

A Gathering of Waterfowl

from a forthcoming book "A Gathering of Waterfowl".

by Frank S. Todd • Corporate Curator of Birds • Sea World — San Diego, California, Ohio and Florida

Chapter One

INTRODUCTION TO THE TRUE WATERFOWL

The first part of this outstanding introduction to the true waterfowl was begun in the last issue of the "Watch-bird". It is from Frank Todd's forthcoming book, A Gathering of Waterfowl. In the last issue Mr. Todd explained the relative position of the family Anatidae to the other birds of the world. He mentioned how waterfowl are ancient birds that are found on all continents except Antarctica.

Waterfowl have some very interesting features including their "duck bills", webbed feet, unusual variation in vocal organs, divergent coloration, extensive migratory habits, phenomenal navigational ability, and a summer moult that leaves the birds flightless for about two months. Of course, there are exceptions to every one of these characteristics.

The last section of this article ended with the spring migration when the waterfowl return to their northern homes to breed and rear their young.

Ducks, geese and swans are noted for their highly ritualized courtship behavior which may range from the very subtle and intricate to very elaborate. Mating usually takes place in the water and is often referred to as "treading" by aviculturists. Copulation is somewhat difficult for birds, and in the case of waterfowl, the act is complicated due to the instability of the surface of the water. As a result, the males have developed a distinct, erectile penis which is lacking in most other avian species which merely need to bring together their cloacas for fertilization to result. However, penetration is required for waterfowl. Due to the presence of the penis, it is possible to accurately sex wildfowl by inspecting the vent.

Most anatids are monogamous; in fact, polygamy tends to be exceptional among waterfowl. The pair bond itself may vary from lifelong such as with the

swans and geese to almost nonexistent such as with muscovies. Pair forming and courtship activities have received a great deal of attention from animal behaviorists in recent years. These highly stereotyped rituals are such that many of the sequences can be very complicated and difficult to interpret. Students of wildfowl behavior have coined special terms to describe specific displays, such as: Triumph Ceremony, Display Shake, Bill-down Display, Incite, Grunt-whistle, Head-throw, Kinked-neck Posture, Bow-sprit, Rear-end Display, Salute, Curtsy, Pushing, Head-pumping, Bubbling, Burping, and Gesture of Repulsion. These terms are self descriptive and suggest the wide range of movements, often forming a kind of dance, with which the male seeks to attract the female. In some species, females initiate courtship by inciting the males. In other instances, females will flatten out on the surface of the water almost as if soliciting the attention of the drake.

Once the pair bond is established, nest building generally commences. However, in most non-tropical migratory species, pair formation may occur long before nesting and often far from nesting areas. In the far north the typical waterfowl nest is in a marshy area on rolling tundra near fresh water. Sometimes over a dozen species nest in relatively close proximity to one another. These immense concentrations frequently are located on small islands surrounded by the melting pack ice where they are afforded security from terrestrial predators such as arctic foxes. It is more common, however, for nests to be scattered because waterfowl are not particularly gregarious during nesting. Snow geese and some eiders, however, can be exceptions.

Many anatids nest in the open while others lay their eggs in the cavities of trees or in underground burrows. Swans, as well as some of the stiff-tails, construct elaborate nests. More typically,

however, waterfowl nest construction is rather rudimentary. Wildfowl lack the instinct to carry nesting material. Generally they merely reach forward from the nest site, grasp a beakfull of material, pass it over their shoulders and drop it. As a rule, they use only material that is within their reach. However, at least one species, the South American black-headed duck, does not construct a nest at all but rather is a parasitic nester, depositing its eggs in the nest of a host species.

Waterfowl eggs are never spotted or patterned and are generally white or off-white, pale green or brownish. Except for the magpie goose, black swan, some whistling ducks and the white-backed duck, the female alone incubates. Wildfowl incubation periods vary from 20 to 43 days. High latitude waterfowl tend to have shorter incubation periods than their tropical or temperate counterparts. The size of the bird does not appear to be related to the length of incubation as some northern geese have incubation periods as short as that of the much smaller teal. Incubation is obviously adapted to the very brief breeding season in the north, for the young must be fledged and capable of departing before the icy fingers of winter take hold.

Most anatids generally line the nest and cover their eggs, which are laid at one or two day intervals, with their own feathers which are heavily underlaid with thick down. Some swans and whistling duck males assist with incubation and in these cases, little down is used. Lining sometimes commences as the clutch is being set although most species wait until the final egg is laid and incubation commences. It is interesting that most of the down is dark for species nesting in the open and whose eggs require a protective cover. Cavity or hole nesters like the American merganser have little need to conceal their eggs and consequently, their down is white. The down of a closely



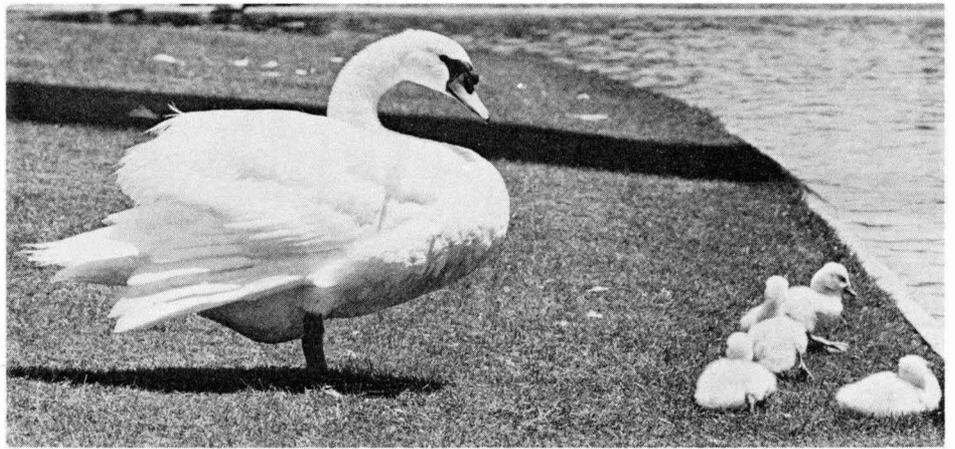
Pair of Mandarin Ducks

related ground nester, the red-breasted merganser, is dark brown.

During incubation, the nests are protected in a variety of ways. Some species cover the eggs with down, as previously noted, to provide warmth and camouflage while others depend on their drab disruptive plumage to keep them concealed during incubation. Still others attempt to draw off an intruder by feigning an injury such as a broken wing; the broken wing technique has been reported for at least 58 wildfowl species. Swans and some geese will stand and fight intruders. These tactics are not always successful because egg predation is surprisingly high. To compensate for such losses many wildfowl lay large clutches. If frightened off the nest, many ducks defecate on the eggs. The foul odor may serve to discourage predation, or it may function as a camouflage mechanism, or both.

In most cases, once incubation commences the hens are reluctant to depart the nest. Some northern species fast during the entire incubation period and will not desert the nest unless ejected by an intruder. More commonly, the females cautiously sneak away from the nest briefly during the early morning or late afternoon to feed. As hatching approaches, the diligent hens flee the nest only as a last resort. Recent evidence suggests that just prior to pipping some communication between the incubating adult and the unhatched egg may take place. Thus, it is not inconceivable that a form of audio imprinting occurs before the young are even hatched.

There is usually an interval of 16 to 18 hours or more between pipping and emergence although up to 24 hours may be required. Since incubation of the total clutch commences at the same time, most of the eggs hatch within a day or two of each other. This synchronized timing increases the survival potential. The young are extremely appealing and are covered with thick down which may be strikingly colored and patterned. They hatch with their eggs open and they become active as soon as they dry off and fluff up. While dependent on their parents for protection, they are not nearly as helpless as the blind and naked chicks of other avian groups such as the passerines, woodpeckers, or hummingbirds. Down covered young are better adapted for maintaining a constant body temperature than naked ones. Usually the downy young begin to forage within a few hours after hatching although, if necessary, they possess sufficient reserve fats to sustain them for several days without external nourishment. The young of some species



Mute Swan and Cygnets

even swim and dive within hours after abandoning the nest. Some of the smaller anatids can fly, or are fledged, at approximately 40 days of age, but two or three months are required for the larger species. However, in the case of some high arctic geese, such as Ross's goose, young may fledge in the incredibly short period of four weeks or less. As a rule, tropical species grow more slowly than birds from higher latitudes.

Once in the water, ducklings feed themselves by randomly pecking at an object that attracts their attention. Interestingly, due to their habit of random pecking, the eyes of most ducklings are protected against pecking by others in the brood by the patterning of the down. Therefore, they have either a dark stripe extending through the eye, an all dark head, or a dark cap which extends down below the eyes. This, of course, tends to obscure the position of the shiny eyes, which would attract the attention of a hungry duckling.

The young learn what is edible by trial and error. The role of the hen during the rearing period is basically that of a guardian and watchdog. She remains ever alert for danger and diligently attempts to keep the brood from scattering too widely. The cohesion of the brood is maintained by use of a gentle call and the ducklings respond with a distinct cheeping of their own. During the first week or so of life, young anatids are very vulnerable to chilling, and this, coupled with starvation, constitutes one of the major mortality factors.

The flight ability of waterfowl is practically unsurpassed in the avian world. Their skill, speed and maneuverability has long captured the imagination of earth bound man. Their spectacular aerial antics have been romanticized time and again in song and verse down through the ages. The fertile minds of many of the world's most creative writers and poets have toiled over and over in an attempt to describe the flight of a wild goose. Sadly,

none has been totally successful and probably never will be, basically because the feat is such that it defies verbal or written description. Geese are perhaps the most exciting of the wildfowl to observe on the wing, not only because they generally move in huge masses and are extremely vocal, but because they also employ unorthodox aerial maneuvers just prior to landing. In an effort to decrease air speed it is not unusual for geese to side slip, tumble, or even to back flap. Simultaneously, the sky may be humming with thousands of flying ducks and they may sweep around and suddenly drop down with set wings to land with a splash.

Although I have been privileged to repeatedly view the spectacle of waterfowl during migration, when many thousands of birds are on the move simultaneously, it never fails to stir me. One almost longs to join them on the adventurous and often hazardous journey that lies ahead. On the water, wildfowl are noted for their grace and beauty but it is not until they have cast aside the bonds of earth and effortlessly drift upward that their true spirit emerges.

The manner in which waterfowl take off is itself arresting. Mallards jump up from the water or ground and become airborne immediately. If startled, they may explode upward like a guided missile, protesting with a loud quack. For other species, becoming airborne is much more laborious. Swans are forced to run along the surface of the water, usually into the wind, before gaining enough speed to take off. Diving ducks skitter rapidly over the water before attaining flight speed.

Although known as powerful fliers, the wings of waterfowl are relatively small and the body is heavy. The area of wing surface per ounce of body weight is among the lowest of flying birds but the power of the wing stroke compensates for this seemingly apparent disadvantage. The wing beat of swans in

flight is approximately 160 strokes per minute, but in some ducks it may exceed 300. The powerful wing strokes make flight possible in heavy headwind when other birds are grounded. Flight speeds are difficult to ascertain with any degree of accuracy and charged hunters, after missing an apparently easy shot, will unhesitatingly suggest that they fly at speeds exceeding 150 to 200 miles per hour. These claims, however, fall into the same category as the tales of the "fish that got away"; interestingly, but not substantiated. The canvasback, one of the swiftest flying of all wildfowl, has been reliably clocked at over 70 miles per hour, but most waterfowl cruise at 25 to 35 miles per hour under normal conditions.

The biannual seasonal movements of these birds is but one of the reasons that international protection is so critical. Biological flyways are much older than mankind and these flyways ignore political boundaries. Birds were migrating millions of years before man became a dominant force. Any abuse of the waterfowl resource in one country can directly affect the utilization and enjoyment of that resource by citizens of other countries. The passage of the Migratory Bird Treaty Act in 1916 was the first major step in providing some means of international protection for North American waterfowl. Canada, Mexico, and the United States now work jointly in an attempt to solve the problems that affect wildfowl and other migratory birds. To illustrate the importance of international cooperation, consider the fact that upwards of 85 percent of all North American waterfowl are produced in Canada and many of these birds winter in Mexico. Long term comprehensive waterfowl studies have resulted in the establishment of hunting seasons, limits, total protection for some species, as well as encouraging the creation of additional refuges in an endeavor to conserve as much of the resource and adequate habitat as possible. Interestingly, no country in Europe has hunting laws as strict as those in North America. Although access to guns is much easier in America than it is in Europe, access to the waterfowl is much more difficult.

Wildfowl management takes many forms. If a sizeable population of game birds is well managed, a portion of that population can be considered surplus as far as the survival of that species is concerned. In North America, this surplus is taken into account when hunting regulations are established. Since bird populations tend to fluctuate, bag limits are established annually and may vary from

year to year. Length of the hunting season is also subject to variation. If a specific species has undergone a poor reproductive year, it is conceivable that the limit will be reduced and the season shortened for that species. If the population crash is severe enough, total protection may be warranted until the numbers recover to the point where a certain amount of hunting pressure can be tolerated. Hunting is legal only in the fall, long after the breeding season has terminated.

Although the total North American wildfowl population has generally decreased during the past century, some species are presently more numerous than they were one hundred years ago due to refined wildlife management techniques. Hunting abuses were excessive during the nineteenth century and the early part of the twentieth century and at one time, legal bag limits exceeded 25 ducks per day. Today, however, the limit may be but two or three per day in some flyways. Currently, habitat destruction and loss is the most detrimental factor effecting waterfowl. Nevertheless, most American anatic populations are presently fairly stable. Stringent protection, habitat preservation and restoration, plus a greater understanding of their biological requirements have contributed to the increase of some species, such as the tenacious mallard. This is not particularly surprising considering that the mallard is among the most adaptable of all waterfowl and its habitat requirements and lifestyle are not particularly specialized. In contrast, the more specialized canvasback is greatly dependent on prairie potholes in the northcentral United States and Canada. Prairie potholes are the backbone of duck production in North America; to the point of being referred to as "duck factories" by some anatic biologists. These nesting areas, however, are unfortunately being rapidly usurped for agricultural and other purposes. The pothole country, created by advancing and retreating glaciers of the recent ice ages encompasses some 300,000 square miles. This unique habitat constitutes only ten percent of waterfowl breeding grounds, yet over 50 percent of North American ducks that hatch annually are produced in these regions.

A species such as the canvasback with relatively narrow habitat requirements is also at the mercy of natural forces and therefore reproductive success or failure tends to be very cyclic, even when man does not interfere. A severe and widespread drought, for example, can be disastrous and severely curtail the production of young.



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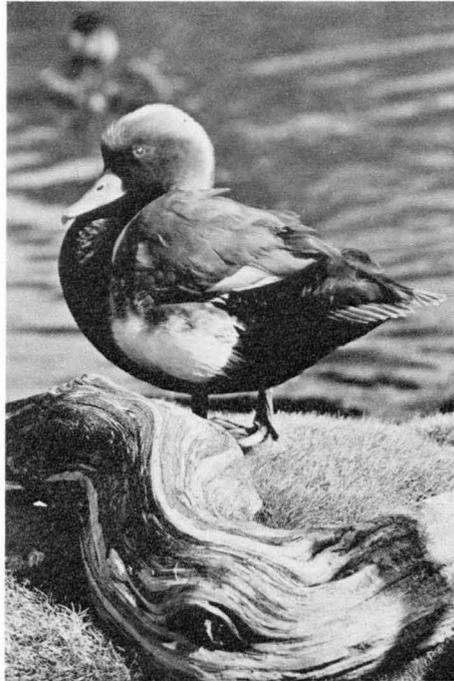
Ducks nesting in agricultural areas are often disrupted by farm machinery since many crops are harvested during the spring breeding season. While most farmers are sympathetic to the needs of waterfowl, nests may be inadvertently destroyed by mowing operations. Incubating hens refusing to flush can be lost as well. A mowed-over nest is invariably a failure, even if the eggs are not molested. Generally the female deserts the site immediately and the eggs are taken by predators. If the nest is not abandoned, the lack of cover inevitably dooms the nesting attempt. In pastures, particularly those which are overgrazed, the birds must contend with restless cattle that may trample the nests. The destruction of nests by trampling is itself rather insignificant, but the total negative effect of agricultural activities is significant. On the other hand, agriculture helps maintain countless thousands of ducks and geese by providing rice, corn and wheat while growing or left behind during the harvest.

The negative effects of pollution, such as oil spills, have become increasingly detrimental to aquatic birds in recent years. Oil spills trap thousands of birds annually and the mortality rate is incredibly high. If the oil itself does not kill the bird outright, the treatment of recovered birds often does. When the coating of oil is manually removed with a solvent, most of the bird's natural oils are lost as well. In addition, once the structure of the feathers is broken down, a bird cannot become adequately waterproofed again until it undergoes a molt and this may require up to a year. Meanwhile, the birds must be kept out of the water to prevent drowning and hence they may perish since they are not adapted to life on shore where they are very susceptible to deadly avian diseases such as aspergillosis, a fungal infection which attacks the lungs and air sacs.

Due to improved methods of cleansing oiled birds, the mortality rate of birds recovered from oil spills has decreased significantly in recent years, but the kills are still far too large. Prevention of oil spills and other pollution is the most effective means of protecting aquatic and pelagic life. In light of ever-expanding world energy demands, the need to continue and expand off-shore drilling is acknowledged, but at the same time the potentially severe environmental hazards must be recognized as well. Likewise, the consequences of a major fracture in the oil pipeline of earthquake-prone Alaska could be disastrous and the subsequent detrimental effects would be very long term. The Arctic is the major breeding grounds for countless numbers of

avian species and individuals. The world, by necessity, has become very energy conscious and the need for raw materials cannot be minimized. However, if environmental concerns are totally cast aside, the quality of life could significantly decrease. It has been suggested by some that man can have both wildlife and kilowatts, but not in the same place nor at the same time.

While man's activities can be extremely detrimental to the lifestyles of many species, this is but one of the numerous dangers all wildlife must face every day. Adverse weather, diseases, parasites, predators, and the scarcity of appropriate food constantly affect their survival. Non-biologically oriented emotionalists may believe that animals in the wild, far from human habitation, lead idyllic lives in a wilderness utopia, but this "Bambi syndrome", is a myth. Running the gauntlet of hunters each fall takes its toll but nature can be just as brutal, albeit a bit more subtle.



Red-Crested Pochard Drake

All animals, except those at the top of the food chain, are potential prey of predators. If man be considered a predator, even the largest animals that ever existed, the great whales, are preyed upon. The predators of North American wildfowl alone are countless, including marauding feral dogs and cats in areas of human habitation, coyotes, foxes, skunks, raccoons, weasels, mink, ground squirrels, gulls, birds of prey, magpies, crows, reptiles and even fish such as bass, pike and catfish. Eggs are favored by many predators while others such as turtles, bullfrogs and fish concentrate on ducklings in the water. Adults are not

immune to predation either, and an unwary duck usually is a dead duck.

Because of their gregarious habits, waterfowl are extremely susceptible to a number of deadly diseases. Two of the most dreaded in North America are botulism and fowl cholera. Botulism, sometimes called "western duck sickness" because mortalities were first described from the west, is not a disease in the true sense of the word, but rather a food poisoning caused by the anaerobic bacterium *Clostridium botulism*. The neuro toxin is absorbed into the blood and lymph circulatory systems from the digestive tract. Due to the toxin blocking the nerve transmission to the muscles, loss of coordination results. Progressive paralysis follows and death may result from drowning when the bird is in the water and is unable to keep its head above water. Ashore, death may be due to respiratory failure, exposure or starvation. The disease is occasionally referred to as "limberneck" because affected birds are unable to control their neck muscles. Thousands succumb annually, but some years are worse than others. In 1932, over 250,000 ducks perished at the north end of the Great Salt Lake in Utah alone; in 1910 millions died in the United States. During the late 1960's, some 250,000 mortalities occurred in the Central Valley of California. Treatment of sick birds consists of flushing out their digestive tracts with fresh water. Antitoxin injections will slightly increase the number of survivors. While a great deal has been learned about botulism since the turn of the century, it continues to be a major mortality factor.

Fowl cholera (*Pasteurella multocida*) has affected the poultry industry for more than 200 years but the first known outbreak in wild ducks occurred in California and Texas in 1944. Losses fluctuate annually but during the winter of 1955-56, over 60,000 ducks died from fowl cholera in Texas alone. In February of 1970, over 88,000 birds died of fowl cholera in Chesapeake Bay including some 62,100 oldsquaw, 19,000 white-wing scoters, 500 black scoters, 2,500 bufflehead and 900 whistling swans. As recently as the spring of 1975, some 20,000 to 25,000 anatids perished in Nebraska of the disease. However, wildfowl perish daily in large numbers as a result of disease, but this mortality becomes apparent only when mass die-offs occur in particular localities.

Lead poisoning has become an increasingly serious danger to wildfowl, the source being shotgun pellets. Like many birds, waterfowl ingest large quantities of sand and small pebbles called grit to

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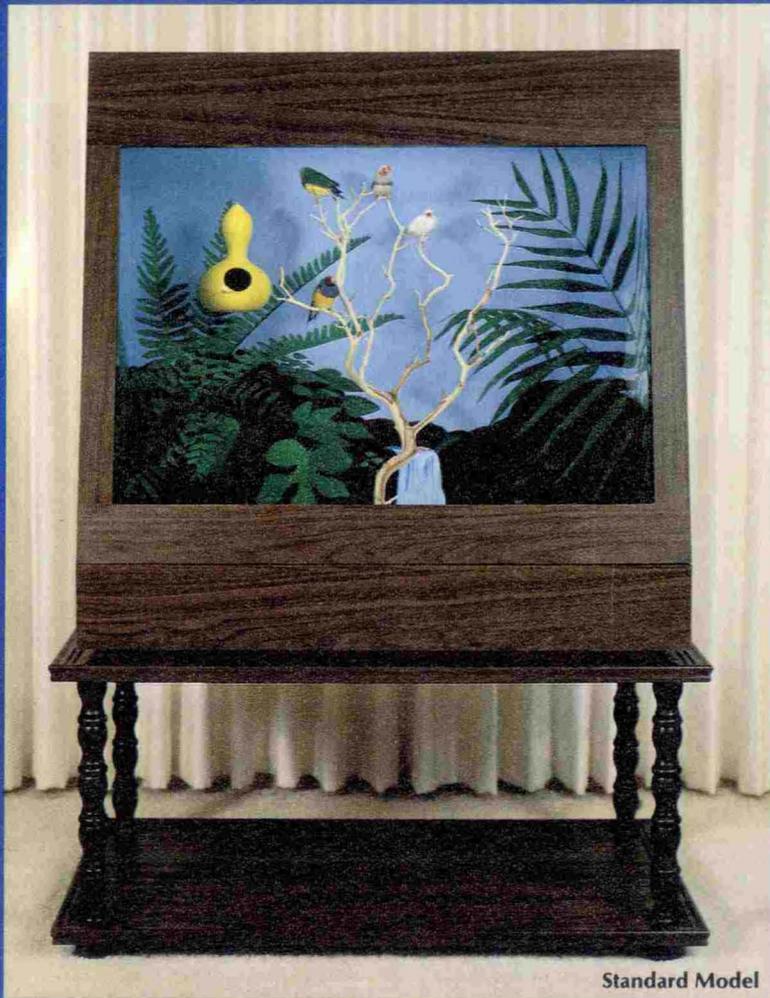
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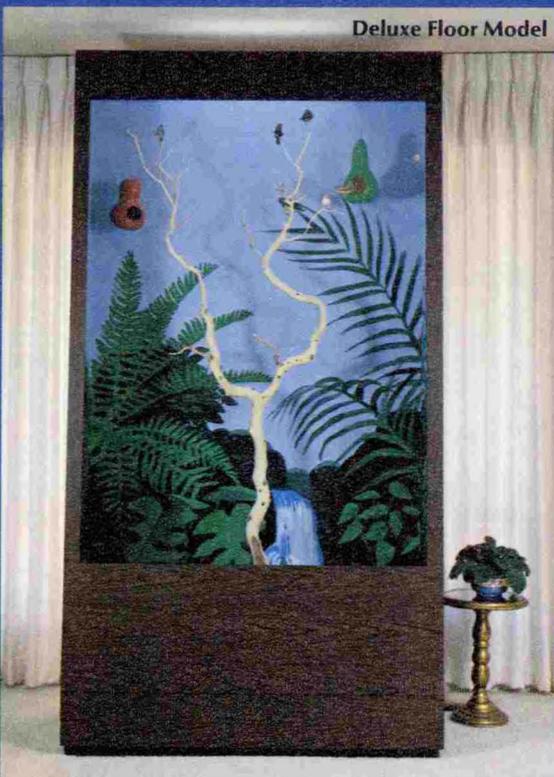
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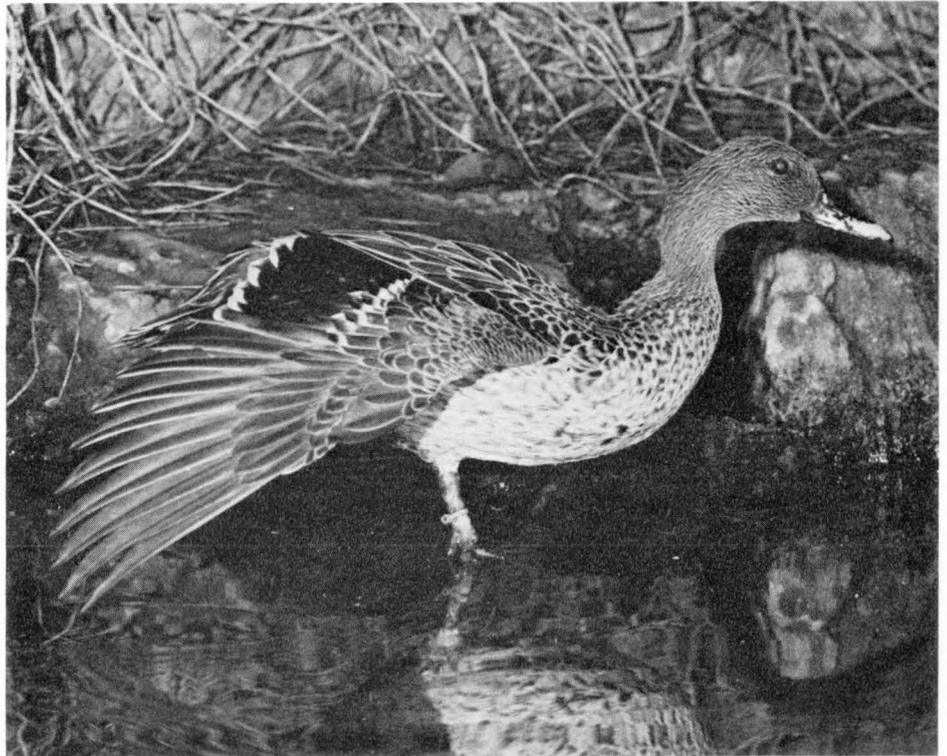


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Abyssinian Yellowbill Drake, a very rare bird in collections.

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aid in digestion and provide them with required minerals. Lead shotgun pellets consumed in place of grit are usually taken by the birds in areas where the bottom of the marsh is hard. If the bottom is soft the pellets tend to sink into the mud and are less accessible to the feeding birds. Unlike botulism or fowl cholera, many victims of lead poisoning die without being observed, hence the losses are not obvious unless there is a concentrated die-off. However, losses from lead poisoning are estimated to account for two to three percent of the annual mortality in North American waterfowl. Symptoms of lead poisoning are gradual weakness and emaciation and ultimately, death. The average hunter discharges up to five shots for each duck dropped. There are about 280 lead pellets in the average 12 gauge load of a No. 6 shell; therefore, up to 1,400 pellets may be deposited for every duck taken. One does not have to be a mathematical genius to see how quickly this foreign material can accumulate.

A great deal of experimentation in the use of non-lead pellets is in progress. Steel pellets appear to be the logical alternative at this point, but many hunters believe that steel is not as effective as lead beyond 35 yards and will result in a greater number of wounded or crippled birds. Some gun specialists also claim that continued use of steel pellets will damage gun barrels. However, there can be no doubt that a disintegrating, non-toxic substitute for lead is needed.

Hunting itself is being increasingly challenged in the United States. Anti-hunters claim that man does not have the right to kill and therefore, hunting is immoral. The hunting fraternity contends that it is man's nature to hunt and thus it is no more immoral than raising cattle to be slaughtered. Like all volatile controversies, both sides have valid arguments but unfortunately the major issues are clouded by uncompromising passions. It is obvious that the controversy will not be easily resolved. The hunting industry is big business with more than two billion dollars spent annually in the United States; over 500 million dollars on ammunition alone. From a biological standpoint, the anti-hunting groups present some potent arguments. They point to the fact that during the past century the number of sport hunters has increased greatly while appropriate habitat for wildfowl has dwindled at a corresponding rate. The question is whether the resource can absorb the increased pressure. In many cases it can, but some basic changes in waterfowl management philosophy may be needed to keep the resource in balance.

Each year approximately 16 million licensed hunters kill over 120 million birds in the United States and an additional 10 million are taken in Canada. Waterfowl do not make up the total kill but in 1970, some 21,100,000 ducks and geese constituted the legal harvest in the United States. Despite this heavy kill, wildfowl numbers regained their normal

levels through annual production. In order to retain some sort of realistic perspective, it is important to note that in excess of 57 million birds are slaughtered annually on the nation's highways. As many as 1.25 million birds may perish annually in the United States alone due to collisions with glass windows, tall buildings, lighthouses, television towers, etc.

Anti-hunting organizations tend to tar all hunters unfairly with the same brush, accusing them of indiscriminately gunning down any wildlife that ventures within run range. To my mind there is considerable difference between the weekend skyblaster who blasts whatever moves and the dedicated waterfowler. The true sportsman appreciates the intricate relationship between man and nature and understands that it must be preserved. Whether or not game is actually bagged is not the prime consideration to such an individual. To suggest that all hunters are bad is almost as ludicrous as insinuating that all non-hunters are good.

The millions of dollars generated by the sale of duck stamps and hunting licenses have made possible the establishment and maintenance of many wildfowl refuges. Numerous organizations raise funds to acquire and restore the habitat of ducks, geese and swans. Without

these habitat acquisition programs some waterfowl populations would have declined while others would have disappeared altogether. It has been said that these pro-hunting organizations are only involved in fund raising to perpetuate their sport. This may be true, but in the long run it matters not why a good deed is done. The important thing is that it is done.

While I am not a hunter, I can appreciate the hunter's point of view, even though I may not fully agree with it. If anti-hunting groups were as active in raising funds for waterfowl studies and acquisition of habitat as they are in clouding the issues with emotional redundant rhetoric, one could be more sympathetic to their cause. Before any progress is made in bringing together these two opposing schools of thought, compromises will be required of both sides. Effective long-term conservation can only be attained by working together.

A number of wildfowl species and subspecies are presently considered endangered, some critically so. At least five forms have disappeared in recent times. The pink-headed duck of India was last observed in the wild in 1935; our own Laborador duck vanished in 1875. At least a dozen others are presently threatened with extinction. The decline of most

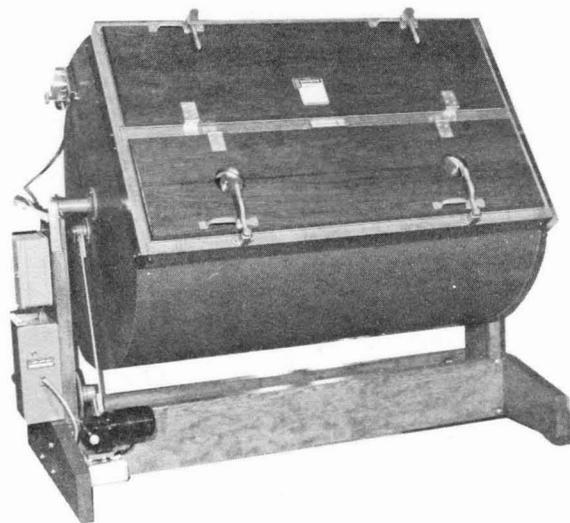
species is generally attributed to habitat loss, especially on the breeding grounds, and in some cases to direct persecution by man. Man's impact on habitat has tremendously influenced the presence and abundance of waterfowl wherever they occur and this influence increases with the human population explosion.

Yet, as more people become interested in waterfowl, concern for their welfare will hopefully escalate. Not too many years ago, there were millions of wetlands and marshes in the continental United States alone. However, by 1968, wetlands had declined from some 127 million acres to 75 million acres. Of this some 9 million acres are considered to be prime wildfowl habitat, although the rest is used to some degree by waterfowl. Habitat loss continues at an alarming rate and simply stated, without appropriate habitat, wildlife cannot survive, no matter how much protection is afforded a specific species. As these important habitats disappear before our very eyes, we may wish to ponder the words of one of America's greatest conservationists, Aldo Leopold, who so astutely noted: "Conservation is a state of harmony between men and land" and one might add "and, its wild creatures". Unhappily, we have not yet reached that necessary harmonious state. ■

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