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WILDLIFE JOURNAL

Journal of the Wildlife Rehabilitation Council FALL 1984



Woodpecker Care . . . Page 3

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3. Fillers and short articles run between 500 and 1500 words.
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REHABILITATION WILDLIFE COUNCIL

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EDITORIAL . . .

Major Oil Spill Hits the West Coast

It promised to be an interesting fall in wildlife rehabilitation. Here on the west coast, and in some other places I have checked with in the mid-west, the numbers of animals brought in for care were up this year. We were all wearily looking forward to the reduced load that fall and winter generally bring and were surprised that the numbers of animals in our care, while reduced, were still up over last year. Hunting season had begun and with it came the usual gun shot injuries and lead poisoning cases. Migration had begun bringing in road strikes (i.e., migratory waterfowl flying at night and hitting wet streets instead of ponds only to find that wing loading problems prevented them from take off on solid surfaces). Other migratory birds ran afoul and hit windows with various forms of traumatic injuries resulting from the encounter. Additionally, the usual load of emaciated birds began to come in as winter came upon us. The trich and candida cases were trickling in as were those hit by cars, chewed by dogs, and attacked by cats. But, all in all, we still had hopes for a quieter season since many volunteers take more time to be with families during the holidays.

Then on November 6th, the USS Puerto Rico exploded outside the San Francisco Bay letting loose in excess of 105,000 gallons of various oils, most of which was a yellow lubricating oil. It had been nearly a decade since the last big oil spill in San Francisco and while WRC had an emergency response committee loosely formed in 1983, we were in no way feeling ready for a big spill. The committee coordinator, Mike Emerine, called me to say the initial birds coming into Marin Wildlife Center in San Rafael were few in number and maybe they would continue to trickle in. Alice Berkner of the International Bird Rescue and Research Center in Berkeley and Dr. Pat Gullett of the California Department of Fish & Game watched the situation carefully in the early hours getting ready to mobilize an effective response. It was fall and the area near Point Reyes was full of birds arriving as a part of the migration south. It had all the ingredients of a rehabers' nightmare.

Needless to say, the trickle of birds rapidly turned into a river with over 600 loons, murres, scoters, grebes and coots. Dr. Gullett mobilized two trailers funded by oil company donations that contained swimming pools, pens, gram scales, feeding syringes and tubes, along with a plethora of equipment needed for a spill. Currently, California has four such trailers stationed along the coast for such disasters. Arrangements were made at Fort Cronkite, a part of the Golden Gate National Recreation Area, to set up a bird cleaning station in an old barrack. The latrine was used for the actual wash room with other areas used for intake and assessment or housing

WRC was called on to send volunteers to wash birds. Centers in northern California were asked to send two people each day for however long it took to wash and waterproof the birds. Many rehabers came and some stayed longer than others. Jay Holcomb was able to pursuade his supervisor at Marin Wildlife Center to let him stay for the first ten days. Joan Humphrey, a WRC Board member from Davis, California set up a home away from home and stayed the entire two and one-half weeks. They, along with Alice and her sister Olive, provided the mainstay of consistency and leadership. Dr. Gullett was able to spend most of her time at the spill but returned to pathology once the spill was considered under control.

It was nice to see the cooperation between the California Department of Fish & Game, Alice Berkner, and the center directors as well as the ever present efforts of the Clean Bay, Inc. who funded the clean-up efforts. One would walk into a huge room only to hear the sounds of loons crying and grebes protesting while center directors who normally give orders, calmly took directions from each other. We were also blessed with the presence of the California Conservation Corps, a group of young men and women that work for nearly nothing to help on a variety of fire-fighting and disaster relief

(continued on page 14)

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Rehabilitation Notes: Woodpeckers

Pam Nave and Bill Stone
Alexander Lindsay Junior Museum, Walnut Creek, California

INTRODUCTION

Woodpeckers belong to the order Piciformes and family Picidae. They are small to medium sized birds. About 23 species range throughout the United States and are present in practically all parts of the country. Most are seen in pairs or are solitary. While usually sedentary, some species are migratory. They are very well adapted to life in the trees. All (except the Three-toed Woodpecker) are zygodactyl (two toes in front, back or slightly to the side). Their short legs with long, strong, sharp toes help them to grip bark. Additionally, their strong pointed tail feathers allow them to prop themselves upright on the side of the tree. The central feathers are shed only after the new pair have grown in.

Woodpeckers have straight, hard pointed bills that are used for chipping and digging into tree trunks or branches for feeding, excavating, nesting, and roosting as well as to drum or tap for courtship or to announce territories. They have a thick skull, a narrow space between the tough outer membrane of the brain and the brain itself, and strong muscles in the skull and bill which absorb the shock of a pounding bill. They have very long tongues that require a specialized support system. Their hyoid apparatus consists of a tongue bone that branches into cartiliginous hyoid bones or "horns". These horns curve upward over the skull where they attach inside the right nostril.

NATURAL DIET

In the wild, a woodpecker's diet is quite varied. A partial list of food consists of ants, aphids, beetles, caterpillars, centipedes, crickets, flies, grasshoppers, katydid eggs, millipeds, moth larvae, snails, and spiders. Their plant food consists of oak, poison ivy, grape, apple, elderberry, corn, buckthorn, cherry, almond, walnut, pine, hawthorn, currant, serviceberry, dogwood, cactus, acorns, and wood and sap from many trees.

BIRTH AND YOUNG

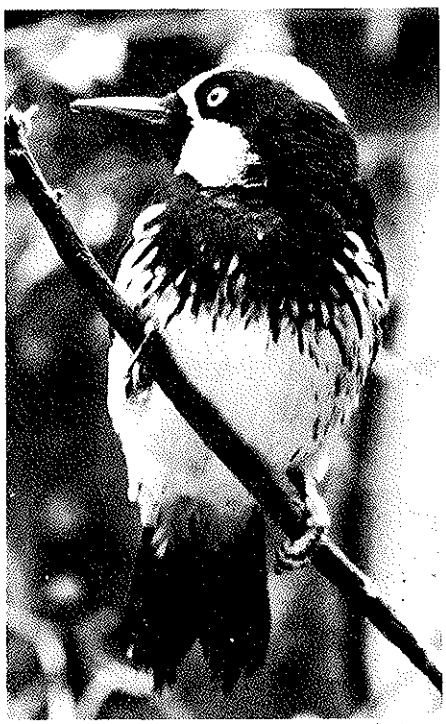
They are for the most part cavity nesters with the hole size, type of trees, etc. dependent on the bird's species. Clutch size consists of four to eight eggs with some species having two or more broods per year. The incubation period is approximately 12-14 days. Altricial birds, they fledge at about the age of three weeks. Climbing is a very important function for the young birds.

CAPTIVE CARE AND FEEDING

Infant: (Up to three weeks of age)

- Housing: A variety of set-ups can be used. The main emphasis should be to provide a safe, warm, and clean environment. A three gallon ice cream bucket lined with an absorbant material (i.e., disposable diapers) can be used. Birds are placed in a "nest" (i.e., margarine container lined with facial or toilet tissue). Young birds are not homeothermic and require additional heat sources (i.e., 7 watt red Christmas tree bulb or heating pad). Temperatures vary with the age of the young (decreasing the ambient air temperature with age) but are generally kept at about 80° F. The heat source must be placed in such a way that the animals will not injure themselves.
- *Diet:* Natural diet tends to be insectivorous and consequently high in protein. Captive diets for infant birds should be used that take this trend into consideration. Little is known about the dietary needs of these birds. They have been raised on moistened dry puppy or cat food based diets (see *Wildlife Journal*, Vol. 7, No. 2), along with supplements of soft bodied insect larvae. If the supplements constitute a major part of the diet, the calcium phosphorous ratio in them should be checked and brought up to a ratio of 2:1.

The birds should be fed during a 12 hour period (i.e., first thing in the morning onward for 12 hours). Depending on their age, the interval of feeding times and amounts will vary. Fledglings can generally be fed at ½ hour intervals depending on the content of the



Acorn Woodpecker.

diet used. Feed as often as they will eat. Weights of growing birds should be monitored by routine weighing on a gram scale. Birds that do not show a regular net gain of 1-2 gm/day up to their fledgling weights should have their diet and feeding regime reexamined.

- The technique for feeding woodpeckers is simple. Using a pair of blunt end forceps, take a piece of food the size of the birds mouth or slightly smaller and tap the soft, round protusions at the base of the beak on either side. This is the cue for the bird to open its mouth and it usually does so quite readily. Place the food at the back of the mouth, behind the glottis (the passageway to the lungs located at the rear of the tongue) and release it from the forceps. The bird should swallow the food when you remove the forceps. If not, gently stroke the throat below the beak, or give the bird a drop of electrolyte water (lactated ringers, gatorade, etc.).
- Birds that do not eat must be force fed until they adapt to their changed environment and captive diet. It may take 1-2 days of force feeding before the bird begins to willingly accept food on a regular basis from the feeder.

Adolescent: (three to six weeks)

- *Housing:* Adolescent housing consists of cardboard pet carrier with the bottom holes covered with tape on the inside. Cover the bottom of the carrier with an absorbant material such as disposable diapers. Place a piece of bark upright in the carrier for perching. Maintain warm ambient air temperatures. Although food and water should be provided, birds will still require hand feeding to some extent during this period. Other caging set-ups include taking a medium-sized cage and lining it with bark. Care must be taken to prevent feather damage, especially to the important tail feathers. At this stage, the cage can be placed outside for short periods of sunshine if protected from predators and other environmental factors.
- *Feeding:* This is the stage in which the birds are encouraged to begin to eat on their own. Woodpeckers begin pecking at an early stage and eventually find their food dish. Food can also be placed in bark crevices. Offer live larva, worms, and insects along with the captive diet. Food items should be removed when no longer fresh. Hand feedings are decreased as they begin to self-feed.

Adults and Pre-Release Adolescents: (six weeks and older)

- *Housing:* Injured adults may be placed in adolescent housing and provided with warmth and quiet. Juveniles and adults that are being prepared for release should be placed in an aviary that allows their flight abilities to be evaluated. Knowledge of normal flight patterns are helpful here as many of these birds have a characteristic dip in their flights. A variety of vertical bark perches should be present because these birds do not normally perch like song birds. Wire aviaries should be lined with sheets or altered in such a way so that their tail feathers will not be damaged by wire. The minimum size enclosure that can be used to evaluate the average sized woodpecker's flight ability is roughly 4' x 8' x 6' H.
- *Diet:* Provide the adult with a lumpier (drier) version of the infant diet. Also provide natural foods such as insects, fresh bark, and fruit. Many species of woodpeckers rely heavily on ants making this a good food item to present to the bird. Offering fresh bark may provide the bird with both cambian layer to eat and the insects hidden in the bark.

RELEASE

- Habitat considerations should be made allowing for release in areas with ample supplies of insects & utilized tree types.
- Diurnal; release during the day.
- Birds should be waterproof.
- Weights should be above the minimum given in Table I for that species. Birds migrating and undergoing rehabilitation at the end of migration will undestandably be at the lower end of weight range.
- Woodpeckers should have basic flight skills and the ability to sustain short to medium ranged flights at average ambient temperatures without panting.
- Hand-raised woodpeckers should, prior to release, have spent time in a flight aviary to build flight skills and to reduce human contacts so that they avoid humans after release. The amount of time will vary but is usually 7-10 days.

DISEASES

- Woodpeckers are susceptible to the various diseases and parasites affecting birds in general. This includes: microfilaria, capillaria, avian pox, coccidia, mites and feather lice. □

See weight graph on page *13*.

Photo by Ken Reichard.

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Fluid Therapy in Birds (Part 2)

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In the first part of this series we dealt with the physiology of fluid dynamics in birds. In this, the last part, we shall put the principles we have learned in the first part to practical use. We will first discuss the conditions which would be expected to result in fluid and/or electrolyte imbalances. This will be followed by a discussion of the products available to treat such conditions and how they should be used.

CAUSES OF FLUID AND ELECTROLYTE LOSS

There are several avenues of fluid and electrolyte loss that a rehabilitator will encounter. These will be considered separately.

Diarrhea

Diarrhea by definition encompasses the abnormal loss of water and electrolytes, the proportions of these differ depending on the causes of the diarrhea, i.e., is the cause the result of a lack of water absorption, or malabsorption which produces an osmotic diarrhea? However, the electrolyte loss can generally be characterized as a loss of moderate levels of sodium, potassium, and especially, bicarbonate ion (HCO^3) as well as large amounts of chloride.[1],[12] The loss of bicarbonate, a pH buffer, usually creates some degree of acidosis in an animal with diarrhea. These events occur by the depletion of the extracellular pool of fluids, i.e., the blood and fluid bathing the cells discussed in Part 1. In fact, severe diarrhea may be accompanied by a 50% reduction (with subsequent hypovolemic shock) in this pool's volume.[1] Considering the above, the water and electrolyte proportions of the formula one would choose to rehydrate such an animal would be essentially the same as its extracellular fluid. Appropriate choices would be lactated ringers or Normosol-R as detailed in Table 1.

Vomiting

While true vomiting probably does not occur in birds, regurgitation from infection, obstruction or other pathology can result in appreciable loss of water and electrolytes. Such losses are usually restricted to water, sodium, potassium and large amounts of chloride.

Traumatic Injuries

Such injuries commonly result in hemorrhaging which is a direct drain on the extracellular pool and, as such, should be replaced with a balanced electrolyte solution mimicking the constituents of the extracellular fluid compartment. Injuries producing only soft tissue damage may also result in loss of water and electrolytes from body fluid seeping into the open wound. Cardiovascular, renal and metabolic changes following trauma can also be a significant source of loss of varying proportions of water and electrolytes.

Inanition or Starvation

Perhaps the most common form of dehydration in birds seen by rehabilitators is that which occurs secondary to a lack of food intake. In birds weighing less than 2 ounces (57 grams), the amount of body water lost daily far exceeds the sum taken in from free water in its food and the amount produced by oxidative metabolism (see Part 1 for definition) of its food. Thus, these sized birds must drink free water to maintain their water balance. In birds over 2 ounces (57 grams), the amount of oxidative metabolism produced water is about equal to that lost by the bird daily (providing the bird is not heat stressed). Thus, most raptors, provided they are in a thermoneutral environment, can meet their daily water loss needs by metabolic conversion of their feed to water. Additionally, the feed itself contains varying amounts of free water, i.e., a mature mouse is about 60-70% water. In other words, a diet of mice brings in free water and allows water to be produced by metabolism of the mouse's body protein, fat, and carbohydrates. Together these supply enough water for daily body needs. If, however, the bird is subjected to some disease or trauma that prevents it from feeding, dehydration can result. This dehydration depends on the size of the bird, i.e., in 100-150 gram birds, severe, life threatening dehydration may occur in 48-72 hours while in birds weighing 1.5 kilograms, dehydration may not become evident for 4-6 days. Usually, feed and water deprivation in mammals and birds results in the loss of water and electrolytes[1]. However, the primary deficit is in water. Among the electrolytes, minimal losses of sodium and chloride occur with marked depletion of body potassium levels.

Metabolic Disorders

There are a variety of metabolic disorders which can result in electrolyte and water loss including pancreatitis, diabetes and liver disease. While these conditions have been described in birds, they are very difficult to

diagnose on the living animal without extensive biochemical testing. Suffice to say that in these conditions a balanced electrolyte solution is usually the recommended therapy.

Other Causes

Lastly, the rehabilitator must also be cognizant that a variety of diseases, various types of trauma, emotional upsets (fright from being handled, etc.) and environmental abnormalities such as heat and cold stress, noise, excessive light, etc. can cause electrolyte and water losses as a result of changes occurring in the respiratory system (remember water is lost via evaporation in panting), kidneys (fright reactions can result in urination via hormonal action) and intestines (lack of absorption or "nervous diarrhea"). These changes are usually the result of the action of several different hormones principally of the adrenal gland. Frequently these losses may become rather important in the overall picture of fluid balance.

REHYDRATION PRODUCTS

In Table I, a number of commercial and homemade electrolyte and water solutions are listed. These products can be broken down into the following categories.

Polyionic Solutions

These solutions are balanced in terms of electrolyte constituents and tonicity to resemble very closely the extracellular fluid. They contain physiological concentrations of sodium chloride, potassium, etc., as well as a carbohydrate blood buffer such as lactate, bicarbonate, acetate, or glucuronate. Acetate and bicarbonate can act directly as buffers in the body while lactate needs further metabolic action to act as a buffer. There are some variations in these products but basically they can be used interchangeably. Notice that they are used as *replacement fluids only*.

Dextrose Polyionic Solutions

These solutions are polyionic replacement products balanced to the extracellular fluid but also containing 2.5% to 5% dextrose (glucose). The addition of glucose makes them hypertonic to the extracellular fluid and as such they cannot be given subcutaneously (except 2½% glucose in half strength or lactated ringers). They are used intravenously or orally.[3] Since glucose is rapidly metabolized to carbon dioxide and water in the patient's body, these solutions are an additional water source as well as a source of energy. Each gram of glucose in these fluids contains four kilocalories of energy. This level will supply adequate glucose to animals that are not suffering from a significant hypoglycemia. However, severe hypoglycemia and/or daily energy needs cannot be practically met with the use of these fluids.

Saline Solutions

While these are isotonic in relation to the extracellular fluid, they are inferior to polyionic solutions for replacement of extracellular fluids losses because they contain only sodium and chloride. They are most suited to those conditions that require an increase in body salt in addition to expansion of the extracellular fluid.[3] They should always be used with great care because of these high levels of salt. Recent evidence indicates that they are also effective in fluid and electrolyte imbalances that occur when one suffers water and food deprivation.

Polyionic Maintenance Solutions

These fluids are not balanced to the extracellular fluid but rather are formulated to cover daily electrolyte and water needs of a patient that is not eating or drinking sufficient water and electrolytes, but is in normal hydration status. As such, they contain levels of potassium usually at least twice as great as replacement fluids. Both Kool-Aid® and salt as well as Gatorade® should be put into this category as they are obviously not equivalent to extracellular fluid. However, the producers of the latter product as well as others in this category claim that their solutions will meet the deficits in fluid and electrolytes that occur with mild to moderate diarrhea or other fluid losses in humans as determined by field research. Since such research is lacking in avian species, it is the author's belief that they should *not* be routinely employed for replacement therapy. One should stay with the product balanced to the extracellular fluid to avoid any problems. Additionally, since these fluids contain high amounts of potassium, they should not be used in large amount IV to correct hypovolemia or shock, i.e., as a replacement fluid, as the potassium can cause heart irregularities and even death.

Dextrose in Water

Five percent dextrose in water contains no electrolytes, and is hypotonic. This would appear to make it ideal for delivering 5% glucose subcutaneously. However, the lack of a balanced electrolyte pattern makes this fluid unlike the interstitial fluid found in this area and thus not an entirely appropriate fluid for this purpose. Further, since this fluid is hypotonic to the blood when given IV to excess, it can produce edema of the tissues or "water intoxication".[3] Rapid delivery of large amounts of this type of fluid can also produce rapid body dehydration. This occurs because when large amounts are given, you essentially dilute the body's fluids. This triggers the regulatory mechanisms to recognize a too dilute blood and to expel enough fluid and electrolytes to bring the blood back into the proper dilution.[3] This fluid should not be used unless there is a severely elevated sodium level since it will dilute out normal levels of sodium.

ELECTROLYTE THERAPY

How do we select an appropriate fluid for rehydrating the animal? First, one must know what types of electrolytes and how much water are being lost before we can select a product. Usually this requires sophisticated biochemical testing of the blood for electrolytes, etc. as well as a good assessment of the degree of water loss. However, even these tests are known not to be true indicators of the whole body level of electrolytes. The biochemical tests are an impractical task for the average rehabilitator due to their expense and the large amount of blood needed to perform them. We would recommend that when economically feasible as well as practical (considering the size of the bird and the volume of blood needed), plasma chemistries be performed. We routinely perform plasma chemistries on all birds of prey admitted with serious injuries. Today's modern equipment can perform as many as 21 biochemical tests on .5 cc of plasma for less than $10.00.

If we make a certain assumption, we can usually be able to treat most forms of dehydration with excellent results without performing plasma electrolyte, etc.

TABLE 1

Commercial and Homemade Rehydration Solutions

Product	Na[B]	K[B]	Cl[B]	Ca[B]	Mg[B]	Buffer[A]	Glucose[C]	Calories	Tonicity	Use
Lactated Ringer's Acetated Ringer's	130	4	109	3	0	28-L	0	9	150	polyionic replacement
Normosol-R Isolyte-R Plasma-Lyte-R Polyionic-R	140	5	98	0-5	0	50 L,A, or G	0	0	150	polyionic replacement
Ringer's	147	4	156	5	0	0	0	0	150	polyionic replacement
Normal Saline (.99%)	154	0	154	0	0	0	0	0	150	saline solution
Normosol-R in D5W	140	5	98	0-5	0	50 A & G	5	185	hyper	polyionic Dextrose replacement
Lactated Ringer's in D5W	130	4	109	3	0	28 L	5	179	hyper	polyionic Dextrose replacement
½ Strength Lactated Ringer's in D2.5W	65	2	54	1	0	14 L	2.5	89	150	polyionic Dextrose replacement
Polysol-M Plasma-Lyte-M Normosol-M Isolyte-R Isolyte-H Polyionic-M	40	10-16	40	0-5	3	16-24 L,A, or G	0-5	0-20	hypo to hyper	SubQ maintenance solution
Pedialyte-M	30	20	30	4	4	28 L	5	20		maintenance
Kool-Aid and 1 tsp. salt/qt. water	20	20	40	trace	trace	0	10	40		maintenance
Gatorade	20	3	11	trace	trace	?	2 Glu 2 Suc	210	hyper	maintenance
5% Dextrose in water	0	0	0	0	0	0	5	20	hypo	water replacement

A L = Lactate, A = Acetate, G = Glucuronate, B Meg/l C g/dl

analysis. This assumption is that, as noted earlier, most forms of dehydration occur as a result of extracellular fluid and/or electrolyte depletion. Thus, we simply replace the volume of extracellular fluid that has been lost by using an electrolyte solution balanced to resemble the extracellular fluid.

Examining the two compartments of the extracellular pool, we find the concentrations of electrolytes in the interstitial fluid is similar to that of plasma, with the exception of a lower protein concentration than in plasma.[1] Thus plasma (not serum) values can be used as general overall overview of the extracellular pool of body fluids. Table 2 lists the electrolyte constituents that have been found in the blood of various species of birds.[3]

Examination of these data will reveal that they are essentially the same regardless of the species from which they were obtained. Comparison of these values with those of commercial rehydrating solutions in Table 1 will allow you to pick out an appropriate replacement fluid. Turning to this table, it is obvious we are restricted to those products which are formulated as polyionic replacement solutions with the exception of the apparent success with mild to moderate cases of dehydration where as discussed previously, products such a Pedialyte-M or Gatorade® appear to be sufficient in man. Unless you are very confident in judging the degree of dehydration, any concurrent or subsequent electrolyte changes and the cause of these losses, it is best to use a polyionic replacement solution.

TABLE 2

Comparative Normal Plasma Electrolyte Concentrations

Species	Sodium meq/l	Chloride meq/l	Potassium meq/l	Bicarbonate	Calcium meq/l	Phosphorus meq/l	Glucose g/dl	Total Protein g%
Red-tailed Hawk	143-162	118-129	2.6-4.3	13-24	10-12.8	1.9-4.4	292-390	4.0-5.2
Chicken	146-1.5	120.1-1.6	3.6-2	20-24	7.5-.4	6-1.1	201-253	3.3-4.7
Turkey	153-3	109-3	3.9-.7	20-24	7.5-11.1	3.8-6.1	200-368	3.5-5
Blue and Gold Macaw	138-153	103-110	5-10.4	—	8.8-12.3	1.9-2.6	286-332	4.3-5.6
Finch	140-151	107-120	4-12	20-24	7.5-10.1	1.2-4.1	200-450	2.5-5
Great Horn Owl	150-159	115-119	2.2-4.5	18-24	8.5-10.9	3.8-7.0	324-405	3.8-4.6
Barred Owl	147-160	107-115	1.1-5.3	19-23	9.6-11.4	3.6-6.7	202-369	3.4-4.3
Crow	149-159	108-117	2.3-4.8	20-24	7.8-10.1	3.1-7.2	265-320	3.2-5.4

Degree of Dehydration

Having determined that a replacement (for fluid losses) is needed, we should assess the degree of dehydration in order to implement appropriate fluid therapy. The clinical parameters used to assess dehydration in mammals are often very subtle and easily overlooked in birds. In mammals, dehydration of less than 5% does not produce clinical problems. At 5% the skin shows a slight loss of elasticity and can be tented. Moderate skin inelasticity, delayed capillary refill time and slight depression of the eye in its orbit characterizes 7% dehydration. Markedly inelastic skin, delayed capillary refill, sunken eyeballs, and early evidence of hypovolemic shock may be seen at 10-12% dehydration. At 12-15%, hypovolemic shock is evident and death is very close.[11]

In the author's experience, similar criteria are observed in birds. For example, currently, the extern at Treehouse Wildlife Center is conducting fluid therapy and osmolality trials on Great Horned and Barred owls.[4] After 5-7 days of food and water deprivation, the owls exhibited a 10% dehydration characterized by tacky, dry and pale mucous membranes, a "wrinkling" of the eyelid (probably the result of loss of eyelid elasticity), a wrinkling and scaling of the foot skin and cere which could be "pinch tented" rather easily and a decrease in the diameter of peripheral veins such as the brachial, no doubt the result of hypovolemia. In our experience, one of the hardest parameters to determine is the degree of skin elasticity since in birds there are areas where the skin is closely adhered to the underlying tissue and is not very elastic while other areas are highly elastic and mobile. If you are knowledgeable as to which areas have highly elastic skin normally, you usually can discern some degree of inelasticity. However, an avian picture can be developed in which obviously slow capillary refill time, tacky, dry oral membranes and mild to moderate eyelid wrinkling indicate a fluid deficit of less than 10% but greater than 5%. Ten percent or greater deficit appears to be associated with dry, tented, scaly skin often with a brownish or reddish color (from dehydrated underlying skeletal muscle, especially on the ventral wing, medial thighs, neck and feet) dry, pale oral membranes, very slow capillary refill time, dry shrunken cere, eyeballs markedly shrunken into the orbit and narrowed, as well as easily collapsible peripheral veins.

As in mammals, the relationships between the percentages of red blood cells (PCV) and the amount of total proteins (TP) in a given sample of blood are helpful in determining the level of dehydration in birds.[3] However, frequently the picture becomes complicated when the PCV and TP either do not show significant changes even in moderate dehydration or the changes are minimal and fall within the lower end of the normal range. This commonly occurs when the animal has not eaten and the PCV and TP are thus reduced due to starvation. In this case, the effects of dehydration do not serve to elevate these values past the normal range. On the other hand, severe dehydration is usually associated with at least moderate changes in these values.

As an example of the use of PCV and TP in uncomplicated cases, we recently successfully treated a severely dehydrated (12-15%) Red-tailed Hawk (from heat exposure) whose initial electrolytes were on the average of 20% above normal with total protein and PCV values 50% above normal. After rehydration with 300 cc's of Normosal-R in D5W IV, the above values returned to normal and persisted as such until the non-releasable bird was euthanized 18 days later. Thus, PCV and total proteins are good avenues of assessing as well as monitoring the animal's hydration status, but are not without their problems.

We have recently been studying the plasma osmolatity of normal and dehydrated birds and have found it to be an excellent tool to determine the degree of body dehydration. Hopefully, we can begin to use this parameter clinically in the very near future.[5]

At Treehouse Wildlife Center we have set up further criteria to guide us in our fluid therapy. First, we now consider that any bird admitted is probably suffering at least 5-7% dehydration. This value is equivalent to a little less than one blood volume which is about 6-9% in most birds (Table 3). Secondly, any bird admitted with moderate to severe emaciation that has a protein value

below two is considered severely dehydrated and treated appropriately.

At this juncture, let us summarize our discussion to date. We have discussed various causes of electrolyte and water loss and have found most to affect changes in the extracellular pool. We have discussed various commercial and hand made products and classified them as to their constituents and intended use. We have discussed the selection of a product so as to utilize one that is similar in electrolyte content to that of the extracellular fluid. Finally, we have described the clinical and laboratory procedures we can use to assess the extent of dehydration in our patient as well as their limitations. Now let us continue our discussion describing the methods for rehydrating the patient and how to monitor the success of the rehydration program.

TABLE 3

Species	Plasma Volume ml/100 mg	Total Blood Volume ml/100g/BW
Mallard Ducks	6.4-6.6	10-11.3
Coot	5.1	9.5
Pigeon	4.4	9.2
Pheasant, Ring Neck	3.2-4.5	4.8-6.7
Red-tailed Hawk	3.5	6.2
GHO	3.4	6.4
Coturnix Quail	4.29-4.73	6.76-7.4
Domestic Geese	3.36-4.15	5.83-6.75
Japanese Quail		5.49
Dog		7.7

In general, blood volume in birds appears to be between 6-12% of live body weight. As the bird ages and puts on fat, a decrease in blood volume occurs.

METHODS OF REHYDRATION

The three basic plans of fluid therapy actually encompass three separate goals. One, replace the lost fluid and electrolytes; two, maintain the daily intake of water and electrolytes; three, replace any continuing losses of fluid and electrolytes.[3]

As stated previously, we utilize clinical signs and certain blood parameters to determine the extent of dehydration that exists. Next, we need some mathematical calculations to determine the amount of fluid to give. Below a few examples are detailed.

Example 1: Bluejay (150 grams). Assessed dehydration, 12%. Thus:

$$\frac{150 \text{ grams}}{100 - 12\%} = \frac{150 \text{ grams}}{88\% \text{ (or.88)}} = 170 \text{ grams}$$

The birds original weight before the water loss was 170 grams. Subtracting 150 (the bird's present weight) from 170 is equal to 20 grams of lost water. As one gram of water equals one milliliter (or cubic centimeter) in volume, the bird has lost 20 milliliters of fluid.

Example 2: Great Horned Owl (1680). Assessed dehydration 15%. Thus:

$$\frac{1680 \text{ grams}}{100 - 15\%} = \frac{1680}{85\% \text{ (or .85)}} = 1976 \text{ grams}$$

To determine the amount of water lost we subtract 1680 from 1976 to get 296.5 grams of water which is equal to 296.5 cc's.

Now that we have determined the amount of fluid to give and have decided to use a balanced polyionic replacement fluid, how should it be administered? We then consider the routes of administration, their advantages and disadvantages.

There are three avenues of fluid therapy. They are: intravenous, subcutaneous and oral. As a rule, the least invasive method to resolve the dehydration should be used. Oral therapy is the preferred method provided the bird is conscious and its bowel functional. Generally, up to 50 ml/kg of body weight can be given at hourly intervals without ill effects. Exceeding this amount can easily result in regurgitation. Intravenous therapy is mandatory in severe cses of dehydration and shock, comatose birds, and those suffering from marked starvation, but is considered unnecessary in mild to moderate cases. This avenue of administration requires a venapuncture and catheter placement and is detailed rather well in Scott Sims' article in the 1983 Fall *Wildlife Journal*.[6] While subcutaneous therapy has been advocated by some, the author finds it to be of little value in comparison to oral or intravenous therapy and does not use it. It is an invasive procedure that can lead to puncture wounds, is painful and generally only small volumes can be deposited. Further, solutions that are not isotonic such as polyionic solutions containing greater than 3% glucose should not be used subcutaneously as they would be hypertonic to the extracellular fluid and thus actually dehydrate the patient further. Additionally, the rate of absorption from the subcutaneous area is slow compared to oral therapy.

Rates of Administration

Now we must determine the rate of administration of the fluids we are giving. When given orally, fluids should be given at a rate of up to but not more than 50 ml/kg every 1-6 hours until the clinical signs and blood parameters indicate the bird is rehydrated. The Red-tailed Hawk described previously was given 40 ml of Normosol-R in D5W orally every hour for four hours, then every three hours until rehydrated. Usually, one half of the fluid deficit is met within 4-6 hours and the remainder by 12-14 hours to achieve the most beneficial effects.

When giving fluids intravenously, it is usual practice not to exceed a delivery rate of 50-90 ml/kg/hour in mammals (one blood volume in the dog and cat respectively), otherwise pulmonary edema may develop. In birds, we know that they are much less susceptible [7,9] to the development of pulmonary edema, thus recommendations for birds have been as high as 90-130 ml/kg/hour. In recent tests with Great Horned and Barred Owls, we have found that birds will tolerate 100 ml/kg/hour without any evidence either gross or

histological of pulmonary edema.[4] However, we have concerns over whether this high amount may activate regulatory systems to dispose of a large amount of it within a very short time (less than 30 minutes) and thus negate the effects of therapy. In fact, in healthy horses and dogs, it has been shown that even rates of 10-40 ml/kg/hour may result in sufficient blood volume expansion to promote the loss of a good portion if not most of the fluid given.[7,8] Thus, until more research is accomplished to define the actual problems that might arise from too rapid an expansion of the blood compartment in birds, we recommend a maximum rate of 90 ml/kg/hour (40.0 ml/lb./hour).

If utilizing the intravenous route of fluid administration for mild to moderate cases of dehydration, (which is *not* recommended) the maximum rate should be between 10-50 ml/kg/hour. In severe dehydration (without hypovolemic shock), the rate should be elevated to 50-90 ml/kg/hour but, as noted above, should not exceed 90 ml/kg/hour. In cases of hypovolemic shock in cats and dogs, it is presently recommended that initial loading doses of 50-90 ml/kg every twenty minutes be given until stable and then followed by continual therapy at 90 ml/kg/hour until the patient is clinically recovered from dehydration.[9] Our initial work in raptors with extensive hemorrage and hypovolemic shock suggests these guidelines also hold true for birds.

One should also remember that the more acutely (faster) the bird is dehydrated, the faster the losses must be replaced to avoid the developing of rapid irreversible electrolyte changes which can cause acute death.[3] However, in chronic losses (over a period of days or weeks) body compensating mechanisms have had time to adjust toward normal and rapid rehydration is much less critical.

Assessment of Rehydration Status: Some Case Histories

Once we have started our fluid therapy, we must have a method to assess our efforts. Remember that the clinical signs of dehydration should be reversed with rehydration. We have found the color and conditions of the oral membranes of the birds we rehydrate will change from a dry, pale color to a rich pink and become moist and glistening when rehydration is achieved. In our experience, this change appears to be the most reliable indicator next to blood parameters. Blood should also be examined to determine if the PCV and total protein (TP) reflect rehydration. A few examples will illustrate the changes that occur with rehydration.

Example 1: Cooper's Hawk admitted within two hours of the injury which was caused by a collision with a car and resulted in a closed ulnar fracture with little hemorrhage. Assessed dehydration: 10-12%. the PCV was 50% and the total protein (TP) was 5.6. Following rehydration intravenously with 100 ml of Normosol-R in D5W within six hours of admission, the PCV was 41 and the total protein was 3.6. Initially, the PCV and total protein were elevated because of hemoconcentration or the blood becoming concentrated following the loss of body fluids. Rehydration with an appropriate volume of balanced electrolyte solution caused the PCV and total protein to return to their normal levels indicating rehydration or hemodilution. Further, these values are apparently normal for this species of bird and, therefore, indicate that a significant degree of hemorrhage has not occured. In other words, the rehydration did not unmask a hemorrhage.

Example 2: A Crow with an open fracture of the left humerus with a laceration of the brachial vein resulting in severe blood loss. The bird was obtained within 30 minutes of the accident. Assessed dehydration: 10%. The initial PCV was 17% and the total protein was 2.6. Following rehydration with 50 ml of fluid IV over a two hour period, the PCV dropped to 10% and the total protein dropped to 1.7. The initial PCV reflected blood loss. However, a good degree of dehydration caused hemoconcentration masking this value, while rehydration resulted in unmasking of a very serious anemia. Continued slow drip IV therapy and oral feeding of an elemental fluid diet (Isocal ® by Meade-Johnson) over 48 hours changed the PCV value to 16% and the total protein to 3.6. The bird eventually recovered on this plan.

Example 3: A Great Horned Owl with severe emaciation (about 60% of body weight lost). The initial PCV was 23%, total protein was .9, and glucose was 93. Assessed dehydration was 15%. The bird was admitted in convulsions. A moderately fast IV drip of 50% glucose, amino acids, and electrolyte solution delivered 186 ml in one hour and produced a PCV of 9%, a total protein of 1.1 and a glucose of 183. However, continued fluid therapy produced marked urination presumably since the blood did not have enought osmolality to hold in the water. The bird died 18 hours later. These cases are all too common in rehabilitation centers and require treatments other than fluid therapy. Such treatments include methods to elevate the red cell volume (transfusions or Dextran therapy) and total protein (amino acid therapy). However, at present, guidelines are not available for this type of therapy in birds. We are presently studying the use of these products with encouraging results.

While seldom mentioned in most texts, we have determined that monitoring of urine output is an excellent method of assessing the extent of hydration. Birds in moderate to severe dehydration void little, if any, urine, while those that have been rehydrated appear to void normal urine volumes, while overly rehydrated birds void copious diluted urine. A refractometer can be used to monitor the specific gravity of the urine which is usually 10.8. One of the goals of fluid therapy (in terms of the kidney) is to get it working again by producing urine.

Determining Daily Maintenance Needs

Now that the bird's water and electrolyte losses have been replaced, we must also determine if and in what amount fluids should be given to maintain daily intake as well to replace any ongoing fluid losses.

Daily maintenance needs for most birds appears to be on the order of 66-132 ml/kg/day.[10] However, this is usually only if the bird is in a thermoneutral zone and is at rest rather than being exercised. In these latter categories, fluid requirements obviously go up. Electrolyte requirements are for the most part unknown, but if extrapolated from data on dogs,[3] they are on the order of 1.5-1.8 meq of sodium per kg of body weight, and .85-1.3 meq of chloride per kg of body weight.

Comparison of these needs with replacement fluids shows they supply excess amounts of electrolytes which

the body would need to dispose of and thus also lose water, which defeats the purpose of the fluid therapy. Thus, maintenance polyionic solutions are used for maintenance therapy. Let's take an example to illustrate the use of these fluids.

Example: One kg Red-tailed Hawk that has been treated for dehydration but cannot eat because of a fractured jaw and must be given fluids daily. If we assume a normal daily intake of 30 ml/lb and the above electrolyte requirements, 60 ml of Normosol-M, Pedialyte-M or Gatorade® could be used.

When these three fluids are compared, it is obvious that Pedialyte-M and Normosol-M are more than adequate with the possible exception of the slight deficiency in Normosol-M potassium. Gatorade, however, is obviously not an appropriate maintenance fluid when comparing the requirements for sodium and potassium.

Fluid Therapy Comparisons

	Rqmt.	Pedialyte-M	Normosol-M	Gatorade
Water	60 cc's	60 cc's	60 cc's	60 cc's
Sodium	1.5-1.8	1.98	2.6	1.32
Potassium	1.1-1.6	1.32	.86	.2
Chloride	.85-1.3	1.98	2.64	.73

Thus, any one of the maintenance polyionic solutions should be given at the rate indicated for oral replacement therapy. Alternately, the fluid can be given IV at no greater rate than 10-20 ml/kg/hour by slow drip utilizing catheter techniques referred to by Sims.[6]

The last category we must deal with is to replace any continuing losses of body fluids beyond maintenance needs. This type of therapy is common in animals with diarrhea. The calculations and methods outlined earlier under initial replacement therapy should be used.

SUMMARY

Fluid therapy in birds is somewhat complex and requires a working knowledge of the subject in order to be successfully accomplished. This article is intended to provide current guidelines for rehabilitators who practice fluid therapy in wild birds in their attempts to salvage the injured or otherwise ill individuals.□

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Letters to the Editor

Dear Editor:

On October 31, 1984 the tanker U.S.S. Puerto Rico suffered an onboard explosion three miles off the coast of San Francisco. The hull was towed out to sea. On November 3, the ship broke apart. The stern sank, spilling 12,000-18,000 barrels (42 gallons per barrel) of lubricating oil and oil additives. On November 6 an oil slick reached the Farrallon Islands. The slick continued to move northeast, polluting the Point Reyes Peninsula, and later, Bodega Bay.

Oiled birds began to beach themselves on November 7. Volunteer crews collected live and dead birds. Live birds were transferred to a central cleaning facility located near Sausalito, California. Over 600 birds were cared for and cleaned by trained volunteers, many of them members of the Wildlife Rehabilitation Council.

The cleanup effort was coordinated by Ms. Alice Berkner of the International Bird Rescue and Research Center. Due to the extraordinary dedication *and experience* of the volunteer staff, over half of these birds survived and were released.

I would like to thank all of the WRC members who cooperated. Their organizations are listed below.

Marin Wildlife Center,
San Rafael
California Marine Mammal Center,
Sausalito
Point Reyes Bird Observatory,
Stinson Beach
San Francisco SPCA,
San Francisco
Sulphur Creek Nature Center,
Hayward
Wildlife Rehabilitation Service,
Fairfield
Davis Wildlife Care Association,
Davis
Native Animal Rescue,
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Youth Science Institute,
San Jose
Alexander Lindsay Jr. Museum,
Walnut Creek
Peninsula Humane Society,
San Mateo
Sonoma Wildlife Rehabilitation Center,
Cotati
Davis Raptor Center,
Davis
San Francisco Bay Bird Observatory,
Alviso
Sacramento Jr. Museum and Science Center,
Sacramento

Thanks, one and all.

Sincerely,

Patricia A. Gullet, DVM
Assoc. Wildlife Pathologist

Dear Editor:

I had the opportunity to see a recent issue of the *Wildlife Journal*, and was quite impressed by its new format and the quality of the material contained within its covers.

I know that its arrival is looked forward to by the Supervisor of our Wildlife Department, Sandi Stadler, as she was beating the bushes looking for it when I had it.

Congratulations on a great job!

Sincerely,
Richard Ward, Executive Director,
Peninsula Humane Society,
San Mateo, California

Thanks Rich! The encouragement is good to hear. While the journal is far from the best possible, we are constantly working to make it better & better.

Dear Wildlife Rehabilitation Council:

In the July 1984 issue of the "Mother Earth News", I learned of your organization and decided to write for assistance on becoming a rehabilitator. I've reached a dead end after trying to be legal with local authorities.

Here at the Garden State Humane Society, we are increasingly faced with caring and relocating wild animals. It is depressing to see the rate at which animals are being displaced due to the increasing human presence. It is even more depressing when you consider how easy it is to get a hunting or trapping license to kill these animals. Our problem is in getting a license to provide temporary care.

We have called the required authorities for information on acquiring permits and been told after much referral within the agency, not to worry about permits. The official response was "as long as you are releasing them, you don't need to bother with a permit or license. Nobody will bother you." WE'D LIKE TO BOTHER!!!! Is this unheard of? Are we asking too much? What would you do? Am I over reacting? Please Help!

Jill Anfenson
Delair, New Jersey

Dear Jill:

Your question is one of national significance. I have talked with many rehabilitators in other states that have also encountered this same problem. Conservation laws were written long before wildlife rehabilitation evolved and the law does not really take our existence into account.

I have a few suggestions for you. STOP calling the authorities. Communicate with them in written form. They normally will respond this way and you will have their directions, or promises (not to be bothered) in writing. Make a formal request for a wildlife rehabilitation permit. Be nice. Type your letter, they can read it better. If you receive no answer in three weeks, write a follow-up letter and send it certified mail, return receipt requested. This will nearly always get an official response. If they respond by calling, request they follow the conversation up with a letter. Keep copies of all your correspondence.

You should have a permit. It is an official way of saying that you and your organization are qualified to care for wild animals. Remember, the permit is only the first step in becoming a rehabilitator. Contact NWRA and WRC for information on continuing education, conferences, publications, and seminars. You need to have the proper knowledge to be a rehabilitator and then keep current in this ever growing field. Good Luck!

Jan White
Editor, WRC

(continued on page 14)

Table I
SELECTED WEIGHTS OF NORTH AMERICAN WOODPECKERS*

Species	Sex	No. of birds	Ave. ± S.D.	Range	Location
Lewis'	U	5	116	108-138	CA
Red-headed	U	89	71.6 ± 7.5	56.1- 90.5	Ontario
Acorn	F	39	78.1 ± 5.4		CA
	M	47	82.9 ± 4.2		
Gila	F	24	60.0 ± 3.13	53.8-67.0	AZ
	M	20	69.7 ± 6.36	54.6-80.6	
Golden-fronted	F	14	76.4 ± 6.36	66.0-90.0	San Luis Potosi
	M	29	85.4 ± 7.00	73.0-99.0	
Red-bellied	F	9	56.2		FL
	M	22	67.2 ± 5.86		
Yellow-bellied Sapsucker	U	52	50.3 ± 4.29	40.7-62.2	PA
Red-breasted Sapsucker	U	13	48.9 ± 4.39	40.1-54.7	CA
Williamson's Sapsucker	U	19	47.6 ± 2.73	44.4-55.3	NEV
Ladderbacked	U	21	30.3 ± 3.55	24.0-41.4	AZ
Nuttall's	U	9	38.3	32.8-43.1	CA
Downy	U	383	27.0 ± .19	20.7-32.2	PA
Hairy	F	11	62.5 ± 1.98	59.3-65.9	PA
	M	27	70.0 ± 3.20	60.8-79.6	
Strickland's	F	5	44.1		AZ
	M	11	49.4 ± 2.32		
Red-cockaded	U	12	43.6 ± 3.90		FL
White-headed	F	17	59.2 ± 3.82	52.6-66.4	OR
	M	18	63.0 ± 3.40	55.6-68.0	
Three-toed	F	5	61.2	57.0-66.0	Norway
	M	10	70.1 ± 6.71	65.0-74.0	
Black-backed	F	3	66.6	63.4-71.3	Ca
	M	6	72.0	61.3-88.1	
N. Flicker	F	65	129 ± 7.67	106-164	PA
	M	94	135 ± 6.37	114.160	
Pileated	F	4	266	250-284	PA
	M	2	308	308-309	

*All data listed in this table is from *Body Weights of 686 Species of North American Birds* by John B. Dunning, Jr. Western Bird Banding Association, Monograph 1, May 1984.

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(continued from page 2)

projects. Initially they cleaned the pens and prepared the rehydrating solution. Later, some were trained to clean birds and do tube feedings. While all oil spills have their chaotic moments, even outside observers noticed how organized everything was.

One of the things that was different about this spill was the availability of quantities of people, rehabers, who knew how to care for wild animals. there was no need to accept the well meaning help of untrained people, many of which called in to offer their services. The result was very few accidental deaths, not even one from poor tubing technique.

Still, at the end of day 14, not all of the birds had been washed. Vast quantities of hot water were required and peeiodically shortages occured leaving the bird washing at a stand still. Frustrated as we were at times, we realized this was probably the most organized and best staff spill the San Francisco area has seen. Some of the birds came out of their wash and dry and went into the pool squeaky clean and waterproof. These lucky ones were released. As time went on, anemia was detected and the longer the birds stayed, the worse they got. Still, we were able to get about half of the birds out fairly quickly.

The news media was everywhere the first few days but quickly lost interest. Then, two weeks after the spill on Thanksgiving Day, while we went about our business, they returned to interview the rehabilitators who chose to spend the holiday working on the birds. Why did we do it? The answers were fairly simple, because it needed to be done. The animals still needed cleaning and feeding. Meanwhile, Alice and Clean Bay arranged for caterers to present us with a magnigicent turkey dinner will all the traditional foods. Some of the vegetarians among the ranks wondered how we could clean and care for wild birds in one room and eat turkey in another! Well, you can't please everybody!

As we got to the end of the cleaning, birds requiring continuing care wer sent out to various centers and bird station was dismantled. While I have no idea what it all cost, it was not cheap. I watched hundreds of pounds of smelt devoured, gallons of Dawn dishwashing liquid used, gallos of Gatorade tubed, mountains of sheets soiled (more or less permanently), acres of bubble carpet popped, and a river full of hot water go by.

It was now December, supposedly the quietest month of the year. We came home to our trauma and disease cases and resumed normal operations. Wearily, we look ahead to the coming year. There are some things we plan to improve, and we hope that lady luck will be kind and spare us further catastrophies until we have sufficiently recovered.

Jan White

Letters

Gentlemen:

I am very interested in knowing more about Basic Wildlife Rehabilitation 1AB, mentioned in the Summer 1984 *Wildlife Journal*. Will you have regional seminars or will they be in California? I am very interested in these seminars.

Sarah C. Haywood
New York, New York

Sarah:

We do indeed intend to offer the Basic Wildlife Rehabilitation 1AB in other areas of the country. Where we go depends on the interest and local support. We need about 30 interested participants and a local person who can coordinate facility arrangements. A local facility must be available that allows seating for thirty people and has table space available for the laboratory time. The costs would be about the same as they are in California seminars but will vary somewhat depending on the dates and distance. The best way would be to schedule several classes in one part of the country so the travel expenses would be minimized. Currently, we have two requests from New York and one from southern California. Contact us for further information. We will try to meet your needs.

Dear Editor:

Please let your readers know that our publications are available free of charge. They can also be ordered in quantities sufficient for distribution. Of particular interest to WRC readers would be our pamphlet called "Help for Hooked Birds". For more information, contact us at 18327 Gulf Boulevard, Indian Shores, Florida 33535.

Ralph Heath, Jr.
Director
Suncoast Seabird Sanctuary

Ralph:

Thanks for the information. We will gladly pass it on. Additionally, I recently ran across another book which I think folks will want to know about. It is called "Body Weights of 686 Species of North American Birds". This can be real helpful when you need to know what the normal weight is for a given bird. Published by the Western Bird Banding Association, it can be ordered from them for $3.75. Orders can be placed (pre-paid) with Jolan Truan at 3314 W. Glenn Drive, Phoenix, AZ 85021.

Editor:

Concerning the Northern Mocking Rehabilitation Notes, I would like for rehabilitators to be aware that we have uncovered a rather severe problem in young mockingbirds this year in California. The signs of the disease are non-specific and include apparent acute weight loss, depression, malaise, anorexia and commonly death. We have diagnosed the cause of the problem to be severe infection by the avian sporozoan parasite *Lamkesterella sp.* with or without secondary *Plasmodium sp.* infection. Since this parasite is transmitted by mites, every effort should be made to keep your birds mite-free with an appropriate dusting powder containing pyrethins or no more than 5% carbaryl. If you feel that you may have this problem, I would be glad to accomplish a diagnosis for you provided I have the following sample:

Live Bird: 3 air dried, methanol fixed (2 mites) blood smears

Dead Bird: Same as live *and* 10% formalin fixed samples of lung, liver, spleen, and small intestine (opened longitudinally).

For those of you requiring information as to the types and effects of various treatment regimens, a letter to the Journal's editor will put you in touch with such.

Richard Evans, D.V.M., M.S.
President,
National Wildlife Rehabilitators Assn.

Physical Examination of Songbirds

Juanita Heinemann
Peninsula Humane Society, Wildlife Department
San Mateo, California

When a bird comes into a wildlife center with an obvious injury or illness, the veterinarian can usually diagnose the problem and prescribe treatment immediately. However, many times birds will come in with no obvious signs of trauma or illness and we must begin to find the answer as to what is wrong. One of the most important things we can do is to perform a complete physical examination. After some practice any rehaber should be able to do an examination, and, hopefully, find some clues that will help the veterinarian diagnose the bird's condition and to help limit the amount of time the bird must spend in captivity.

Equipment necessary to conduct a physical exam include a towel to pad the table you will be holding the bird over, and an artist's soft sable paint brush. One other piece of equipment that is not necessary but very helpful is a fluorescent or incandescent magnifier lamp (Fig. 1). It helps with the examination of small songbirds by giving you a well lighted area and magnifying the field you are looking at. Before picking the bird up, look at the way the feathers are laying on the body. Do any appear out of place? This may indicate and injury site. Are the wings being held against the body in a normal position or are they droopy? Is the bird using both legs and feet to support its body weight? Does the bird try to defend itself against you? If there are droppings in the box, check their smell, color, and consistency. Checking these few items before handling the bird may help determine why the animal was brought in.

To pick up the larger songbirds, place the bird's shoulders between your thumb and fingers, letting the bird grasp your little finger for support (Fig. 2). Small birds, such as the hummingbird, may be held between the thumb and index finger (Fig. 3). Start with the back of the head, brushing the feathers away from the skin (Fig. 4) so you can observe skin color, general condition, and look for injury or ectoparasites. While at the head, check the eyes, ears, and nostrils. After examining the head area move down the back (Fig. 5). Be sure and replace the feathers to their normal position by stroking them in the direction of growth with the brush. Turning the bird over, begin at the head and work your way down the body (Fig. 2). Check the groin area for wounds, parasites, and the vent for any blockage. Test the legs to see if they have a spring-like reflex, and that the feet grip strongly. To check the wings for injuries, brush through the wing feathers and after the examination, brush them back into place. Gently extend the wing out and release it. Observe if the wing snaps back into a normal position. Check for fractures by starting at the shoulder or hip joint, working your fingers across the bones outwardly to the distal end of the wing or leg. Palpate the chest muscle for plumpness and weigh the bird.

If you see anything during the examination that appears abnormal, write it down and be sure the veterinarian sees your notes. The doctor cannot ask the patient what's wrong, so they must rely on your observation as well as their own.

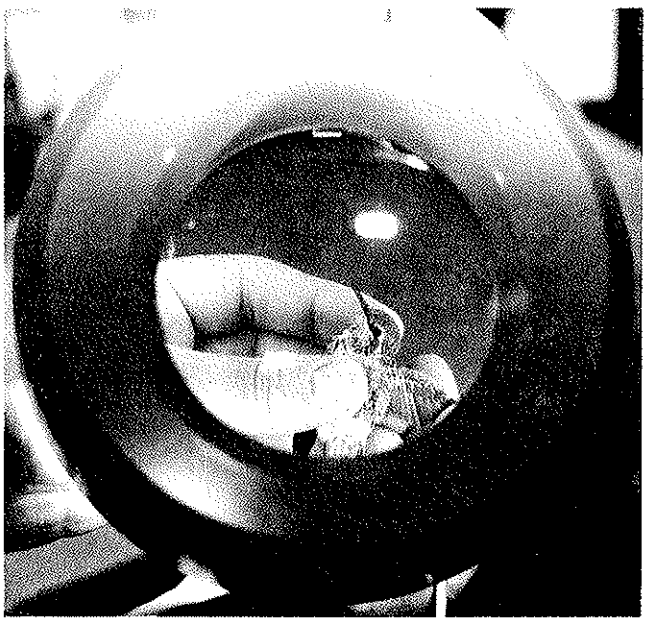


Fig. 1 Hummingbird being examined under a magnifying lamp.

The only way you will know when something is out of place or not quite right is by observing normal, healthy birds. During the baby bird season you will probably have many healthy young birds in your care. Take advantage of the situation by observing their normal behavior and healthy condition. Be sure to observe the color and condition of their skin. The color and consistency of their droppings (this may vary, depending what you are feeding). Observe the way the feathers and wings lay on the body. Recently expired birds are another good learning tool. By using dead birds to practice on, you will become more familiar with the feel of a bird in your hand, as well as the bird's anatomy. You will also feel more confident when you conduct a live-bird examination.□

Photographs by Susan Kelly

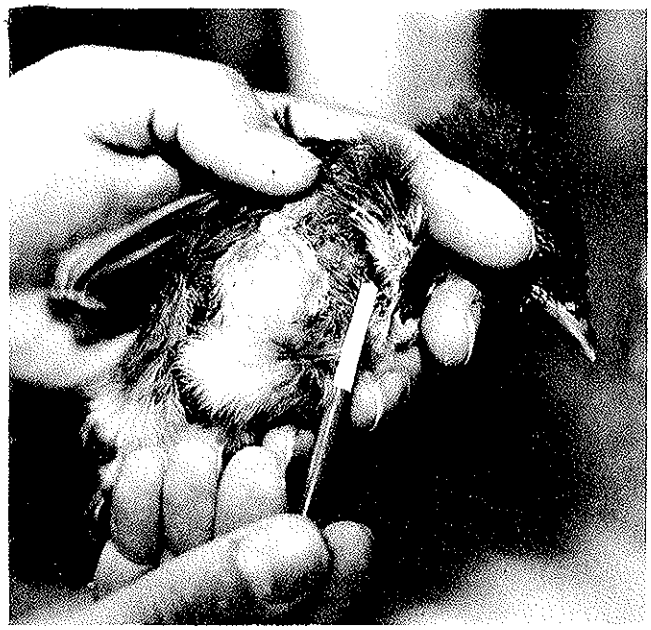


Fig. 2 Holding a larger songbird between thumb and fingers and brushing through abdominal feathers.

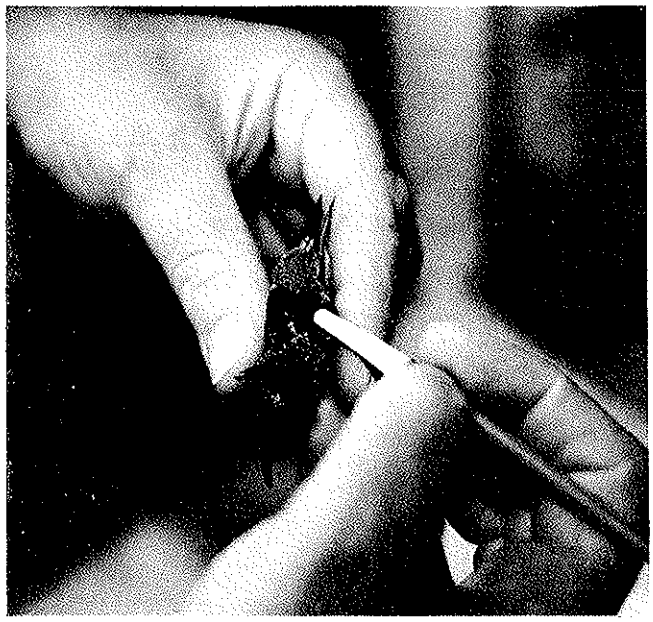


Fig. 3 Hold small bird's shoulders between thumb and index finger.



Fig. 4 Starting the examining of a young Scrub Jay at the head. Be careful when holding beak with fingers not to block nares.

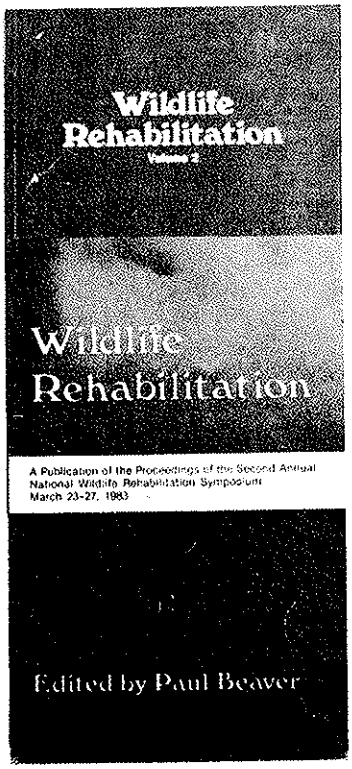


Fig. 5 Examining back of Scrub Jay exposing two large air bubbles. Note how the head is controlled by placing finger behind head.

NATIONAL WILDLIFE REHABILITATORS' ASSOCIATION'S

Wildlife Rehabilitation, Volume 2

Edited by Paul Beaver



Partial List of Contents: The Organization of a Wildlife Rehabilitation Program, *Nancy Frank* • How to Establish and Maintain a Relationship with Your Veterinarian, *Mark Lerman, D.V.M.* • Nutrition and Feeding of Orphaned and Injured Wild Animals, *Murray Fowler, D.V.M.* • Rearing Orphan Opossum, *Debbie Marcum* • Housing and Maintenance of Accipiters and Harriers in Captivity, *Walter C. Crawford, Jr.* • Reptiles and Amphibians: Their Needs are Different, *Ray Pawley* • Some Behavioral Aspects in the Rehabilitation of Owls, *Katherine McKeever* • Notes on Fluid Therapy, *R.H. Evans, D.V.M.* • Pre-Operative Care: Assessing the Avian Patient for Surgery, *Mitchell Taylor, D.V.M.* • Uses and Limitations of Internal and External Fixation, *Douglas M. MacCoy, D.V.M.*

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