



INTERNATIONAL WILDLIFE
REHABILITATION COUNCIL

S U M M E R 2 0 0 0
VOLUME 23, NUMBER 2

J O U R N A L O F
WILDLIFE
REHABILITATION



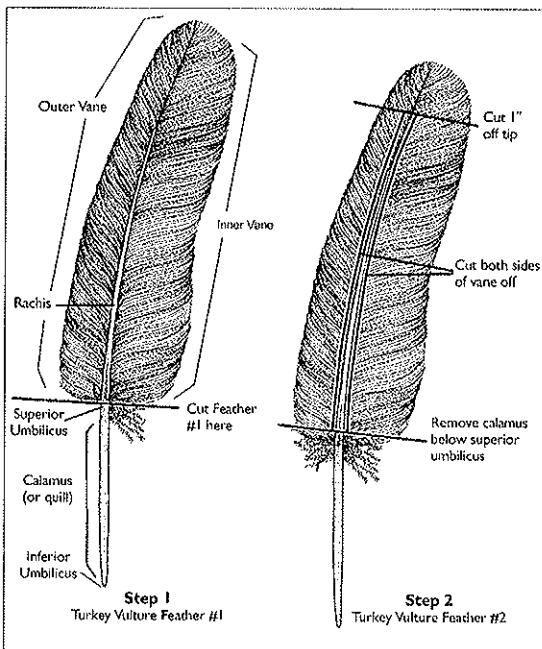
IN THIS ISSUE...

**The Exotics Dilemma, Part 2: Nutritional Aspects ... Imping of a Black
Vulture ... Rodenticides and Wildlife ... Becoming a 501(c)3 Organization
... Early Environmental Education ... Conservation Classics ... Book
Reviews ... Selected Abstracts ... 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 quarterly 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: Miko, a former exotic "pet," arrived at the Hellenic Wildlife Hospital in Greece weighing more than twice the normal weight of a four-year-old Canadian raccoon [photo: Philip Dragoumis]. BELOW: Initial steps in adapting a turkey vulture feather for use in imping a black vulture [illustrations: Barbara Gleason].





W JOURNAL OF WILDLIFE REHABILITATION

CONTENTS SUMMER 2000, VOL. 23, NO. 2

Editor

Marianne Skoczek

Associate Editors

Marjorie J. Gibson

Kieran Lindsey

Louise Shimmel

Kelley R. Tucker

Contributing Editors

Kieran Lindsey

Nathalie Karvonen

Astrid MacLeod

Veterinary Committee

Lora R. Ballweber, DVM

Edward J. Gentz, DVM

Martin Haulena, DVM

Patrice Klein, DVM

Kathleen Linn, DVM

Victoria Lukasik, DVM

Tracey Neff, DVM

Printing

Modern Litho-Print Co.

Jefferson City, Missouri

WILDLIFE MEDICINE AND REHABILITATION

3

Case Study: A Wing and a Prayer

by Jonathan B. Lahr and Deborah A. Lorah

7

The Exotics Dilemma: A Case Study in Progress

PART 2: NUTRITIONAL ASPECTS

by Astrid MacLeod, Janine Perlman, and Philip Dragoumis

TOXICOLOGY

13

Poisoning of Wildlife with Anticoagulant Rodenticides in New York

by Ward B. Stone, Joseph C. Okoniewski, and James R. Stedelin

NONPROFIT ADMINISTRATION

18

Demystifying the United States Federal 501(c)3 Application Process

A SELF-HELP DISCUSSION

by Allan M. Casey III

CONSERVATION EDUCATION

23

Starting Early: Environmental Education during the Early Childhood Years

by Ruth A. Wilson

DEPARTMENTS

Editorial, by Marianne Skoczek	2
Up For Discussion	27
Operating Instructions, by Nathalie Karvonen	31
Open Minds, by Kieran Lindsey	32
Conservation Classics	34
Book Reviews	35
Selected Abstracts	37
Ditto	38
Memorials	39
Tail Ends, by Astrid MacLeod	40

President

Marjorie J. Gibson
Raptor Education Group
Antigo, Wisconsin, U.S.A.

Vice President

Susan Heckly
Lindsay Wildlife Museum
Walnut Creek, California, U.S.A.

Treasurer

Dody Wyman
River Raisin Raptor Center
Manchester, Michigan, U.S.A.

Secretary

Lee Thiesen-Watt
Dallas, Texas, U.S.A.

Edward Clark Jr.
Wildlife Center of Virginia
Waynesboro, Virginia, U.S.A.

Elizabeth P. Elliston
Wildlife Rescue, Inc. of New Mexico
Albuquerque, New Mexico, U.S.A.

Nathalie Karvonen
Toronto Wildlife Centre
Toronto, Ontario, Canada

Kieran Lindsey
Natural Assets Consulting
Cedar Crest, New Mexico, U.S.A.

Joseph MacLeod
Anola, Manitoba, Canada

Kelley R. Tucker
American Bird Conservancy
Washington, D.C., U.S.A.

Executive Director

Mary Reynolds
Suisun City, California, U.S.A.

JOURNAL OF WILDLIFE REHABILITATION

is published quarterly by the International Wildlife Rehabilitation Council, 4437 Central Place, B-4, Suisun, CA 94585, USA, ©2000 (ISSN: 1071-2232). All rights reserved. Permission to make duplicate copies can be obtained by contacting IWRC directly or through the Institute for Scientific Information at 3501 Market Street, Philadelphia, PA 19104, USA. Articles from this publication are abstracted and cited in Focus On: Veterinary Science and Medicine, SCISEARCH, and RESEARCH ALERT.

Do It for Wildlife—Do It for Yourself

In the heat of this hectic summer season, take a few minutes to think about one of the best gifts you can give yourself—and the wildlife you will have in your care this time next year.

The IWRC's 23rd annual conference, "Wildlife Without Borders," offers you the time and the opportunity to refresh and reinvigorate yourself for the busy times ahead, to learn something new, or simply a better way to do something you've been doing for years.

The *Journal of Wildlife Rehabilitation* has always been about education, about providing the diverse array of people doing rehabilitation on all creatures who fall under the umbrella term "wildlife" with the information needed to do the best job possible. We balance solid scientific papers with columns and features that create for you a community of like-minded, caring, and knowledgeable people. The conference takes the *Journal's* lofty goal and makes it "live."

This issue of the *Journal* is concerned, in part, with various facets of public education. Ruth A. Wilson's paper discusses the need to start conservation education early and outlines strategies for effectively reaching very young children. Contributing editor Kieran Lindsey offers her own take on what makes for lasting public education in her "Open Minds" column. Nathalie Karvonen's column, "Operating Instructions," offers practical advice for hiring the right people to staff your center's phones—recognizing that educating the public begins the minute your organization answers their call.

Clearly, public education is critical. Without it—and the goodwill and understanding it engenders—successful rehabilitation would simply not be possible over the long term. But we shouldn't let our commitment to education stop there. To be most effective, we need to periodically re-examine what we are doing and how we are doing it. We need to connect with others who face the same successes and problems we do. We need to create oppor-

tunities to brainstorm together and to learn from each other. For wildlife rehabilitators—whether you work primarily alone in a home-based facility or with colleagues and other animal-care professionals in a larger operation—there is probably no better antidote to frustration and eventual burnout than the IWRC's annual conference.

We've got a long list of informative and important topics to discuss this October in Montreal: wildlife medicine and husbandry, nutrition, parasites, and zoonoses. We'll be exploring some "larger issues," such as illegal trafficking of wildlife, international wildlife treaties/CITES, translocation, toxicology, and the myriad issues facing urban wildlife.

Mirroring the *Journal's* expanded efforts to meet the needs of "pararehabbers," the conference will offer workshops and tutorials on fund-raising, risk management, leadership skills, and how to create and nourish an effective board of directors.

We're also offering a special pre-conference session especially for educators. The Project WILD Facilitator Training Workshop is designed to give educators the knowledge and confidence necessary to effectively connect with children from kindergarten through 12th grade. And because we need to reach everyone with our message—adults and children alike—there will be offerings on general public education, thematic interpretation, birds of prey in education programs, and hotline strategies.

The conference will be held 26–29 October in beautiful Montreal, Quebec, Canada. Preconference activities, from 23–25 October, include IWRC skills seminars, as well as whale watching, birding, and other field trips.

If you are intrigued, call the IWRC at 707/864-1761 or e-mail us at iwrc@inreach.com for a registration brochure. You can also visit our website (www.iwrc-online.org) and download a PDF version of the form.

—Marianne Skoczek, Editor

Case Study: A Wing and a Prayer

Written by Jonathan B. Lahr

Rehabilitation by Deborah A. Lora

History

On 30 June 1999 Majestic Wildlife Rehabilitation & Education Center, Inc., in Bethlehem, Pennsylvania (U.S.A.), received an injured black vulture (*Coragyps atratus*). The bird had been observed on the ground by a member of the public for 3 days prior to its admission to the center. The subject was thin and, other than the feather damage, no injuries were apparent (Table 1). The bird seemed quite normal in every respect. In fact, it was quite spirited and absolutely refused to cooperate. To us this is always a positive sign.

Initial Treatment

The bird was maintained in a holding kennel for one week. During that time, it was exercised for half an hour each day. The bird was then moved to an outside flight pen until more information on imping procedures was found.

Feeding Schedule

The bird's appetite was good. The bird was offered 7 day-old chicks with vionate and 3 medium-sized mice each day. Carrion was also offered on a daily basis. The carrion varied depending on what was available, and included rabbit, squirrel, and a mallard duck, all of which had been hit by a car.

Molt or Imp?

Assessment of the subject led to the conclusion that the only hindrance to releasing the vulture was, in fact, feather damage. Thus two options, imping or natural molt, were considered. As the main objective was to release the vulture as quickly as possible, it was decided to research imping. Because no one at the center had any experience with this procedure, it was necessary to gather a vast amount of information before making a final decision. However, through study, it was determined that successful imping was possible due to the excellent condition of the quills remaining on the damaged secondaries.

Further, although the primary feathers bear most of the stress in take-off and flight maneuvering, only two of the primary feathers were damaged.

TABLE 1. INITIAL PHYSICAL EXAM OF BLACK VULTURE

Weight:	1743 g
Body:	Thin
Eyes:	Normal
Musculoskeletal:	No fractures
Nervous system:	Normal
Respiration:	Rapid upon arrival. Breathing stabilized within 1 hour.
Wings:	Feather damage on the right wing, nos. 2 and 7 primary, and 4, 8, and 11 secondary.
Legs:	No injury
Skin:	No wounds

ABSTRACT: Many avian cases admitted to rehabilitation centers have a minimal need for medical assistance; however, extensive feather damage may extend potential rehabilitation time. In such cases, the rehabilitator has three options: waiting for the subject to molt naturally, stimulating the molting process, or imping feathers to correct the damage. This case study involves a black vulture (*Coragyps atratus*) with several broken feathers, including both primaries and secondaries, on the right wing. Because feathers from a black vulture were unavailable for imping, the feathers of a turkey vulture (*Cathartes aura*) were substituted with successful results.

KEY WORDS: Black Vulture, Imping, Imping Technique

JONATHAN LAHR has been involved with wildlife concerns since a very young age. Through participation in local bird counts and raptor research with the Little Gap Raptor Banding Group, his involvement with local wildlife has increased steadily over the past 25 years. He currently serves as assistant operations director and vice president of Majestic Wildlife Rehabilitation and Education Center in Bethlehem, Pennsylvania, U. S. A.

DEBORAH LORAH became involved in wildlife rehabilitation after a satisfying career in companion animal care and services. In the 1990s Lora served five and a half years as an apprentice under the Pennsylvania Raptor & Wildlife Association; she became a licensed wildlife rehabilitator in 1996. In November 1997 she founded the Majestic Wildlife Center in Bethlehem, Pennsylvania, U. S. A.

J. Wildlife Rehab. 23(2): 3-6

© International Wildlife Rehabilitation Council 2000

Imping Technique

1. Securing Feathers

The first challenge was to obtain feathers from a black vulture. The optimal scenario would be for the imping feathers to come from the same species; however, after an exhaustive search, no black vulture feathers could be secured. Although there are several nesting pairs in the area, black vultures remain uncommon. It was possible, however, to obtain feathers from a turkey vulture (*Cathartes aura*). Necessity being the mother of invention, it was decided to pursue this avenue.

2. Removal of Imping Feathers

Removing the feathers from the turkey vulture carcass proved to be more difficult than anticipated. The best method seemed to be to feel along the shaft to the point where feather meets flesh. Here, a cut was made into the flesh parallel to the shaft on both sides, until the feather was free from the wing. It is critical that excessive pressure is not applied in removing the feathers, as the shaft splinters very easily. Once the feather is removed in this fashion, the excess flesh must be scraped off the quill (a razor blade was found to be adequate). Again, it is important to be gentle: squeezing the shaft too tightly between the fingers can result in a damaged shaft.

Feather Preparation

The first and most obvious obstacle in preparing the imping feathers was the inherent size difference between black vultures and turkey vultures. Although there is much conflicting information on average weights of the two species (Bent 1961; Brown 1976; Terres 1987), we concluded, after research and consultation with individuals who had extensive hands-on field experience, that the differences between them was negligible, although the black vulture tends to be the heavier of the two. Turkey vultures range from 1500 g to 2600 g; black vultures average 2000 g to 2800 g.

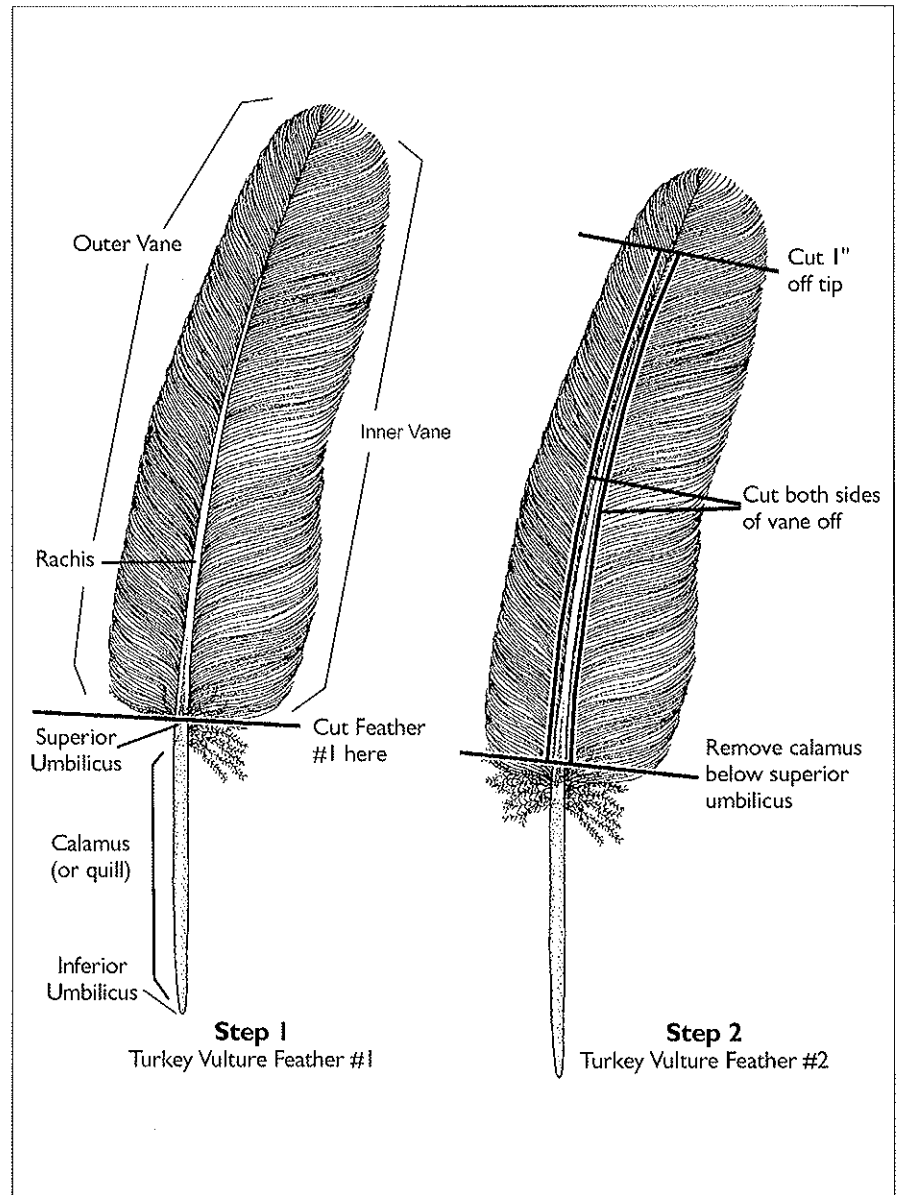
The overall body length of both species is very similar, with the turkey vulture at 68.58 cm (27 in) and

the black vulture averaging around 63.5 cm (25 in). The primary disparity between the two is in overall wingspan and wing cord measurements, as well as the length and width of the primary and secondary feathers. The turkey vulture's wingspan averages 1.73–1.83 m (68–72 in); the black vulture ranges from 1.37–1.52 m (54–60 in). The turkey vulture's feathers are up to 5.08 cm (2 in) longer and 1.27–2.54 cm (0.5–1 in) wider. The size of the vane of the turkey vulture feather could easily be dealt with, as is detailed below.

Our primary problem was that the larger calamus of the turkey vulture feather would not mate properly with

the existing calamus of the damaged black vulture feather. We overcame this obstacle as follows:

Starting with two turkey vulture feathers of similar size, we snipped the calamus off of one feather just below the superior umbilicus. From the second feather we snipped the vane from both sides, then snipped about an inch from the remaining tip, and removed the calamus from just above the superior umbilicus. We then slid the rachis from the second feather into the center of the first, widest end first, leaving the narrow end exposed. Once assured of a good fit, we glued the two together. (Krazy Glue® worked well.)



Once the feathers had been completed, the bird's existing broken feathers were trimmed, leaving approximately 2.54–3.81 cm (1–1.5 in) of calamus intact. The new feather was then inserted into the hollow of the existing calamus and glued in place once the proper fit was assured. This step required a bit of trimming until everything lined up properly. After allowing a few minutes for the glue to set, the strength of the new feathers was tested. Initially we gave them a strong tug by grasping the tips of the feathers between thumb and forefinger. Once assured the glue would hold, we took an ordinary pair of scissors and trimmed the implanted

feathers to size and shape relative to the bird's existing feathers (Person 1990; Beebe and Webster 1995).

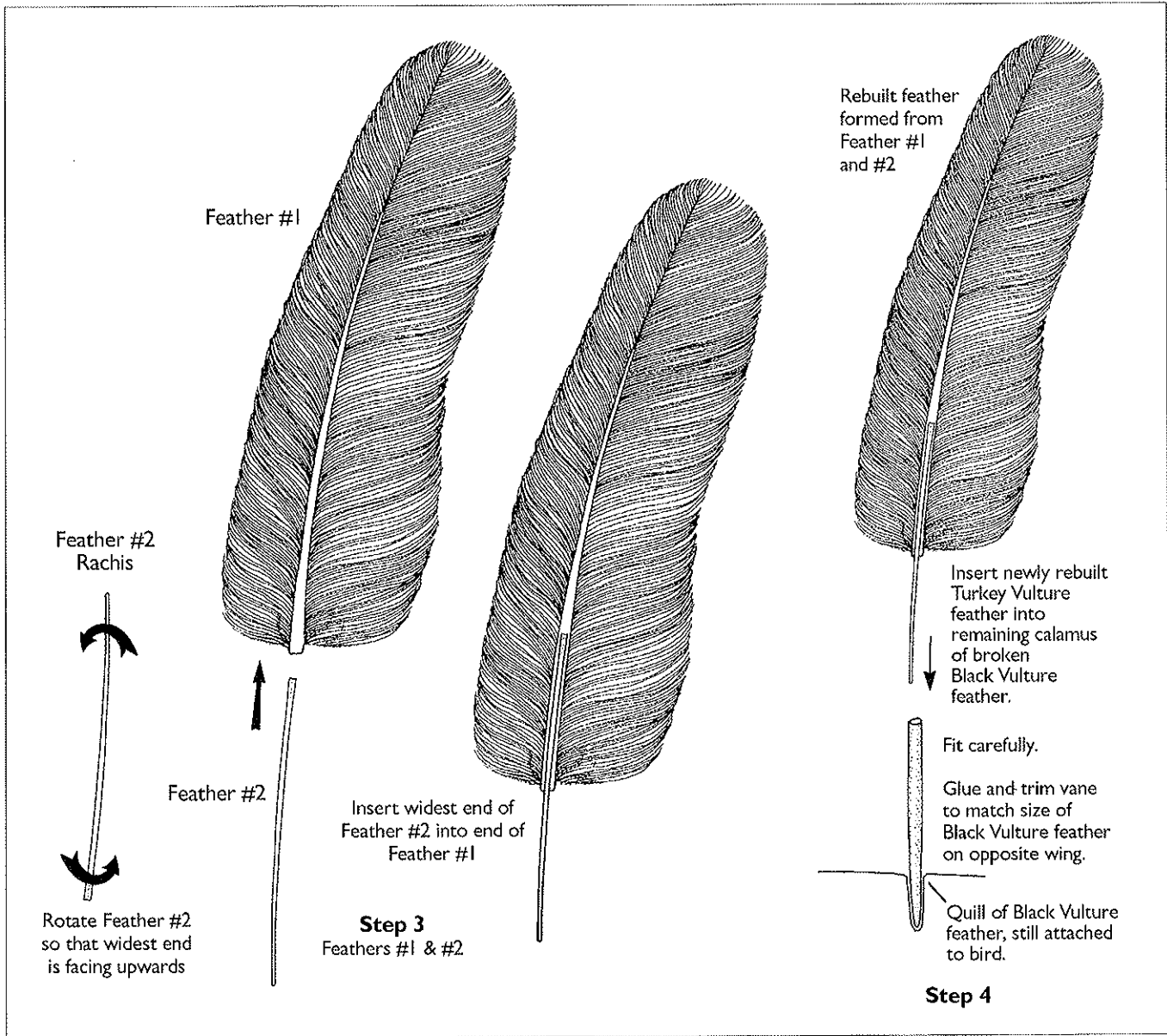
Conditioning

The vulture was placed in a large Vari-Kennel overnight and on the following morning was observed preening its new feathers as if they had always been there. The vulture was then moved to a 3.55 m x 7.62 m x 3.96 m (12 ft x 25 ft x 13 ft) flight pen, where it immediately took to the air, flying the full length of the pen from perch to perch with ease. For approximately 1 week the bird was kept in this pen and made to fly daily to build up strength and stamina. Progress was steady and the implanted feathers

showed no signs of weakening. It was interesting to note that by the end of the week, the bird's natural molt had started, and new feathers were just beginning to appear. It was decided at this point to release the vulture (Beebe and Webster 1995; Ford 1998; Beebe 1995).

Release

The subject was returned to its initial point of capture. The area consists mainly of farmland, but also contains a dump site at which turkey vultures are commonly in residence. When first released, the subject initially preferred sprinting to flight, as is common with black vultures. After a bit of coaxing, the vulture did opt





LISA BRISKEY

Following imping, the vulture was kept for approximately 1 week in a flight pen, where daily flight insured that it would build strength and stamina. The bird made quick progress and the impeded feathers showed no signs of weakening.

for flight. After a few awkward moments, the bird quickly adjusted to its new freedom and performed beautifully. The vulture landed on the roof of a nearby residence and, after adjusting to its surroundings, flew off in the direction of the dump. Subsequent observation noted that the released bird had established contact with a number of other black and turkey vultures and was received by the group with no animosity.

References

Beebe, F. L., and H. M. Webster (eds.). 1995. *North American falconry and hunting hawks*. Denver, Colo.: World Press of America.

Beebe, F. 1995. *The complete falconer*. Blaine, Wash.: Hancock House Publishing.

Bent, A. C. 1961. *Life histories of North American birds of prey*. Dover Publications.

Brown, L. 1976. *Birds of prey: their biology and ecology*. New York: A & W Publishers.

Ford, E. 1998. *Falconry art and practice*. New York: Sterling Publications, pp. 27,31-33.

Person, M. DVM. 1990. "Dr. Mike's foolproof imping method." *Hawk Chalk* 29 (2).

Terres, J. A. 1987. *The Audubon Society Encyclopedia of North American Birds*. pp. 200-81.

Consultants

David Dobias, United States Fish and Wildlife Service, Migratory Bird Permit Office, Hadley, Mass.

Ed Henckel, vulture biologist.

Acknowledgments

Pennsylvania Raptor and Wildlife Association, Inc., for supplying feathers for imping purposes.

To Contact the Authors

Jonathan B. Lahr

Deborah A. Lorah

Majestic Wildlife Rehabilitation & Education Center, Inc.
3216 Keystone Street
Bethlehem, PA 18020
U.S.A.

Phone: 610/867-7178

E-mail: majwildlife@enter.net

About the Illustrator:

Barbara Gleason is a freelance scientific illustrator and graphic designer. A member of the Guild of Natural Science Illustrators, she uses pen and ink, watercolor, pencil, carbon dust, and the computer in her work. Gleason has also been a wildlife rehabilitation volunteer in Eugene, Oregon, U. S. A. She and her husband, Dan, an ornithologist, produced and published their book, *Birds! From the Inside Out*, in 1999.

To Contact Barbara Gleason:

bgleason@teleport.com

The Exotics Dilemma: A Case Study in Progress

PART 2: NUTRITIONAL ASPECTS

by Astrid MacLeod, Janine Perlman, and Philip Dragoumis

The Case So Far...

In Part I of this case study, Miko, a captive-born raccoon, was admitted to the Hellenic Wildlife Hospital (HWH) in Greece. Veterinarian Dr. Kostas Demetriades determined that the four-year-old raccoon was suffering from intestinal impaction and that his heart and digestive tract were weakened, possibly as a result of obesity or possibly due to nutritional deficiencies. A definitive cause for the latter problems could not be determined, due in part to lack of familiarity with the species, and because of limited access to diagnostic tests. With rehabilitators from North America networking to advise HWH Codirector Philip Dragoumis and his staff, the effort to rehabilitate the raccoon began....

The raccoon had been moved to a large, well-equipped enclosure, but showed no interest in his surroundings. He was weak and listless and kept to his bed, refusing to eat and drink. He had been hydrated and was producing urine, but another dose of stool softener was required before he produced feces. Finally, two days after being admitted to HWH, Miko's fecal samples were collected and sent to the laboratory at the University of Thessalonica for analysis.

Although the raccoon was obese, he still required nutrients on a daily basis. Miko's care team decided to offer a human enteral formula to provide calories while sparing the weakened digestive tract untoward stress. The range of products in Greece was limited, but Ensure® was available. After a few tube feedings, Miko began to drink the Ensure® on his own. He continued to refuse any other foods.

Methods

Three different diets were analyzed: a wild/natural diet, a rehabilitation diet, and the diet Miko was provided by his original caretakers. The analyses were calculated on an "as-fed" basis, with the exception of non-natural baked foods (i.e., puppy kibble and arrowroot biscuits), which were converted to "wet weight."



PHILIP DRAGOUMIS

ABSTRACT: Wildlife Rehabilitators are often contacted for assistance when a wildlife "pet" has developed a problem or is no longer wanted. This article explores the problems that resulted when a deficient diet was fed to a captive raccoon for a four-year period, and compares this diet to the natural diet and rehabilitation diet of the raccoon. The methods a rehabilitation center took to wean the animal to a nutritious diet are also discussed.

KEYWORDS: Wildlife Rehabilitation, Wildlife in Captivity, Wildlife "Pets," Raccoon, Natural Diet, Rehabilitation Diet, Deficient Diet, Nutrition, Malnutrition

ASTRID MACLEOD has worked as a wildlife rehabilitator in Manitoba, Canada. She works with Manitoba Conservation and is a writer and researcher.

JANINE PERLMAN, PhD, has spent 20 years as a research biologist. She is a wildlife rehabilitator and lives in Hillsborough, North Carolina, U. S. A.

PHILIP DRAGOUMIS is a wildlife rehabilitator and the codirector of the Hellenic Wildlife Hospital in Greece.

J. Wildlife Rehab. 23(2): 7-12
© International Wildlife Rehabilitation Council 2000

(Left) When Miko showed no interest in any food other than Ensure®, his care team decided to give him a healthier version of his life-long diet: skim milk; whole meal, 12-grain bread; strained fruit baby food; low-fat yogurt; and a vitamin/mineral supplement.

The rationale behind this approach is that most natural foods are approximately 75 percent water, and dry weight bases may make them appear much more nutrient-dense than they are (Appendix I). The baked goods are presented on the same basis, for purposes of comparison. Naturally nutrient-dense foods, such as nuts and honey, were not adjusted to wet weight, so that their nutrient density would be obvious. To calculate approximate dry-weight values for the other foods, multiply listed percentages by 4.

The sources for the nutritional breakdowns of individual foods include the United States Department of Agriculture (USDA), the University of Iowa, and The Raptor Center at the University of Minnesota. Data provided for food items by these sources included the amount of water, protein, carbohydrates, fat, and ash in 100 g. The authors analyzed the diets by looking at each food item and determining grams of protein in the menu as percentages of over all grams of food, followed by calculation of the overall percentages. The process was then repeated for fats, carbohydrates, and calcium/phosphorus (Ca/P). All analyses were done using weights.

Natural History: An Analysis of the Diet of a Free-Ranging Raccoon

The raccoon's first food is mother's milk, which is composed of 6.1 percent protein, 4.2 percent fat, and 4.8 percent carbohydrate, and offers 0.81 kcals per cc (Jeness and Sloan 1970). Youngsters nurse until they are approximately 14 weeks of age; the mother does not bring food to the den, thus the youngsters depend wholly on her milk until she leads them from the den at 8 to 12 weeks of age (Lee Rue 1994).

The weaning process begins when the youngsters follow their mother on her nightly forays. Their first foods include insects, berries, and small aquatic animals. By 16 weeks of age, they have learned to catch crayfish and frogs and will raid birds' nests for eggs and nestlings (Harrison 1985).

The raccoon's diet includes a variety of foods as they become seasonally available. The animal-based portion of their diet includes frogs, crayfish, and grasshoppers and other insects, but almost any small vertebrates (including muskrats and rabbits) will be taken

when opportunity exists. The plant-based portion of the diet includes corn and fleshy fruits, with acorns being a staple. Only where oak trees are not abundant, as on prairies, are acorns absent from the natural diet (Alexander, Martin, and Zim 1951).

TABLE 1. DIET ANALYSIS IN THREE REGIONS OF THE UNITED STATES

TYPE OF VEGETATION	EAST TEXAS	IOWA	PACIFIC COAST
Alfalfa			X
Barley			X
Beautyberry	X		
Blackberry	X	X	
Blueberry			X
Buckthorn			X
Clover		X	
Corn		X	
Fairy bells			X
Fig			X
Grape	X	X	X
Grass		X	
Green briar	X		
Gooseberry		X	
Hawthorn	X		
Hickory		X	
Holly	X		X
Manzanita			X
Mulberry	X		
Nightshade		X	X
Oak (nuts, fruit, berry)	X		X
Persimmon	X		
Pokeweed	X		
Raspberry		X	
Rattan vine	X		
Smartweed		X	
Wild cherry		X	X
Yaupon	X		
(Stuewer 1943; Alexander, Martin, and Zim 1951)			

An early ecological monograph involved studying raccoon droppings and some stomach contents analyses to determine the plant-based portion of the diet.

In the Northeastern United States, the samples indicated a winter diet that included:

- 25–50% fruits, nuts, or berries of oak
- 25–50% corn
- 2–5% persimmon
- 2–5% pokeweed
- 0.5–2% grape
- 0.5–2% beech, hazelnut, holly, paw-paw, green briar, hackberry and hickory

In the Southeastern United States, the dietary percentages were:

- 10–25% fruits, nuts, or berries of oak
- 2–5% corn
- 5–10% persimmon
- 10–25% palmetto
- 5–10% green briar
- 5–10% grape
- 0.5–2% holly
- 0.5–2% pecan

The vegetation aspect of a raccoon's diet varies across the species' range (Table 1).

Averages for North America showed that in spring the animal content of the raccoon's diet rises from a winter low of 38 percent to a high of 96 percent. By mid-summer, animal intake is lowered to about 82 percent; by mid-autumn, to 42 percent; and returning in winter to its lowest level at 38 percent (Stuewer 1943).

Dietary Imbalance: Comparison of Natural Weaning Diet to Diet of Captive Raccoons

By 16 weeks of age, young raccoons are weaned and are foraging to meet their own nutritional requirements. Based on the Steuwer study (1943), their diet at this time is made up of approximately 86 percent animal-based foods and 14 percent plant-based foods.

TABLE 2. ANALYSIS OF NATURAL DIET

	% Protein	% Fat	% Carbos.	% Ca/P
Acorns (3.87 kcals/gram)	16.8	25.9	40.8	0.041/0.079
Crayfish (0.77 kcals/gram)	16.0	1.0	<10.0	0.027/0.26
Crickets (1.2 kcals/gram)	12.9	5.5	5.1	0.076/0/183
Mouse (2.07 kcals/gram)	19.8	8.8	<10.0	0.84/0.61
Slip skin grapes (0.67 kcals/gram)	0.6	0.4	17.1	0.001/0.01

(Redig 1993; Berenbaum 1996; USDA)

TABLE 3. ANALYSIS OF REHABILITATION DIET

	% Protein	% Fat	% Carbos.	% Ca/P
Crayfish (0.77 kcals/gram)	16.0	1.0	<10.0	0.027/0.26
Mouse (2.07 kcals/gram)	19.8	8.8	<10.0	0.84/0.61
Science Diet Canine Growth (1.1 kcal/gram, corrected to wet weight)	7.3	4.8	10.3	0.36/0.29
Slip skin grapes (0.67 kcals/gram)	0.6	0.4	17.1	0.014/0.01

(Redig 1993; USDA; Hills)

Raccoons vary in size and weight across their range. Miko was born to raccoons of Canadian origin, and the average weight of a Canadian raccoon at 16 weeks is 3.18 kg (7 lbs) (Evans 1985; Kuruziak 2000). A healthy 3.18 kg raccoon in rehabilitation would require approximately 667 kcals per day (Appendix II)—5 mice (150 g), 16 “average” crayfish (200 g), 30 crickets (10 g), 30 g of grapes, and 44 g of acorns following the 86 percent to 14 percent animal/plant ratio.

If it were possible to offer a raccoon in captivity a completely natural diet

based on a mid-summer diet of 86 percent animal-based foods and 14 percent plant-based foods, a sample diet might include deer mice, crayfish, crickets, grapes, and acorns (Table 2).

Assuming the raccoon consumed approximately 667 kcals per day, its diet would break down to 16.5 percent protein, 6.4 percent fat, and 7 percent carbohydrate (much in the form of chitin, which is relatively undigestible), with 0.33 percent calcium and 0.36 percent phosphorus. The animal

TABLE 4. ANALYSIS OF MIKO'S DIET

	% Protein	% Fat	% Carbos.	% Ca/P
Almonds (5.97 kcals/gram)	22.1	52.8	19.3	0.27/0.49
Arrowroot biscuits (1.2 kcals/gram, corrected to wet weight)	2.0	3.8	18.7	0.008/0.032
Hazelnuts (6.28 kcals/gram)	15.0	60.8	16.7	0.11/0.29
Honey (3.04 kcals/gram)	0.3	0.0	82.4	0.006/0.004
Whole cow's milk (0.614 kcals/gram)	3.3	3.3	4.7	0.12/0.093
(USDA)				

TABLE 5. COMPARISON OF DIETARY NUTRIENTS

	% Protein	% Fat	% Carbos.	% Ca/P
Natural Diet	16.4	6.40	7.0	0.33/0.36
Rehabilitation Diet	8.5	3.90	9.4	0.29/0.27
Miko's Diet	3.4	5.25	12.4	0.06/0.08

would have opportunity to correct its Ca/P ratio by eating eggshells, bits of bone, shells from mollusks, grit, etc.

While in rehabilitation, young raccoons are generally fed considerably more plant material. The captive diet is based on high-quality dry puppy food, which is largely corn; additional plant food comes from fruits. However, the young raccoon in rehabilitation is also introduced to many of its natural foods before release (White 1989). A sample diet of 667 kcals might include 125 g (1.25 cups) dry puppy food (corrected to wet weight in Table 3), 1 mouse (30 g), 8 crayfish (100 g), and 75 g slip skin grapes (Table 3). This diet would yield 8.5 percent protein, 3.9 percent fat, and 9.4 percent carbohydrate, 0.29 percent calcium, and 0.27 percent phosphorus.

After weaning, Miko had been offered a diet of milk, biscuits, nuts, and honey. This diet did not change through the stages of his life, nor was it seasonally adjusted in any way (Table 4).

A sample diet of about 488 g (2 cups) of whole cows' milk, 5 arrowroot biscuits (94 g wet weight), 24 g mixed nuts and 42 g (2 tbs.) honey would offer 686 kcals, with 3.4 percent protein, 5.25 percent fat, 12.4 percent carbohydrate, with 0.09 percent calcium, and 0.08 percent phosphorus.

Miko's diet was dangerously deficient in protein (Table 5). Protein is required for growth, repair of tissues, enzymatic processes, and production of blood (White 1993). Protein requirements for maximum growth in weaned mammals range from a dry-weight percentage of 35 percent for

cats to 25–38 percent for mink and foxes, 15–18 percent for guinea pigs, and 13–20 percent for ruminants. Protein requirements must be met simultaneously with energy requirements, thus the dietary protein requirement must increase as the energy content of the diet increases. The protein requirement (dry weight) for adult mammals ranges from 18–30 percent for carnivores, 8–10 percent for ground squirrels, and 5–9 percent for ruminants (Robbins 1993).

When dietary protein levels are poor, the amino acids are deficient. Wildlife can select diets based on their amino acid content (Robbins 1993). Captive wildlife may not have that option. In studies involving birds, it has been shown that even a marginal deficiency in amino acids causes an increase in food intake, resulting in a disproportionate deposition of adipose tissue in relation to skeletal muscle (Underwood, et al. 1991; D'Mello 1994; Kirkpinar and Oguz 1995).

Combined with a sedentary lifestyle, this protein-deficient diet resulted in gross obesity that, as determined by Dr. Demetriades, affected the raccoon's digestive tract and heart. A healthy Canadian raccoon in the wild, at four years of age, weighs an average of 6.4 to 7.3 kg (14–16 lbs) (Environment Canada 2000; Kuruziak 2000). Miko weighed 15 kg (33 lbs) at intake.

Breaking Lifelong Dietary Habits

When Miko showed no interest in any food other than Ensure®, his care team decided that a healthier version of his life-long diet would be offered in an attempt to slowly wean him to a better diet. Skimmed milk was substituted for whole milk. Whole meal, 12-grain bread was substituted for biscuits. Strained fruit baby food offered the sweetness he craved. Some low-fat natural yogurt was used to boost the protein level, and a vitamin/mineral supplement added essential minor nutrients. This food was offered to him by syringe, and after a few tastes, Miko accepted it. The bread



A protein-deficient diet, combined with inactivity, resulted in obesity. At 15 kg, Miko weighed more than twice the average weight for a healthy, four-year-old Canadian raccoon in the wild.

was gradually replaced with soaked puppy food.

Dry puppy food, fruits, vegetables, and fish were put in his enclosure on a daily basis, but for almost three weeks, he would eat only from the syringe. Then, one day, in an attempt to attract the raccoon's interest, Dragoumis sat playing with a live fish in Miko's pool. The raccoon lumbered over, watched for a few minutes and grabbed the fish. He devoured it in minutes. It was his first taste of meat, and it was a turning point in his recovery.

Part III: Disease and Parasites

In the next issue of the *Journal of Wildlife Rehabilitation*, this case study continues as the possibility of disease and/or parasite infestation becomes a concern.

Acknowledgments

The authors wish to thank the following individuals for their assistance in the preparation of this manuscript: Pat Isaacs, Animal Rescue of the Carolinas, Fort Mill, South Carolina, U. S. A. (advisory and research assistance); Mary Catherine Kuruziak,

House of Wildlife, Welland, Ontario, Canada (advisory and research assistance); and Louise Shimmel, Cascades Raptor Center, Eugene, Oregon, U. S. A. (research assistance).

Appendix I

While percentages of nutrients in foods are normally calculated on a dry weight percentage, the resulting numbers can be somewhat misleading, making a food look more nutritious than it is. The authors chose to compare the diets in this case study by wet weight analyses, or "as fed," so that the comparisons would be more obvious.

To calculate dry weight percentages, one would subtract the amount of water found in a food from the "solids" portion of the food. For example 100 grams of whole milk (3.25 percent milk fat) includes 87.99 g of water. The "solids" portion, thus, would be:

$$100 \text{ g milk} - 87.99 \text{ g water} = 12.01 \text{ g solids.}$$

100 g of milk has 3.29 g of protein, 3.340 g of lipid (total fats), 4.66 g of carbohydrate, and 0.720 g of ash. These are the components of the "dry weight" portion of the milk (12.01 g).

To determine the dry weight percentages:

Protein:
 $3.29/12.01 \times 100 = 27.39\%$ (of solids)

Lipid:
 $3.34/12.01 \times 100 = 27.81\%$ (of solids)

Carbohydrate:
 $4.66/12.01 \times 100 = 38.80\%$ (of solids)

Ash:
 $0.72/12.01 \times 100 = 5.99\%$ (of solids)

The animal in this case study was not fed 61.44 kcals of milk solids distributed over 12.01 g. He was fed 61.44 kcals of fluid milk, distributed over 100 g. Dry weight bases, thus, make foods appear more nutrient dense than they are.

Nutrient	COW'S MILK	
	Milk, dry weight %	Milk, wet weight % (as fed)
Water	0.00%	87.99%
Protein	27.39%	3.29%
Lipid	27.81%	3.34%
Carbohydrate	38.80%	4.66%
Ash	5.99%	0.72%
Kilocalories	61.44 kcal	61.44 kcal

(USDA)

Appendix II

Three factors are considered when calculating the minimal daily caloric intake of an animal: animal type, weight (in kilograms), and physical state. The kilocalories required by a 3.18 kg (7 lb) juvenile raccoon were calculated through the following basic formula:

Animal factor x (weight [kg])^{.75} x basal rate factor = kcals required per day (White 1993)

70 (mammal) x (3.18 kg)^{.75} x 4 (healthy juvenile) = kcals required per day

or

70 x 2.38 x 4 = 666.77 kcals required per day.

References

- Alexander, C., H. S. Martin, and A. L. Zim. 1951. *American wildlife and plants: a guide to wildlife food habits*. New York: Dover Publications; Canada: General Publishing Company, Ltd.
- D'Mello, J. P. F. 1994. Responses of growing poultry to amino acids. *Amino Acids in Farm Animal Nutrition*. Wallingford, U. K.: CAB International, pp.37-62.
- Evans, R. H. 1985. Raising raccoons for release. *Veterinary Technician* 6(6): 300.
- Harrison, K., and G. Harrison. 1985. *America's favorite backyard wildlife*. New York: Simon and Schuster, A Fireside Book.
- Jenness, R., and R. E. Sloan. 1970. The composition of milks of various species: a review. *Dairy Science Abstracts*.
- Kirkpinar, F. and I. Oguz. 1995. Influence of various dietary protein levels on carcass composition in the male Japanese quail. *British J. of Poultry Science* 36: 605-610.
- Kuruziak, M. C. 2000. *Rehabilitation Notes* (unpublished). House of Wildlife, Welland, Ontario, Canada.
- Lee Rue, L. L. 1994. *The world of the raccoon*. Springfield, Calif.: Wild Ones Animal Books. (Originally published by Lippincott Co.)
- Robbins, C. T. 1993. *Wildlife feeding and nutrition* (2nd Ed). Burlington, Mass.: Academic Press.
- Rosatte, R. C. 1989. Raccoon. *Canadian Wildlife Service Hinterland Who's Who*. Environment Canada website: <http://www.cws-scf.ec.gc.ca/hww-fap/raccoon/raccoon.html>. Published by Authority of the Minister of the Environment.
- Stuewer, F. W. 1943. Raccoons: their habits and management in Michigan. *Ecological Monographs* 13(2): 55.
- Underwood, M. S., D. Polin, P. O'Handley, and P. Wiggers. 1991. Short-term energy and protein utilization of budgerigars fed isocaloric diets of varying protein concentrations. *Proceedings of the Assn. of Avian Veterinarians* 91: 227-37.
- White, J. 1989. The raccoon: rehabilitation notes. *J. Wildlife Rehab.* 12(4).
- White, J. 1993. *Basic wildlife rehabilitation IAB* (4th Ed.). Suisun City, Calif.: International Wildlife Rehabilitation Council.

References for Nutritional Values of Foods

Crickets:

Berenbaum, M. 1996. *Bugs in the system: insects and their impact on human affairs*. Perseus Press. On the Iowa State University website: www.ent.iastate.edu/misc/insectnutrition.html

Dunkel, F. V. (Ed.). Montana State University. *The Food Insects Newsletter* 9(2). On the Iowa State University website: www.ent.iastate.edu/misc/insectnutrition.html.

Mice:

Redig, P. T. 1993. *Medical management of birds of prey* (2nd Ed.). St. Paul: The Raptor Center at the University of Minnesota.

Science Diet Canine Growth® Dry Food:

Hill's Pet Nutrition, Inc. website: http://www.hillspet.com/products/canine_growth-dry.html.

All other foods:

United States Department of Agriculture website: www.nal.usda.gov/fnic/foodcomp/Data/index.html.

To Contact the Authors

Astrid MacLeod

Manitoba Conservation
P.O. Box 17, Group 75, RR 1
Anola, Manitoba R0E 0A0
Canada
Telephone: 204/866-4268
E-mail: sparrow1@mb.sympatico.ca

Janine Perlman

1714 Borland Road
Hillsborough, NC 27278
U.S.A.
919/968-6133
E-mail: jpandjf@ix.netcom.com

Philip Dragoumis

Hellenic Wildlife Hospital
42 N. Kazantzaki Street
Aegina 18010
Greece
Telephone: 0297-28367
E-mail: ekpaz@x-treme.gr

Poisoning of Wildlife with Anticoagulant Rodenticides in New York

by Ward B. Stone, Joseph C. Okoniewski, and James R. Stedelin

Introduction

Anticoagulant poisons interfere with the action of vitamin K in the production of clotting factors in the liver, and thereby kill by predisposing animals to fatal hemorrhage. They are presently the most commonly used pesticides for the control of rodent pests world wide. The first anticoagulant synthesized for use as a pesticide was the coumarin-based compound warfarin, introduced in the 1940s (Osweiler et al. 1985). Other coumarin-based rodenticides were subsequently developed, as were indandione compounds like diphacinone, which show similar anticoagulant activity. Emergence of rat populations with resistance to warfarin and some of the other early anticoagulants eventually led to the development of more potent compounds like brodifacoum and bromadiolone which, unlike the older compounds, will kill rodents after single feedings.

Toxicity data for a variety of domestic animals (Osweiler et al. 1985) suggest that anticoagulant rodenticides are no doubt a potential hazard to many wild mammals and birds. The degree of hazard would be expected to vary by compound, species, and type of application. Poisoning could occur by direct ingestion of bait (primary poisoning), or via consumption of poisoned rodents (secondary poisoning). Potential for the latter was demonstrated by Evans and Ward (1967), who fed anticoagulant-killed nutria (*Myocastor coypus*) to dogs and commercial mink; by Mendenhall and Pank (1980), who fed rats and mice killed with a variety of rodenticides to owls; and by Townsend et al. (1984), who fed warfarin-dosed mice to least weasels (*Mustela nivalis*).

In the United States, applications of brodifacoum in apple orchards resulted in the deaths of radio-marked screech owls (*Otus asio*) (Hegdal and Colvin 1988). Littrel (1988) reported the diphacinone-caused deaths of a raccoon (*Procyon lotor*) and a mountain lion (*Felis concolor*) at a site in northern California under unknown circumstances. More recently, two barn owls (*Tyto alba*) were killed by brodifacoum near a poultry farm in Georgia (U. S. A.) in 1995 (C. F. Quist, pers. comm.).

In the British Isles, Shawyer (1987) reported a "mass mortality" involving tawny owl (*Strix aluco*), buzzard (*Buteo buteo*), magpie (*Pica pica*), and red fox (*Vulpes vulpes*) that followed baiting with brodifacoum at a Hampshire farm in 1981. Shawyer (1987) also reported suspected poisonings in barn owls associated with the use of brodifacoum (four cases), difenacoum (four cases) and bromadiolone (one case) between 1982 and 1985. Subsequently, about 10 percent of 145 barn owls found dead in Britain between 1983 and 1989 were found to contain detectable (>0.005 ppm) levels of brodifacoum, although only one owl was considered to have succumbed to poisoning (Newton et al. 1990). In France, a four-year study of possible anticoagulant poisonings of wildlife (Berny et al. 1997) yielded 59 confirmed diagnoses for bromadiolone and 41 for chlorophacinone. Twenty-eight animals, principally red foxes and buzzards, were recovered from a single area near the Swiss border where bromadiolone was applied to carrot baits for the control of voles (*Arvicola terrestris*). Similar use of bromadiolone in Switzerland itself was followed by a large kill of buzzards and kites (*Milvus milvus*). Several unspecified predatory mammals also were killed (Beguin 1983 and Pedrolc 1983, cited in Shawyer 1987). In Malaysia, barn owls were reportedly decimated when brodifacoum and coumachlor replaced warfarin on a palm oil plantation (Duckett 1984). In New Zealand, one magpie, one paradise duck (*Tadorna*

• **ABSTRACT:** From 1971 through 1997,
 • the authors documented 51 cases (55
 • individual animals) of poisoning of
 • nontarget wildlife in New York (plus
 • two cases in adjoining states) (U. S. A.)
 • with anticoagulant rodenticides—all
 • but two of these cases occurred in the
 • last eight years. Brodifacoum was im-
 • plicated in 80 percent of the incidents.
 • Diphacinone was identified in four
 • cases, bromadiolone in three cases
 • (once in combination with brodi-
 • facoum), and chlorophacinone and
 • coumatetralyl were detected once each
 • in the company of brodifacoum. War-
 • farin accounted for the three cases
 • documented prior to 1989, and one
 • case involving a bald eagle (*Haliaeetus*
 • *leucocephalus*) in 1995. Secondary in-
 • toxication of raptors, principally great
 • horned owls (*Bubo virginianus*) and
 • red-tailed hawks (*Buteo jamaicensis*),
 • comprised one-half of the cases. Gray
 • squirrels (*Sciurus carolinensis*), rac-
 • coons (*Procyon lotor*), and white-tailed
 • deer (*Odocoileus virginianus*) were the
 • most frequently poisoned mammals.
 • All of the deer originated from a rather
 • unique situation on a barrier island off
 • southern Long Island (New York, U. S. A.).
 • Restrictions on the use of brodifacoum
 • appear warranted.

• **KEY WORDS:** Anticoagulant Rodenticide
 • Poisoning, Brodifacoum, Bromadiolone,
 • *Bubo virginianus*, *Buteo jamaicensis*,
 • Diphacinone, Great-Horned Owl,
 • *Odocoileus virginianus*, Raptor, Red-
 • Tailed Hawk, White-Tailed Deer, Wildlife

• **WARD B. STONE** and **JOSEPH C.**
 • **OKONIEWSKI** are with the Wildlife Pa-
 • thology Unit, New York State Depart-
 • ment of Environmental Conservation.

• **JAMES R. STEDELIN** is with the Animal
 • Disease Laboratory, Illinois Department
 • of Agriculture.

• *J. Wildlife Rehab.* 23(2): 13-17

TABLE 1. ANTICOAGULANT RODENTICIDE POISONINGS IN WILDLIFE IN NEW YORK (U. S. A) AND ADJOINING STATES, 1971-1997

Species ^a	Date (Mo/yr)	County ^b	Gross Pathology ^c	Toxicant (ppm in liver)
Gray squirrel	10/71	Westchester	d	warfarin (not quantified)
Gray squirrel	9/81	Niagara	b,d,k	warfarin (0.228)
Peregrine falcon	10/86	Cape May	c,h	warfarin (1.48)
Great horned owl	3/89	Putnam	a,b	brodifacoum (0.01)
Great horned owl	10/89	Suffolk	a,b,c	brodifacoum (0.2)
Gray squirrel	6/90	Westchester	a,h	brodifacoum (0.7)
Gray squirrel	7/90	Monroe	b,d	brodifacoum (4.1)
Eastern chipmunk	6/92	Albany	a,b	brodifacoum (3.8)
Raccoon	6/92	Niagara	j	brodifacoum (1.8 in stomach contents)
Raccoons (3)	9/92	Nassau	c	brodifacoum (3.1, 5.3, 4.6)
Gray squirrel	8/93	Albany	a,d,h	brodifacoum (0.53), chlorofacinone (0.62)
Gray squirrel	9/93	Albany	a,d,j	brodifacoum (25.8 in colon contents)
Snowy owl	11/93	Dutchess	a,d	diphacinone (0.26)
Great horned owl	3/94	Niagara	b,h	brodifacoum (0.53)
Great horned owl	6/94	Albany	a,b,f	brodifacoum (0.64)
White-tailed deer	10/94	Suffolk	c,i	brodifacoum (0.38)
Great horned owl	10/94	Erie	a,b,f	brodifacoum (0.41)
Red-tailed hawk	11/94	Westchester	b,g,f	brodifacoum (0.41)
Great horned owl	11/94	Orleans	a,b,e,f,g	brodifacoum (0.73)
Great horned owl	12/94	Albany	a,b,d,f,g	brodifacoum (0.1)
Red-tailed hawk	12/94	Westchester	a,b,f	brodifacoum (0.23)
Red-tailed hawk	1/95	Richmond	b,h	brodifacoum (0.43)
Red-tailed hawk	3/95	Nassau	b,g	brodifacoum (0.76)
Bald eagle	4/95	Orleans	i	warfarin (1.4)
Great horned owl	8/95	Suffolk	a,d,h	brodifacoum (0.53), bromadiolone (0.14)
White-tailed deer	9/95	Suffolk	c,d,e	brodifacoum (0.37), coumatetralyl (0.5)
Red-tailed hawk	12/95	Suffolk	a,b,f,g	brodifacoum (1.6)
Great horned owl	2/96	Chenango	a,h,i	brodifacoum (0.36)
Raccoon	3/96	Suffolk	a,d,e,j	brodifacoum (1.0)
Red fox (2)				b,c,ebrodifacoum (1.32 and 4.01)
Skunks (3)	4/96	Westchester	a,c,e	bromadiolone (0.02, 0.28, 0.08)
Raven	4/96	Rensselaer	a,d,h	brodifacoum (1.04)
Golden eagle	4/96	Monroe	c	brodifacoum (0.03)
White-tailed deer	4/96	Suffolk	c,e	brodifacoum (0.12)
White-tailed deer	5/96	Suffolk	c,k	brodifacoum (0.41)
Red-tailed hawk	6/96	Onondaga	a,b,f,g	brodifacoum (0.65)
Great horned owl	6/96	Monroe	a,b,d,e,g	brodifacoum (0.35)
White-tailed deer	10/96	Suffolk	c,e	diphacinone (0.93)
Red-tailed hawk	10/96	Suffolk	b,i	brodifacoum (0.5)
Opossum	11/96	Albany	c	bromadiolone (0.8)
White-tailed deer	12/96	Suffolk	c	diphacinone (0.2)
Gray squirrel	12/96	Albany	a,b,d	brodifacoum (1.39)
Common crow	1/97	Fairfield	a,d,f,j	brodifacoum (1.34)
Screech owl	2/97	Suffolk	a,c	brodifacoum (0.34)
Great horned owl	2/97	Greene	a,b,f	brodifacoum (0.08)
Raccoon	3/97	Albany	a,d,f	brodifacoum (0.32)
Gray squirrel	4/97	Suffolk	a,e	diphacinone (2.0)
Opossum	4/97	Albany	a	brodifacoum (0.18)
Great horned owl	4/97	Niagara	i	brodifacoum (0.11)
Great horned owl	6/97	Dutchess	b,g	brodifacoum (0.22)
Screech owl	10/97	Erie	d	brodifacoum (0.80)
White-tailed deer	12/97	Suffolk	a,c,e	brodifacoum (0.16)

^a See text for scientific names.

^b All in New York except for Cape May (New Jersey) and Fairfield (Connecticut).

^c a = subcutaneous hemorrhage; b = pallor of muscle and/or internal organs; c = hemorrhage in lungs; d = inter- and intramuscular hemorrhages; e = subcutaneous edema; f = low blood volume heart/major vessels; g = excessive hemorrhage from superficial wounds; h = free hemorrhage or bloody fluid in body cavity; i = hemorrhage into alimentary canal; j = dyed rodenticide bait in alimentary canal; k = hemorrhage and/or serum in pericardial sac; l = intrauterine hemorrhage.

ferruginea), two unidentified hawks, two unidentified gulls, one unidentified passerine, and one unidentified hare were found dead following experimental use of brodifacoum to control rabbits (*Oryctolagus cuniculus*) (Rammell et al. 1984). Other reports of avian mortality linked to brodifacoum use in New Zealand have been reviewed by Eason and Spurr (1995).

Given the experimental evidence, the magnitude of rodenticide use, some of the reports cited above, and our own data, we suspect that the poisoning of wildlife in the United States with anticoagulants is far more common than the published record suggests. The purpose of the present paper is to report both primary and secondary poisoning of nontarget wildlife with anticoagulant rodenticides in New York State from 1971 through 1997.

Methods

Most of the cases included in this report were submitted for diagnosis directly or indirectly by the general public. Wildlife rehabilitators also contributed a significant number of specimens. When necropsies showed hemorrhage or anemia in the absence of traumatic injury or infectious or parasitic disease processes, the livers were collected, frozen, and shipped to an analytical laboratory. Analyses were completed at the New York State Police Laboratory (Albany, New York, U. S. A.) prior to 1977, and subsequently at the WARF Institute and its successor, Raltech Scientific Services (Madison, Wisconsin, U.S.A.), through 1984. Since then, analyses were completed at the State of Illinois Animal Disease Laboratory (Centralia, Illinois, U.S.A.) using a high-performance liquid chromatography screening procedure. This method utilized a solid-phase cleanup to prepare small-sized samples (2 g) for analysis (Chalermchaikit et al. 1991). Identification and quantitation of the 11 different anticoagulant rodenticides in the screen were achieved by reverse-phase separation using both UV and fluorescence detectors (Shimadzu models SPD-6AV and RF-535, Shimadzu Scientific Instruments, Inc., Columbia, Maryland, U.S.A.) in tandem to facili-

tate both the primary and confirmatory analysis (J. R. Stedelin, unpublished data). When needed, particularly with indandione compounds, additional sensitivity and confirmation were attained with an ion-pairing method (Hunter 1985). Detection limits at the Illinois Laboratory were 0.02 ppm for brodifacoum and bromadiolone; 0.03 ppm for difenacoum; 0.05 ppm for coumatetralyl; 0.1 ppm for warfarin, fumarin, and coumachlor; 0.02 ppm for diphacinone; 0.4 ppm for pindone and valone; and 0.5 for 4,6,7, and 8-OH warfarin.

Results

Death from hemorrhage associated with anticoagulant rodenticides was confirmed in 51 cases (56 individual animals) over a 27 yr period (Table 1). Only 3 cases, all involving warfarin, were diagnosed prior to 1989. Most of the poisonings originated in one of three regions in New York: including (1) Long Island and the lower Hudson River Valley (40°30' to 41°31'N and 72°50' to 74°00'W), (2) within about 80 km of our laboratory near Albany (42°35'N and 73°53'W), and (3) counties bordering the southwest shore of Lake Ontario and the Niagara River (42°25' to 43°23'N and 77°37' to 79°04'W).

Presumed secondary poisoning of raptors was documented in 26 cases, principally in great horned owls (13 cases) and red-tailed hawks (7 cases).

Presumed primary intoxications were confirmed in 16 cases, primarily in gray squirrels and white-tailed deer. Rodenticide bait was visually identified in the alimentary canal in 4 of these cases: 2 raccoons, 1 squirrel, and common crow (*Corvus brachyrhynchos*). The poisonings in the red foxes, skunks (*Mephitis mephitis*), opossums (*Didelphis virginiana*), and the other raccoons could have been primary or secondary in nature.

Brodifacoum was identified in the liver or alimentary canal in 41 cases (80 percent). Warfarin was identified in 4 cases, diphacinone in 4, and bromadiolone in 3 (once in combination with brodifacoum). Coumatetralyl and chlorophacinone were found (once each) in the company of brodifacoum.

Gross postmortem findings (Table 2) typically included subcutaneous hemorrhage in both avian and mammalian specimens. Birds tended to show more noticeable overall pallor, frequently had a notably reduced volume of blood in the heart and associated large vessels, and about one-third showed excessive external hemorrhage from superficial wounds. Subcutaneous hemorrhage in raptors frequently included sites over the abdomen, including intense hemorrhage between the stomach and the abdominal wall in several specimens. Pulmonary hemorrhage was far more

TABLE 2. GROSS PATHOLOGICAL FINDINGS IN WILDLIFE KILLED BY ANTICOAGULANT RODENTICIDES

Finding	Frequency ^a	
	Birds (n = 25)	Mammals (n = 27)
Subcutaneous hemorrhage	+++	+++
Pallor	+++	++
Hemorrhage in lungs	+	+++
Intet/intra-muscular hemorrhage	++	++
Subcutaneous edema	+	++
Free hemorrhage in body cavity	++	+
Dyed bait in alimentary canal	+	++
Excessive bleeding from minor wounds	++	o
Low blood volume in heart/major vessels	++	o
Hemorrhage into alimentary canal	+	+
Hemorrhage/serum in pericardial sac	o	+
Intrauterine hemorrhage	NA	+

^a Constructed from necropsy records, these frequencies should be considered conservative as records varied in degree of detail: +++ = frequent (>50%); ++ = occasional (10-50%); + = infrequent (<10%); o = not observed, NA = not applicable.

common in mammals. Also, mammals sometimes showed areas of subcutaneous edema. The edematous fluid was frequently blood-tinged and, in some cases, perhaps a sequel to earlier hemorrhage. In general, tentative diagnoses based on gross findings in birds were confirmed by analytical results in almost every case. The gross findings on mammals, however, seem to be less pathognomonic, and confirmations were much less certain, particularly for carnivores and ungulates.

We were able to link known anticoagulant use and raptor mortality to a particular site on only three occasions. In the first case, brodifacoum was employed in barns and sheds at a small farm outside of Albany (New York) where horses, goats and llamas were kept. Availability of livestock food and an absence of barn cats combined to produce an enormous rat population. Despite the fact that a great horned owl had been repeatedly observed in the vicinity of the barnyard, brodifacoum-treated bait was used in the buildings. An owl was eventually found near death at the site, having suffered near complete exsanguination from a small laceration on one toe.

The second case involved a red-tailed hawk in rehabilitation at our facility in Delmar (New York). The bird had been fed a rat found dead on the ground by an employee (counter to instructions never to utilize animals found dead for animal food) unaware that brodifacoum bait was being used at an adjoining residence. The hawk, kept in an outdoor flight cage not designed to exclude small animals, may have captured additional brodifacoum-exposed rodents on its own.

The third incident occurred at a lower Hudson Valley correctional facility where a rodent control program (using a tracking powder containing 0.2 percent diphacinone) coincided with presence of a snowy owl (*Nyctea scandiaca*) that had established a temporary residence at the site. The owl's stomach was full of rat remains.

The white-tailed deer poisonings with brodifacoum (4) and diphacinone (2) all occurred on Fire Island, a barrier island on the south shore of Long

Island. No hunting is allowed and the deer population is large and food limited. The deer are fed by some Fire Island residents and, as we observed on one field visit, have come to associate plastic bags with food opportunities. The remains of plastic bags or wrappers were occasionally found in the rumen of deer at necropsy. This situation is sometimes coupled with a heavy use of rodenticides in some of the small communities. Deer have been observed eating baits, even going to considerable effort to extract them from beneath buildings supported on low piers. Other deer we have examined in the past few years from this location may also have been poisoned by anticoagulants, but postmortem scavenging and/or decay precluded or compromised confirming analyses. The most common gross finding in poisoned deer was extremely hemorrhagic lungs.

Discussion

Our data suggest that poisonings of nontarget wildlife with anticoagulant rodenticides may currently be widespread, largely due to the use of brodifacoum. More acutely toxic to most species tested than other commonly used anticoagulants (Table 3), brodifacoum is also very persistent in the liver (Bachmann and Sullivan 1983; Laas et al. 1985). For example, substantial amounts of brodifacoum were found in the livers of sublethally dosed possums (*Trichosurus vulpecula*) eight months after exposure, with little decline after the first week (Eason et

al. 1996). Repeated sublethal exposures, even intermittent ones, may therefore be expected to eventually cause fatal hemorrhage. Not surprisingly, Mendenhall and Pank (1980) experimentally showed brodifacoum to be the most hazardous of six anticoagulants to barn owls fed poisoned rats.

Brodifacoum and other anticoagulants are not registered for field use in the U. S. A. Some outdoor use may occur, however, as U. S. Environmental Protection Agency-approved label directions for commensal rodent control permit placement of bait "in and around" structures—the term "around" being unquantified. Extensive outdoor placement is probably rare in New York, however, as we have confirmed relatively few primary anticoagulant poisonings in species that should be particularly vulnerable to outdoor baiting.

The toll on New York State wildlife is nonetheless impressive, particularly with respect to two raptor species. Since 1994, anticoagulant poisonings have comprised 17 percent (n = 59) of our diagnoses for great horned owls, and 6 percent (n = 114) of our diagnoses for red-tailed hawks. The actual rate of exposure of these raptors and other wildlife in New York to these anticoagulants is unknown as we have not screened the livers of animals found dead of other causes.

The poisoning of white-tailed deer on Fire Island raises some questions about human consumption of deer and other game. A common pattern of resi-

TABLE 3. ACUTE ORAL LD₅₀ VALUES^a (MG/KG) FOR SOME COMMON ANTICOAGULANT RODENTICIDES IN SEVERAL SPECIES

Species	Warfarin	LD ₅₀ (mg/kg)		
		Diphacinone	Bromadiolone	Brodifacoum
Rat	50-100	1.5	1.25	0.27
Mouse	374 ^b	340	1.75	0.4
Rabbit	800 ^b	35	1.0	0.29
Pig	3	—	—	0.5-2.0
Dog	50	3	11-15 ^c	0.25-1.0
Cat	5-50	15	>25 ^c	25
Chicken	1000 ^b	—	—	10-100

^a As reported in Osweiler et al. (1985) unless otherwise indicated.

^b Reported in Hagan and Radomski (1953)

^c Reported in Felice and Murphy (1995).

dential development in many areas of New York State at present is for houses to be erected on large (e.g., 0.4–2.0 ha) lots in prime wildlife habitat on the outskirts of cities and suburbs. White-tailed deer often continue to thrive in close proximity to these houses. Norway rats (*Rattus norvegicus*) also occasionally do well in some of these areas if birdseed or pet foods provide a food source. When the latter occurs, the use of rodenticides may be expected to increase, possibly exposing deer and other wildlife to poison bait. As long as sufficient natural foods persist, the likelihood of deer consuming bait is probably slight. However, as hunting is almost inevitably restricted to some extent in these areas, deer populations may become food limited (as on Fire Island) and bait consumption could become more common. Unlike Fire Island, however, some hunting, at least by archers, is likely to continue in or adjacent to these developments, potentially exposing hunters to contaminated flesh. It would be useful to survey deer livers for anticoagulants in some areas that currently approximate these circumstances. Surveys of livers of game species would also appear warranted in locations abroad where field applications of anticoagulants occur.

We recommend that physiologically persistent anticoagulants, particularly brodifacoum, should not be used if direct or indirect exposures to wildlife are likely to occur. Warfarin or a similarly nonpersistent anticoagulant requiring multiple feedings should be considered in locations where warfarin resistance has not been demonstrated. Rodenticides containing cholecalciferol, bromethalin or phosphide can be used if warfarin resistance is known to be present, although these products can also present a serious direct threat to some wildlife species if placed outdoors. Appropriate regulatory agencies worldwide should consider additional restrictions on the use of brodifacoum.

Acknowledgments

We wish to thank M. Beqaj for assistance in obtaining suspected poisoned deer on Fire Island, and V. Palmer for investigating rodenticide use at that location. We also thank Volunteers for Wildlife and other wildlife rehabilitators for providing specimens for examination.

References

- Bachmann, K. H., and T. J. Sullivan. 1983. Dispositional and pharmacodynamic characteristics of brodifacoum in warfarin-sensitive rats. *Pharmacology* 27: 281–88.
- Berny, P. J., T. Buronfosse, F. Buronfosse, F. Lamarque, and G. Lorgue. 1997. Field evidence of secondary poisoning of foxes (*Vulpes vulpes*) and buzzards (*Buteo buteo*) by brodifacoum, a four-year survey. *Chemosphere* 35: 1817–29.
- Chalermchaikit, T., L. J. Felice, and M. J. Murphy. 1993. Simultaneous determination of eight anticoagulant rodenticides in blood serum and liver. *J. of Analytical Toxicology* 17: 56–61.
- Duckett, J. E. 1984. Barn owls (*Tyto alba*) and the “second generation” rat-baits utilised in oil palm plantations in Peninsular Malaysia. *Planter, Kuala Lumpur* 60: 3–11.
- Eason, C. T., and E. B. Spurr. 1995. Review of the toxicity and impacts of brodifacoum on non-target wildlife in New Zealand. *New Zealand J. of Zoology* 22: 371–79.
- Eason, C. T., G. R. Wright, and D. Batcheler. 1996. Anticoagulant effects and the persistence of brodifacoum in possums (*Trichosurus vulpecula*). *New Zealand J. of Agricultural Research* 39: 397–400.
- Evans, J., and A. L. Ward. 1967. Secondary poisoning associated with anticoagulant-killed nutria. *J. of the Am. Vet. Medicine Assn.* 151: 856–61.
- Felice, L. J., and M. J. Murphy. 1995. CVT Update: Anticoagulant rodenticides. In *Kirk's current veterinary therapy XII—small animal practice*, J. D. Bonagura (ed.). Philadelphia: W. B. Saunders, pp. 228–32.
- Hagan, E. C., and J. L. Radomski. 1953. The toxicity of 3-(acetonylbenzyl)-4-hydroxycoumarin (warfarin) to laboratory animals. *J. of the Am. Pharmaceutical Assn.* 42: 379–82.
- Hegdal, P. L., and B. A. Colvin. 1988. Potential hazard to eastern screech-owls and other raptors of brodifacoum bait used for vole control in orchards. *Environmental Toxicology and Chemistry* 7: 245–60.
- Hunter, K. 1985. High-performance liquid chromatographic strategies for determination and confirmation of anticoagulant residues in animal tissues. *J. of Chromatography* 321: 252–72.
- Laas, F. J., D. A. Forss, and M. E. R. Godfrey. 1985. Retention of brodifacoum in sheep tissue and excretion in faeces. *New Zealand J. of Agricultural Research* 28: 357–59.
- Littrell, E. E. 1988. Wild carnivore deaths due to anticoagulant intoxication. *Calif. Fish and Game* 74: 172–85.
- Mendenhall, V. M., and L. F. Pank. 1980. Secondary poisoning of owls by anticoagulant rodenticides. *Wildlife Society Bulletin*. 8: 311–15.
- Newton, I., I. Wyllie, and P. Freestone. 1990. Rodenticides in British barn owls. *Environmental Pollution* 68: 101–17.
- Oswiler, G. D., T. L. Carson, W. B. Buck, and G. A. Vangelder. 1985. Clinical and diagnostic veterinary toxicology, Third edition. Dubuque, Iowa: Kendall/Hunt.
- Rammell, C. G., J. J. L. Hoogenboom, M. Cotter, J. M. Williams, and J. Bell. 1984. Brodifacoum residues in target and non-target animals following rabbit poisoning trials. *New Zealand J. of Experimental Agriculture* 12: 107–11.
- Shawyer, C. R. 1987. The barn owl in the British Isles. London: The Hawk Trust.
- Townsend, M. G., P. J. Bunyan, E. M. Odam, P. I. Stanley, and H. P. Wardall. 1984. Assessment of secondary poisoning hazard of warfarin to least weasels. *J. of Wildlife Mgmt.* 48: 628–632.

To Contact the Authors

Ward B. Stone
Wildlife Pathology Unit
New York State Department of
Environmental Conservation
108 Game Farm Road
Delmar, NY 12054
U.S.A.
E-mail: wstone@gw.dec.state.ny.us

The Journal of Wildlife Rehabilitation will publish a second pesticides article by Ward Stone in an upcoming issue.

This article was originally published in the Journal of Wildlife Diseases 1999 35(2): 187–93. Reprinted with permission.

Demystifying the United States Federal 501(c)3 Application Process

A SELF-HELP DISCUSSION

by Allan M. Casey III

Introduction

The benefits of becoming a tax-exempt 501(c)3 organization are not reserved for large rehabilitation organizations. Much smaller, home-based independent rehabilitators may also enjoy these many benefits. However, they may find the application packet and accompanying Internal Revenue Service (IRS) forms somewhat intimidating. Additionally, there are organizational, recordkeeping, and fundraising requirements that need to be understood and satisfied, even for smaller groups. Addressing these requirements up front will help in understanding the application process and ongoing administrative requirements, and help to ensure an activity does not run afoul of IRS regulations.

The Definition of a 501(c)3 Organization

Simply stated, the 501(c)3 designation denotes an organization that is exempt from paying income tax and, as importantly, can assure its donors that contributions and donations are tax deductible to the donor for federal and, generally, state income tax purposes. Designation as a 501(c)3 also places certain restrictions on a few of the organization's activities.

The term "501(c)3" refers to the part of the United States Federal Internal Revenue Code (IRC) that describes certain tax-exempt organizations. Paraphrasing from statutory language, organizations that are exempt from federal income tax include ... corporations that are organized and operated exclusively for religious, charitable, scientific, testing for public safety, literary, or educational purposes; to foster national or international amateur sports competition; or for the prevention of cruelty to children or animals. Most wildlife rehabilitators who seek tax-exempt status under this section will qualify under the charitable purpose and, in some cases, the educational purpose. (The prevention of animal cruelty purpose is mostly applicable to domestic animals and livestock, and if applied to a wildlife organization, might be interpreted as an antihunting or animal rights group whose intentions are to influence legislation through lobbying activities.)

The IRC goes further in describing three additional conditions and restrictions. It says that ... no part of the net earnings inures to the benefit of any individual. This means that no one person can use or take any of the organization's financial or other assets for personal use or benefit. However, individuals can be paid reasonable and customary salaries and wages and reimbursed for approved out-of-pocket expenses. The assets and resources of the organization must be kept separate and used only in the furtherance of the organization's stated charitable and public purposes.

Secondly, the IRC restricts the organization such that ... no substantial part of the activities is carrying on propaganda or otherwise attempting to influence legislation (except as provided in subsection (h)). This does not prohibit such activity, but it does establish limits. For most wildlife rehabilitation organizations, this should not be a problem. As opposed to legislation, attempts to influence regulation such as state wildlife rehabilitation regulations falls outside this restriction. Working with a state wildlife agency

• **ABSTRACT:** Independent, home-based
• wildlife rehabilitators can enjoy the
• same tax-exempt benefits as larger
• centers. Transforming an informal
• operation to one that is managed like
• a business is the first step. The next big
• step, as described in this article, is ap-
• plying for the United States Federal
• 501(c)3 tax exemption. The author
• demystifies the requirements of this
• initially daunting process to show how
• small organizations can gain this cov-
• eted tax-favored status. Additionally,
• the required five-year audit—some-
• thing many find out about too late—is
• described. Failure to pass this audit
• may jeopardize an organization's tax-
• exempt status.

• **KEY WORDS:** Nonprofit Organizations,
• 501(c)3 Tax Exemption, Nonprofit
• Administration

• **ALLAN M. CASEY III** is cofounder and
• vice president of WildAgain Wildlife
• Rehabilitation in Evergreen, Colorado.
• He and his wife, Shirley, have been
• permitted rehabilitators since 1986,
• and have published and presented
• widely on many rehabilitation topics.
• Allan Casey was a financial manager
• for a large international corporation
• for 23 years. He now works with
• rehabilitators across the country in
• matters related to the 501(c)3 tax
• exemption. This includes the state non-
• profit incorporation, drafting of by-
• laws, selection of board members, and
• consultation on and preparation of the
• federal 501(c)3 filing.

• *J. Wildlife Rehab.* 23(2): 18-22
• © International Wildlife Rehabilitation Council 2000

to improve or change regulations is an acceptable activity.

Lastly, the IRC prohibits the ... participation, or intervention, in (including the publishing or distributing of statements) any political campaign on behalf of (or in opposition to) any candidate for public office. This strong prohibition applies to the organization and the use of its name. It does not apply to individuals acting on their own behalf, but who may also participate in managing the affairs of the organization, such as directors and officers.

These last three requirements and restrictions must be included in the Articles of Incorporation that are filed with the secretary of state. The fill-in-the-blank form provided by most states does not usually include these three items. While the state is indifferent as to whether or not they are included, the IRS does require them. Rather than using the state-provided form, many perspective 501(c)3 applicants simply type out their own Articles of Incorporation, making sure to address all of the required items from their secretary of state, as well as from the IRS.

Advantages of the 501(c)3 Tax Exemption

The primary benefits enjoyed by a 501(c)3 organization derive from its exemption from paying certain taxes. The tax exemptions include exemption from most United States federal and state income taxes, and generally from sales tax on purchases. While the state income tax exemption is generally automatic, some states do require a separate application. The sales tax exemption certificate usually requires an application, once the 501(c)3 status has been obtained. (If the organization plans to sell any products or merchandise, it will almost always need to obtain a retail sales tax license, and subsequently collect and remit to the state any sales tax on such sales.)

Another benefit of a 501(c)3 organization is its preferred position in receiving public and private chari-

table funds. The organization can assure its donors that gifts are, in fact, tax deductible for the donor. Additionally, many private and corporate foundations that issue grants to nonprofits require that grant recipients be formally recognized under section 501(c)3.

One other obvious benefit is that the 501(c)3 organization can apply for and use reduced bulk mailing rates. This can result in substantial savings in the mailing of newsletters or educational materials, or letters and brochures soliciting public support and contributions.

There are a number of benefits to becoming a 501(c)3 organization. Chief is the exemption from most federal and state income taxes.

Several benefits accrue from organizing as a nonprofit corporation (and an organization must incorporate as such prior to filing for the federal tax exemption). One such benefit includes affording limited liability, in most cases, such that any legal or other claim against the corporation may not exceed the assets of the corporation, and may not fall to the individuals managing the organization. Some of the exceptions to this rule include instances in which directors and officers violate statutory duties as prescribed in state law (such as gross negligence or failing to manage the affairs of the corporation as separate and distinct business). Another exception is where loans in the name of the organization have been personally guaranteed by someone (such as a director

or officer). In the case of the organization failing to report and/or pay taxes, the organization's treasurer may be held personally liable in some instances.

The corporation has its own separate, legal existence. To that end, it can transact business, including receiving and maintaining funds; opening a bank account; hiring people as employees and paying salaries and wages; entering into contracts to receive or provide services; and borrowing money and incurring debts.

Disadvantages of the 501(c)3 Organization

Many people find the paperwork associated with formally establishing an organization as a nonprofit corporation, as well as the paperwork associated with the 501(c)3 federal filing and ongoing recordkeeping, to be unpleasant and time consuming. Some of the paperwork includes drafting and formalizing the organization's Articles of Incorporation (to be filed with the secretary of state in the state where the organization will have its principal office and conduct business). Drafting the bylaws of the corporation requires thought and effort, as it is the primary document describing how the organization will govern its affairs. Additional paperwork involves preparing minutes of board of directors and committee meetings; establishing and maintaining a set of accounting books and financial records; and preparing and submitting required annual and informational reports.

There are some initial costs associated with the corporate filing with the secretary of state (generally around \$50-\$100), as well as for the federal tax exemption filing (generally around \$150 for smaller organizations). Other costs may include any legal or professional fees to assist with these filings if the organization cannot find someone to perform these services on a pro bono basis.

Additional time and energy is required to manage the affairs of the organization, such as scheduling and holding board meetings, the account-

ing and recordkeeping cited above, and fundraising activities. Close financial scrutiny and oversight is required to ensure the appropriateness of expenditures and uses of corporate funds. Sources of income must be managed to ensure that certain public support tests are met. Lastly, the organization must be diligent to ensure that everyone in the organization understands and complies with the restrictions or prohibitions on political activities.

The Application Process

The 39-page application packet (IRS Form 1023) can be intimidating and overwhelming. Attorney Anthony Mancuso's *How to Form a Non-profit Corporation* (Nolo Press) is an excellent resource that helps the applicant work through these forms, line by line. The book costs less than \$50 and includes a computer diskette containing many of the forms needed for the initial corporate organization and filing.

There are actually only about nine pages in Form 1023 that most wildlife

rehabilitation organizations will need to complete. While many of the questions on the forms deal with corporate governance issues, there are a few critical questions. These include a section to describe the corporation's purpose and objectives in detail. Other important questions cover sources of income, including fundraising strategies and programs. Lastly, the applicant must submit a "best guess" budget of income and expenses for the next three years.

Form 1023 also requires at least two attachments: a copy of the organization's Articles of Incorporation as stamped and filed by the secretary of state, and a copy of the organization's current set of bylaws. Other attachments that will help illustrate the organization's activities include copies of any wildlife rehabilitation permits issued by state or federal agencies; copies of news articles written about the organization; articles published by the organization; certificates of attendance or training attended; and copies of certificates of

recognition or awards received from the community.

Other forms that must be submitted with the Form 1023 package include Form 872-C, which extends the time period that the IRS has to audit the organization (this is non-negotiable if 501(c)3 approval is desired), as well as Form 8718, which is the form for the user fee for submitting an application (generally \$150, or more for large organizations). While the Form 1023 package is being assembled, Form SS-4 needs to be completed and submitted to obtain a Tax Identification Number for the organization. This is also the organization's Employer Identification Number, and will be needed prior to opening a bank account.

The Advance Ruling Period

Once submitted, the IRS can approve the package as is, or respond back with questions or requests for additional information. The more carefully the package is initially prepared and assembled, the greater the likelihood that it will be approved quickly. Once approved, the IRS will issue the organization an "advance determination" letter granting "provisional" tax-exempt status for a five-year period. If the organization files within the first 15 months of operation, the effective date of this provisional period will be the date of incorporation of the organization. If the organization files after the first 15 months of operation, the effective date will most likely be later. Additionally, that 15-month-or-later delay causes the IRS to want more information about the organization, especially its financial affairs. The general rule of thumb seems to be the later the filing after initial incorporation, the more questions and hoops to jump through.

Given no material change in the operations of the organization during that five-year period, the organization will continue to enjoy the 501(c)3 status during the provisional period. During this time, there is typically little or no contact with the IRS, unless the organization's receipts generally ex-

IS A 501(C)3 RIGHT FOR YOU?

While the tax-exempt status is very appealing, it is not right for every organization. As you explore whether or not to incorporate and pursue the 501(c)3 tax exemption, consider your degree of knowledge or comfort with the following:

- **The 501(c)3 organization is a business, requiring a degree of formality and structure.**
- **Certain organization decisions are now shared by a board or committee.**
- **Thorough and accurate records—such as meeting minutes and bank accounts—must be kept on a timely basis.**
- **Fundraising is a critical requirement. Most contributions come in small increments from a wide range of contributors, not just large grants from a few donors.**
- **Limited discretionary time previously allocated to direct animal care must now compete with various administrative and fundraising activities.**
- **As a publicly supported nonprofit, the organization's activities and financial affairs are much more open to scrutiny from the public and the IRS.**
- **The IRS places limits on how much money you can personally contribute, or the organization may be considered a private foundation, not a 501(c)3.**

ceed \$25,000 per year. For this level of income, the IRS requires the annual submission of Form 990, which itemizes the organization's activities, income, and expenses.

The Five-Year Audit

Near the end of the five-year provisional period, the IRS will require the organization to provide information about its sources of income during each of the first five years. This information is submitted to the IRS on the two-page Form 8734. This audit serves to determine whether the organization has met the "public support tests" (described below) as required in section 501(c)3 of the Internal Revenue Code.

If these tests are satisfied, the IRS will issue the organization a revised "permanent determination" letter continuing its tax-exempt status, again absent any material changes in the operation of the organization. The organization may be subject to income tax for any year that it fails any of these tests. Failure may also result in the organization losing its preferred tax-exempt status going forward.

Publicly Supported Organizations

It is clearly in the best interest of the corporation, if possible, to be well aware of and to meet the financial support tests that will establish it as a publicly supported organization. The following rules are not the easiest to understand, but are critical to the proper management of the organization in complying with the 501(c)3 requirements.

The IRC describes two types of organizations that will qualify as publicly supported organizations. The first type (described in Section 509(a)1) is an organization that generally receives at least one-third (1/3) of its total annual receipts from the general public and/or governmental sources. Or, it is an organization that receives at least one-tenth (1/10) of its total receipts from the general public and/or governmental sources and meets the attraction of support requirement. The attraction of public support requirement is generally met by an

organization that pursues a broad and visible fundraising effort in the community in an attempt to attract donations. These types of activities include hosting booths or exhibits at such events as Earth Day and other community service gatherings and fairs, as well as mailings sent out to potential supporters and donors.

Any organization that files for the 501(c)3 tax exemption needs to be fully aware of the public support tests and clearly understand what qualifies as public support.

The other type of publicly supported organization (described in Section 509(a)2) is an organization that generally receives at least one-third (1/3) of its total receipts from gifts, grants, contributions, fees, and gross receipts from activities related to its tax-exempt purpose (such as providing services or sales of products); and an organization that also receives less than one-third (1/3) of its total support from unrelated business income or gross investment income. Unrelated business income could derive from temporarily renting out to a third party some of the corporation's assets (e.g., personal computer, vehicle, etc.). Gross investment income includes interest, dividends, and capital gains on sale of investments.

The Ins and Outs of Public Support

The regulation complicates this even further by placing certain limits and restrictions on what qualifies as public support, and thus, what can be

counted toward the public support percentages described above.

The amount that can be counted as public support by any one person, trust, or corporation is limited to 2 percent of the total receipts received by the organization for that year. For example, if the organization receives a total of \$1,000 for the year, only \$20 (2 percent of \$1,000) of a \$50 gift from a member of the general public will count toward public support.

Donations from certain "disqualified" persons do not count at all toward public support, but do count toward total support. These individuals generally include the organization's founders, directors, and officers; certain individuals related to the organization's founders, directors, and officers (such as direct family members); and certain substantial contributors (generally large donors of more than \$5,000). While gifts from these individuals are certainly well meaning and appreciated, they serve to raise the amount of qualifying public support the organization must generate and receive through other fundraising.

Lastly, one way to manage these percentages of public support is the receipt of "unusual grants." Unusual grants are excluded from the calculation of both public support and total support. These receipts qualify as "unusual" if they are truly unusual in the sense of being unexpected; they are attracted by the nature of the organization's activities; and if included in the calculation of both total and public support, the grant would cause the organization to fail the public support test.

Admittedly, all of this may seem very confusing. Any organization that files for the 501(c)3 tax exemption needs to be fully aware of the public support tests and clearly understand what qualifies as public support. As such, the organization's directors and officers need to exercise caution in providing large amounts of financial support to the organization themselves, without a corresponding

fundraising program to attract broader public support. Too much "personal" financial support may result in the organization being classified as a private foundation, with certain prior income now subject to retroactive taxation.

Summary

Nothing in the IRS regulations indicates a minimum size for an organization to qualify as a 501(c)3 federally tax-exempt nonprofit corporation. Small, independent, home-based wildlife rehabilitators can enjoy the same benefits as larger wildlife centers. This important step must be accompanied by the knowledge that a previously informal rehabilitation operation must now be managed as a business. This means such things as establishing a separate bank account for the organization, as well as the need to perform many of the administrative duties mentioned above. Fundraising becomes a more critical activity, in order to meet the public support requirements. It does not mean, as some have been told, that the public must have access to a private home, if the operation is home based. Visibility in the community can be accomplished away from a private home.

The Section 501(c)3 federal income tax exemption clearly provides direct benefits to an organization. It also opens many doors for fundraising opportunities not afforded to non-501(c)3 groups. These, and other benefits, do command a price, in terms of time, energy, and money for record-keeping, paperwork, fundraising, and the rigors of managing a stand-alone business. In the beginning, close attention is required in the drafting of workable and complete bylaws; the decision to have or not have voting members; and the selection of board members to help guide the organization. Ongoing oversight is required to ensure that all expenses are made solely for the benefit of the corporation in furthering its nonprofit objectives.

While there are a variety of useful resources, the Mancuso book is an ex-

cellent resource to guide an applicant through the Form 1023 maze of questions and schedules. Once the application is submitted and approved, the five-year audit clock begins to tick. The audit is simply something to be mindful of up front, in managing the organization's sources of income. Particular attention needs to be focused on understanding the various public support tests, as well as what actually constitutes qualifying public support.

With proper recruitment and selection, board members and volunteers can help with the initial 501(c)3 application, in addition to the ongoing recordkeeping. Board members and volunteers should also be called upon and be willing to help with the organization's fundraising efforts.

Someone in the organization needs to understand the entire process described above, even if a professional, such as an attorney or accountant, is asked or hired to prepare the application. The Mancuso book discusses many of the governance issues facing a new organization, from the drafting of bylaws, section by section, to the selection of directors and officers.

Lastly, keep in mind that establishing a corporation and applying for the 501(c)3 exemption is a long-term commitment, and should be accompanied by careful thought, planning, and personal commitment. As is stated in almost all Articles of Incorporation for any nonprofit corporation filed with any secretary of state, the duration of the corporation is perpetual.

Resources

Mancuso, A. 1990. *How to Form a Nonprofit Corporation*. (Berkeley: Nolo Press). An excellent guide for new organizations. Puts the IRS regulations into easy to understand language. If unavailable locally, contact Nolo Press at 1-800-992-6656.

Internal Revenue Service. Publication #557 "Tax Exempt Status for Your Organization." Order directly from the IRS at 1-800-829-3676. Some of the same material and informa-

tion as in Mancuso's book, but is more difficult to read, as are most regulations. Also, all of the forms mentioned in this article are available through this number, or can be downloaded from the IRS website at www.irs.ustreas.gov.

Note

Anyone undertaking the formation of a nonprofit corporation and applying for the 501(c)3 federal tax exemption should consider seeking the advice and counsel of legal and tax professionals (or at least someone familiar with the application and administrative requirements discussed above). Many of the tax rules in this area are complex, confusing, and subject to change. If someone wants to take the time and effort to do the research, homework, and preparation, the application can be successfully completed by a layperson. Even then, a thorough review by a professional would serve to make sure the application is complete and might expedite approval.

To Contact the Author

Allan M. Casey III
WildAgain Wildlife Rehabilitation, Inc.
29319 Northstar Lane
Evergreen, CO 80439
U.S.A.
E-mail: wildagn@aol.com

A version of this article was published in the 21st Annual IWRC Conference Proceedings (October 1998).

Starting Early: Environmental Education during the Early Childhood Years

by Ruth A. Wilson

Introduction

Because young children learn about the environment by interacting with it, educators and other adults must attend to the frequency, nature, and quality of child-environment interactions during the early years. Many young children have limited opportunities for such experiences. Studies indicate that the average American spends more than 95 percent of his or her time indoors (Cohen 1984), and that by the year 2000, more than 90 percent of all Americans will live in urban areas (Schicker 1988). Studies also indicate that children growing up in urban areas tend to develop unfounded fears and feelings of disgust in relation to natural objects (Bixler, Carlisle, Hammitt, and Floyd 1994).

Yet, it is not just children living in urban areas who should be targeted for environmental education during their preschool years. Many young children, regardless of where they live, spend most of their time in settings and activities that keep them essentially isolated from direct contact with the natural world. Recreation tends to be indoors (e.g., watching TV); transportation tends to be by car or other motor vehicle versus walking; and daycare programs—where many children spend most of their waking hours—tend to be much more oriented toward the classroom than outdoors. The result is that many young children are at risk of never developing positive attitudes and feelings toward the natural environment or achieving a healthy degree of competency on the environmental literacy continuum (as outlined by Disinger and Roth 1992). Attention to environmental education at the early childhood level is proposed as a partial antidote to this concern.

Rationale

The rationale for environmental education during the early childhood years is based on two major premises. The first premise is that children must develop a sense of respect and caring for the natural environment during their first few years of life or be at risk for never developing such attitudes (Stapp 1978; Tilbury 1994; Wilson 1994).

The newly emerging field of early childhood environmental education reflects an increasing awareness that “environmental experience in the critical phase of the early learning years can determine subsequent development in environmental education” (Tilbury 1994, p. 11) and that the preschool years may “prove to be critical for the environmental education of the child” (Tilbury 1994, p. 11).

The rationale for environmental education at the early childhood level is also based on the premise that positive interactions with the natural environment are an important part of healthy child development (Carson 1956; Cobb 1977; Crompton and Sellar 1981; Miles 1986/87; Patridge 1984; Sebba 1991; Wilson 1994) and that such interactions enhance learning and quality of life over the span of one’s lifetime (Wilson 1994). Children who are close to nature tend to relate to it as a source of wonder, joy, and awe. Their spirits are nurtured by nature and they discover through it “sources of human sensibility” (Wilson 1992, p. 348).

• **ABSTRACT:** When should environmental education begin? In the third grade? First grade? Kindergarten? Even earlier. Environmental education based on life experiences should begin during the very earliest years of life. Such experiences play a critical role in shaping life-long attitudes, values, and patterns of behavior toward natural environments (Tilbury 1994; Wilson 1994).

• **KEYWORDS:** Environmental Education, Experiential Learning

• **RUTH A. WILSON** has published numerous books and articles on the importance of environmental education during early childhood. Prior to her retirement last year, Dr. Wilson was an associate professor in the Department of Special Education at Bowling Green University, Bowling Green, Ohio, U. S. A.

• *J. Wildlife Rehab.* 23(2): 23–25



Guidelines for Program Development

Environmental education opportunities for preschool children should be offered on an ongoing rather than a sporadic basis (Bixler, Carlisle, Hammitt, and Floyd 1994; Gaylord 1987). On-going environmental education programs for preschoolers, however, are relatively scarce, and those that do exist tend to serve primarily middle- and upper-middle-class white families (Wilson, in press). This is unfortunate since children living in low-income minority neighborhoods are more likely to be affected negatively by environmental assaults (e.g.,

air pollution, noise, congestion, solid wastes, etc.) (Harding and Holdren 1993) and less likely to have frequent positive interactions with the natural environment.

Environmental education for the early years should be based on a sense of wonder and the joy of discovery. Consistent with this approach, the following guidelines are proposed as a framework for developing and implementing an environmental education program for preschool children.

- **Begin with simple experiences.** Young children learn best

through experiences that relate to what is already familiar and comfortable. Thus, the best place to start is in an environment that is similar to what they already know. For example, focus on a single tree in a backyard or playground before venturing into a heavily wooded area.

- **Provide frequent positive experiences outdoors.** Because children learn best through direct, concrete experiences, they need to be immersed in the outdoor environment to learn about it. Optimally, the exposure should be provided on an almost daily basis. A one-time trip to a park or nature preserve will have very limited impact on young children. Far better to provide ongoing simple experiences with the grass, trees, and insects in environments close to home or school than to spend time and energy in making arrangements for field trips to unfamiliar places the children may seldom visit.

In addition to investigating the elements of the natural world already present in an outdoor setting, there are also many different ways to transform a typical playground into an environmental yard. Start by adding bird feeders, wind socks, flower and vegetable gardens, tree houses, rock piles, and logs, and then provide children with tools for experimenting and investigating (e.g. magnifying glasses, water hose and bucket, hoes, rakes, etc.).

- **Focus on "experiencing" versus "teaching."** Because young children learn through discovery and self-initiated activities, the role of an adult is to be more a facilitator than a teacher. Learning among young children requires active involvement: hands-on manipulation, sensory engagement, and self-initiated explorations. Young children should not be expected to "watch and listen" for any length of time, nor should they be expected to always follow

the teacher's lead or agenda. Far better to focus on what children find of interest than to compete for attention through teacher-selected activities and materials.

- **Demonstrate a personal interest in and enjoyment of the natural world.** A teacher's expressions of interest in and enjoyment of the natural world are critical to the success of an early childhood environmental education program. It is the teacher's own sense of wonder, more than his or her scientific knowledge, that will ignite and sustain a child's love of nature. Therefore, even teachers with a minimal background in science need not be intimidated by the thought of implementing an environmental education program for young children. Feelings are more important than facts when it comes to introducing young children to the world of nature. No one has stated this more clearly than Rachel Carson when she wrote, "I sincerely believe that for the child, and for the parent [or teacher] seeking to guide him, it is not half so important to know as to feel" (1956, p. 45).
- **Model caring and respect for the natural environment.** Teachers should also model caring and respect for the world of nature. Talking to children about taking care of Earth is far less effective than demonstrating simple ways of expressing care. Care and respect can be modeled through the gentle handling of plants and animals in the classroom, establishing or maintaining outdoor habitats for wildlife, attending to the proper disposal of trash, and recycling or reusing as many materials as possible.

Conclusion

Young children tend to develop an emotional attachment to what is familiar and comfortable to them. If they are to develop a sense of connectedness with the natural world, they need frequent positive experiences

with the outdoors. Providing opportunities for such experiences and sharing them with young children is the essence of what environmental education is all about. Rachel Carson, in *The Sense of Wonder*, was one of the first to articulate the importance and characteristics of environmental education at the early childhood level. In her words, "If a child is to keep alive his inborn sense of wonder...he needs the companionship of at least one adult who can share it, rediscovering with him the joy, excitement, and mystery of the world we live in" (Carson 1956, p. 45). Environmental education for the early years focuses primarily on young children exploring and enjoying the world of nature under the guidance and with the companionship of caring adults.

References

- Bixler, R., D. L. Carlisle, W. E. Hammitt, and M. F. Floyd. 1994. Observed fears and discomforts among urban students on field trips to wildland areas. *J. of Environmental Education* 26(1): 24-33. [EJ 496 836].
- Carson, R. 1956. *The sense of wonder*. New York: Harper & Row.
- Cobb, E. 1977. *The ecology of imagination in childhood*. New York: Columbia University Press.
- Cohen, M. 1984. *Prejudice against nature*. Freeport, Maine: Cobble-smith.
- Crompton, J. L., and C. Sellar. 1981. Do outdoor education experiences contribute to positive development in the affective domain? *J. of Environmental Education* 12(4): 21-29. [ED 250 321].
- Gaylord, C. 1987. Training and education in relation to environmental problems. *Annual Review of Environmental Education*, No. 1. U. K.: Council of Environmental Education. [ED 300 273].
- Harding, A., and G. R. Holdren. 1993. Environmental equity and the environmental professional. *Environmental Science Technology* 27(10): 1990-93.
- Miles, J. C. 1986/87. Wilderness as a learning place. *J. of Environmental Education* 18(2): 33-40. [EJ 356 038].
- Patridge, E. 1984. Nature as a moral resource. *Environmental Ethics* Summer: 101-130.
- Schicker, L. 1988. Planning for children and wildlife begins at home. *Journal of Environmental Education* 19(4): 13-21. [EJ 386 241].
- Sebba, R. 1991. The landscapes of childhood. *Environment and Behavior*, 23 (4): 395-422.
- Stapp, W. 1978. An instructional model for environmental education. *Prospects* VIII(4): 495-507. [EJ 197 100].
- Tilbury, D. 1994. The critical learning years for environmental education. In R. A. Wilson (Ed.). *Environmental Education at the Early Childhood Level*. Washington, D.C.: North American Association for Environmental Education, pp. 11-13.
- Wilson, E. O. 1992. *The diversity of life*. Cambridge: Harvard University Press, Belknap Press.
- Wilson, R. A. (Ed.) 1994. *Environmental education at the early childhood level*. Washington, D.C.: North American Assn. for Environmental Education.
- Wilson, R. A. (in press). Environmental education programs for preschool children. *J. of Environmental Education*.
- Wilson, R. A. 1993. *Fostering a sense of wonder during the early childhood years*. Columbus, Ohio: Greyden Press.

"Starting Early: Environmental Education during the Early Childhood Years," *Clearinghouse for Science, Mathematics, and Environmental Education*, March 1996. Reprinted with permission.

Educators! Administrators!

There's something special for you at The IWRC 23rd Annual Conference in la belle ville de Montréal, Québec



Pre-Conference Seminar – October 25th, 2000

project WILD Facilitator Training

A new offering especially for educators! Project WILD is a highly-acclaimed interactive, interdisciplinary conservation and environmental education program. Educators will be introduced to Project WILD materials, activities, and strategies during this lively and engaging day-long professional workshop. Through hands-on practice, educators gain the experience and confidence needed to work with students and integrate Project WILD into their programs. The Project WILD k-12 Activity Guide and a Certificate of Completion are provided to those who participate. Cost: US \$ 35 (Register early! Class is limited to 30 participants)

Conference Activities – October 26-29

MEETING TOPICS • Meeting sessions and topics of particular interest to educators and administrators include:

Nonprofit Administration:

- "Fundraising: Getting to the heart of the matter"
- "The true cost of doing business"
- "Hotline designs: Preparing to meet the public"
- "Your board members: Are they effective?"

Conservation Education:

- "Remember the theme: Conservation education using thematic interpretation"
- "Public education: Its not just in front of a classroom"
- "Taking raptor education one step further"
- "Waging the war against ignorance on the urban front"

Professional Development:

- "Critical thinking: Let the buyer beware"
- "Biospeak: The language of wildlife management"
- "Choosing excellence for the future"
- "The role of rehabilitation in federal law enforcement"



Mission Statement

The International Wildlife Rehabilitation Council, conserving and protecting wildlife and habitat through wildlife rehabilitation.

The International Wildlife Rehabilitation Council provides excellent training in all aspects of wildlife rehabilitation. Sure, rehabilitation is about medical care and husbandry; **but it's also about public education and outreach, fundraising and donor development, and volunteer management.** If you're involved in any or all of these "para-rehab" activities, this year's conference offers special presentations, seminars, tutorials, workshops, and discussion groups you won't want to miss.

Mark your calendars now to reserve these dates and join us for this fact-filled, fun-filled adventure!

To request a registration brochure, or submit an abstract, contact our office.

Write to: IWRC,
4437 Central Place, Suite B-4,
Suisun, CA 94585-1633, USA
or phone us at: 707-864-1761
fax: 707-864-3106
email: iwrc@inreach.com.

FROM THE LAST ISSUE...
CASE X:

Financial Realities

Rehabilitation requires funding. What can independent, home-based rehabilitators do to remain fiscally sound?

Tim and Grace Harrison had just reviewed their rehabilitation budget. The number of incoming animals continued to increase dramatically. While most veterinary services—as well as some food and caging—were donated, they paid for medications and other supplies. Expenses were rising: the Harrisons felt trapped between a rock and a hard place.

After volunteering for four years at the Smithville Wildlife Rehabilitation Center, last year the Harrisons had obtained their own wildlife rehabilitation permit for small mammals. The Smithville center specialized in birds and transferred any mammals to other facilities.

During the last 15 months, the Harrisons had admitted and rehabilitated 63 raccoons, 4 foxes, 9 opossums, 30 squirrels, and 8 cottontails. They had expanded their indoor and outdoor enclosures to accommodate the influx of animals, all of which had come to them through the Smithville rehab center.

A couple of days earlier, they had read in the Smithville center's newsletter of a \$10,000 donation from the Smith Valley Home Construction Corporation in recognition of the center's help with 17 raccoons. The raccoons, which had been living in the path of new housing construction, had been trapped by nuisance control operators and delivered to the center. They had quickly been transferred to the Harrisons' facility. The raccoons had required emergency veterinary medical attention and significant rehabilitation. The Harrisons had not received any portion of the \$10,000 donation.

The center's manager and board of directors believed that Tim and Grace should receive some money to help de-

fray their expenses. However, IRS regulations prohibited tax-exempt 501(c)3 organizations, like the center, from giving money to individuals.

The Harrisons were uncertain what to do. They had previously considered forming their own 501(c)3 organization, but had not wanted to compete with the center's fund-raising activities. At the same time, they could not afford to continue as they had been. They needed to act quickly: with many new housing subdivisions planned, more animals would soon be in need.

QUESTIONS FOR DISCUSSION

1. Rehabilitation activities can be expensive and financially stressful regardless of the species. What can rehabilitators do so their budget is not overburdened?
2. If a rehabilitation facility accepts wildlife and donations for their care, what should be done with the money if the animals are transferred to another rehabilitator for care? Why? Are there differences for nonprofit groups, particularly 501(c)3 organizations?
3. How can larger wildlife rehabilitation facilities support home-based wildlife rehabilitators?
4. Do businesses or organizations that are clearly responsible for the displacement or injury of wildlife have a financial responsibility for the animals' rehabilitative care? Why? If yes, how might action occur?

RESPONSES

1.

Susan Heckly
Wildlife Rehabilitation Director
Lindsay Wildlife Museum
Walnut Creek, California

Feeling overwhelmed because of too many animals in care is pretty common for wildlife rehabilitators. When we begin to rehabilitate wildlife, it is difficult to think past the animals currently in need: they suck us in and we respond with an emotional response to help them. Many of us dive into rehabilitation without a clear picture of

Wildlife rehabilitators' interests range far beyond the direct care and handling of wildlife. Standards, ethics, wildlife policy, and community involvement are among the many issues that have a direct impact on the work rehabilitators do every day.

Since these issues benefit from broad public discussion, this section of the *Journal* is designed to offer a forum for wildlife rehabilitators to exchange ideas about challenging issues, which are "up for discussion" by you, our readers. Some of the cases may also be discussed at upcoming IWRC conferences.

The following cases will present either hypothetical situations or real-life problems facing active rehabilitators. Each case is followed with several questions for readers, and responses from people involved in wildlife rehabilitation. To encourage a free exchange of ideas, both attributed and anonymous responses are welcome.

Each issue of the *Journal* will publish a synopsis of the original case from the last issue, several responses, and a new case for your consideration. Please see page 29 for this issue's new case and for details about how to participate.

Space may not be available for all responses submitted, and responses may be edited for space and clarity, but we will include as many responses as possible. We welcome your participation. Only with your help can this forum thrive.

NOTE: The International Wildlife Rehabilitation Council makes no claims as to the accuracy or truth of the following cases, nor does it endorse any particular answer or viewpoint.

what we are doing, why we are doing it, or where it will lead us.

Tim and Grace need to sit down and develop a long-range plan that will help them in their decision making. Without a plan, they are at the mercy of whatever comes through their door and will probably make their decisions based primarily on emotion. They need to articulate a mission and develop a plan to fulfill their mission.

With increases in population and development in many areas of the country, there will be an increased demand for wildlife rehabilitation to address the issues that arise when humans and wildlife live together. With rehabilitators' increased knowledge and standards, we will be called upon to give the best possible care to wildlife. This will require more resources than most individuals are able to give by themselves, making wildlife rehabilitation and education centers the way of the future, especially in populated areas. For one person or a family (the Harrisons, in this case) to fill all the roles needed—fund-raiser, educator, rehabilitator—for increasing numbers of animals is extremely difficult. This massive workload can lead to burnout, leaving the profession and possibly leaving the state. (Do we know why the previous mammal rehabilitator left the state?)

Education becomes extremely important when the population in an area grows. Working with the developers before the raccoons became a "nuisance" may have prevented the need for the pest control operator to pick up raccoons. Organizations with resources that can be directed toward prevention can often do proactive work to prevent wildlife problems; individuals caring for large numbers of animals often don't have the time to go to the community to try to reduce their workload through education. I believe that wildlife rehabilitators, especially in urban and suburban areas, should be trying to put ourselves out of business through education. When no animals are in trouble because of human-caused problems, we

will have done our job in giving the best possible care to wildlife—preventing problems in the first place.

If Tim and Grace decide to continue rehabilitating mammals by themselves, they will need to decide how much they can do, taking into account all the resources (monetary, time, emotional) they are willing to commit to this endeavor. They probably will not be able to continue to take ever-increasing numbers of a wide variety of species, but if they set boundaries for themselves, limiting the species they care for or the total number of animals, they should be able to continue to give care to mammals in need. They need to know that it's OK to set limits on what they do. In fact, it is absolutely necessary to have defined boundaries that will help guide them to make good decisions, both for the animals and for themselves.

RESPONSES

II.

*Mary Anna Cook-Babcock
Team Leader
Wildlife Rescue Team of Omaha
Omaha, Nebraska*

Rehabilitation centers, with their increasing visibility, have access to methods of increased financial support not available to individually permitted rehabilitators working in home-based settings. When such a facility transfers animals to an individually permitted rehabilitator, some arrangements should be made for compensation to help off-set the financial burden assumed by the individual caregiver. The individually permitted rehabilitator should be viewed by the center not as another center volunteer, but as a subcontractor providing professional assistance during times of work overload.

These arrangements should be made before the rehabilitator accepts any animals and provisions for reevaluating these arrangements on a regular basis should be a part of the working relationship between the center and

the individually permitted rehabilitator. If outright financial assistance cannot be offered, as in the case of the Harrisons, the board of directors and the center director should be willing to provide supplies or materials to help ease the financial responsibilities of the individual rehabilitator. Species-specific formulas, weaning and adult animal foods, use of tools and excess building materials, and sharing donated items are some of the exchanges that could be suggested.

The individually permitted rehabilitator bears the responsibility of determining the number, ages, and species of animals that can realistically be accepted without compromising the quality of care provided. Adherence to the limitations set can significantly reduce rehabilitation costs and assure a higher standard of care for the animals in rehabilitation. These limitations should be clearly conveyed to any facility that wants to transfer wildlife patients to home-based rehabilitators. The public should also be made aware of the limitations set by the rehabilitator. Recorded telephone messages, brochures, business cards, public service announcements, media interviews, and all other publicly accessible information can verify these limitations.

The workload of wildlife rehabilitators increases in direct relation to the increase in urbanization and habitat loss caused by human impact on the environment. The time has come for businesses and organizations responsible for this impact to assume financial responsibility for their actions. Before this will happen the public needs to become aware of the devastating effects that current business and industrial practices have on our native wildlife.

Educational presentations should include graphic illustrations of the loss of habitat caused by the construction companies that "strip mine" mile after mile of farm land, laying to waste trees, shrubs, native grasses, top soil, and wildlife populations in preparation for another new subdivision. Audio recordings

of orphaned fawns calling for mothers who have been driven from their young by giant construction equipment can make quite an impact on the listening audience. Photographs of severely injured animals left in nuisance control operator traps illustrate the plight of innocent animals caught in a trap of misunderstanding and hate. Video recordings of pigeons and migratory birds ripping off body parts as they attempt to free themselves from glue traps on hot building roofs provide audiences with the reality of man's inability to tolerate wildlife in his space. These inhumane practices will continue as long as the public perceives them as harmless necessities instead of the atrocities that they are.

Every business that causes an animal to be admitted to rehabilitation needs to be informed of the cause of admission, the cost of rehabilitation, and asked to accept financial responsibility for each animal admitted. Most businesses will not respond positively to such a request. Careful preparation of the approach to make to the offending business will increase the odds of their cooperation.

Each business that accepts that financial responsibility should be given positive reinforcement for its efforts. Every business will want to be rewarded for its good citizenship in different ways, depending on how the executives view their participation in such a project. Some will welcome publicity for their daring and goodwill. Others will view such publicity as a declaration of defeat, of giving in to causes that detract from profit making. Rehabilitators need to be sensitive to these needs and at the same time be prepared to use those that are willing to take financial responsibility for their actions as examples to the rest of the business/industrial community.

Paying for the rehabilitation of wildlife could become the easiest way for businesses to look good without actually changing their operational practices, so rehabilitators need to devise practical guidelines and suggestions to assist businesses that show an interest

in modifying their tasks to reduce the impact on wildlife and their habitat. These guidelines should take into consideration techniques that would enhance the profit-making ability of the company in other ways.

A construction company might advertise itself as desirable because of its environmental sensitivity. A nuisance trapper might begin working with wildlife rehabilitators to provide humane methods of wildlife control—methods that could enhance the reputation of the trapper and stimulate added revenues. Any business or industry can be encouraged, with a bit of imagination—for which rehabilitators are famous—to make small changes in waste management, property management, storage facilities, building design, or any other part of the business that is causing wildlife damage. These visible signs of caring can be used as evidence that the company is more worthy of providing business services than their competitor and to generate publicity for the company.

**NEXT TOPIC...
CASE XI:**

Eager to Help

As Ann was preparing food for the baby birds, she did a mental count of the patients in her home-based rehabilitation facility. She had 16 ducklings, 11 goslings, 1 injured adult duck, 4 injured adult passerines, and 27 young passerines of assorted ages and species. These numbers were somewhat low for early June based on her five years of rehabilitating passerines and waterfowl, but the local outbreak of avian pox had resulted in many birds dying or being euthanized. She also reflected on 5 more birds that were being delivered within the next hour.

When the phone rang 30 minutes earlier, she had expected it to be another potential "kidnapper" of a fledgling. To her surprise, the caller introduced herself as Dr. Carron, the new veterinarian from the Riverview Vet-

erinary Clinic. She explained that she had taken over the clinic from Dr. Miller when he retired the month before, and was eager to get established in the community. She also wanted to help by donating her services to the local humane society and wildlife rehabilitators. While her veterinary training and experience was with dogs and cats, she had told her staff, clients, and others that she would help with any animal in need.

Dr. Carron explained that 5 wild birds had been brought to the clinic in the last couple of weeks. She and her staff had been caring for them until she found a bird rehabilitator. Dr. Carron offered to have one of her veterinary technicians deliver the birds to Ann immediately; she would call her later and give more information on the treatment plans for the birds. Ann agreed, somewhat amazed that Dr. Carron was so interested in helping wildlife since the previous veterinarian had shown little interest. It would really help Ann to be able to take wildlife to a veterinarian located only 15 minutes from her house instead of the 80-mile round trip to the veterinarian who usually treated her birds.

The doorbell rang and the smiling technician handed Ann two kennels

JOIN THE CONVERSATION

We invite you to read Case XI, "Eager to Help," and consider the questions posed at the end. The cases are designed to raise complex issues, leaving plenty of room for varied or even contradictory perspectives. To join the conversation, send your response by 10 September 2000 to Attn: Up for Discussion, IWRC, 4437 Central Place, B-4, Suisun, CA, 94585-1633, USA, or via e-mail to iwrc@inreach.com.

The *Journal* also welcomes suggestions for topics to feature in future issues.

and two small boxes. The technician was very excited that Dr. Carron was so willing to help wildlife. Dr. Carron had told her staff that she felt some people were too hasty to euthanize injured wildlife, but that in her facility, each wild animal would be given the same quality and level of care as companion animals with paying owners. Ann agreed that it was wonderful that Dr. Carron was so willing to help wildlife.

Ann asked about paperwork for where the birds came from and treatments. The technician said that they had not written down who brought them or where they were from, but Dr. Carron could give more details on their care. The technician offered to provide some background since she had been helping care for the birds for the last week or so.

The first box had 2 fledglings starlings and an abundance of sunflower seeds. As Ann took the birds to a bathroom that she had set up for intake of new birds, the technician explained that the staff had been feeding them moistened dog food and had put the seeds in as a "treat." Ann put the starlings in a clean basket and fed them. She then washed her hands before opening the next box to avoid any disease transmission between the birds.

The second box had an adult blue jay with large, nasty, crusty pustules almost obscuring its eyes and sealing its vent. The technician explained that the jay had arrived late the day before and didn't seem to be eating well. Dr. Carron, believing that the jay might have been exposed to some chemicals, had washed him several times and started him on antibiotics, which she had been included in the box. Ann, however, recognized the pustules as an advanced case of avian pox and immediately took the box outside to her front porch. She returned to the house and scrubbed her hands thoroughly, explaining to the technician that she felt the bird's condition was likely contagious and that she'd talk with Dr. Carron about it.

The first kennel had a western grebe with a bandaged wing. The technician said Dr. Carron explained that the grebe had a severely damaged wing joint. Dr. Carron felt that it was unlikely that the bird would fly again, but wanted to give it several months to see if it might heal. Ann knew that the grebe could not recover from a severe joint injury and would probably have to be euthanized, but didn't comment to the technician.

The technician was very excited to show Ann the bird in the second kennel. She explained that this crow was the first wild bird that had been admitted, about 10 days ago. The crow had arrived with a severe injury to the tip of the wing. Dr. Carron had very carefully amputated two inches of the wing. The crow had healed beautifully, did not seem stressed by captivity, and seemed comfortable around people. The technician explained that they hoped the bird would be able to fly again when it got to a bigger cage, but if not, suggested that it could be adopted as a pet or that the clinic could keep it. Ann gently explained that it is illegal to keep migratory birds as pets, but that she would do the best she could for all the wild ones.

Ann thanked the technician for delivering the birds. As the technician walked to the door, she said Dr. Carron was so relieved to have found Ann because another rehabilitator had said the crow and grebe had to be euthanized. Dr. Carron had refused to give them to that rehabilitator, saying the birds could still have a good life. The technician then left, saying that Dr. Carron would call later.

Ann immediately quarantined the birds that had just arrived. She thought that the blue jay with the advanced case of avian pox needed to be euthanized. She was concerned that the crow and grebe were nonreleasable, and since placement options were unlikely, felt they, too, would have to be euthanized.

Ann was delighted to have a veterinarian willing to help wildlife so

close by, even if she was inexperienced with wildlife. At the same time, she had some concerns. Ann hoped Dr. Carron would be willing to learn more about wildlife care and rehabilitation regulations. Meanwhile, Ann needed to talk with her about these cases. She figured she had a couple of hours of feeding to decide what to say before Dr. Carron called.

QUESTIONS FOR DISCUSSION

1. Problems are not uncommon when well-meaning but inexperienced caregivers "help" wildlife. These situations can be more difficult to handle when veterinarians and other domestic animal-care professionals are involved. How can rehabilitators help to build mutually respectful relationships with private practice veterinarians and others?
2. There will be times when a caregiver's best efforts result in a healthy but nonreleasable animal. What are some of the issues that must be considered when making a decision about the future of nonreleasable wildlife?
3. Some rescuers "shop around" when one rehabilitator doesn't tell them what they want to hear. What are some ways to effectively handle this type of situation?
4. Caregivers accustomed to working with domestic animals often expect heroic measures to be performed to keep wild animals alive even when it means the animal would have to spend its life in captivity. They may become angry with rehabilitators who euthanize wildlife that are nonreleasable due to injury, treatment, etc. How would you respond to these reactions and possible criticisms?

Operating Instructions

by Nathalie Karvonen

First Contact

If your rehabilitation organization has a phone, you have a hotline. Answering the phone can be a nuisance, and staffing the hotline isn't always an organization's top priority. Some groups allow any volunteer to answer the phone if it rings. But just being kind enough to donate time shouldn't automatically qualify someone to work the phones. Even your most knowledgeable wildlife expert may not be the best candidate. Hotline duty takes a special set of skills, including a talent for public relations.

To the person on the other end of the line, your phone staff is the face of your organization. The phone may be the first contact—often the only contact—the public, the media, or another group will have with your organization. Putting the wrong person on the phones can damage the reputation your organization has worked so hard to establish.

I once called a new rehabilitator in our area because she and her group were involved in a situation concerning a starling that the Toronto Wildlife Centre hotline had received a call about. I explained the situation to the person who answered her phone, and he responded, "What's a starling?" He then proceeded to tell me he was just caring for the animals while the rehabilitator was away for a week. Needless to say, this encounter caused me to reconsider my opinion of this group, and raised doubts about the credibility of this rehabilitator.

Even if you only receive a small number of calls each year, taking the time to find the right person to answer your phones can be critical to your success. What questions should you ask yourself about a candidate for your hotline staff—paid or volunteer?

Do they enjoy talking to and helping people?

Your hotline staff must genuinely enjoy people and enjoy solving problems—often the same problem, over

and over again. They need the ability to look at each situation through the caller's eyes, as a completely new experience, and patiently explain what a fledgling bird is one more time....

Do they have good listening skills? Can they empathize with the caller?

Whether it's an irate homeowner who has raccoons digging up his lawn or a child who has just had a baby bird die in her hands, your hotline staff needs to be able to connect with the caller and hear what is needed if they hope to help wildlife.

Do they have excellent problem-solving skills?

A good hotline staffer is half detective. Figuring out what critter is living in the caller's attic or what kind of baby the caller has encountered—as opposed to what the caller *thinks* they have—is crucial in determining what information the caller needs.

Do they have good research skills?

Try as you might to provide your hotline staff with all the information they may need at their fingertips, there will always be a new, unforeseen challenge. Phone staff must be able to find and digest new information quickly, make use of available literature, find trustworthy Internet sites, and network with other wildlife-related organizations. Guessing is not allowed!

Do they have excellent organizational skills? Can they multitask?

Can your hotline staff deal with the chaos caused in your center by an oil spill, remember to check back with the caller who left a juvenile squirrel out for its mother at the base of a tree, and provide directions to the caller who needs to bring a cat-caught bird in to your facility?

Do they have professional phone skills?

No matter how new or small you are, always think big! If your phone staff could just as easily be answering the calls coming in to a big multimillion dollar company, you've got the right people.

Can they handle difficult people without getting ruffled?

Callers can get quite nasty, and if your hotline staff are not able to get past a difficult caller's attitude, they will not be able to help the animal involved.

Do they handle stress well? Do they know when they've had enough?

Hotline duty is stressful, as it involves both wildlife emergencies and dealing with the public, and phone staff can burn out quickly. Staffers need to be able to recognize when they need a little break after an especially difficult phone call, or even an entire "mental health day" once in a while. (I recommend settling down with a carton of ice cream and a trashy novel!)

Do they have a good working knowledge of wildlife and environmental issues?

This item was intentionally left for last. You can teach hotline staff about wildlife, but many of the other characteristics mentioned on this list are linked to a person's personality. Rather than trying to make a "people person" out of someone who tries to avoid human beings whenever possible, your time is better spent polishing the skills of someone who already has an affinity for working with the public.

Toronto Wildlife Centre is currently recruiting a new Wildlife Hotline staff member, and we received over 300 resumes in response to our ad. Many applicants had biology degrees, experience at nature centers, and/or animal handling experience. Two applications caught my eye: one person had worked crisis lines in a women's shelter, the other had handled abusive customers in the billing department of Bell Telephone. Both were called in for interviews.

Natalie Karvonen is the executive director of Toronto Wildlife Centre. TWC operates a Wildlife Hotline service available to the public. Last year the hotline received more than 16,000 calls.

Open Minds

by Kieran Lindsey

A Lifetime of Learning

Becoming educated is a lifelong journey, but a 10-minute encounter may be all it takes to begin the trip.

As our society becomes increasingly urbanized, we're being cut off from daily interactions with the natural world. Nature has become something to be "experienced" on special occasions, such as a trip to a national park or a city arboretum. For many people, "nature" is what they see when they watch the Discovery Channel or the latest IMAX feature.

A love of the natural world usually begins when we're young, and it's passed from one individual to another. Someone we look up to, someone whose opinion matters to us, takes the time to make the introduction, and in doing so they plant seeds of caring in our hearts.

My mother was the person who nurtured in me a love of wild things. She didn't do this by reeling off the scientific names of every bird that came to our backyard feeder. She sat in the grass with me and "talked" to the cardinals, whistling—*birdy-birdy-birdy...cheer, cheer, cheer*—allowing me to see delight illuminate her face as two, then three brightly colored males flew into the maple tree above us to investigate. As we talked about the birds and why they responded to her whistle, she encouraged my curiosity and deepening love of the nature.

Passing the torch in this way is becoming more rare with each generation. We're losing touch with the people in our families and neighborhoods who would have served as our guides. In addition, fewer people are familiar enough with nature to act as guides. But if the public is to care about wild places and those who live there, someone has to step in to fill the void. Wildlife rehabilitation, combined with informal education, offers one of the best opportunities I know to foster an interest in wildlife.

Unlike a formal education program, informal education is unpredictable.

You can't assume anything about your audience—who they are, what they know, or if they have any interest your topic. It's completely off the cuff, and, as a result, it requires from the educator a high degree of creativity and a solid understanding of a broad range of subjects. Like an understudy, informal educators never know when they'll be called upon to perform.

Actually, being an informal educator is a lot like being a busker—a street performer. Your act doesn't last very long, you repeat it many times during the course of a day, and you're constantly changing the performance to suit each audience. You don't have slides or a script to memorize, but there are ways to improve your chances of a successful performance. I've found that something I call "gee-whizzers" are enormously helpful for lighting a spark of curiosity.

An enthusiastic educator can make just about any nugget of information look like a gem, but gee-whizzers generally aren't about statistics, and they don't include Latin words...most of the time. Gee-whizzers often begin, "Did you know...?" These are the little tidbits of information that stick to your mind like lint sticks to velvet. Rest assured, they'll cling to your audience just as effectively.

Let me illustrate by offering a few gee-whizzers about common rehab animals:

- Did you know hummingbirds use *spider webs* to make their nests?
- Did you know a female opossum may give birth to as many as 25 *babies* in just *five minutes*?
- Did you know snapping turtles were once used to find *dead bodies* in lakes? (Young children love that one!)

In this day and age, having a close encounter with wildlife is a big event in a person's life. By expressing your enthusiasm, by sharing gee-whizzers and stories, you give someone permission to show their excitement. You're fanning a spark.

I've also discovered something interesting about people that I'll share with you. Most of us can't easily make the leap from apathy to caring passion-

ately about an abstract idea—for instance, the effects of habitat loss on spotted owls in the north woods. But, as informal educators, we *can* help others cross from one level of caring to the next by laying down some stepping stones.

For example, say a disinterested, but basically kind person brings in a screech owl that has collided with his car. You *could* just examine the animal, thank him for his help, and say goodbye. Or you could start a short conversation about owls, beginning with, "Screech owls are one of my favorite birds. Want to know why? Because they *love* to eat...ROACHES!"

From here, the conversation meanders as it will, and all the while you're encouraging the rescuer to care, just a little bit more, about screech owls. Now he's standing on that first stepping stone. He's become a bit more "owl conscious." He shares the gee-whizzer with his friends at work. When he comes across an article in the newspaper about spotted owls, he stops and thinks about "his" owl. He reads the article. Now he's standing on the second stepping stone. As he thinks about what he's read, he realizes habitat loss issues aren't something separate from his life. The little screech owl he helped was affected by a road running through its habitat. Maybe he should be a little more concerned about what happens to owls in Oregon. Now he's done it: he's made that last leap to the other side of the stream!

I've watched this process happen more times than I can count.

Does it work every time? Of course not. But it never works when you don't even try. Do you always know when it does work? No. One of the most difficult things about informal education is that you often don't know if what you've shared created a spark, or if the spark grew into something larger. Informal education takes a lot of faith. But only 10 minutes of your time.

Kieran Lindsey is a wildlife biologist and president of Natural Assets Consulting. Send your comments and questions to IWRC@lindsey@aol.com, or to P.O. Box 1443, Cedar Crest, NM 87008-1443, U.S.A.



Parasite Identification Charts from IWRC!

Created by Dr. Gary Averbeck of the University of Minnesota, these charts are a must-have for any center or home-care rehabilitator involved in diagnostic testing for internal parasites.

I. IDENTIFICATION OF *GIARDIA* CYSTS

This 8-1/2" x 11" two-sided, laminated chart uses full-color photomicrographs to aid you in the identification of cysts and other structures commonly confused with *Giardia*. The zinc sulfate centrifugal flotation procedure is described on the reverse.

COST: \$14/\$15*

II. HELMINTH EGGS AND PROTOZOAN CYSTS

A single-sided 8-1/2" x 11" chart featuring color photomicrographs of eggs and cysts found in raptor feces and how they appear in different species.

COST: \$10.50/\$12*

III. HELMINTH EGG TYPES

One side of this 8-1/2" x 14" chart illustrates a number of the most commonly seen helminth egg types encountered in vertebrates. Each photo lists parasite name, host(s), and best diagnostic test. Directions for these tests are found on the reverse side.

COST: \$16/\$17*

3 CONVENIENT WAYS TO ORDER:

Call us at 707/864-1761

Fax us at 707/864-3106

E-mail us at iwrc@inreach.com

*Prices include handling and shipping within the United States/outside the United States.

IWRC members receive a 10 percent discount.

California residents must add 7.375 percent sales tax

IWRC accepts *Mastercard, Visa, and Discover*. ☎ Ask us for a copy of our publications catalog!

Conservation Classics

The Sense of Wonder

by Rachel Carson

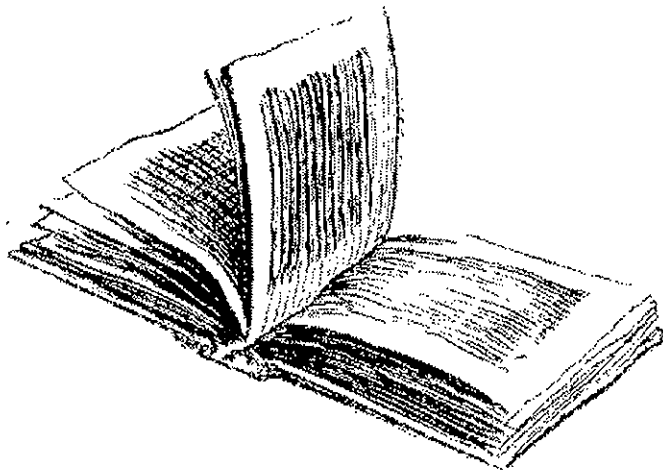
New York: HarperCollins, 1956/1998
96 pp; \$20 U.S. (hardcover)

reviewed by Kieran Lindsey

Although Rachel Carson is best known for a book condemning the use of synthetic, nonselective, and persistent insecticides such as DDT, she was already a popular nature writer when the classic *Silent Spring* was released in 1962. *The Sense of Wonder*, written two years later with a very different tone and focus, has also become a conservation classic.

Carson graduated from Pennsylvania College for Women (now Chatham College) in 1929, studied at the Woods Hole Marine Biological Laboratory, and received her MA in zoology from Johns Hopkins University in 1932. She was hired by the United States Bureau of Fisheries to write radio scripts during the Depression, and supplemented her income by writing feature articles on natural history for the *Baltimore Sun*. She began a fifteen-year career in the federal service as a scientist and editor in 1936 and rose to become editor-in-chief of all publications for the United States Fish and Wildlife Service.

Carson wrote pamphlets on conservation and natural resources and edited scientific articles, but free time was devoted to turning her government research into prose, first for an article in *Atlantic Monthly* (1937), and then in a book, *Under the Sea-Wind* (1941). In 1952 she published her prize-winning study of the ocean, *The Sea Around Us*, which was followed by *The Edge of the Sea* in 1955. These books constituted a biography of the ocean and made Carson famous as a naturalist and science writer for the general public. Carson resigned from government service in 1952 to devote herself to her writing.



The Sense of Wonder, originally published in *Women's Home Companion* under the title "Help Your Child to Wonder," was inspired by Carson's grandnephew, Roger Christie, whom she adopted in 1957 following her niece's death. The text was published as an illustrated book following a long battle with breast cancer that ended Carson's life in 1964.

Carson began to nurture her nephew's sense of wonder when he was quite young. The book begins with a description of Carson carrying 20-month-old Roger, wrapped in a blanket, down to the beach one stormy autumn night. Big waves were thundering in, and "Together we laughed for pure joy—he a baby meeting for the first time the wild tumult of Oceanus, I with the salt of half a lifetime of sea love in me."

Carson admits that this and subsequent explorations were "hardly a conventional way to entertain one so young," but as Roger grew, the two continued to share adventures based on having fun together rather than on teaching.

"When Roger has visited me in Maine and we have walked in these woods I have made no conscious effort to name plants or animals nor to explain to him, but have just expressed my own pleasure in what we see, calling his attention to this or that but only as I would share discoveries with an older person. Later I have been amazed at the way names stick in his mind, for when I show color slides of my woods plants it is Roger who can identify them. [Roger was about four years old at the time.] 'Oh, that's what Rachel likes—that's bunchberry!' Or 'That's Jumer [juniper] but you can't eat those green berries—they are for the squirrels.' I am sure no amount of drill would have implanted the names so firmly as just going through the woods in the spirit of two friends on an expedition of exciting discovery."

Carson knew that parents often have a sense of inadequacy when confronted with the eager, sensitive mind of a child and a world of complex and unfamiliar natural phenomena. But she assures us that we don't need a head full of facts to instill wonder. "Exploring nature with your child is largely a matter of becoming receptive to what lies all around you." If a child is to keep alive an inborn sense of wonder, she writes, "he needs the companionship of at least one adult who can share it."

What a wonderful reason, as if any were needed, to rediscover "the joy, excitement and mystery of the world we live in."

Conservation Classics is intended to provide our readers with suggestions for building a collection of must-have wildlife and ecology reference books.

A Veterinary Guide to the Parasites of Reptiles

Volume 2: Arthropods
(Excluding Mites)

by Susan M. Barnard and Lance A. Durden, PhD

Melborne, Fla.: Krieger, 2000
288 pp; 129 figures; 46.50 U.S.
(hardcover)

This second volume in the "Parasites of Reptiles" series, following Volume 1: Protozoa, is dedicated to the diagnoses and treatment of reptiles affected by arthropod parasites. The information, which is presented in annotated outline form for quick reference, is quite comprehensive, especially in its presentation about ticks (Ixodoidea). All groups of ectoparasitic arthropods affecting reptiles, except mites, are treated in this volume.

Chapters 1 through 4 are devoted to identification with ample illustrations, morphological diagrams, and photographs, as well as easy-to-follow keys (if one has a background in zoology or veterinary medicine) to be used in identifying parasites. Chapter 1 deals with Hemiptera (true bugs), of which only the triatomine bugs are blood-feeders of reptiles. Chapter 2 discusses Dipterans (true flies), with summaries of fly genera reported to feed on or infest reptiles, both as larvae causing myiasis and as adults feeding on reptile blood. Chapter 3 gives only a very brief description of Siphonaptera (fleas) and a diagram of flea morphology, since these parasites seldom feed on reptiles. Chapter 4 presents an extensive discussion of the Ixodoidea (ticks, both soft and hard) with numerous gross and microscopic photographs and illustrations. In addition to detailed descriptions of each tick, the authors have provided ample material on hosts, life-cycles, acquisition symptoms and diagnoses.

Chapter 5 describes laboratory procedures for the herpetoculturist, including the equipment needed, how to prepare specimens for mailing, short- and long-term preservation methods, cleaning and preparing specimens for

examination and methods for preparing microscope slides of small ectoparasites.

The appendices list parasiticides used in the treatment of ticks and flies feeding on reptiles; products mentioned in the text with names and addresses of suppliers; and a summary of the hosts and parasites mentioned in the text. The latter is particularly useful in eliminating some of the parasite possibilities and some of the labor involved in keying out the parasite. The glossary is especially helpful for the lay reader, as the text is quite technical. The reference section has an extensive bibliography (430 references).

This guide would be useful as a partial reference for diagnoses and treatment, especially for veterinarians or wildlife centers that see a sizable number of reptiles. It is part of a continuing series and, therefore, covers only the arthropods; volumes on other parasite groups have yet to be published. As a reptile rehabilitator, I had hoped to find an arthropod parasite on an accessioned animal in order to test the practicality and ease of use of this guide. I will have to leave such a test to the future and hope that the guide proves to be a source of easy, accurate identification and treatment.

Reviewer Julie Matisoo is a rehabilitator at the Lindsay Wildlife Museum in Walnut Creek, California.



Avian Medicine

by Jaime Samour, PhD

London: Mosby, 2000
427 pp, 690 illustrations; \$139 U.S.
(hardcover)

In recent years there have been a number of texts published on avian medicine and surgery. Most of these have been oriented to the pet bird, especially psittacines. In addition, most of the contributing authors have been from the United States. Dr. Samour's volume fills a much needed niche in the current literature. The book focuses on raptors and wild birds. Most of the au-

thors are from Europe and the Near East, and it is refreshing to hear from them and have their experience shared with us.

The book is divided into chapters on capture and handling, clinical examinations, clinical and diagnostic procedures, anesthesia, medical procedures, trauma-related medical conditions, management-related diseases, infectious diseases, and postmortem examinations with anatomical notes. In addition, there are extensive appendices on weights of species, hematology reference values, blood chemistry reference values, incubation periods, avian literature, legislation and codes of practice, organizations and electronic resources relating to avian medicine, and pharmaceuticals. There is a good index.

The book is beautifully illustrated and well organized. The appendix sections are worth the price alone. Reading this volume will not make you an avian veterinary practitioner, but both veterinarians and rehabilitators will find *Avian Medicine* an invaluable text and resource.

Reviewer James M. Harris, DVM, is owner of the Montclair Veterinary Hospital in Oakland, California, and a founder of the IWRC.



Veterinary Dentistry for the Technician and Office Staff

By Steven E. Holmstrom

Philadelphia: W. B. Saunders, 1999
355 pp; \$35 U.S.

While dentistry is not a primary area of interest in wildlife rehabilitation, it should not be overlooked. Some animals are presented emaciated with only one broken or infected tooth; collisions with automobiles commonly cause fractures of the skull, jaw, and teeth.

This book is written specifically for veterinary technicians and clinic staff. Because it is a text designed for learning, it is, however, an excellent resource for rehabilitators of all levels of exper-

tise. Techniques are clearly depicted with many photographs and illustrations. New terms are defined in brackets within the text, rather than in a glossary, and important points are restated in text boxes as well as in summary tables. Worksheets are provided at the end of each chapter; answers are available on the Internet.

This book covers all aspects of veterinary dentistry, including a thorough introduction, examination techniques, disease recognition, personal safety, anesthesia, periodontal therapy, extractions, dental radiology, and follow up care. The terminology and anatomy is detailed and easily understood by even the most inexperienced reader. This basic information is extremely helpful when communicating with veterinarians.

This book gives readers with little or no knowledge in veterinary dentistry a practical working knowledge. Overall, it is a good resource for rehabilitators as it covers all areas of dentistry and can help identify and assess problems that may otherwise be overlooked.

Reviewer Lisa Fosco is a rehabilitator in Napa, California.



**Squirrels At My Window
Life With A Remarkable Gang
of Urban Squirrels
by Grace Marmor Spruch**

Boulder, Colo.: Johnson Books, 2000
192 pp; \$12 U.S. (softcover)

Squirrels At My Windows is thoroughly delightful and engaging book. Grace Marmor Spruch and her gang of urban squirrels provide an afternoon of entertainment. Her adventures with squirrels began with a grey squirrel landing squarely on top of a rubber plant in her Manhattan apartment on a chilly morning in November 1970. A walnut was offered and the intruder scampered off with his treasure.

Thus began a multiyear observation of squirrels and their habits. The au-

thor provides an entertaining tale while tricking her readers into a thorough lesson of squirrel anatomy and physiology. Rehabbers will relate to her story of taking "Sweetie Longtail" to the only vet she could find who would work with wildlife. As she recounts the details of trapping the injured/ill squirrel and running through the streets of New York City to get to the vet before he left, rehabbers will be nodding their heads as they recall similar situations they have been in. While some may disagree with her methods as she observed the squirrels, none will discount her findings.

Reviewer Elizabeth Madewell is the IWRC's office manager.



CHILDREN'S BOOKS

The following books are published by Charlesbridge Publishing, Watertown, Massachusetts (www.charlesbridge.com; 617/926-0329).

**Counting Is for the Birds
by Frank Mazzola Jr.**

1997; 32 pp; \$6.95 U.S. (softcover)

This beautifully illustrated book is designed for children in the six- to 10-year-old age group. It has a wealth of valuable information about natural history, natural foods, and identification of the various birds featured. While teaching the reader to count, it also educates them on such things as the different types of seeds and bugs that the birds like to eat. It identifies migratory routes and beak and foot types, as well as behavioral characteristics. The book is easy to read for younger readers, but also challenges the older child with additional, more in-depth information.

Unfortunately this beautiful publication is ruined at its very beginning by the introduction of a cat, hiding and waiting in the bush beneath the bird feeder. Later we are told that the cat's "fun" is ruined by a selfish squirrel, who

chases it away and makes it miss its "treat."

The book could easily have been written without the introduction of the cat, unless it was introduced to picture the cat as an unwelcome predator. The story and the educational benefits of the book would have been just as worthwhile and certainly would have appealed to a much larger audience. This is definitely not a story that you would want your children or grandchildren learning from.



**No One Told the Aardvark
by Deborah Eaton and Susan Halter
Illustrated by Jim Spence**

1997; 32pp; \$6.95 U.S. (softcover)

This book is all about the trials and tribulations of being a child living amongst grownups who constantly want to tell you what to do and how to do it. The subject of the story is a young boy who compares everything he is told about life and manners to animals and their various traits. For instance when being told to take small bites and to chew his food, he retorts, "Boa constrictors don't have to chew their food. They swallow it in one piece."

The book will appeal to children in the five- to eight-year-old group, and with its eye-catching illustrations should keep even toddlers interested. The style is somewhat reminiscent of days gone by, and the simplicity of the sentences allows young readers to follow along. Readers also receive an introductory education on animal behavior.

Following the story, there is a glossary-like section that offers additional information on the habits of the different animals referred to in the book. This book makes for a cute read and is something that children will look through more than once.



The children's books were reviewed by Mary Reynolds, executive director of the IWRC.

NUTRITION

“Do Avian Frugivores Absorb Fruit Sugars Inefficiently? How Dietary Nutrient Concentration Can Affect Coefficients of Digestive Efficiency”

M. C. Witmer

J. Avian Biology. 1999. 30(2)

Fruit-eating birds are thought to inefficiently digest and/or assimilate nutrients from fruits. Contradicting this established premise, cedar waxwings (*Bombycilla cedrorum*) and 3 thrush species absorbed fruit sugars efficiently, comparable to the sugar assimilation of nectar-feeding birds. Fecal nutrient concentration may be an appropriate indication of how well animals utilize these nutrients. The data from this study contradict the premise that sugary, bird-dispersed fruits challenge the digestive systems of avian frugivores so that nutrient utilization is impaired. Simple sugars are readily assimilated, so processing of sugary fruits is quicker than for foods containing complex nutrients. Thus, fruits represent accessible, energy-rich foods from which nutrients are efficiently absorbed by avian frugivores.

MAMMALIAN SPECIES

“Feline Papillomas and Papillomaviruses”

J. P. Sundberg, et al.

Veterinary Pathology. 2000. 37(1)

Papillomaviruses (PVs) are highly species- and site-specific pathogens of stratified squamous epithelium. Although PV infections in the various Felidae are rarely reported, the authors identified productive infections in 6 cat species (*Panthera leo*, *Panthera uncia*, *Felis rufus*, *Felis concolor*, *Neofelis nebulosa*, and *Felis domesticus*). PV-induced proliferative skin or mucous membrane lesions were confirmed by immunohistochemical screening for papillomavirus-specific capsid antigens. Seven monoclonal antibodies, each of which reacts with an immunodominant antigenic determinant of the bovine papillomavirus L1 gene product, revealed that feline PV capsid epitopes

were conserved to various degrees. Tests confirmed the variability among three viral genomes recovered from available frozen tissue. Because most previous PV isolates have been species specific, these studies suggest that at least 8 different cat papillomaviruses infect the oral cavity or skin.

AVIAN SPECIES

“A Radio Transmitter Attachment Technique for Soras”

G. Michael Haramis and Gregory D. Kearns

J. Field Ornithology. 2000. 71(1).

The authors modified a figure-8 leg-loop harness designed for small passerines to attach successfully 1.8 g radio transmitters over the synsacrum of migrant soras (*Porzana carolina*). Because of the short caudal region of soras, addition of a waist loop was critical to securing the transmitter while leg loops were maintained to center the package. Thin-gauge (0.6 mm diameter) elastic thread proved ideal for transmitter attachment and allowed for freedom of movement and girth expansion associated with fattening during a 6–10 wk stopover. Of 110 soras radio tagged during three field seasons, only a single mortality was observed and only a single bird lost its transmitter. Migration from

the study area was confirmed for 76 (69 percent) and suspected for another 25 birds (total 92 percent).

HERPETILE SPECIES

“The Effects of Forest Clearcut Harvesting and Thinning on Terrestrial Salamanders”

Julie A. Grialou, Stephen D. West, and R. Neal Wilkins

J. Wildlife Mgmt. 2000. 64(1).

The authors studied short-term effects of forest clearcut harvesting and thinning on species presence, abundance, and demographics of terrestrial salamanders in an area intensively managed for forest products in southwestern Washington. Western red-backed salamanders (*Plethodon vehiculum*), ensatinas (*Ensatina eschscholtzii*), northwestern salamanders (*Ambystoma gracile*), rough-skinned newts (*Taricha granulosa*), and Dunn's salamanders (*Plethodon dunni*) were captured using pitfall traps in both forested and clearcut areas. Columbia torrent salamanders (*Rhyacotriton kezeri*) and Pacific giant salamanders (*Dicamptodon tenebrosus*) were captured only in forested areas. Population responses of salamander species to forest management are variable, with some species declining in abundance after clearcutting and thinning.

Director of Veterinary Services

Nation's leading wildlife hospital seeks highly motivated, outgoing, team-oriented veterinarian with proven clinical, management and teaching skills to direct rehabilitation, training and research programs. Three-plus years of wildlife experience required. Send resume, cover letter, salary requirements and three references to:

Edward E. Clark, Jr.
President
The Wildlife Center of Virginia
PO Box 1557
Waynesboro, VA 22980

Closing date 10/31/00.

See complete job description at www.wildlifecenter.org.

A hospital for native wildlife—teaching the world to care about and care for wildlife and the environment.

THIS IS A LEASH

IT'S A GREAT SAFETY DEVICE, protecting your pet from traffic and unrestrained animals.

IT'S A GREAT "GOOD NEIGHBOR" POLICY, preventing your dog from trespassing on neighbors' property during your walk. It also keeps your dog from jumping up on children or adults you encounter, ensuring that your dog has the chance to be properly introduced.

IT'S A GREAT IDENTIFICATION TOOL, symbolizing that the dog has an owner, and enabling someone who sees the leash and identification tag attached to the dog's collar to find you should you and your pet become separated.

IT'S A GREAT RELIEF TO WILDLIFE, keeping your dog from harassing deer, squirrels, and other wild animals.

IT'S A GREAT WAY TO BE YOUR DOG'S BEST FRIEND, rewarding your dog and you with fresh air, exercise, and companionship.



**THIS IS A LEASH. USE IT. BE A GOOD NEIGHBOR. BE A GOOD FRIEND.
KEEP YOUR DOG UNDER CONTROL.**

(This space for your organization's name, address, and phone number)

PROVIDED BY THE HUMANE SOCIETY OF THE UNITED STATES

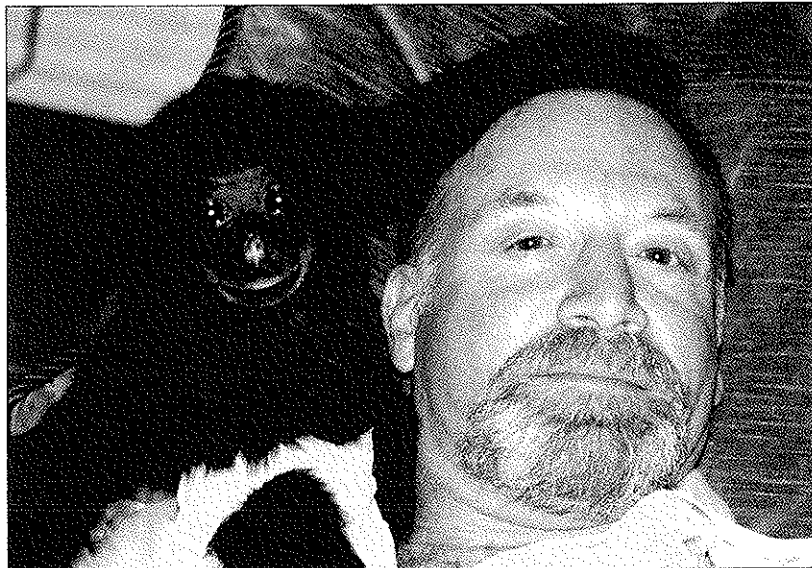
Jeff Watt

IWRC's family has been diminished by the unexpected death of Jeff Watt, husband of IWRC board member Lee Theisen-Watt. Jeff was one of IWRC's most generous and enthusiastic supporters. He was 52 when he died in late June in the couple's Dallas, Texas, home.

Jeff and Lee hosted IWRC's 1998 Conference in Dallas/Fort Worth. Many of us will always remember Jeff's tireless efforts to be sure that every logistical detail was addressed, and that all of IWRC's special guests were treated royally. In January of this year, Jeff and Lee entertained the IWRC board in their beautiful home and hosted the board's winter meeting. Always gracious and fun loving, Jeff had a special zest for life and a sincere concern for others. His infectious good nature will certainly be missed.

On behalf of our members and staff, the IWRC board of directors extends its sympathies and condolences to Lee and the rest of Jeff's family. We appreciate his many contributions to the organization and mourn his passing.

Written by Edward Clark, Jr.



(Above) Jeff was proud to support his wife's wildlife rehabilitation efforts. Earlier this year, he became an active participant when Lee agreed to raise an endangered siamang gibbon orphan for the International Center for Gibbon Studies (Santa Clara, California).

Eric Orendorff

Eric Orendorff, 27-year-old son of NWRA board members and *Quarterly* editor Bea and Gary Orendorff, died suddenly on 6 March 2000 while at work in Cincinnati, Ohio.

Eric grew up part and parcel of his parents' wildlife passion. While other kids had cats and dogs, Eric grew up with baby bird incubators, flight cages in his backyard, and mealworms and mice in the refrigerator. His love and empathy for all things wild was evident very early in his life, when he would sob over youngsters stepping on ants and killing them.

One of the Orendorffs' favorite stories about Eric occurred when he was a tiny boy—and during the busiest part of baby season. Eric came to the nursery to talk with Bea about something. However, she was concentrating on feeding a large number of nestling blue jays and did not pay enough attention to Eric's young voice. Suddenly he started flapping his arms up and down his sides, doing a great imitation of baby jays begging for food. Of course, that earned him his mother's full attention.

During his teen years, Eric was diagnosed with a serious heart condition. His mother eulogized him in part with the following:

"He came to terms that his heart would not allow him to live a long life and he made the best of it. He lived life with gusto. He was a complex, passionate man who loved hard, played hard, felt intensely, was very sensitive, fiercely loyal, highly opinionated, very intellectual—an artist who created beautiful Indian-inspired jewelry and artifacts and a prolific poet. He was part of my body and my spirit. He was my son."

During high school, Eric worked part-time at the zoo, where he instantly fell in love with rhinos and warthogs. He was very passionate about the rhinos' plight and was determined that, someday, he would go to Africa to fight rhino poachers. In respect for Eric's passions, his family suggests memorials be sent to the Black Rhino Foundation or NWRA. The addresses for these organizations and additional information about Eric Orendorff can be found on a website created by his friends: www.twinlights.org/eric/.

The IWRC board of directors and members offer our deepest condolences to Bea and Gary on the loss of their son.

Written by Marjorie J. Gibson

TAIL END



by Astrid MacLeod

PHOTO: NEONATE GREY SQUIRRELS (*Sciurus carolinensis*) PAT AND JIM ISAACS



“Quit hogging the bed!”

GUIDELINES FOR AUTHORS

THE JOURNAL OF WILDLIFE REHABILITATION invites submissions in several categories, including feature articles, case studies, brief pieces sharing practical tips, and book reviews. The *Journal* publishes articles on natural history, rehabilitation, wildlife policy issues, nonprofit administration, conservation education, and other relevant topics. Articles on veterinary medicine as it relates to wildlife rehabilitation are also welcome. To expand the international scope of the publication, individuals from countries outside the United States are especially encouraged to contribute.

All submissions to the *Journal* are evaluated by the editors and anonymous reviewers with expertise in the relevant subject matter. The editors consider clarity, conciseness, accuracy, and overall thoroughness when determining if the work is appropriate for publication. Authors should strive to present their work succinctly and with minimal jargon. Normally, work submitted for review should not exceed 5,000 words.

All authors receive a \$30 honorarium for each original article published or a one-year individual membership or renewal. IWRC retains copyright on all articles published in the *Journal*, but will grant permission to reprint articles upon request, with credit given to IWRC.

SUBMISSION INSTRUCTIONS

1. To submit an article to the *Journal*, send four copies of the manuscript to *Journal* Editor, IWRC, 4437 Central Place, Suite B-4, Suisun, CA 94585-1633, USA. Manuscripts should be typewritten and double spaced. Include the author's name, address, phone number, and e-mail address, an abstract, several key words, references, and a one-paragraph biography of each author. If trade names are used, indicate if product is trademarked or registered, and list any products cited, along with generic equivalents, at the end of the article.
2. If possible, also send an electronic version of your submission to iwrc@inreach.com. Whether sent by regular mail to IWRC on diskette or sent via e-mail, please make sure that your electronic submission is Macintosh-compatible. To help facilitate this process, include the name of the software and operating system used to prepare your submission.
3. If the submission has been published elsewhere, the author is obligated to obtain permission or reprint rights before submitting the article to the *Journal*.
4. Citations should be noted within the body of the article with the last name of the author and the year published, and full references should be included at the end of the manuscript in alphabetical order beginning with the author's last name.
5. The *Journal* publishes high-quality black and white photographs as available. Color slides and prints are acceptable as well, though all images will appear in black and white only. Please include photo credits.

IWRC LITERATURE COMMITTEE

Elizabeth P. Elliston, Chair
Wildlife Rescue Inc., of New Mexico
Albuquerque, New Mexico

Marjorie J. Gibson
Raptor Education Group Inc.
Antigo, Wisconsin

Kieran Lindsey, Interim Chair
Natural Assets Consulting
Cedar Crest, New Mexico

Louise Shimmel
Cascades Raptor Center
Eugene, Oregon

Kelley R. Tucker
American Bird Conservancy
Washington, D.C.

FOR INFORMATION

International Wildlife
Rehabilitation Council (IWRC)
4437 Central Place, Suite B-4
Suisun, CA 94585-1633, USA

707/864-1761
Fax: 707/864-3106
iwrc@inreach.com
www.iwrc-online.org



**INTERNATIONAL WILDLIFE
REHABILITATION COUNCIL (IWRC)
4437 CENTRAL PLACE, SUITE B-4
SUISUN, CA 94585-1633, USA**

ADDRESS SERVICE REQUESTED

**NONPROFIT ORG.
U.S. POSTAGE
P A I D
JEFFERSON CITY, MO
PERMIT NO. 210**