REHABILITATION WILDLIFE COUNCIL

WILDLIFE JOURNAL

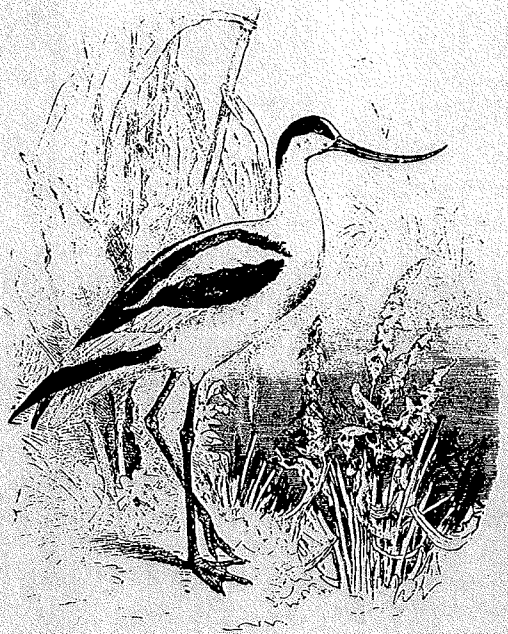
Vol. 1 No. 2 Spring 1978

THERMAL REGULATION IN BIRDS AND MAMMALS

Most animals are ectothermic or cold-blooded. The body temperature of these animals is regulated by heat gained from the environment rather than by heat produced by the animals' own metabolic processes. Mammals and birds are characterized by being endothermic or warm-blooded; their body temperatures are controlled largely by metabolic activity and by modifications that regulate the rate of heat exchange with the environment. Thus, endotherms have gained an advantage over ectotherms by developing partial independence from environmental temperatures, but this advantage is maintained at considerable metabolic expense. Some 80% to 90% of the oxidative energy produced by endotherms is used for maintaining thermal homeostasis; this is assuming ambient temperatures at which their physiological processes function at maximum efficiency. Thermal stress, therefore, would increase the energy needs and over an extended period of time would, most likely, be lethal.

Thermal regulation is maintained through a variety of mechanisms including insulation, circulation, evaporation, behavior, and metabolism. Insulation, in the form of fur, blubber, or feathers, is the primary means of reducing thermal conductance. When stressed by cold or extremely hot ambient temperatures, mammals and birds will piloerect or fluff up their fur or feathers creating an air space between the skin and outer covering to act as insulation. In this way they can maintain a relatively constant body temperature without conducting their body heat to the air or absorbing heat from the air into the body. This behavior holds true for most animals; however, fur seals have both a layer of blubber and fur. If stranded out of water their fur is inadequate to protect them from the heat, and they will literally be cooked.

Circulatory control of body temperature is particularly important for animals living in extremely cold climates but is found throughout the animal kingdom. How is it possible for an avocet to stand in 55° F. water or for a deer to live in the

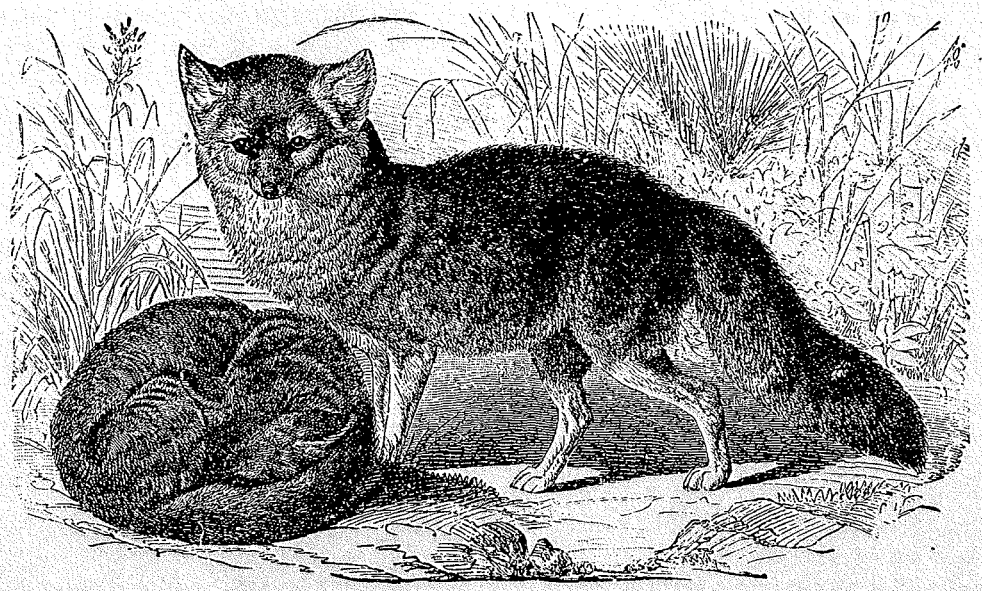


snow without their legs freezing? In fact most animals have a "countercurrent" circulatory system in their extremities, which allows for heat exchange between the veins and arteries deep beneath the skin. Thus, the cooled blood in the peripheral capillaries has little effect on the core temperature of the animal.

If an animal needs to decrease its body temperature, it can do so by increasing the circulation to the skin and placing itself in a cool environment, e.g. the water, a shaded area, or underground. Extremities are the most typical site for vasodilation. This is the most effective means of cooling for marine mammals. Their skin has a well developed vascular supply, and the temperature gradient between the deep parts of their body and the skin can often be as much as 5° C. Another means of circulatory cooling common in mammals of arid climates is licking an area of the body where there is a concentration of blood vessels, a vascular plexus. The evaporative process then cools the skin and blood, which decreases the body temperature.

Sweat glands are an important mechanism of heat dissipation in mammals which have them. However, some animals have few sweat glands. Aquatic mammals and birds do not have any, so respiration (panting) is an important means of heat dissipation. Panting is perhaps the most efficient system for evaporative cooling and is of primary importance to animals lacking continuous access to water. Blood flow to the tongue increases sharply at the onset of panting, and during heat stress increases six times over normal. One disadvantage of panting is that the increased activity increases metabolism which increases heat production.

Behavior is one of the most sensitive and powerful homeostatic mechanisms. It is impossible to mention all the behavioral techniques used to maintain a constant body temperature, but a few examples should be helpful. Animals will choose the environment appropriate to their needs whether it be the cooling effects of water or wings spread in direct sunlight. Also by minimizing the ratio of the outer surface to the volume, the most advantageous shape in terms of retention of heat is obtained. This can be accomplished in mammals by curling into a ball and in birds by tucking their beaks under their feathers (also providing themselves with prewarmed air to breathe). Another behavioral technique used by marine mammals to maintain heat is to swim with flippers or flukes out of the water, absorbing radiant heat from the sun.



There is a fairly close but inverse relationsip between the weight of a bird and its temperature. With every ten fold increase in body weight there is, roughly, a decrease of 1.5° C. in body temperature. The same correlation holds for large mammals; but, surprisingly, for mammals with weights of less than

about five kilograms, body temperatures become lower with decreasing weight, rather than higher as in birds. This contrast is probably due to the fact that fur is a poorer insulator than feathers, so that a small mammal with its relatively large surface cannot maintain as high a body temperature as a small bird. Also, primitive avian species tend to have lower temperatures than more advanced species.

The daily cycle of activity and rest is understandably accompanied by a temperature cycle. Diurnal birds have their highest temperatures late in the afternoon and their lowest in the early morning. Nocturnal species, such as owls, have their maximum body temperature at night, when they are most active.

As a general rule the body temperature of small birds fluctuates more than that of large birds. That of a robin can fluctuate 6° C. in 24 hours; whereas, the domestic duck varies its temperature only 1° C. in the course of a day.

Listed below are the mean temperatures, in degrees centigrade, of a variety of species. Keep in mind that there are many factors affecting the temperature such as: species, age, reproductive state, nutrition, activity, coat, environment, sun, humidity, rain, air movement, diurnal and seasonal changes, and dehydration. Temperatures of most birds range between 39° to 42° C. and of most adult mammals between 36° to 39° C.

skunk---------36.4	towhee, day---41.8
human---------37.0	night-39.1
mouse---------37.0	dove, day-----41.8
seal----------37.3	night---39.5
squirrel------37.2	sparrow-------40.0
kangaroo rat--37.2	junco---------40.0
rat-----------37.8	kestral-------41.6
white fox-----37.7	pigeon--------41.8
raccoon-------38.6	gull----------41.0
cat-----------38.6	murre---------40.2
rabbit--------39.0	owl-----------40.3
pelican-------40.5	hawk----------42.0
swan----------40.3	woodpecker----41.7
quail---------41.8	goose---------41.0
duck----------41.5	

The mean resting temperature of 29 passerine species is 40.6°. The mean resting temperature of charadriiformes (gulls, murres, etc.) is 40.1°.

Thermal regulation in young birds starts early but develops slowly in the downy, alert chicks of precocial species, whereas it starts later but develops more rapidly in altricial nestlings--those young which emerge from the shell blind, naked, and usually cold blooded. As a general rule, altricial young acquire a relatively stable homothermism when between one and two weeks old.

It is interesting that the normal temperature of birds is much closer to the upper viable limits (zone of thermoneutrality) than to the lower. Since birds live close to their maximum metabolic limits, a small rise in body temperature is more likely to be fatal than a comparable drop in temperature. The average lethal maximum is 46.7° C. and the average lethal minimum is 21.7° C.

Of what significance is all this information to those who rehabilitate wildlife? Admittedly, an animal's temperature normally may vary from those listed above; however, when abnormal temperatures are obtained, the animal's behavior can be the clue as to whether or not treatment should be instituted. Slight abnormal temperatures without behavioral indications should be monitored but not necessarily treated. Be consistant as to the time of day the temperature is taken. Oiled, wet, or noninsulated (newborn) animals obviously need to be placed near a source of heat. Animals with low temperatures who appear to be hungry should be situated near a heat source and provided with enough food to increase their metabolic rate. Dehydrated or infected animals will have elevated temperatures, and providing them with water to drink and water in which to swim (if appropriate), will help bring the temperature down to within normal limits. If the cause of the abnormal temperature is not obvious, treat the animal's hyper- or hypothermia while determining the diagnosis. Symptomatic treatment alone is not sufficient when medications are indicated.

by J.A.

INFORMATION SHEETS AVAILABLE FROM WRC

WRC has detailed care sheets on many animals available to its members. New sheets not mentioned before in the *WILDLIFE JOURNAL* are: "Care, Feeding and Development of Fledging & Juvenile Pigeons & Doves"; "Water Turtle Care Sheet"; "Substitute Diets for Orphaned Birds"; & "Initial Care of Injured or Oiled Water Birds."

You may write WRC for a complete list of all the care sheets. They are 50¢ each, plus 50¢ for postage of complete packet. ($1.50 for postage outside the U.S. or Canada)

CCC VOLUNTEER WORK CREWS WANT TO HELP

Are you a California non-profit organization that could use a supervised crew of young people to help in habitat improvement, construction, planting, fencing--just about anything physical? If so, you should immediately get in touch with the California Conservation Corps in Sacramento.

The CCC is a state agency that provides a one year residential program in the field of conservation for 18 to 20 year olds. These young people are housed in 16 centers throughout the state. From there they branch out in crews of ten, plus a supervisor, to work on projects involving everything from trail rebuilding to reforestation.

Bob Conrich, CCC Program Director, says they are interested in doing more projects with wildlife rehabilitation groups and humane societies. They have recently contracted with Project Wildlife in Alpine, North County Wildlife Rescue and Treatment Society in Poway and Wildlife Rehabilitation Service, Inc. in in Fairfield to work on specific projects.

The CCC provides the labor, transportation, crew supervisor and workmen's compensation. You must provide the orientation, technical assistance, special equipment and materials.

If you would like to find out more about the California Conservation Corps, call or write Bob Conrich, 1530 Capital Drive, Sacramento, CA 95814. Phone: 916-322-6790.

CURRENT LITERATURE

The following is a list of current articles that may be helpful for those in various types of rehabilitation work. The periodicals mentioned are available at most universities, and single copies of each article are kept at the Marin Museum of Science.

"Fate and Effects of Oil in Marine Animals," Stegeman, J.J., Oceanus, Vol. 20, No. 4, Fall 77.

"Numbers, Distribution and Movements of a Raccoon Population in a Suburban Residential Community," Hoffman, C.O. et al., Journal of Mammology, Vol. 58, No. 4, Nov. 77.

American Zoologist, Winter 77. Entire second half of journal contains articles on social behavior of reptiles.

"Public Health Aspects of Mycotic Diseases," Journal of the American Veterinary Medical Association, Vol. 171, No. 11, Dec. 77.

"Herpesvirus-like Infection in Two Pacific Pond Turtles," Frye, F.L. et al., Journal of the American Veterinary Medical Association, Vol. 171, No. 9, Nov. 77.

"Oak Poisoning of Cattle in Ohio," Sandusky, G.E. et al., Journal of the American Veterinary Medical Association, Vol. 171, No. 7, Oct. 77. Gives symptoms and autopsy results; can be used to diagnose tannic acid poisoning in wild ungulates.

"Pesticide Poisonings in Domestic Animals," Modern Veterinary Practice, Vol 58, No. 11, Nov. 77. Gives symptoms and treatments for a variety of toxic substances.

"Restraint of Exotic Animals," Modern Veterinary Practice, Vol. 58, No. 3, March 77.

"Clinical Use of Gentamycin," Modern Veterinary Practice, Vol. 58, No. 9, Sept. 77.

"Reported Cases of Avian Tuberculosis in California Waterfowl," Floeke, R., California Fish and Game, Vol. 63, No 3, July 77.

HELP IN DETERMINING THE AGE AND SEX OF VARIOUS BIRDS

"The North American Bird Banding Manual", Vol. 2, 1977 includes a detailed guide to various techniques for determining the age and sex of 65 species of North American birds. The following excerpts from the manual demonstrate the applicability of this information. It is recommended that anyone with a desire to record accurate age and sex data for the birds they encounter should consult a licensed bander in their area. Presumably, the manual will be added to periodically until a majority of species is represented.

Mourning Dove

Male- Crown and nape blue or blue-gray; breast and throat clearly washed with pink or rose

Female- Crown and nape brown or gray-brown; breast and throat tan

Sharp Shinned Hawk

Male- Wing chord* 184 mm or less

Female- Wing chord 185 to 215mm

*Wing chord is the length of the closed wing in natural position from the bend to the tip of the longest primary. It is taken with a rule equipped with an upright stop secured at a right angle to the end of the rule.

Violet Green Swallow

Male- White of throat extending upward behind and above eye, separation of white area and dark crown sharp; upper parts largely bright irridescent green; bright emerald green to turquoise or purplish rump and upper tail coverts

Female- Sides of head dusky gray-brown, especially the post-ocular area; separation of dark crown and light throat graded with no sharp border; upper parts dull with varying amounts of dull brown especially on forehead, lores, and nape; rump brown to black with only green or purple edges on some feathers.

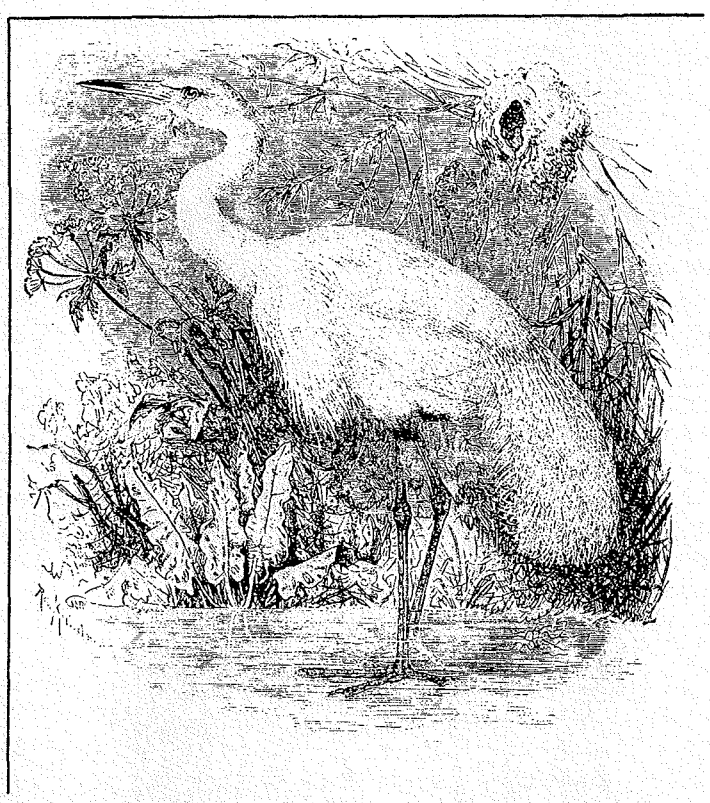
Excerpts taken from "The North American Bird Banding Manual", Vol. 2, Part 6, 1977. Department of the Interior, U.S. Fish and Wildlife Service and the Department of Fish and Environment, Canadian Wildlife Service.

by M.W.

CALIFORNIA
LEGISLATIVE UPDATE

Bill	Author		Status or Committee
SB 1480	Nejedly	Bans killing of coyote pups in den; prohibits use of poison where endangered species may live; creates advisary committee and calls for research relating to methods of protecting livestock from predators.	To be heard in Senate Natural Resources on April 11.
SB 1581	Homedahl	Amends Fish and Game Protected List to include bobcats.	Senate Natural Resources
SB 1357	Behr	Bans aerial application of pesticides on forest and range land.	Senate Natural Resources
SB 490	Roberti	Prohibits intentional killing or cruelty to animals in the making of motion pictures.	Passed Senate; now in Assembly Ways and Means
SB 925	Carpenter	Requires that driver who hits an animal must stop and notify humane society or local animal control agency.	Dead; will have to be reintroduced

Legislative information courtesy of Humane Society of the United States, Animal Protection Institute and Fund for Animals.



SAVING OILED SEABIRDS

International Bird Rescue Research Center of Berkeley, California has recently published "Saving Oiled Seabirds" ("SOS"). Its principal author is Anne Williams, former Associate Director of IBRRC. This manual is the most comprehensive, "how to" manual on current methods for cleaning oiled water birds. "SOS" can be used by interested persons under the approval and supervision of the U.S. Fish and Wildlife Service and your state wildlife agency.

U.S. Fish and Wildlife Service has jurisdiction over all wildlife involved in an oil pollution emergency and will be the agency, along with the state wildlife agency, to approve your facility for oiled bird rehabilitation. Contact your Regional Response Coordinator of the U.S. Fish and Wildlife Service now, prior to any emergencies. This person will decide whether or not your facility is suitable. You may also put your name on a list with them to be notified if there is an oiled bird workshop planned for your region.

Copies of "SOS" are available through WRC at $1.00 per copy, which includes postage. Order from WRC, P.O Box 3007, Walnut Creek, CA 94596.

by C.P.

WILDLIFE REHABILITATION SERVICE, INC.

Wildlife Rehabilitation Service, Inc. was organized and became operational on February 8, 1977. We started with $200.00, no equipment, and an old county building in dire need of renovation. With 22 experienced volunteers, the organization began its struggle for survival.

At first the problems seemed insurmountable, with the initial capital expenses for operations, the legal technicalities associated with becoming an incorporated, non-profit organization, and the ever pressing search for ongoing funding. However, by May we were incorporated and the public became cognizant of our services. In retrospect the year held many surprises, including the rescue of a family beseiged by a Great Horned Owl, cautiously relieving an eight year old child of one ten inch rattlesnake, and slogging through knee deep mud to rescue an injured raccoon in the marsh.

We are an in-house facility located at 524 Delaware Street in Fairfild, California and open to the public daily from 10 am to 5 pm. Our telephone number is (707) 429-HAWK, which has a 24 hour emergency answering service that contacts wildlife technicians on call.

During our first year we handled over one hundred different species of wildlife from varied ecosystems. Although we are situated near the Suisun Marsh, many of our animals come from riparian to open oak grassland habitat.

Through the generous efforts of Doctors Shriro and Benjamin of Berkeley Dog and Cat Hospital and Doctors Emanuelson, Jurberg and Barney excellent veterinary services have been provided.

Some of our staff have specialized in raptor, raccoon and fox rehabilitation. During this year we plan to continue collecting our data and hope to share ideas with other rehabilitation groups.

by Jan White, WRS, Inc.

WELCOME: Kathy Hobson of International Bird Rescue and Research Center has joined the WRC Board of Directors.

GROWTH & DEVELOPMENT OF ALTRICIAL NESTLINGS

Listed below is the daily growth and development of a typical open nesting altricial nestling (a bird which is born blind and featherless). A precocial bird, in contrast, is endowed with most of the following capabilities on the day that it hatches.

Days After Hatching	Characteristic Behavior
1	Raises head and gapes at any disturbance. Evacuates in the nest
2	Eyes begin to open. Primary feathers show through skin.
3	Eyes open. Uses wings as props. Evacuates at edge or door of nest.
4	Beginning of most rapid growth. Begins to use legs. Voice stronger. Primaries pierce skin.
5	Bird faces opening of nest or the feeding parent. Temperature control nearly established.
6	Shows better muscular coordination. Shows fear and responds to alarm note of parent.
7	Exercises neck, wings and legs. Relative growth rate begins to decline. Primary feathers unsheathing.
8	Alert to sights and sounds outside nest.
10	Preens unsheathed feathers. Stretches wings and legs. Pecks at objects.
13	Acquires fluttering flight. Leaves nest. (Hole-nesting altricial birds leave the nest at 16 days.)

Reference

Welty, J.C., The Life of Birds, W.B. Saunders Co., Philadelphia, 1962.



WE NEED YOU!

In our continuing efforts to improve this newsletter, the Editorial Staff would appreciate receiving copies of your own publications. If you would like to have an article considered for publication in the next "Wildlife Journal", you must send the final, typed copy to WRC by May 1, 1978. You can increase the amount of information to the membership, so let us hear from you.

If you have accumulated care information on an animal and wish to share it, send a double-spaced, typed draft to the Editorial Staff for inclusion with the care sheets now available to the membership.

***

WILDLIFE JOURNAL Editorial Staff:

Joyce Abrams
Marin Museum of Natural Sciences

Ann Brice
San Francisco SPCA

Carol Patterson
International Bird Rescue

Martha Williams
Marin Museum of Natural Sciences

with special assistance from
Tina Papenhause, San Francisco SPCA

QUARTERLY MEETING

The WRC Quarterly Meeting will be held on April 1, 1978 at The San Francisco SPCA.

9:00-Board Meeting. This is an open meeting; all members are invited.

10:30-Regular Meeting. Topic: Wildlife Permits. The speakers are Captain Jim Zobel, CA Dept. of Fish & Game and Dick Basler, U.S. Fish & Wildlife Service.

All members will have an opportunity to ask questions regarding their permits.

Directions to The SF/SPCA:

From Marin County: From Golden Gate Bridge continue on 101 which turns into Van Ness. Stay on South Van Ness to 16th St. Turn left. Go 3 blocks.

From the East Bay: Take 9th St. Exit off 80. Go down Harrison to 16th St. Turn left. Go one block.

From the Peninsula: Go up 101 to the Vermont Exit. Turn left onto Vermont. Continue 2 blocks to 16th St. Turn left. Go 6 blocks.

WILDLIFE REHABILITATION COUNCIL MEMBERSHIP APPLICATION Date:_____

Name:_____ Phone:_____

Address:_____ City:_____ State:_____ Zip:_____

Organization:_____ Your Position:_____

Membership Category: Associate ($7.50) ____ Professional ($15.00) ____ Organization ($25.00) ____ Renewal ____

Mail to: Wildlife Rehabilitation Council, P.O. Box 3007, Walnut Creek, CA 94596

REHABILITATION
WILDLIFE COUNCIL

P.O. BOX 3007
WALNUT CREEK, CA 94596

Please note: Your subscription expiration date is on the upper right hand corner of the address label. Renew early & encourage a friend to join.