

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 kaleidoscopic colors and patterns associated with the avian world make it difficult, if not impossible, to select a single group of birds as the most spectacular. However, if one were faced with such a choice, it could easily be the waterfowl. As a long-time waterfowl enthusiast, I believe this selection to be a logical one for a number of reasons. Ducks, geese and swans not only often have brightly colored plumages and occur in a great variety of diverse shapes, sizes and forms, their lifestyles are such that sooner or later most people are exposed to them. Their relatively large size and highly social nature quickly draws our attention to them. The center of distribution of waterfowl occurs in the northern hemisphere, not in the tropics like many families of exotic birds. Some of the most beautiful and striking birds that ever graced this planet fall within this group. In essence, they combine many of the qualities that man finds aesthetically pleasing about birds, and of all the birds, waterfowl are perhaps the most fascinating to observe. There are relatively few individuals who will not admit they have at least a passing interest in those colorful and fascinating winged creatures known as waterfowl.

Ducks, geese and swans are all closely related and collectively are referred to as waterfowl or wildfowl. They comprise the avian family *Anatidae*, and consequently are sometimes called anatids by ornithologists. Although they resemble other groups of water birds in many respects, these similarities are merely superficial and have resulted because of their similar lifestyles. Many casual observers assume that all water birds are wildfowl but the 151 species of ducks, geese and swans found on the plant stand alone. Coots, grebes and loons, which also live on water and are similar in profile, are not even distantly related. Stilts, sandpipers and avocets are shorebirds rather than

wildfowl. Likewise, egrets, herons, flamingos and storks thought of as waders, while cormorants, gulls, penquins, pelicans, and puffins are loosely called "sea birds".

The closest surviving relatives of wildfowl are the bizarre screamers of South America; so close in fact, that they occupy a position in the same order, the Anseriformes. This relationship is quite puzzling to non-biologists because screamers don't even remotely resemble a duck or a goose. Rather, they are more like huge chickens. Screamers are basically terrestrial birds and although they lack webbed feet, they are excellent swimmers. Some contemporary specialists believe that flamingos are also closely related to wildfowl and may represent an ancient offshoot. This opinion is based on anatomical similarities and the fact that much flamingo behavior closely parallels that of true waterfowl; even their feather parasites suggest an affinity with geese. Their vocalizations are distinctly goose-like and interestingly, newly hatched flamingo chicks are superficially remarkably similar to young goslings.

Ducks, geese and swans were among the first birds to be domesticated by man. Greylag geese, for example, were domesticated at least 4,000 years ago and may be the oldest of the domestic birds. Originally, waterfowl were undoubtedly maintained as a food source and later for ornamental and aesthetic purposes as well. Written allusions to waterfowl date back some 2,500 years and artistic depictions even earlier. Primitive rock carvings of swans fashioned by Cro-Magnon man in northern Russia have been unearthed as well as cave paintings of waterfowl in neolithic sites inhabited at least 20,000 years ago in Spain, France and Italy. Waterfowl are just as intriguing to modern man and the literature concerning them is probably the most extensive of any avian group.

From an economic standpoint, waterfowl are among the most valuable of all birds. They have probably been admired more and exploited to a greater degree than most other bird groups. One need only consider how dependent many people are on wildfowl and their eggs as a food source. In the western world the rearing of these birds for food is not of major importance, but in less affluent regions, particularly in Asia, domestic ducks are frequently as common as chickens in America. In North America and Europe, waterfowl hunting is a major sport, an industry that contributes billions of dollars to the economy each year. At the same time, the escalating conflict between hunters and protectionists has spawned a great deal of intense controversy in recent years.

Life on earth extends back into the spectrum of time for more than two billion years but man, as we presently know him, has only existed for 500,000 to one million years. Waterfowl are far more ancient; their origin dates back some 50 to 80 million years ago, which makes them relative newcomers when compared to many other life forms. Birds originally evolved from reptiles and are sometimes referred to as "glorified reptiles" by non-sentimental paleontologists. It is believed that birds began to branch off from reptilian stock some 150 million years ago, shortly before the emergence of the first mammals, which also evolved from reptiles, but independently. *Archaeopteryx* is the earliest recognized avian fossil, dating from the Jurassic Period approximately 140 million years ago. Undoubtedly there were earlier birds or birdlike creatures, but remains of these have yet to be discovered.

Fossil remains of waterfowl and other birds are scarce since they are relatively frail creatures; their bones are fragile because most are hollow, a condition necessary for flight. Therefore, avian



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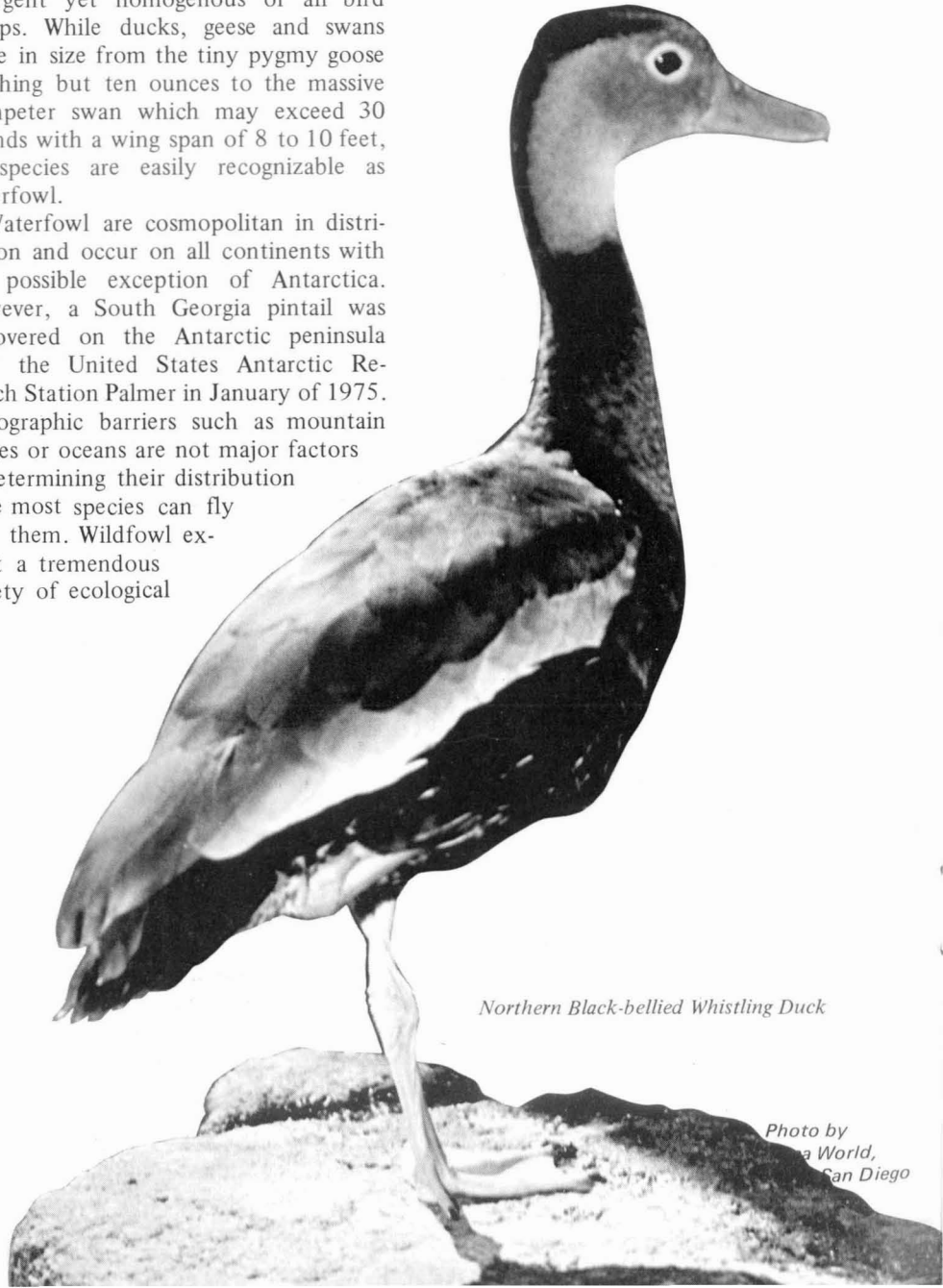
bones do not stand the test of time very well. In fact, most fossil waterfowl species have been described mainly from only a few disarticulated bones. The earliest recognizable wildfowl fossil on which most experts agree upon comes from the upper Eocene Period, dating back some 40 to 50 million years. Avian paleontologists have identified about a hundred extinct forms, including one family, two subfamilies, 22 genera, 92 species and three subspecies.

The never-ending process of evolution has been particularly productive with birds. Thousands, and perhaps millions, of species have evolved over the years only to ultimately disappear, and today there are approximately 8,650 living species of birds divided into 27 orders and 155 families. The anatids comprise but one of these orders and families, but they are among the most divergent yet homogenous of all bird groups. While ducks, geese and swans range in size from the tiny pygmy goose weighing but ten ounces to the massive trumpeter swan which may exceed 30 pounds with a wing span of 8 to 10 feet, all species are easily recognizable as waterfowl.

Waterfowl are cosmopolitan in distribution and occur on all continents with the possible exception of Antarctica. However, a South Georgia pintail was discovered on the Antarctic peninsula near the United States Antarctic Research Station Palmer in January of 1975. Topographic barriers such as mountain ranges or oceans are not major factors in determining their distribution since most species can fly over them. Wildfowl exploit a tremendous variety of ecological

niches and some of the more familiar species are widely distributed. The ranges of the common mallard and northern pintail, for example, encompass most of the northern hemisphere whereas others, such as the white-eyed duck of Madagascar, is restricted to a few small lakes on a single island. Although they may have originated in tropical or southern regions, waterfowl have most successfully colonized the extensive grasslands and tundras of the north temperate and Arctic zones.

Most waterfowl are excellent swimmers, having comparatively short legs and strongly webbed front toes. However, the Ne-ne goose, magpie goose and Cape Baren goose are exceptions and are more terrestrial and consequently exhibit greatly reduced foot webbing. As a swimming adaptation, the legs of most waterfowl are usually placed far back on the body, forcing the birds to move with a waddling



Northern Black-bellied Whistling Duck

Photo by
a World,
San Diego

gait when they are ashore. To maintain their balance, the center of gravity must be shifted above the supporting leg. Because of the wide body and relatively short legs, displacement of the center of gravity can only be effected by rotation and shift to the side, thus bringing about the characteristic waddle. Their buoyancy in the water is due mainly to internal air sacs, not to air held in the feathers as some writers suggest. These air sacs extend into the body cavity as well as into some of the long bones and connect with the lungs. As in the case of many diving bird species, the air sacs can be inflated or deflated to alter the bird's buoyancy.

The normal swimming speed of waterfowl is between two and three miles per hour, although they can swim much faster is pursued. The webbed feet are most advantageous to a swimming bird and as the foot is pushed backward, the webs are spread apart presenting the maximum surface to the water. During the forward stroke the webs are closed, thus affording less resistance.

Wildfowl have relatively long necks and flattened, broad bills known as "duck bills", which is perhaps their most distinctive characteristic. Mergansers or "sawbills" are unique in this regard and have long slender bills with teeth-like serrations along the edges that aid in holding a slippery fish securely.

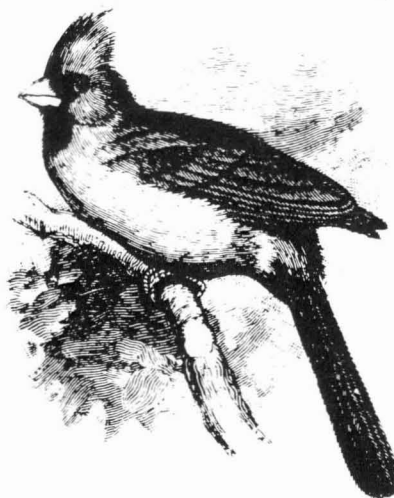
All duck, geese and swans are densely feathered and are noted for their compact plumage. The numbers of feathers varies greatly; a whistling swan may have over 25,000 feathers, most of them covering the neck, while a green-winged teal may have a few as 11,500. Ten or eleven primaries and twelve to twenty-four tail feathers are typical. Not surprisingly, wildfowl are powerful fliers except for a few species which are totally flightless, such as two of the three forms of South American steamer ducks. Wildfowl generally fly with their necks extended and their legs trailing. They are not, like condors and albatrosses, noted for their soaring ability.

Waterfowl are fairly long lived, at least in captivity, where they are afforded greater protection than in the wild. Twenty to thirty year old captive geese and swans are not particularly uncommon. However, for most of the smaller duck species in the wild, two or three (possibly up to six) breeding seasons constitutes the maximum that can be expected. Between 60 and 75 percent of the annual hatch is lost during the first year and 90 to 95 percent within three years. Mortality is obviously very high and the potential life spans suggested by

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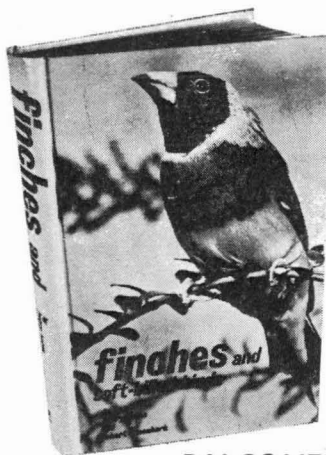
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captive specimens is rarely attained under natural conditions. Yet, banding records indicate that some wild geese have survived for 18 years and ducks up to 16 years.

The voices of waterfowl vary considerably in intensity, tone and quality. The familiar quack of dabbling ducks is the typical anatid call. Honking, hissing and trumpeting are also familiar but few people are aware that some species of wildfowl may huff, grunt, bark, squeak, cluck, and coo as well. The old-squaw duck chatters constantly with a distinctive call that can best be described as yodeling. Vocalizations are used for courtship, communication, defense, warnings, recognition, flocking signals as well as for other social purposes. Contrary to popular beliefs, no species of wildfowl is totally mute; not even the so called "mute" swan. Swans exhibit the greatest vocal variety, ranging from the clear, melodic far-carrying cry of the trumpeter swan to the insignificant voice of the mute swan. Many anatids derive their vernacular names from their voices; whistling ducks obviously whistle, Cape Barren or pig geese grunt, and trumpeter swans trumpet. The coscoroba swan possesses a distinct ringing "cos-cor-ooo" call.

The waterfowl family exhibits a great deal of variation in the size and shape of the syrinx or vocal organ. The males of a number of species are characterized by the development of a bulla which is a symmetrical bony enlargement at the base of the trachea. Systematists consider the bulla to be very significant taxonomically. The size and shape of the bulla, or the lack of it altogether, depending on the sex or species, is instrumental in the sound and quality of the vocalization produced. The bulla can best be described as a bony sound chamber which, in the words of Johnsgard: "operates in much the same manner as a mechanical whistle, producing a whistling note as air is rapidly passed by it through the trachea. Female ducks, and males of species that lack such bullas, instead apparently rely on the vibration of the soft tympanic membranes located between the base of the trachea and the bronchi. These thin membranes are readily vibrated by the passage of air across them, and pitch is apparently regulated by varying the tension on the membranes through the use of two opposing pairs of muscles. In the geese and probably also in ducks, sound is evidently produced by inhalation as well as by exhalation since the air sac in the region of the crop can frequently be observed to enlarge during calling."

Sounds are used for various purposes

and can be either vocal or mechanical in origin. Some of the stiff-tails, such as the male ruddy duck, have specialized tracheal air sacs in the neck which can be inflated and beaten with the bill during courtship, creating a distinct drumming sound. A number of whistling ducks produce a characteristic whistling sound in flight created by the vibration of peculiarly shaped outer primaries; its exact purpose is not known. The rushing wing beats of the mute swans may be audible for over a hundred yards, probably assisting the birds in maintaining auditory contact with each other in flight. Because mute swans are the least vocal of the group, calling would be of little consequence. In contrast, other northern swans produce no significant mechanical sounds while in flight and maintain contact by voice.

Waterfowl feed on a great variety of food items and as a result numerous feeding adaptations have evolved. The structure and shape of the bill of many species has been modified to suit specific feeding requirements. The most extreme modifications have evolved on those species which tend to be most specialized. Basically, there are three main methods of feeding; diving, grazing, and surface feeding. Dabbling ducks, sometimes called river or puddle ducks, are surface feeders, ingesting material from the surface of a pond, lake or river, but often tipping up to obtain their food from the bottom. This feeding behavior is referred to as "up-ending". Surface feeding is the most common method of anatid feeding behavior and is utilized by not only the least specialized of waterfowl, but by some of the most specialized as well. Diving ducks dive for their food and are rather poorly developed for terrestrial locomotion because of the position of their legs. Some species, like ruddy ducks, rarely leave the water because they can scarcely walk. However, practically all waterfowl can, and do, dive when forced to do so. Sea ducks feed chiefly in salt water where they spend a great deal of time. Many of these latter species have evolved specialized nasal salt glands which facilitate the discharge of excess salt.

The type of food selected by the various wildfowl depends somewhat on their method of feeding. Mallards are relatively non-selective and consume almost anything edible that they encounter. Shovelers and pink-eared ducks are more specialized and filter minute aquatic organisms from the surface of the water. The true geese are noted for extreme grazing habits and spend a great deal of time ashore. Consequently, their terrestrial movements are very proficient. All waterfowl except mergansers have a highly

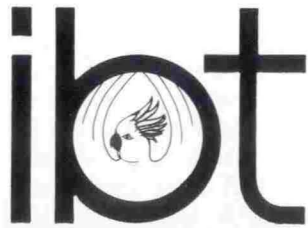
sensitive tongue which is lined with many small projections. The action of the tongue, when combined with the lamellae lined mandibles, serves as an efficient food-sifting mechanism, particularly with dabbling ducks. The peculiar sound emitted during feeding is sometimes referred to as "chattering". Except for the flamingos, no other group of birds feed in this specialized manner.

Many diving ducks forage on living organisms in the water. Rarely do they go deeper than 10 feet but in the case of several species such as the oldsquaw or king eider, dives exceeding 180 feet have been recorded. In sum, ducks, geese and swans exploit almost every available food source. Grass, seeds, cultivated grain and aquatic vegetation such as duck weed and algae are favored by some species while others prefer fish, molluscs, crustaceans, insects and miscellaneous small succulent creatures. Some waterfowl are selective about their diet while others have less discriminating tastes. A few species are even carnivorous and may feed on carcasses at times.

The beauty and variety of coloration is one of the most attractive features of the world's waterfowl, giving endless pleasure to the beholder. Their colors span the full spectrum, ranging from the exquisitely caparisoned wood duck to the rather nondescript greylag goose. Generally the males are more ornate whereas the females are subdued in color. Among the most strikingly patterned and colorful wildfowl are the wood duck, harlequin duck, Baikal teal, and red-breasted goose; their brilliant garb appears almost artificial.

Bright plumage is often used to great advantage by males to attract mates, yet in some species such as the Siberian red-breasted goose, both males and females are boldly colored and patterned. In natural surroundings, distinctive colors and contrasting patterns serve as a kind of camouflage that enables the animal to visually melt into the surroundings by de-emphasizing their shape. Therefore, while it may seem that bright colors and bold patterns versus camouflage are somewhat contradictory, quite often just the opposite is true. Nature has provided most waterfowl with an abundant supply of color in their livery and their conspicuous plumage is often enhanced by a metallic, iridescent wing speculum, a lustrous area sometimes called a "wing window". The velvety appearance of the eiders and some of the scoters also produces a unique visual effect.

Not only are many waterfowl brightly colored, but some have developed other attractive adornments as well. These



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adornments may take the form of modification of the shape of a single feather or whole regions of plumage. The distinctive forward curled tail of the mallard drake is unmistakable. Muscovy ducks are noted for curled hoods, crested ducks and mergansers for crests, plumed tree ducks for elongated flank feathers, falcated ducks for long trailing sickle-like wing feathers, mandarin ducks for sail-like inner secondaries, and pintail and oldsquaw ducks for long, thin tail feathers. Fleshy modifications are not unusual either. For instance, black-necked swans and drake king eiders have highly developed colored knobs on the top of their upper mandibles, and drake European shelducks and rosy billed pochards are noted for ornamental bills with bright facial shields. The bills of some species are brilliantly colored and the color may vary greatly depending on the season. The beautiful powder blue bill of the courting drake ruddy duck fades to a dull greyish brown during the non-breeding season.

Female ducks are usually cryptically dressed, which is an advantage to a bird sitting on a ground nest because it provides a degree of camouflage. The inconspicuous colors of the female are predominated by browns and greys. A brightly colored male moving away from an incubating hen will tend to attract the attention of a potential predator and hence it can be lured away from the vulnerable female. To the casual observer many ducks can be difficult to identify because their plumage is altered during the molt. During the summer, drakes of many northern species acquire an "eclipse plumage" when the brilliant colors and patterns are replaced by a dull plumage similar to that of the hen. Characteristically, during the molt, many species of wildfowl may lose a great deal of weight.

The question arises why many of the drakes, particularly in the north, are so brightly dressed. Obviously, the gay colors and conspicuous patterns play a significant role during courtship, but it has also been suggested that ornamental plumage may be a device to prevent hybridization. This supposition is weakened by the fact that there are numerous nondescript species of waterfowl, and some forms exhibit no external sexual dimorphism at all. If prevention of hybridization is involved, one must wonder why all waterfowl are not brightly colored, or for that matter, all birds.

During the summer molt, all of the wing flight feathers are lost simultaneously and the birds are flightless for one to two months. The Australian magpie goose is the unique exception and assumes a graduated wing molt, thus by-passing the

typical anatid flightless period. Because of their inability to fly during the molt, most wildfowl tend to spend a great deal of time in the water in an effort to escape predation. This is also the period that the colorful drakes of many duck species assume the nondescript eclipse plumage. A grounded camouflaged bird stands a much greater chance of survival than a flightless colorful one. The large flight feathers are not dropped until the male is well into the eclipse plumage and thus the duck is already protectively colored when the need is greatest. In some cases, both sexes do not molt simultaneously so that one is always in a position to provide parental care for the young. As the wing feathers are replaced, the wings become very heavy due to the "blood feathers". This is a very dangerous time to handle wildfowl because if a blood feather is broken, a great deal of bleeding results.

Thousands of waterfowl are banded by biologists annually during this period of flightlessness. Once done in a haphazard manner, all official banding in North America is now a coordinated computerized operation. Approximately 300,000 ducks, geese and swans are banded annually in North America alone, and the data obtained sheds much light on the biology and lifestyles of many species, including life spans, population dynamics, effects of hunting pressure, migratory routes, etc. These data are important when considering length of hunting seasons, bag limits, protection of some species and acquisition of habitat.

Since they spend a great part of their lives in water, waterfowl must be adequately waterproofed. For this they are equipped with a large and highly developed oil gland, known as the uropygial gland, located at the base of the tail. They must preen and oil themselves frequently in order to maintain the feathers in prime condition and to keep them waterproofed. Preening also helps to preserve the surface of the bill and legs. After bathing, ducks and geese may preen for hours, a process that is fascinating to observe. If the birds fail to keep themselves in good condition, especially if the feathers are not maintained and oiled, they risk sinking and ultimate drowning. An unoiled duck, depriving itself of water to avoid drowning, becomes potential prey for an alert predator.

Waterfowl can be extremely gregarious and tend to assemble in tremendous flocks, particularly during migration and on the wintering grounds. Gregariousness has a number of advantages, not the least of which is the fact that an individual bird obtains greater survival potential through the combined senses and actions

of the group. This social tendency, however, increases their vulnerability to oil spills and other forms of pollution. The biannual migratory treks of many of the northern species are well documented. Not all waterfowl migrate but those that inhabit the higher latitudes usually do. Each fall, millions of ducks and geese move down from their northern breeding grounds in the Arctic to spend the winter in more favorable southern climates. The melodic, far-carrying call of the Canada goose winging its way south on a crisp autumn morning is unforgettable and is a sure sign that winter is not far behind. The phenomenon of migration also occurs in the southern hemisphere but is not near the spectacle. The seasons are reversed south of the equator and the southern or austral summer corresponds to the northern winter. Both sexes generally migrate to the same area, but there are some exceptions such as with the European Goldeneye.

Migration may be triggered by variations in climatic conditions at higher latitudes and the resulting effect on food availability. Presumably adverse weather itself is of no great consequence, but freezing waters will encourage southward movement. These mass movements may appear to be random, but they are far from that. Well established aerial highways or corridors known as flyways are utilized. In North America four major migration routes are recognized; the Atlantic, Mississippi, Central and Pacific flyways. These administrative flyways overlap considerably and their boundaries cannot be precisely defined. They may also vary somewhat from year to year depending on climatic conditions. Millions of waterfowl emanating from Canada and Alaska winter in the southern states, but large numbers move on to the Central and South America as well. As an example, a tiny blue-winged teal banded in Canada was recovered six months later in Peru, some 7,000 miles away. The flyways of Europe and Asia are not yet as well defined as those in North America, but they exist nevertheless.

The uncanny ability of birds to navigate accurately for long distances has been the subject of intense scientific investigation and controversy for many years. While our understanding of this phenomenon increases annually, our knowledge is still rather rudimentary. The position of the sun, moon and stars obviously serve as navigation aids, but there are undoubtedly numerous other factors involved as well. During migration, waterfowl tend to fly higher than when engaged in local flights. These heights

vary considerably but on the average are between 1,000 and 3,000 feet, but on occasion can be as high as 20,000 or more feet.

In the spring, migrants return to their northern homes to breed and rear their young. This northward movement is possibly triggered by certain physiological stimuli; for example, the gonads increase tremendously in size. Timing of an animal's reproductive cycle is set so that the young are reared during the best possible climatic conditions when there is an abundance of food. The amount of light, or photoperiod, is extremely important and also stimulates breeding activity. In the higher latitudes, these optimal conditions exist only during the brief warm spring and summer months. At these latitudes, both north and south, the number of species is reduced as compared to temperate or tropical regions, but the number of individuals is far greater. Seasonal variation in abundance of specific food items is reflected in waterfowl food habits. For nearly all species, this results in an increase in animal food during the spring and summer when more invertebrates are available.

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