*																	
Cathartidae																	
Turkey Vulture	*Cathartes aura*	2	1	5	3	3	6	3	5	6	3	2	1	6	3	4	53
ANSERIFORMES																	
Anatidae																	
Mute Swan	*Cygnus olor*		1														1
Snow Goose	*Chen caerulescens*	3		1					1				5	2		2	14
Ross's Goose	*Chen rossii*							1	2	1			2				6
Canada Goose	*Branta canadensis*		4	1	1	1		3	7	3	3	2	2	2	1	3	33
Wood Duck	*Aix sponsa*	1	2		1	1	11	4	6	10	23	12	14	16	29	51	181
Gadwall	*Anas strepera*								1	1							2
Mallard	*Anas platyrhynchos*	1	13	13	21	23	22	31	62	17	50	14	17	23	49	73	429
Blue-winged Teal	*Anas discors*	1							1							4	6
Cinnamon Teal	*Anas cyanoptera*												1				1
Green-winged Teal	*Anas crecca*	1								1		1	1	1		1	6
Lesser Scaup	*Aythya affinis*		1														1
Bufflehead	*Bucephala albeola*												1				1
Common Merganser	*Mergus merganser*	1															1
Ruddy Duck	*Oxyura jamaicensis*							1		1	1	7	1	1		3	15
Duck species	Anatidae spp.								17				6	6		1	30
FALCONIFORMES																	
Accipitridae																	
Osprey	*Pandion haliaetus*				1		1	1		2		1					6
Mississippi Kite	*Ictinia mississippiensis*		2		8	2	12	4	1	12	6	16	5	11	8	2	89
Northern Harrier	*Circus cyaneus*	1	1	1	1	2	1	2	2	3		3		1			18
Sharp-shinned Hawk	*Accipiter striatus*	2	9	7	10	6	6	12	5	10	11	10		8	13	12	121
Cooper's Hawk	*Accipiter cooperii*	4	6	3	19	9	8	7	24	19	10	26	13	55	40	45	288
Northern Goshawk	*Accipiter gentilis*													1	1		2
Harris's Hawk	*Parabuteo unicinctus*	1	1		3						1	2			1		9
Red-shouldered Hawk	*Buteo lineatus*		1														1

...continued

APPENDIX A. WILDLIFE RESCUE, INC. OF NEW MEXICO: 15 YEARS OF ACQUISITIONS, 1990–2004

Order/Family Common Name	Scientific Name	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	Totals
FALCONIFORMES, **Accipitridae**, *continued*																	
Swainson's Hawk	*Buteo swainsoni*	4	4	15	8	5	13	10	4	9	11	25	6	12	10	19	155
Red-tailed Hawk	*Buteo jamaicensis*	24	16	21	39	37	26	21	23	32	22	48	9	32	33	20	403
Broad-winged Hawk	*Buteo platypterus*													1			1
Ferruginous Hawk	*Buteo regalis*		5	9	4	2	3	7		8		5	2	4	3	1	53
Rough-legged Hawk	*Buteo lagopus*								1	1	1	3	1	1	6		14
Golden Eagle	*Aquila chrysaetos*	2	3		4	1	8	5	4	3	3	9	1	2			45
Hawk species	Accipitridae sp.						1							2			3
Falconidae																	
American Kestrel	*Falco sparverius*	35	53	86	81	69	98	70	75	93	86	71	14	76	77	42	1026
Merlin	*Falco columbarius*	2		3	1	2	2	2			3	1	1	3	2	2	24
Prairie Falcon	*Falco mexicanus*	2	2	4	6	3	1	4	6	1	1	2	1	2	3	2	40
Peregrin Falcon	*Falco peregrinus*			2	3	2	1	1			1	3	2	4		2	21
GALLIFORMES																	
Phasianidae																	
Ring-necked Pheasant	*Phasianus colchicus*	3	5	5	2	3	6	3	2	1		6	1	5	3	3	48
Silver Pheasant	*Lophura nycthemera*						1										1
Pheasant species	Phasianidae sp.									4			3				7
Chukar	*Alectoris chukar*			1		2	1	1		1						1	7
Peafowl	*Pavo* sp.								1				1				2
Common Quail	*Coturnix coturnix*								1			1	1				3
Odontophoridae																	
Scaled Quail	*Callipepla squamata*	10	9	13	14	12	22	40	14	33	32	42	36	34	82	23	416
Gambel's Quail	*Callipepla gambelii*												1	4	2	8	15
Quail species	Callipepla spp.													6		6	12
GRUIFORMES																	
Rallidae																	
Virginia Rail	*Rallus limicola*		1				1	1		1			1		1	1	7
Sora	*Porzana carolina*	2			1	1	1	1				2	2	2	1	1	14
Purple Gallinule	*Porphyrio martinica*	1	1														
American Coot	*Fulica americana*	5					1	1	1	4	3		1		2	3	21

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APPENDIX A. WILDLIFE RESCUE, INC. OF NEW MEXICO: 15 YEARS OF ACQUISITIONS, 1990–2004

Order/Family Common Name	Scientific Name	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	Totals
GRUIFORMES, *continued*																	
Gruidae																	
Sandhill Crane	*Grus canadensis*	3	3	1	2	4	3	4	2	1		1	2	1		3	30
CHARADRIIFORMES																	
Charadriidae																	
Killdeer	*Charadrius vociferus*	4	11	9	1	6	12	10	9	5	9	9	3	2	1	3	94
Recurvirostridae																	
American Avocet	*Recurvirostra americana*						1		1								2
Scolopacidae																	
Spotted Sandpiper	*Actitis macularia*	1						1									2
Long-billed Curlew	*Numenius americanus*			1			1	1									3
Long-billed Dowitcher	*Limnodromus scolopaceus*											1					1
Common Snipe	*Gallinago gallinago*	1			1					2		2	1				7
Wilson's Phalarope	*Phalaropus tricolor*	1											2			1	4
Laridae																	
Franklin's Gull	*Larus pipixcan*										2				1		3
Ring-billed Gull	*Larus delawarensis*	2			1				2				1				6
COLUMBIFORMES																	
Columbidae																	
Band-tailed Pigeon	*Columba fasciata*		1										3		1	2	7
Ringed/Collared Turtle-Dove	*Streptopelia risoria/decaocto*	2	4	3	2		4		12			13	3	13	3	11	70
White-winged Dove	*Zenaida asiatica*			1			4	1	1	6	10	15	29	33	31	72	203
Mourning Dove	*Zenaida macroura*	34	28	39	19	37	44	68	110	74	111	162	205	260	250	290	1731
Inca Dove	*Columbina inca*														2	2	4
Dove species	Columbidae spp.								3							1	4
CUCULIFORMES																	
Cuculidae																	
Yellow-billed Cuckoo	*Coccyzus americanus*	1	2	4					1	1			1	1			11
Greater Roadrunner	*Geococcyx californianus*	28	22	34	31	44	36	24	31	13	35	31	20	39	30	33	451

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APPENDIX A. WILDLIFE RESCUE, INC. OF NEW MEXICO: 15 YEARS OF ACQUISITIONS, 1990–2004

Order/Family Common Name	Scientific Name	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	Totals
STRIGIFORMES																	
Tytonidae																	
Barn Owl	*Tyto alba*	10	6	27	21	6	11	12	17	24	15	31	12	10	11	14	227
Strigidae																	
Flammulated Owl	*Otus flammeolus*	1	4	4	5	3	2	3	2	3	4	6		2	1	6	46
Western Screech Owl	*Otus kennicottii*	11	12	15	27	22	18	16	14	25	29	21	3	7	17	18	255
Great Horned Owl	*Bubo virginianus*	15	16	23	36	27	23	41	26	26	36	35	7	41	26	28	406
Northern Pygmy Owl	*Glaucidium gnoma*											1					1
Western Burrowing Owl	*Athene cunicularia*	7	12	16	21	11	16	10	30	18	16	10	2	9	1	12	191
Spotted Owl	*Strix occidentalis*							1	1			1					3
Long-eared Owl	*Asio otus*	1	2	3	1	2	1	2	4	1	2	4	2	1	2	2	30
Northern Saw-whet Owl	*Aegolius acadicus*	1		1	3	3	4	1		1		6	1	2			23
Owl species	Strigidae/Tytonidae sp.							2					2				4
CAPRIMULGIFORMES																	
Caprimulgidae																	
Lesser Nighthawk	*Chordeiles acutipennis*		2	1		1						2		1	2		9
Common Nighthawk	*Chordeiles minor*	17	10	19	24	10	16	10	13	13	8	14	2	4	7	8	175
Common Poorwill	*Phalaenoptilus nuttallii*	9	10	19	8	7	11	11	4	7	4	2	8	2	2	2	106
Goatsucker species	Caprimulgidae sp.			2													2
APODIFORMES																	
Apodidae																	
White-throated Swift	*Aeronautes saxatalis*		1	1		1	1	1									5
Swift species	Apodidae sp.												1	1			2
Trochilidae																	
Black-chinned Hummingbird	*Archilochus alexandri*	44	27	44	48	54	89	42	88	76	78	62	64	64	86	83	949
Anna's Hummingbird	*Calypte anna*						1										1
Calliope Hummingbird	*Stellula calliope*					2			1	1			1	2			7
Broad-tailed Hummingbird	*Selasphorus platycercus*	3	2	2	6	1	3	4	1	2	4		5	4	5	3	45
Rufous Hummingbird	*Selasphorus rufus*	2	1	4	6	7	9	7	8	1	7	4	6	6	9	10	87
Hummingbird species	Trochilidae sp.	3	10		5	4	8	3	5	1		1	12	7		2	61

...continued

APPENDIX A. WILDLIFE RESCUE, INC. OF NEW MEXICO: 15 YEARS OF ACQUISITIONS, 1990–2004

Order/Family Common Name	Scientific Name	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	Totals
CORACIIFORMES																	
Alcedinidae																	
Belted Kingfisher	*Ceryle alcyon*			1	1		1	1		1			1			1	7
PICIFORMES																	
Picidae																	
Lewis's Woodpecker	*Melanerpes lewis*			3		1		1	1								6
Red-naped/ Yellow-bellied Sapsucker	*Sphyrapicus nuchalis/varius*	1	1	2		2		3		1			1	2	2	2	17
Williamson's Sapsucker	*Sphyrapicus thyroideus*	1	4						1								6
Ladder-backed Woodpecker	*Picoides scalaris*							1							4	2	7
Downy Woodpecker	*Picoides pubescens*	1					1			1			1				4
Hairy Woodpecker	*Picoides villosus*		1						1				1		1	1	5
Northern Flicker	*Colaptes auratus*	9	14	17	17	14	20	12	104	7	8	11	20	9	9	12	283
Woodpecker species	Picidae spp.					1							1	2	2		6
PASSERIFORMES																	
Tyrannidae																	
Olive-sided Flycatcher	*Contopus cooperi*								1								1
Western Wood-Pewee	*Contopus sordidulus*		1						1								2
Dusky Flycatcher	*Empidonax oberholseri*													1		1	2
Say's Phoebe	*Sayornis saya*	3	9	12	16	8	8	6	10	2	7	8	21	6	23	22	161
Ash-throated Flycatcher	*Myiarchus cinerascens*	1							5				2			1	9
Western Kingbird	*Tyrannus verticalis*	8	13	8	8	9	11	3	11	5	4	5	11	9	12	19	136
Flycatcher species	Tyrannidae sp.	1			2	5											8
Laniidae																	
Loggerhead Shrike	*Lanius ludovicianus*		1													1	2
Vireonidae																	
Vireo species	Vireo sp.			2								1					3
Corvidae																	
Steller's Jay	*Cyanocitta stelleri*			1			1				3	1	1	4			11
Blue Jay	*Cyanocitta cristata*											1	1		2		4
Western Scrub-Jay	*Aphelocoma californica*	5	8	8	9	18	18	10	15	11	1	13	13	18	32	16	195

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APPENDIX A. WILDLIFE RESCUE, INC. OF NEW MEXICO: 15 YEARS OF ACQUISITIONS, 1990–2004

Order/Family Common Name	Scientific Name	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	Totals
PASSERIFORMES, **Corvidae**, *continued*																	
Pinyon Jay	*Gymnorhinus cyanocephalus*		2				5	1	2	1	2	4	1				18
Black-billed Magpie	*Pica pica*		6	1													7
Jay species	Corvidae sp.						1	2		3			2	4			12
American Crow	*Corvus brachyrhynchos*	19	32	17	19	22	17	19	46	38	34	28	43	46	47	23	450
Chihuahuan Raven	*Corvus cryptoleucus*	1		3	1		1		1		1	1		1		3	13
Common Raven	*Corvus corax*	7	3	6	2	1	4	2	16	13	10	8	4	4	12	10	102
Alaudidae																	
Horned Lark	*Eremophila alpestris*	6		2		2	2		1		1	1	1	1			17
Hirundinidae																	
Violet-green Swallow	*Tachycineta thalassina*			1			1				1		1			1	5
Bank Swallow	*Riparia riparia*		1	1													2
Barn Swallow	*Hirundo rustica*	17	3	7	8	9	8	26	23	3	7	18	12	6	12	10	169
Cliff Swallow	*Petrochelidon pyrrhonota*		2			1	1		1				3	0	3	23	34
Swallow species	Hirundinidae sp.												6	0	0	1	7
Paridae																	
Mountain Chickadee	*Poecile gambeli*					2		1						1	1	1	6
Juniper Titmouse	*Baeolophus ridgwayi*										1	1	4				6
Aegithalidae																	
Bushtit	*Psaltriparus minimus*	1	1	1	1			3	1	1		1		3	1	5	19
Sittidae																	
Red-breasted Nuthatch	*Sitta canadensis*												1				1
White-breasted Nuthatch	*Sitta carolinensis*					1										1	2
Nuthatch species	Sitta sp.											1					1
Certhiidae																	
Brown Creeper	*Certhia americana*															1	1
Troglodytidae																	
Cactus Wren	*Campylorhynchus brunneicapillus*				1	1										1	3
Rock Wren	*Salpinctes obsoletus*							1									1
Bewick's Wren	*Thryomanes bewickii*		1		1		1					1				2	6
House Wren	*Troglodytes aedon*		1	1				2		1			1		2	1	9
Marsh Wren	*Cistothorus palustris*	1															1

...continued

APPENDIX A. WILDLIFE RESCUE, INC. OF NEW MEXICO: 15 YEARS OF ACQUISITIONS, 1990–2004

Order/Family Common Name	Scientific Name	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	Totals
PASSERIFORMES; **Troglodytidae**, *continued*																	
Wren species	Troglodytidae spp.						2	1				7					10
Regulidae																	
Golden-crowned Kinglet	*Regulus satrapa*					1		1									2
Ruby-crowned Kinglet	*Regulus calendula*	1		1	1	1	1			1		1	2	2			11
Turdidae																	
Western Bluebird	*Sialia mexicana*		1	7	1			1			4		1				15
Mountain Bluebird	*Sialia currucoides*	2	4		4	6					1	3				1	21
Townsend's Solitaire	*Myadestes townsendi*							2	1							1	4
Swainson's Thrush	*Catharus ustulatus*								1								1
Hermit Thrush	*Catharus guttatus*	1	1	3	3		3	2	2		2		1			1	19
American Robin	*Turdus migratorius*	106	159	83	63	122	148	106	164	54	82	99	98	118	85	74	1561
Thrush species	Turdidae spp.												1				1
Mimidae																	
Gray Catbird	*Dumetella carolinensis*			1													1
Northern Mockingbird	*Mimus polyglottos*	3	2		1	4	2	8		4		4	2	8	3	2	43
Sage Thrasher	*Oreoscoptes montanus*						1	1						4			6
Brown Thrasher	*Toxostoma rufum*								1	1							2
Bendire's Thrasher	*Toxostoma bendirei*					1											1
Curve-billed Thrasher	*Toxostoma curvirostre*			2		1		3	2		1	1				8	18
Crissal Thrasher	*Toxostoma crissale*															1	1
Thrasher species	Toxostoma/Oreoscoptes spp.											1					1
Bombycillidae																	
Cedar Waxwing	*Bombycilla cedrorum*	2		5	1		1	3		1							13
Parulidae																	
Orange-crowned Warbler	*Vermivora celata*							3									3
Virginia's Warbler	*Vermivora virginiae*	2															2
Yellow Warbler	*Dendroica petechia*						1	1			1						3
Yellow-rumped Warbler	*Dendroica coronata*		1	1								1		1			4
Worm-eating Warbler	*Helmitheros vermivorus*		1														1
Ovenbird	*Seiurus aurocapillus*								1								1
MacGillivray's Warbler	*Oporornis tolmiei*	1	2	1	2		4	5	1	1	3	9	2	8	9	6	54

...continued

APPENDIX A. WILDLIFE RESCUE, INC. OF NEW MEXICO: 15 YEARS OF ACQUISITIONS, 1990–2004

Order/Family Common Name	Scientific Name	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	Totals
PASSERIFORMES; **Parulidae**, *continued*																	
Common Yellowthroat	*Geothlypis trichas*									1							1
Hooded Warbler	*Wilsonia citrina*										1						1
Wilson's Warbler	*Wilsonia pusilla*	5	1	4	2	1	1	2	1		1		1		1	5	25
Warbler species	Parulidae spp.	3	1		2	1						3		2	1		13
Thraupidae																	
Summer Tanager	*Piranga rubra*	1									1			2			4
Western Tanager	*Piranga ludoviciana*	1	2	1	3		2		2				1	4	1	5	22
Emberizidae																	
Green-tailed Towhee	*Pipilo chlorurus*	3	1				1	3	1							1	10
Spotted Towhee	*Pipilo maculatus*			1			1				1			1	1	1	6
Canyon Towhee	*Pipilo fuscus*		2	1	1	1	1	3		1		1	1	3	5	3	23
Towhee species	Pipilo spp.								2								2
Chipping Sparrow	*Spizella passerina*	1			2	1	4	1	1					1	1	1	13
Brewer's Sparrow	*Spizella breweri*				1						1						2
Black-chinned Sparrow	*Spizella atrogularis*													1			1
Lark Sparrow	*Chondestes grammacus*	3						1	1	1						1	7
Song Sparrow	*Melospiza melodia*									1							1
Lincoln's Sparrow	*Melospiza lincolnii*					1											1
White-throated Sparrow	*Zonotrichia albicollis*											1					1
White-crowned Sparrow	*Zonotrichia leucophrys*					1		2	1		1	1		1	1		8
Dark-eyed Junco	*Junco hyemalis*	5	6	7	3	1	7	7	2	7	3	2	4	2	2	3	61
Slate-colored	*J. hyemalis hyemalis*														1		1
Oregon Junco	*J. hyemalis oreganus*														6	2	8
Longspur species	Calcarius sp.					1											1
Sparrow species	Emberizidae spp.				1			2									3
Cardinalidae																	
Pyrrhuloxia	*Cardinalis sinuatis*															1	1
Rose-breasted Grosbeak	*Pheucticus ludovicianus*								1	1							2
Black-headed Grosbeak	*Pheucticus melanocephalus*	10	18	15	4	11	17	10	7	8	7	7	5	11	6	5	141
Blue Grosbeak	*Guiraca caerulea*								2								2
Grosbeak species	Pheucticus/Guiraca spp.								1								1

...continued

APPENDIX A. WILDLIFE RESCUE, INC. OF NEW MEXICO: 15 YEARS OF ACQUISITIONS, 1990–2004

Order/Family Common Name	Scientific Name	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	Totals
PASSERIFORMES; **Cardinalidae**, *continued*																	
Lazuli Bunting	*Passerina amoena*							1									1
Indigo Bunting	*Passerina cyanea*											1					1
Icteridae																	
Red-winged Blackbird	*Agelaius phoeniceus*	3			2		2		2		1	2				1	13
Western Meadowlark	*Sturnella neglecta*	7	6	7	8	2	1	3				2	3		2	2	43
Yellow-headed Blackbird	*Xanthocephalus xanthocephalus*											1			1		2
Brewer's Blackbird	*Euphagus cyanocephalus*						1						1				2
Blackbird species	Icteridae spp.														1		1
Common Grackle	*Quiscalus quiscula*	5	8	8	12	8	20	18	22	13	9	13	15	16	16	9	192
Great-tailed Grackle	*Quiscalus mexicanus*	1	3	3	1	3	1	5					1		10	11	39
Grackle species	Quiscalus spp.							4					1			2	7
Bronzed Cowbird	*Molothrus aeneus*															1	1
Brown-headed Cowbird	*Molothrus ater*			1			1			1			1			1	5
Bullock's/Baltimore(?) Oriole	*Icterus bullockii/galbula(?)*	2	3	1		1	6		2	1	2	5	5	4		2	34
Oriole species	Icterus sp.								1			1				2	4
Fringillidae																	
Cassin's Finch	*Carpodacus cassinii*								53	1							54
House Finch	*Carpodacus mexicanus*	65	99	69	35	77	95	74	137	23	109	95	121	143	157	161	1460
Red Crossbill	*Loxia curvirostra*					1			3								4
Pine Siskin	*Carduelis pinus*		1				2	4	7		3		2			1	20
Lesser Goldfinch	*Carduelis psaltria*					1					7	2			6	11	27
American Goldfinch	*Carduelis tristas*													3		1	4
Goldfinch species	Carduelis sp.								2				6				8
Evening Grosbeak	*Coccothraustes vespertinus*	13	2		1		1	4	9				1				31
Unknown Bird species	Aves spp.		18			1	9	1		3	8		3			6	49
	ANNUAL TOTALS:	642	777	784	743	793	1,012	895	1,337	804	977	1,125	989	1,309	1,352	1,449	14,988

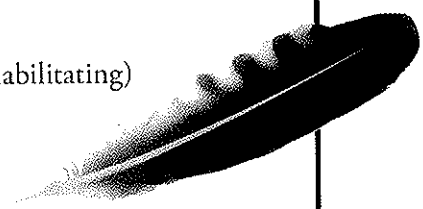
SOURCE: Wildlife Rescue, Inc. of New Mexico. 1990–2004. Annual Reports filed with the U.S. Fish and Wildlife Service. Region 2, Albuquerque, New Mexico.

The IWRC Nominations Committee Is Looking for Candidates for the 2006 Board of Directors Election

We need leaders to help us fulfill the mission of IWRC through governance, leadership, fund raising, event planning, marketing, public relations, financial management, curriculum development and legal advisement.

Qualified candidates will possess the following attributes:

- A commitment to IWRC and its goals
- An understanding of wildlife rehabilitation (it is not necessary to be actively rehabilitating)
- Ability and willingness to actively participate in board projects
- Ability to travel and attend board meetings
- Ability to actively communicate via e-mail



Nominations received will be reviewed by the Nominations Committee to be presented at the annual Membership Meeting in November 2006 in Columbus, Ohio. Candidates do not need to be present at the meeting to be eligible.

The deadline for nominations is 31 October 2006. To nominate a candidate, please complete the form below or visit the "members-only" section at www.iwrc-online.org.

Your Information

First Name _____ Last Name _____

Member Number _____ E-mail Address _____

Nominee Information

First Name _____ Last Name _____

City _____ State/Province _____

Phone Number _____ E-mail Address _____

Please describe why you believe this nominee would make a good director. Include as much information as possible, including background information, professional affiliations, and career or volunteer history.

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Nominations from the floor will also be accepted at the annual membership meeting.

Bugs & Drugs

AVIAN TRICHOMONIASIS

by Kathy Dolan

Wildlife rehabilitators who care for birds need to be able to recognize, treat, and prevent the transmission of avian trichomoniasis within their facilities. The causative agent of trichomoniasis is a small protozoal parasite known as *Trichomonas gallinae*. While pigeons and doves, members of the Columbiforme family, are the primary hosts and reservoirs of *T. gallinae*, songbirds, waterfowl, and various members of the psittacine group as well as birds of prey are also susceptible to trichomoniasis. The disease is known as "canker" in pigeons and doves, "frounce" in birds of prey, and generally as "trich."

T. gallinae is a small (6–19µm x 1–9µm), highly motile organism that lives on mucosal membranes of the upper digestive system, mouth, pharynx, crop, and proventriculum of host birds. The organism feeds on bacteria, host cells, and fluids. Pear-to-oval in shape, the parasite has an external undulating membrane that extends approximately 2/3 the length of its body. The organism is motile by means of four flagella, which are attached to its anterior portion or head. Reproduction of *T. gallinae* occurs asexually by binary fission. When a critical size is reached, organelles duplicate and the organism divides along its vertical axis, producing two new identical organisms. Under favorable conditions, this mode of reproduction enables a few organisms to explode into hundreds or thousands within a short period of time.

Numerous strains of *T. gallinae* exist; these vary widely in their ability to produce disease. The pathogenicity of the strains ranges from the highly virulent Jones' Barn strain, which is associated with high mortality among pigeon and dove nestlings, to avirulent or mildly virulent strains that cause either no obvious disease or only mild disease. Birds that recover from trichomoniasis develop immunity that protects them from future episodes of the disease. Recovered birds can become asymptomatic carriers of *T. gallinae*, able to carry and spread the parasite to other birds. It has been suggested that between 80–90 percent of all adult pigeons and doves may carry *T. gallinae* without obvious symptoms of disease (Whiteman and Bickford in Pokras et al. 1993).

Symptoms and Diagnosis

The classic symptom associated with trichomoniasis is a raised, white-yellow lesion present in the mouth of an affected bird. Lesions can also occur in the lower esophagus, crop, proventriculum, or even trachea, where they are visible only by endoscopy performed by a veterinarian. The lesions cause discomfort and interfere with the bird's ability to feed or breathe, leading to other symptoms generally associated with the trichomoniasis. These symptoms include but are not limited to head flicking, regurgitation, loss of appetite, weight loss, respiratory difficulties, and excessive salivation. Appearing first as small areas of reddening (areas of irritation) on the mucosal surfaces, the lesions progress to caseous yellow-white raised lesions, as the bird's immune system responses to mucosal damage or irritation by the parasites. In severe cases of trichomoniasis, lesions can penetrate the soft tissue and bones of the mouth, entering the bird's orbital-sinus cavities. In these cases, the organism can spread to other organs of the body. While the presence of lesions within the oral cavity is highly suggestive of trichomoniasis, care must be taken to differentiate trichomoniasis from other diseases that also produce similar oral lesions. Consultation with a veterinarian is recommended to establish a protocol designed to rule out other diseases.

Many protozoal parasites alternate between an environmentally resistant cyst form and a fragile, reproducing trophozoite form. Cysts, which are shed in the feces of an infected animal, can remain dormant in the environment for long periods of time until ingested by another potential host. Inside the new host, cysts develop into trophozoites, which start a new cycle of feeding and reproducing. While trophozoites are also shed into the environment, they succumb more rapidly to desiccation and other harsh environmental conditions. Thus, trophozoites are not the usual means of disease transmission from one host to another. *T. gallinae* and related members of the genus are unique in that only the trophozoite form exists. Transmission of *T. gallinae* is generally limited to direct contact between birds where the trophozoites can be directly passed from bird-to-bird in oral fluids.

Transmission of *T. gallinae* among bird populations occurs through

either direct or indirect contact. Among pigeons and doves, infected parents spread the parasite to their nestlings during the first feedings when the nestlings are fed crop-milk, a regurgitated material produced in the crop of both parents. Crop-milk becomes contaminated with trichomonads as it passes from an infected parent bird to the nestlings. Among non-colombid birds regurgitive feeding by an infected parent can also transmit/transfer trichomonads to nestlings. Mate-feeding and other behaviors that involve beak-to-beak contact and saliva exchange can also serve as a mechanism for the dissemination of *T. gallinae* through wild bird populations.

Birds of prey or their nestlings are infected either directly with *T. gallinae* when they consume infected birds, or indirectly when they feed infected prey to their offspring. The impact of feeding *T. gallinae*–infected prey on nestling raptors has become a focus of interest in recent years. Boal (Boal et al. 1998) reported higher mortality rates and nest failures among urban Cooper's hawk (*Accipiter cooperii*) nestlings due to trichomoniasis where the prey base was primarily doves. In contrast, Cooper's hawk nestlings reared in more rural settings where doves were not a significant part of the diet had a greater success rate. In a study of reintroduced goshawks (*Accipiter gentilis gentilis*) in Great Britain, Cooper and Petty (1988) suggested that trichomoniasis may have played a role in the mortality of these birds.

Feeding doves or pigeons to birds of prey is frequently a question. There are two answers here. Either do not feed columbids to birds of prey, or freeze columbids for at least 24 hours in a reliable freezer prior to feeding to kill any trophozoites. In a study using white-winged doves (*Zenaida asiatica*), live *T. gallinae* could still be cultured from 91 percent and 44 percent of carcasses 24 hours and 48 hours after death, respectively, that had been maintained at approximately room temperature (Erwin, et al. 2000)



While owls are susceptible to infection and disease by *T. gallinae*, the disease occurs less frequently in most owls than in their more diurnal counterparts.

While owls are susceptible to infection and disease by *T. gallinae,* the disease occurs less frequently in owls than in their more diurnal counterparts (Pokras et al. 1993, 88–91). Pigeons and doves are not a significant prey item in the diets of owls, explaining the reduced incidence of the disease in owls. Western barn owls (*Tyto alba*)are an exception in that trichomoniasis is seen more frequently. Western barn owls roost in buildings, which provides them ample opportunity to prey on pigeons and doves—and increases their likelihood of contract-

ing trichomoniasis. When trichomoniasis does occur in owls, the bird usually presents to the rehabilitator in poor physical condition with extensive oral lesions (Pokras et al. 1993, author's observation).

Trichomonas Ecology

While trophozoites are fragile outside of the host, they do not die immediately. It is often stated that *T. gallinae* trophozoites can survive for up to 5 hours on moist grain, although a primary literature source for this information has not been found by this author or others (Pokras et al. 1993). It is known that the closely related human pathogen, *T. vaginalis*, can survive and remain infective in damp towels, sponges, and water for several hours (Zelbig 1997). By extension, under favorable conditions of moderate temperature and high humidity, it is quite probable that *T. gallinae* survives and remains infective outside a host, albeit for limited periods of time.

Bird feeders and possibly birdbaths provide a means for the indirect transmission of *T. gallinae*. As infected columbids feed and drink, trophozoites are deposited onto food or into water, which is then ingested by other birds. Flying from feeder to feeder or moving from flock to flock, infected birds can spread different strains of *T. gallinae* through bird populations. Removal of old or uneaten feed followed by a thorough cleaning and disinfecting of feeders and birdbaths can reduce the spread of trichomoniasis among wild bird populations.

Interestingly, weather conditions can contribute to the spread of trichomoniasis. Outbreaks of trichomoniasis have occurred during unusually long periods of rainy weather. The high humidity prevents desiccation of the trophozoites, increasing their survival in the environment. Conversely, droughts facilitate the spread of trichomoniasis by concentrating large numbers of birds to a few available watering spots.

Detection and Treatment

While polymerase chain reaction (PCR) antibody-antigen test kits and culturing of the organisms can demonstrate the presence of *T. gallinae* in oral lesions, most of these tests are beyond the realm of the rehabilitator. For the rehabilitator, microscopic examination of material obtained from swabs of saliva and material taken directly from oral lesions remains the fastest, simplest method to detect *T. gallinae*. The sample is transferred to a pre-warmed slide by gently rolling the swab in a drop of warm saline, placing a cover slip over the sample and immediately examining the slide with low illumination. The protozoa may be observed swimming with a characteristic rapid, jerky motion. Usually the protozoa are not directly seen; instead, there is a visual sensation of rapid, jerky motion. While a positive slide is definite for trichomoniasis, a negative slide does not necessarily rule it out. Fragility of the parasite, improper sampling, or inexperience can contribute to negative results. Working with a veterinarian is an excellent way to learn proper techniques and parasite identification.

Trichomoniasis is treated with anti-pararsitic drugs. The two most widely used drugs are metronidazole (Flagyl®) and carnidazole (Spartrix®). Because dosages and length of treatment regimes varies from source to source it is recommended that rehabilitators work with their veterinarian to develop a treatment plan for trichomoniasis.

Literature Cited

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Zelbig, E. A. 1997. *Clinical parasitology: A practical approach.* Philadelphia: W. B. Saunders.

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A LOVE POEM

Herons
blue as elderberries
suddenly singing in pairs
whose foraging
improves with age.

—Marion Davidson

SUCCESS STORY

A Leg Banding Success

by Betty O'Leary



CAROLINA RAPTOR CENTER

A baby barn owl (*Tyto alba*) was received at Carolina Raptor Center (Charlotte, North Carolina) on 23 May 1994 at about 4 weeks of age, after the tree its nest had been in was cut down.

The owl and its four siblings had no injuries. They were placed in an 8 x 16 ft (2.44 x 4.88 m) outdoor cage, and fed mice and cut-up rats with vitamin and calcium supplements. When they were approximately 8 weeks of age the owl and two of its siblings were moved into a 10 x 50 ft (3.01 x 15.24 m) flight cage that had leaf litter on the ground. During the next 16 days the owl strengthened its flight muscles and practiced catching live mice. It was fed one live mouse and two dead brown mice each night.

After the owl graduated "mouse school," it was banded (# 1807-03690) and released on 12 September 1994 in a field in eastern Lincoln County, North Carolina, along with another barn owl that had been received as a baby from a different clutch.

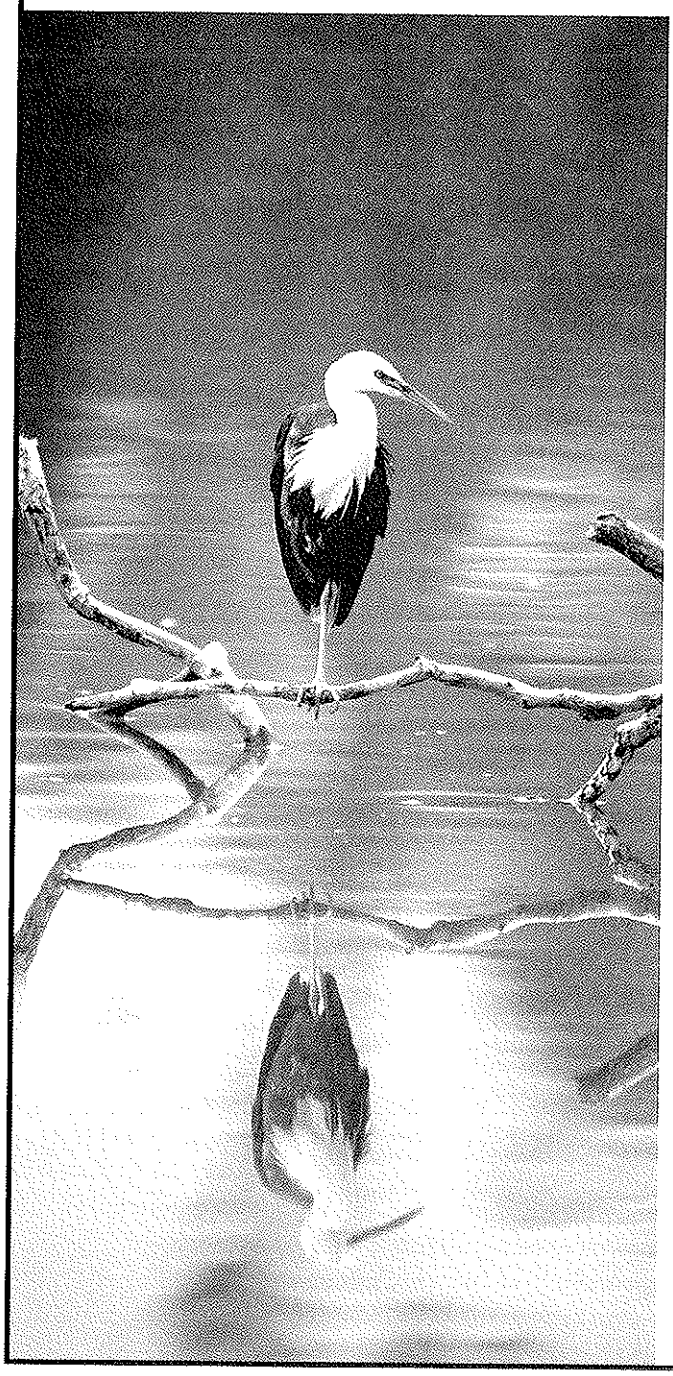
In 2006 we received a report from the Bird Banding Lab that the owl's band had been reported. The owl had been found dead on 24 March 2006 near Lincolnton, North Carolina, approximately 14 miles west of the release site. The owl had survived for 11.5 years!

Betty O'Leary is the resident bird care coordinator at the Carolina Raptor Center in Charlotte, North Carolina (www.carolinaraptorcenter.org). She can be reached at: bettyoleary@carolinaraptorcenter.org.

CALL FOR COMMENT

Minimum Standards for Wildlife Rehabilitation (MSWR)

Third Edition, 2000



The National Wildlife Rehabilitators Association (NWRA) and the International Wildlife Rehabilitation Council (IWRC) are starting the process of revising this document. Suggestions from rehabilitators, veterinarians, governing agencies, and others involved in the wildlife rehabilitation are requested. Please use the form below to suggest changes or additions. All feedback will be seriously considered.

Copies of the MSWR Third Edition, 2000 are available from the offices of IWRC or NWRA or on-line at http://www.iwrc-online.org/pub/publications.html

Suggestions and thoughts will be welcomed through 31 October 2006.

Please use the response form on page 39. For specific comment, give the chapter number, sub-chapter number, and page number where you believe additions, or subtractions should be made. If this is not possible, identify yours as a general comment. Please use one form per suggestion.

Anonymous replies will be given every consideration. However, the review committee may wish to contact you for further explanation or clarification of your suggestion. Therefore, we strongly encourage you to provide contact information.

The Ccompleted forms may be sent to either address given on page 35, in hard copy or electronically. Electronic forms can also be accessed by visiting the IWRC and NWRA web sites.

Thank you for your comments. Your commitment to wildlife in need and to furthering the science and standards of wildlife rehabilitation are greatly appreciated!

REVISION SUGGESTIONS TO MSWR

THIRD EDITION, 2000

Comment Form: (please circle category of your suggestions) Specific General

(JWR 2006)

Chapter:_____ **Sub-chapter Number:** _____ **Page Number:** _____

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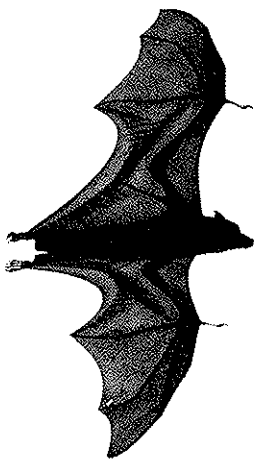
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INSIGHT

Voice from Abroad

A CIVILIZED BIRD HUNT

by Eric Terzaghi

A one-and-a-half-hour stroll up through a managed forest of spruce and larch, startling a small herd of deer along the way, brought us to the Derby Hotel in Riederalp. For those who prefer, access is also provided by telecabine and telepherique from Morel in the Rhone Valley, far below.

The very name of our accommodation hints at the recent history of this and many other areas of the Swiss Alps. Once these high meadows were the realm of summer grazing and cheese making immortalized in *Heidi*; remnants of this time can be seen in the form of squat structures constructed of roughly squared, dark brown-black, and incredibly durable larch logs, roofed with heavy slate slabs.

In the mid to late 19th century, English tourists discovered the Alps. Since then, these high meadows have been steadily transformed into winter and summer playgrounds. Today they are dominated by vast ski areas and numerous clusters of vacation chalets and hotels. Far below to the south the steep slopes of the Rhone Valley rise up through forest and chalet-dotted meadows to the snow, rock, and ice peaks of the eastern end of the Valais Alps.

Over a tasty meal of local fare, we watched the dazzling display of alpenglow fading to deep blue, and then headed early to bed.

We were up and out the door by 4:10 the next morning, and almost immediately were onto frozen snow, thanks to a recent heavy fall. We soon started hearing, in the pitch dark, the melodic burbling of the male tetras lyre (black grouse, *Tetrao tetrix*) well above us, in the vicinity of the Pro Natura Zentrum Aletsch, a bizarre turn-of-the-20th-century English country house constructed close to the lateral moraine of the Aletsch Gletscher at almost 2000 meters elevation. As we continued climbing, a troupe of startled chamois scattered out of our way. We found a comfortable position in a copse of stunted spruce, settled in, and waited for the familiar call to come closer. Finally, there, about 50 meters away, on a low mound of snow, was the jet black bird, puffed up and with tail splayed out like, well, a Greek lyre, with a great bustle of fluffy pure white feathers at the base. Periodically the strutting display was interrupted by a hop or a short flight, accompanied by a more raucous call.

Sadly, there was not a female in sight. We could hear a couple of other, more distant males doing their thing and wondered if they were any more successful. Long after the sun came up, our male finally, in apparent desperation, flew to the top of a nearby ski lift pylon and repeated his routine—to no avail.

We returned to the hotel for a filling breakfast of sliced sausage, cheese, butter, and jam on fresh bread, washed down with strong coffee and hot milk. We felt fortified for a day of leisurely rambling and casual birding, with hopes for slightly more success the next morning.

Clouds rolled in overnight and we awoke to dense fog, and accordingly declined another frigid session with Mr. Tetras Lyre and his fickle partner. As the fog dissipated, we could hear the tantalizing call of the male, which filtered through the distance and remaining patches of fog. Then the morning sun broke through and from the hotel balcony we could clearly see (with the binocs!) the performing male against the snow.

Suddenly a shy female appeared out of a clump of alpine scrub and approached the male, who dramatically stepped up his efforts while encircling the hen, closer and closer. The melodious gurgling became more excited and the little hops more frequent. Just as we thought the whole affair was to be consummated, she jumped up and flew off, swooped low over a nearby male competitor, and disappeared into a stand of stunted spuce. End of show.

Meantime, a small group of people, toting skiis and packs, headed up the slopes, bound for Concordiaplatz at the head of the Aletsch Gletscher for a few days of late spring skiing. We turned to another delicious breakfast on the hotel's now sunny verandah. With the Valais Alps spread out before us, we wondered whether our male would ever be deemed suitable and allowed to pass his genes onto the next generation. JWR

Eric Terzaghi is a molecular geneticist with a long-standing love of the outdoors and travel. He is now "retired" and running a deer farm in New Zealand. The extracurricular activities continue at a level befitting the advancing years. Dr. Terzaghi was educated in Massachusetts and Oregon and held various university-related positions in Japan, Switzerland, France, the U.S. and finally New Zealand.

AVIAN

Fitness Level as a Determining Factor in the Survival of Rehabilitated Peregrine Falcons (*Falco peregrinus*) and Brown Goshawks (*Accipiter fasciatus*) Released Back into the Wild

by P. H. Holz, R. Naisbitt, and P. Mansell
J. Avian Med. and Surg. 20(1): 15–20

This study examined the effect of two fitness programs on the postrelease survival and ability to maintain weight of 15 peregrine falcons (*Falco peregrinus*) and 12 brown goshawks (*Accipiter fasciatus*) held captive for treatment or because they had been orphaned. Each bird was treated or allowed to mature, then was either exercised by traditional falconry methods or by stimulating flight within its cage. Prior to release, resting blood lactate concentrations were measured before a short period of exercise and at 2 and 10 minutes after a standardized exercise test. Pre-exercise blood lactate concentrations were higher in cage-exercised peregrine falcons compared with those exercised by traditional methods, but there was no difference in pre-exercise lactate concentrations between the two treatment groups of goshawks. At 2 and 10 minutes following exercise, blood lactate concentrations were significantly higher for the cage-exercised group of both species. All birds were fitted with radiotransmitters, released, and monitored, then were trapped at varying times after release and weighed. Of the falconry-trained birds, three of six peregrine falcons and all four brown goshawks gained weight. In contrast, all nine peregrine falcons and six of the eight brown goshawks subjected to cage exercise lost weight postrelease. The results suggest that peregrine falcons and brown goshawks exercised with traditional falconry techniques were more fit than the same species of birds exercised in their cages and that the improved fitness achieved with the former method increases the probability that captive peregrine falcons and brown goshawks will survive after being released to the wild. The study also indicates that postexercise blood lactate concentrations are important predictors of fitness in raptors.

Survival and Movement of Juvenile Burrowing Owls during the Post-Fledging Period

By J. M. Davies and M. Restani
The Condor 108 (2): 282–91

Burrowing owl (*Athene cunicularia*) populations have declined extensively throughout much of North America, and modeling demography may assist conservation. However, few studies have estimated adult survival, and fewer still have determined juvenile survival. In 2003 and 2004 the authors monitored survival of 40 radio-tagged juveniles



PEREGRINE FALCON (*FALCO PEREGRINUS*) PHOTO: CRAIG KOPPIE/USFWS

during the postfledging period in the Little Missouri National Grassland, North Dakota, where owls nested in black-tailed prairie dog (*Cynomys ludovicianus*) colonies. Survival averaged 0.57 (95% CI: 0.41–0.73) prior to fall migration. Mortality was highest during the first 2 weeks after nest departure when juveniles were flightless, and 2 to 3 weeks later when juveniles became independent. Predation or starvation was implicated in most deaths. Distribution and abundance of escape cover (number of prairie dog burrows within 30 m of nests and size of the natal prairie dog colony) did not affect survival. Body condition and brood size at the time of radio-tagging also did not influence survival. Juvenile owls exhibited nest-centered dispersal, and averaged 108 ± 21 (SE) m and 82 ± 17 m from nests at initiation of migration in 2003 and 2004, respectively. Mean dates of departure from the study area were 2 September (± 3 days) 2003 and 24 August (± 2 days) 2004. Mortality during the postfledging period accounted for approximately two-thirds of mortality in the first year of life.

MAMMALS

A New Trap-Catch Index of Patchiness in Animal Distribution

by J. A. Brown, R. J. McAuliffe, and G. J. Hickling

Wildlife Research 31(4): 433–36.

Researchers and managers commonly use catch rates on trap-transects as an index of abundance for trappable wildlife species. The authors describe a method whereby the data collected from such surveys can be further analysed to obtain information on the patchiness of the trapped species' distribution on those transects. For certain applications, such as the management of wildlife disease, the index is likely to have significant advantages over traditional indices of spatial aggregation. One such situation is the management of brushtail possums (*Trichosurus vulpecula*) in New Zealand to inhibit the spread of bovine tuberculosis within their populations. Trap-catch data from a possum survey are used to illustrate the proposed method, and the potential for application of such monitoring to wildlife populations is discussed.



RED-COCKADED WOODPECKER (*PICOIDES BOREALIS*) PHOTO: J. & K. HOLLINGSWORTH/USFWS

Role of Predator Odor in Roost Site Selection of Southern Flying Squirrels

By J. S. Borgo, L. M. Conner, and M. R. Conover

Wildlife Society Bulletin 34(1, March 2006): 144–49

Roost site selection should be influenced, in part, by predator avoidance strategies. Prey species may use olfactory cues to assess predation risk. The study's objective was to determine if southern flying squirrels (*Glaucomys volans*) use olfaction for assessing predation risk and selecting safe roosting sites. The authors tested the response of captive flying squirrels to several scents placed inside nest boxes. Squirrels spent significantly less time overnight in nest boxes scented with fox squirrel (*Scirus niger*) fur, bobcat (*Lynx rufus*) fur, red fox (*Vulpes vulpes*) urine, raccoon (*Procyon lotor*) fur, king snake (*Lampropeltis getula*), and corn snake (*Elaphe guttata*) than unscented (control) boxes. Nest boxes with gray squirrel (*S. carolinensis*) fur, red fox urine, raccoon fur, and corn snake scent were selected as daytime roosting sites less than would be expected by chance. Southern flying squirrels are a major usurper of red-cockaded woodpecker (*Picodes borealis*) cavities and may reduce reproduction in this endangered bird. The study's results indicate that predator odor may be an effective means of deterring flying squirrels from roost sites. If so, predator scent application could be used to reduce negative impacts of flying squirrels on red-cockaded woodpeckers.

Forage Selection by Mule Deer: Does Niche Breadth Increase with Population Density?

by M. C. Nicholson, R. T. Bowyer, and J. G. Kie

J. Zoology 269(1): 39–49

Effects of population density of mule deer (*Odocoileus hemionus*) on forage selection were investigated by comparing diet characteristics of two subpopulations of deer in southern California that differed in population density during winter. Quality of diet for deer, as indexed by fecal crude protein, was higher at the low-density site than at the high-density site in winter, when deer densities were different. Quality of diet was similar in summer when both areas had comparable densities of deer. Both outcomes are consistent with predictions from density-dependent selection of diets by deer. Dietary niche breadth, however, differed in a manner opposite to predictions of niche theory based on diet selection

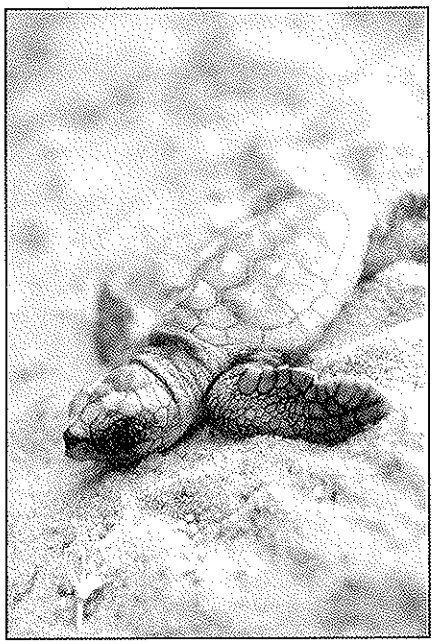
under an ideal-free distribution. During winter, when differences in density between the two study sites were pronounced, niche breadth along the dietary axis in the low-density area was twice that of the high-density site. Generalist herbivores feeding primarily on low-quality browse at high population density in winter would be expected to increase their dietary breadth by feeding on additional species of plants as they depleted their food supply. Mule deer in the study, however, decreased the breadth of their dietary niche as population density increased. The authors hypothesize that by rapidly eliminating high-quality forages from an area by heavy grazing, deer at higher population densities narrowed their dietary niche. Theoretical models for changes in niche dimensions, including the ideal-free distribution, need to consider such empirical outcomes.

CONSERVATION

Impacts of Passage Manipulation on Cave Climate: Conservation Implications for Cave-Dwelling Bats

by K. W. Martin, D. M. Leslie, M. E. Payton, W. L. Puckette, and S. L. Hensley
Wildlife Society Bulletin 34(1): 137–43

Human disturbance has caused declines in populations of many cave-dwelling bats and other cave-obligate organisms. Cave gating has been used to eliminate human disturbance, but few studies have assessed its impact on internal cave climate. The authors recorded ambient (air) and substrate (rock) temperatures at specified distances within the entrances of three gated and three open-passage caves in northeastern Oklahoma during summers 1999 and 2000 and winters 1999–2000 and 2000–2001. No differences occurred in ambient and substrate temperatures at any distance or season between gated and open-passage caves. The authors also monitored long-term (6 weeks) and seasonal (summer and winter) climate variables at specific distances inside two caves (OK-13 and OK-220) before and after modifications of their cave passages/entrances. Ambient and substrate temperatures before and after cave manipulation differed in only 1 of 12 observations in summer but in 9 of 12 observations in winter. The authors also monitored cave climate 7 days immediately before and after passage modification. Differences occurred at all eight observations and at four of 12 observations before and after entrance and passage manipulation at OK-13 and OK-220, respectively. Airflow did not differ when monitored 7 days before and 7 days after instillation of an internal gate system in the passage of cave OK-220. The data indicate that caves with modified entrances and passages show no changes in ambient and substrate temperatures in summer and only slight changes in winter. Although temperature changes during winter were statistically different, the authors posit that their biological implications on endemic cave fauna are minimal.



LOGGERHEAD TURTLE (*CARETTA CARETTA*) PHOTO: DONNA A. DEWHURST/USFWS

Vessel-related Mortality of Sea Turtles in Queensland, Australia

by J. Hazel and E. Gyuris
Wildlife Research 33(2): 149–54

Identification of threats is a standard component of conservation planning and the ability to rank threats may improve the allocation of scarce resources in threat-mitigation programs. For vulnerable and endangered sea turtles in Australia, vessel strike is recognised as an important threat, but its severity relative to other threats remains speculative. Documented evidence for this problem is available only in stranding records collected by the Queensland Environment Protection Authority. With the authority's support, the authors assessed the scope and quality of the data and analysed vessel-related records. They found adequate evidence that during the period 1999–2002 at least 65 turtles were killed annually as a result of collisions with vessels on the Queensland east coast. This level of mortality appears broadly comparable to that recorded in the Queensland East Coast Trawl Fishery before the introduction of mandatory turtle-exclusion devices in that fishery. Green turtles (*Chelonia mydas*) comprised the majority of vessel-related records, followed by loggerhead turtles (*Caretta caretta*); 72% of cases concerned adult or subadult turtles. The majority of vessel-related records came from the greater Moreton Bay area, followed by Hervey Bay and Cleveland Bay. The waters of all three areas are subject to variable levels of commercial and recreational vessel traffic, and their shores are both populated and unpopulated. © CSIRO 2006

JWR

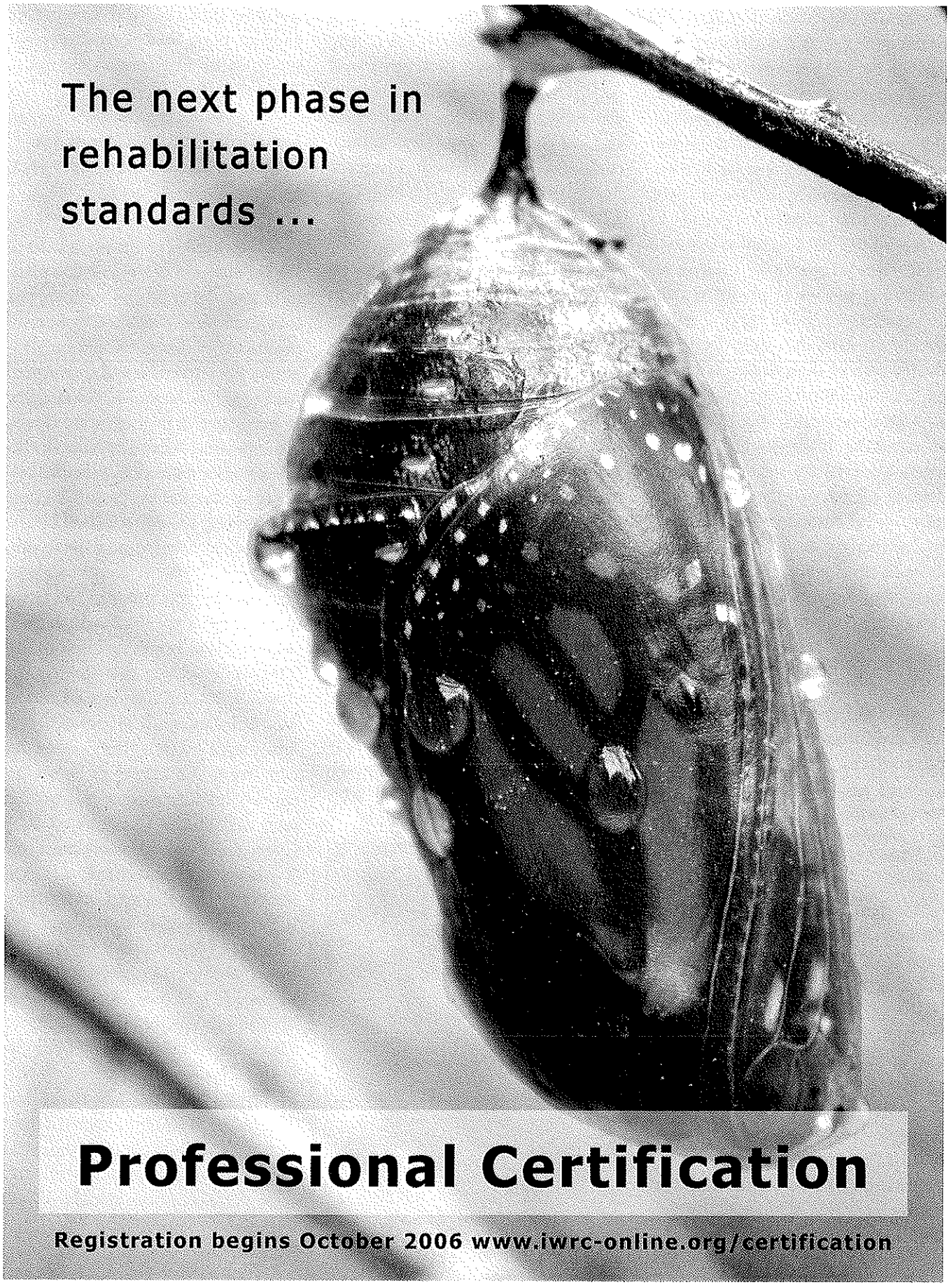


PHOTO © TEXAS PARKS & WILDLIFE DEPARTMENT, MIKE QUINN

Tears of the Cheetah: The Genetic Secrets of Our Animal Ancestors

by Stephen J. O'Brien

New York: St Martin's Griffin, 2005; 304 pp; U.S$14.95

This book is a must-read for anyone who professes a serious interest in conservation biology and who is not frightened by having to come to grips with a few basic concepts in contemporary molecular genetics. As the title suggests, the book is a collection of short stories or essays, strung together by DNA, or more accurately, by the imaginative application of the tools of DNA sequence analysis. The contexts are as diverse as understanding the reproductive difficulties of the cheetah, tracing whale population dynamics, migration patterns and illegal capture, forensic DNA profiling (in a cat!), establishing the diverse ancestry of the giant and the red panda, and tracing the origin of a sudden outbreak of a fatal viral epidemic among the Serengeti lions. Some of the animal tales serve as a springboard for discussions of tangential issues such as the meaning of the biological species concept or the politics of endangered species legislation, its enforcement, and problems with the Hybrid Policy.

Although the vast majority of case studies considered are mammalian, the experimental approach and conclusions are equally applicable to avian species. Indeed, a major implicit and explicit message of the book is that the enormous strides that have been made in recent years in understanding the structure and evolutionary dynamics of the hereditary material (DNA) are relevant to all organisms. Perhaps because the author works at the National Institutes of Health, the relevance of some of the case studies to human health issues is pointed out. In particular, observations of the genetic basis of resistance to fatal virus diseases in wild populations led naturally to investigations of the possible genetic basis of human resistance to several scourges of humankind, including the very contemporary one of HIV/AIDS.

My one substantive criticism is that for a book that will, I trust, appeal to a general public, an introductory chapter (or better still, an appendix) should have been provided for those unfamiliar with contemporary genetic thinking. This was attempted in a chapter in the middle of the book (The Way We Were) presented in the form of a justification and rationale for "comparative genomics." However, slipped in this way, the information presented interrupts the narrative flow of the book. A good glossary is of some assistance here.

A second, niggling criticism may be directed at the last chapter, in which gene therapy—and tangentially—stem cell therapy, are discussed. This is a huge technical area (along with many others that have developed out of contemporary genetic research), but one that does not flow obviously out of any of the fascinating diversity of nonhuman case studies reported earlier in the book. It comes across as an afterthought.

In sum, however, *Tears of the Cheetah* is strongly recommended. It offers an easy read for those with some familiarity with molecular genetics, and is quite accessible for others who are willing to invest some mental effort. JWR

Reviewer Eric Terzaghi is a retired geneticist. Please read his column, Voices from Abroad, on page 36.

Editor's Note: *The* Journal of Wildlife Rehabilitation *welcomes reviews of relevant books, including veterinary reference books, memoirs, natural history, and novels. Please include the book's title and author, as well as publisher, date of publication, number of pages, and cost of the book. Reviews should run 600–700 words and should be e-mailed to runmuki@yahoo.com.*



Forester's Log

ADVENTURES IN ALASKA

by Mary Stuever

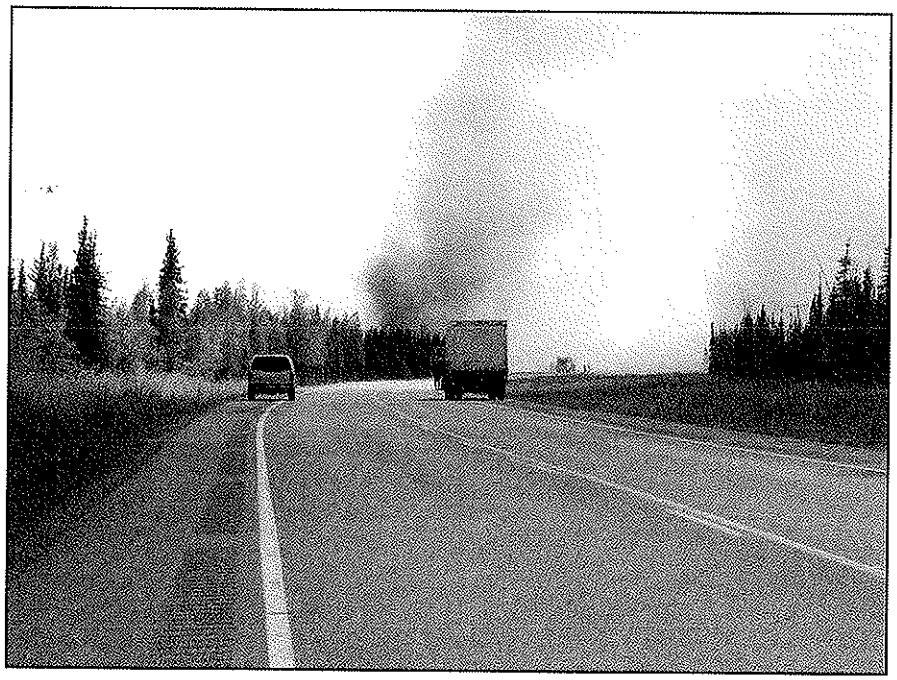
There are many ways I could have come to Nenana, Alaska—barge, train, plane, canoe, parachute—but I came the most conventional way: rental car. Nenana has a special magnetism that attracts a plethora of goods and people. The small village on the George Parks Highway is about an hour southwest of Fairbanks and situated at the confluence of the Nenana River and the broad Tanana River. Railroad tracks partially encircle the town and frequently host freight and passenger trains, the former providing interface with barges on the Tanana. An air strip at the south end of the town offers the fourth major form of transportation in and out of the community.

When I stopped that first night in Nenana to catch a few hours sleep by the side of the road, I had no idea this town's magnetism would exert its pull on me in the most unusual way. I had flown into Fairbanks on a Friday and was heading toward Denali National Park. The main purpose of my Alaskan visit was to moderate a panel at the 30th Annual Intertribal Timber Council Conference in Fairbanks. I planned to spend the weekends on either side of the workshop exploring the Last Frontier.

After rafting on the Nenana River and hiking in Denali National Park, I rendezvoused back in Fairbanks with several of my staff. The Tanana Chiefs Council, headquartered in Fairbanks and representing many Alaskan Native Tribes throughout central Alaska, was sponsoring the native-focused national forestry gathering. On Wednesday of the conference, my staff broke in two groups. While a small group of renegades took the day off to visit Denali National Park, most of our group participated in the conference-hosted field trip. After a morning of learning about black spruce, white spruce, and birch-aspen forest ecology, Nenana tribal leaders led us to a beautiful lunch with tables on the Tanana River beach. Tribal children entertained us with traditional dancing and singing.

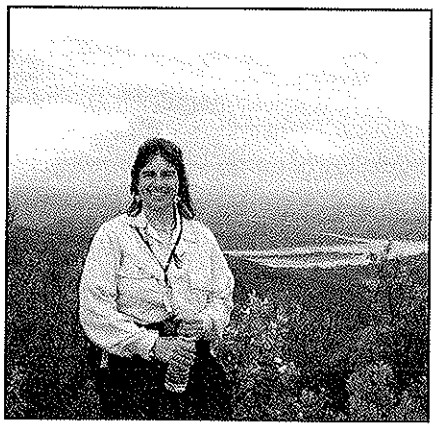
At our next forest stop above the town, several of us noticed a plume of smoke starting in the valley below. As our speakers talked of thinning, forest pests, and the effects of global warming on boreal forests, we watched the smoke column grow. My Denali-bound employees who live for firefighting assignments called in to report that their attempts to travel were thwarted by a closed highway, tall flames, and smokejumpers coming out of the sky.

Despite the excitement of watching the fire develop, my staff was



Left, Soon after ignition, the George Parks Highway Fire south of Fairbanks Alaska stopped traffic.

Below, Columnist Mary Steuver with the Parks Highway fire smoke column in the background.



more excited with the conference agenda. On Thursday, five of my staff presented papers relating to our work on Fort Apache Reservation in Arizona. All tribal forestry technicians, this was their first opportunity to speak at a national conference. With well crafted PowerPoint presentations and hours of practice and coordination, the speeches drew wonderful evaluations and generated thoughtful discussions.

Still, we found ourselves awake through the bright, near-summer-solstice Alaskan night, mesmerized by the smoke column, now quite visible from Fairbanks. When I took my staff to the airport the next morning, one of them asked me to go by the Alaska Fire Center and purchase a fire sweatshirt for her.

That afternoon I wandered into the George Parks Highway Fire Information Center that was still hastily being organized. The sole woman staffing the center had a cell phone headset and was rapidly answering multiple calls. Recognizing the chaotic rush that comes in the first days of a fire incident, I quickly volunteered to answer phones. I figured I was looking for adventure, and what would be more adventurous for a seasoned fire information officer from the Southwest than to spend an afternoon helping on a real Alaska wildfire? In an attempt to gain credibility, I whipped out my current "Red Card" identifying me as a Type 2 Information Officer. Recognized nationally by all interagency wildland firefighting agencies, the Red Card is carried by all trained and registered firefighters, and outlines the carrier's experience and qualifications.

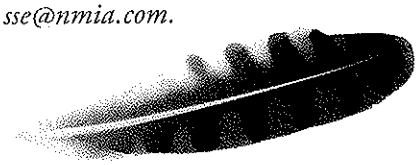
The staff there looked at me in awe. Although other information officers were en route from other parts of Alaska and "the lower 48," the current needs were immediate. A house had already burned near Nenana and the whole town was threatened. A voluntary evacuation was in place and the Alaskan Railroad was bussing passengers rather than risk running the train through the middle of a fast-moving wildfire. Rather than volunteer for an afternoon, they wanted me to sign up and stay for a fire assignment. After few calls to my home unit in Arizona, I was officially one of the 551 firefighters that would respond to the incident.

That evening in Nenana I attended a large community meeting and got my first briefing on the fire. Just as the university professors two days earlier had described, the homogenous stands of black spruce were burning intensely and fire was rapidly spreading. One home and some cabins had already burned. More were threatened. People with smoke-related health concerns were encouraged to leave the area. Tom Kurth, the incident commander, explained that the airstrip on the south end of town would provide a good fuel break to help firefighters defend the actual town area, but the outlying subdivisions and home sites were still quite vulnerable. Many residents had evacuated or were evacuating. That night the town lost power and another home burned.

I spent the next nine days working out of Nenana at the Incident Command Post. The operation was set up in a student dormitory, currently empty of students who summer in their bush-village homes. Although this was my first Alaska fire, my co-workers marveled at how unique it was to have a wildfire anywhere near a highway. Alaskan Information Officers are accustomed to less immediate media and public access, so my "lower 48" wisdom came in handy. The days were full, as changing winds threatened additional communities along the Parks Highway. I had a chance to learn about firefighting techniques using trains, helicopters, river access, and slopping through the muskeg.

As I came to know residents and firefighters, my enchantment with Nenana grew. Although I found myself fantasizing about moving to the Great Land of Adventure, I was needed back in Arizona where fires were also burning. My planned week in Alaska had stretched past two weeks, and I now had life-long friends all over the state. As I finished my assignment, I finally made the right connections to buy the sweatshirt I had originally been tasked with finding. JWR

Mary Stuever is a consulting forester specializing in forest ecosystems of the American Southwest. She can be reached at sse@nmia.com.



SCRUB JAY

A scrub jay in the morning light,
composed of sky blue and
white—
a flawless blue—with wisps of
white
scattered through, settling
on the scrub jay's throat, contrasting
its bright blue wing, and above
its eye
drawn long a stripe from the
clouds
of tousled white. Yet for all
my rhymes and gods' good taste
its ways are mean, the voice
is harsh—a beauty's scourge.
I'm glad that I'm a plainer bird.

—Marion Davidson



Mice may serenade mates

Scientists have known for decades that male mice vocalize when they encounter females or female urine pheromones. A recent study by researchers at the Washington University School of Medicine in St. Louis examined these ultrasonic sounds for previously undocumented patterns. Their findings? The mice's songs have a richness and diversity approaching that of many songbirds. Further, individual male mice sing their own distinct songs.

It is not known whether female mice sing.

Songbirds, bats, and some marine mammals are believed to learn their vocal signals in a manner similar to how humans acquire theirs: from a tutor (e.g., a parent or another animal) and at the right period in life.

The vocalizations of other species, including nonhuman primates, are hard-wired from birth. JWR

Info: http://biology.plosjournals.org

Reducing carbon dioxide

Researchers at the University of California, Davis, Northern Arizona University, and the Netherlands believe that plants' ability to counteract global warming by removing carbon dioxide from the atmosphere and storing it as carbon in the soil is limited by their dependence on nitrogen and other nutrients in the soil.

The team summarized findings from numerous published studies.

Various plants can pump nitrogen from the air into soils, and some researchers expected rising carbon dioxide to accelerate this. However, the studies analyzed revealed that nitrogen fixation cannot keep up with increasing carbon dioxide unless other essential nutrients (e.g., potassium, phosphorus, and molybdenum) are added as fertilizers.

The researchers believe that reducing reliance on fossil fuels is likely to be far more effective in slowing global warming than expecting natural ecosystems to absorb increasing levels of carbon dioxide in the atmosphere. JWR

Transitional "walking fish" found

A team led by Neil H. Shubin of the University of Chicago has reported the discovery of several well-preserved skeletons of a 375-million-year-old fish that is a link in the evolution of some fishes from water to walking on land on four limbs.

The fossils, found in sediments of former streambeds in the Canadian Arctic, have the fins, scales, and other attributes of a four- to nine-foot fish. Shubin and his team found anatomical strains of a transitional creature—a fish that anticipates the emergence of land animals and thus is a predecessor of amphibians, reptiles, dinosaurs, mammals, and eventually humans.

The scientists found the beginnings of digits, proto-wrists, elbows, and shoulders in the fish's forward fins. The fish had a flat skull, a neck, ribs, and other parts similar to four-legged land animals known as *tetrapods.*

The fish has been named Tiktaalik roseae, at the suggestion of elders of Canada's Nunavut Territory. Tiktaalik means "large shallow water fish."

A few other transitional fish from approximately the same Late Devonian time period (385 to 359 million

Project Tripwire



GROUND SQUIRREL PHOTO: JOE MARTIN/USFWS

The Wildlife Center of Virginia (WCV) is developing a pilot wildlife disease surveillance network that will link wildlife care facilities across North America to a centralized epidemiological data collection and analysis resource known as Project Tripwire. Project Tripwire will analyze the intake of patients at rehabilitation centers and wildlife hospitals in order to detect patterns and trends in wildlife health that could indicate emerging disease issues, biosecurity threats, or deliberate acts of bioterrorism.

A brief survey has been developed to enable Tripwire planners to get an idea of the range of organizations and level of relevant activities that exist across the wildlife care community in North America.

To participate in the survey or for more information about Project Tripwire, go to http://tripwire.wildlifecenter.org.

years ago) have been discovered, but, the scientists said, Tiktaalik is so clearly an intermediate link between fishes and land vertebrates that it "might in time become as much an evolutionary icon as the proto-bird Archaeopteryx." JWR

French farmers protest bears

About 5,000 French farmers rang cowbells and set off firecrackers in the Pyrenees Mountains in May to protest a plan to release three brown bears (*Ursus arctos*) in their region. The farmers fear the bears will attack their livestock.

Environmental officials had already released two female Slovene bears in the area; three more releases are planned. France's highest administrative body ruled that the government can repopulate bears, overturning local farmers' complaint.

Brown bears disappeared from the Pyrenees in the 1980s. As too few



BROWN BEAR (*URSUS ARCTOS*) PHOTO: STEVE HILLEBRAND/USFWS

remained to ensure their survival, authorities released three bears in 1996. One of them killed 165 sheep last year. JWR

Tallying the wild panda

There may be many more giant pandas (*Ailuropoda melanoleuca*) living in the wild than previously believed, say scientists involved in a study of the animals' DNA.

Michael Bruford of the Cardiff School of Biosciences, U.K., and Fuwen Wei of the Chinese Academy of Sciences examined DNA from panda feces collected from 26 km^2 of China's Wanglang National Nature Reserve. This method of analysis may provide a more accurate population profile than conventional techniques, which gague population by examining feces and estimating how many different pandas may have left them by analysing distinctive bite marks on half-digested bamboo.

The giant panda is native to the mountains of central and southern China, northern Burma, and Vietnam; their numbers have been decimated by human-caused habitat destruction.

It was previously believed that 27 giant pandas lived in the area studied; however, Buford's team found DNA from 66 different animals. He predicts the results will be replicated in other reserves, and believes that previous surveys had underestimated the population by more than 50%.

CRANES

Sunday should be different from another day. People may walk, but not throw stones at birds.
—Samuel Johnson

Hearing cranes
on Saturday
is easier than
any other day
but Sunday
when the silence
stirs with
an absent god.

—Marion Davidson



WHOOPING CRANES (*GRUS AMERICANA*) PHOTO: STEVE HILLEBRAND/USFWS

Marion Davidson is the author of Closeness of Ice, *a chapbook of poems (Finishing Line Press, 2004). Her poems have appeared in the* Sunday Oregonian *newspaper, numerous literary journals, and several anthologies. A retired attorney and avid birder, she lives on the Deschutes River in Bend, Oregon.*

Even if true, the population size is still perilously low. China founded its first nature reserve for giant pandas in the 1950s and now has 56 reserves for them. It also has 183 giant pandas in captivity, while others have been sent to zoos around the world. JWR

Info: http://www.newscientist.com/channel/life/dn9375.html

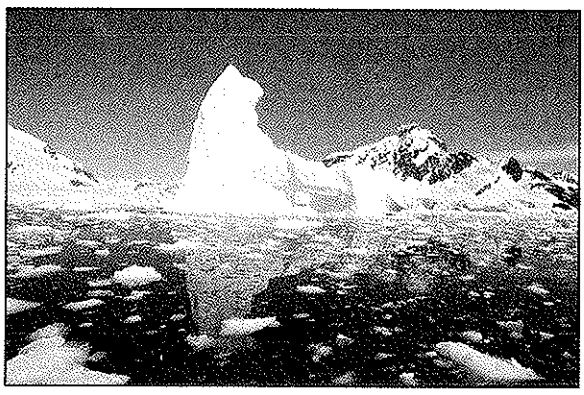
Global warming and polar bears

Scientists have documented for the first time multiple deaths of polar bears (*Ursus maritimus*) off Alaska, where they likely drowned after swimming long distances amid the melting Arctic ice shelf.

In a quarter-century of aerial surveys of the Alaskan coastline before 2004, U.S. Minerals Management Service (USMMS) researchers said polar bear drownings were so rare as to never be documented.

But in September 2004, when the polar ice cap had retreated a record 160 miles north of Alaska's northern coast, researchers counted 10 polar bears swimming up to 60 miles offshore. Following a fierce storm, four dead bears were found in the water. The researchers estimate that 40 bears may have been swimming and that many drowned in the rough seas.

"For anyone who has wondered how global warming and reduced sea ice will affect polar bears, the answer is simple—they die," said Richard Steiner, a marine-biology professor at the University of Alaska, in the New York *Times*.



The USMMS researchers also found a shift in the bears' habits. From 1979–1991, 87% of bears spotted were found mostly on sea ice. From 1992–2004, this dropped to 33%. Most of the remaining bears have been found either in the ocean or on beaches, congregating around carcasses of whales butchered by hunters. In the past, polar bears were rarely seen at such kill sites, because they spent their time hunting seals on sea ice.

Some scientists predict polar bears could become extinct within the next century because they have evolved to hunt only on ice. Those that try to swim in disappearing ice conditions to catch seals are likely to tire and drown. Further, polar bears that stay onshore aren't adapted to hunting land animals, and they require more fat intake than most food on land provides.

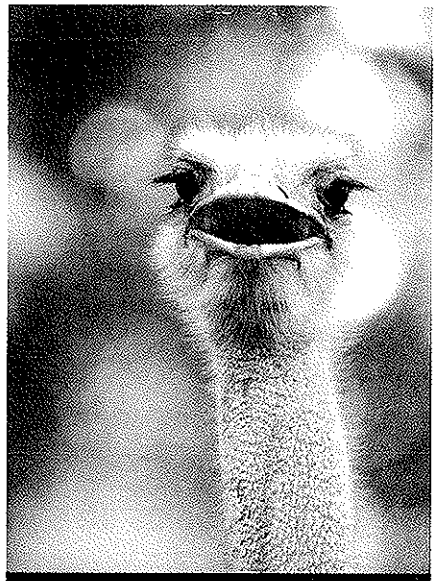
There are an estimated 20,000 to 25,000 polar bears world-wide, including about 2,000 that frequent the Beaufort Sea off Alaska. JWR

Gene shows parting of way

An international team of researchers has discovered that a gene linked to human brain development has evolved at a dramatic rate and appears to be a key difference between humans and chimpanzees (*Pan troglodytes*).

The 108-letter sequence Human Accelerated Region 1 (HAR1) stood out from other genes and gene sequences. When HAR1 was examined in chimpanzees and chickens (*Gallus gallus domesticus*)—which shared a common ancestor around 310 million years ago—they found just two changes in the genetic code of the region. But since humans and chimps split 5 million years ago there have been 18 changes.

Typically genes contain the instructions for making proteins via the messenger molecule RNA but the researchers say the RNA generated by HAR1 has a different role, and may act as a controlling mechanism in the development of the cerebral cortex, the center for memory, awareness, and perception that is far more developed in humans than in chimps. JWR



Do you have an easy answer to a frustrating rehab issue?

A new way to solve a common problem?

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Please send your "Simple Solution" to the Editor at runmuki@yahoo.com. If possible and appropriate, include high-resolution digital images, as well as a brief note about yourself.

REHABILITATION ACQUISITION LOG FOR THE YEAR 200___ : PAGE____

Log Number Species Code	Age Sex	Date Rec'd. Time Rec'd. Date Found	Rescuer Information (Name or Organization, Address, City/State/Zip/Phone)	Where Found Cause of Encounter	Transfer & Date	Disposition & Date
Log #: Species:	Age: Sex:	Date Rec'd. Time Rec'd. Date Found:	Name: Address: City/State/Zip: Phone: Phone:	Where Found: Cause of Encounter:	Date:	Date:
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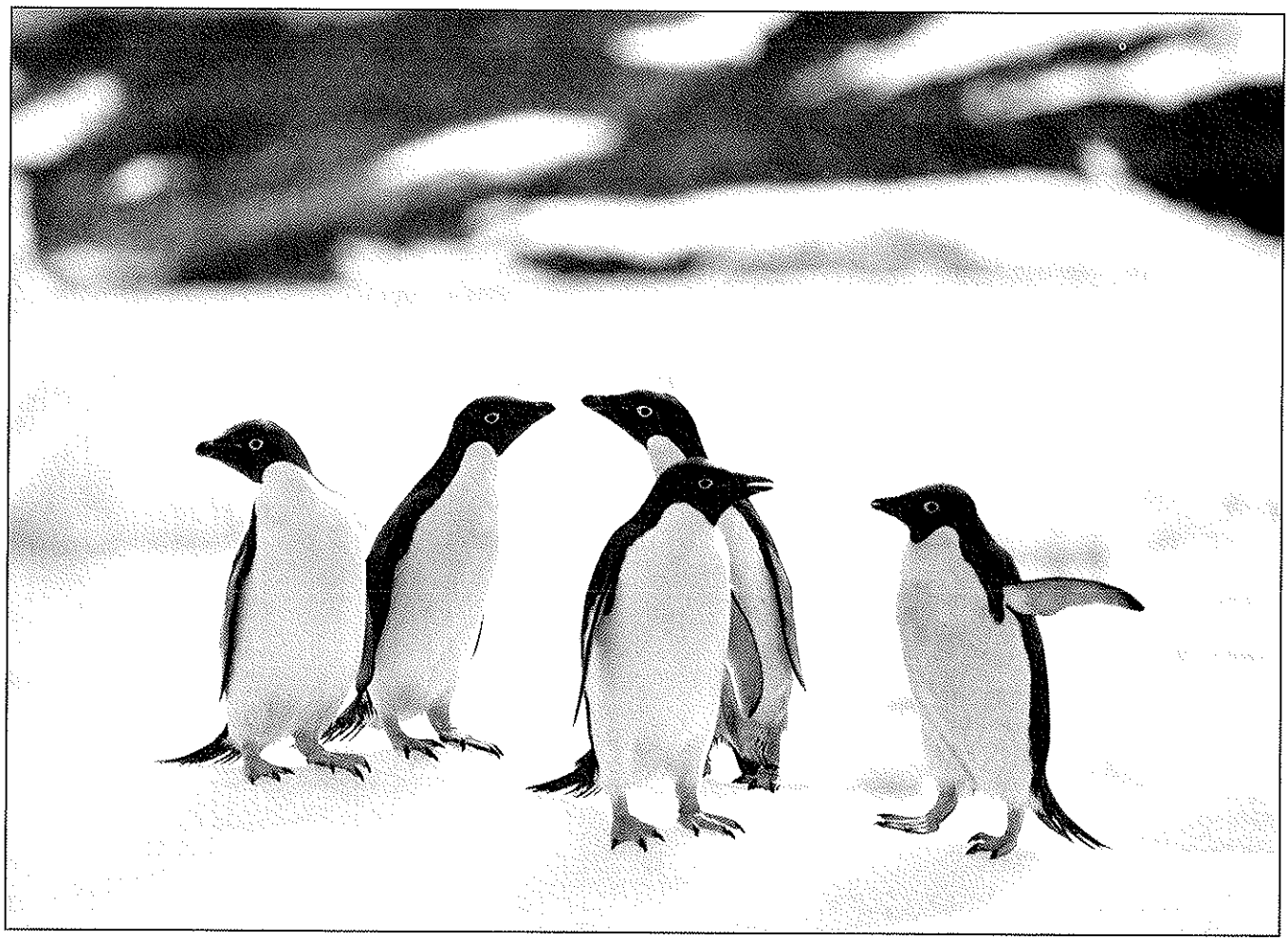
Age Key: N = nestling; F = fledgling; A = adult; U = unknown Phone Key: H = home; C = cell; W = work

DITTO

A REPRODUCIBLE ACQUISITION LOG FOR YOUR CENTER

TAIL END

by Penny Elliston



"Are your sure? I thought it was that way!"

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