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Migration of Birds

When Birds Migrate

Individual birds are relatively sedentary during two periods each year, at nesting time and in winter. When the entire avifauna of a continent is considered, however, during almost all periods there are some latitudinal movements of birds. Each species, or group of species, migrates at a particular time of the year and some at a particular time of the day. Other species are more irregular in their migratory behavior. Red Crossbills, for example, are erratic wanderers and will settle down and breed any month of the year when and where an adequate supply of conifer seeds is available.

Time of Year

Some species begin their fall migrations early in July, and in other species distinct southward movements cannot be detected until winter. For example, many shorebirds start south in the early part of July, while Northern Goshawks, Snowy Owls, Common Redpolls, and Bohemian Waxwings do not leave the north until forced to do so by the advent of severe winter weather or a lack of customary food. Thus, an observer in the northern part of the United States may record an almost unbroken southward procession of birds from midsummer to winter and note some of the returning migrants as early as the middle of February. While on their way north, Purple Martins have been known to arrive in Florida late in January; and, among late migrants, like some wood warblers, the northern movement may continue well into June. In some species with a broad latitudinal range, the migration is so prolonged that the first arrivals in the southern part of the breeding range will have performed their parental duties and may complete nesting while others of the species are still on their way north. As you should expect, northern and southern populations of the same species can have quite different migration schedules.

In fall, migratory populations that nest farthest south migrate first to the winter range because they finish nesting first. For example, the breeding range of the Black-and-white Warbler covers much of the eastern United States and southern Canada northwest through the prairies to Great Bear Lake in Canada (Figure 1). It spends the winter in southern Florida, the West Indies, southern and eastern Mexico, Central America, and northwestern South America. In the southern part of its breeding range, it nests in April, but those summering in New Brunswick do not reach their nesting grounds before the middle of May (Figure 2). Therefore, if 50 days are required to cross the breeding range, and if 60 days are allowed for reproductive activities and molting, they would not be ready to start southward before the middle of July. Then with an assumed return 50-day trip south, the earliest migrants from the northern areas would not reach the Gulf Coast until September. Since adults and young have been observed on the northern coast of South America by August 21, it is very likely that they must have come from the southern part of the nesting area.

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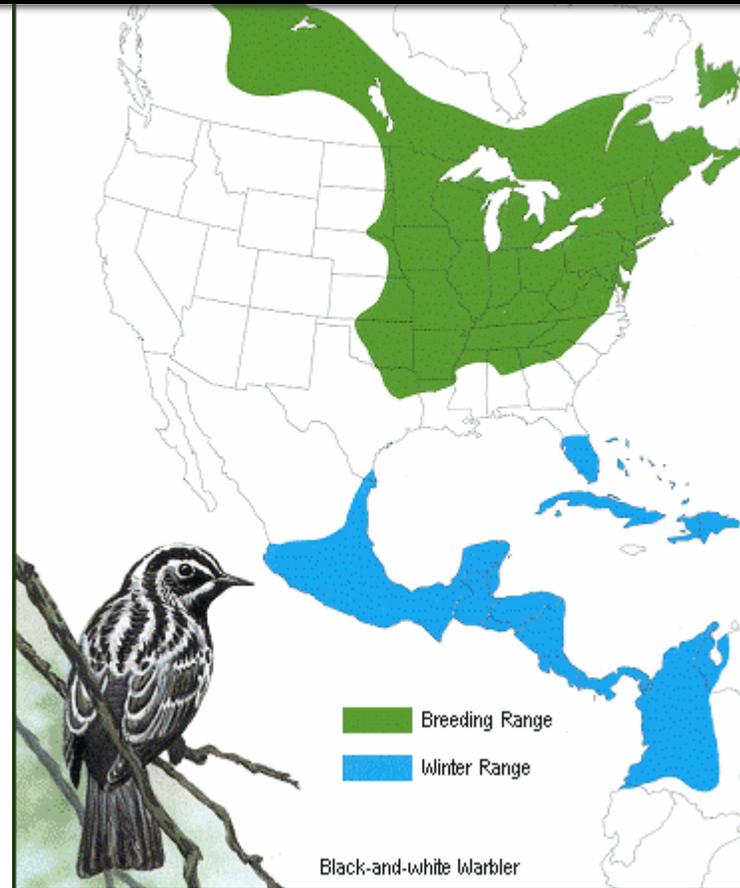


Figure 1. Summer and winter homes of the Black-and-white Warbler. A very slow migrant, warblers nesting in the northern part of the continent take 50 days to cross the breeding range. The speed of migration is show in Fig. 2.

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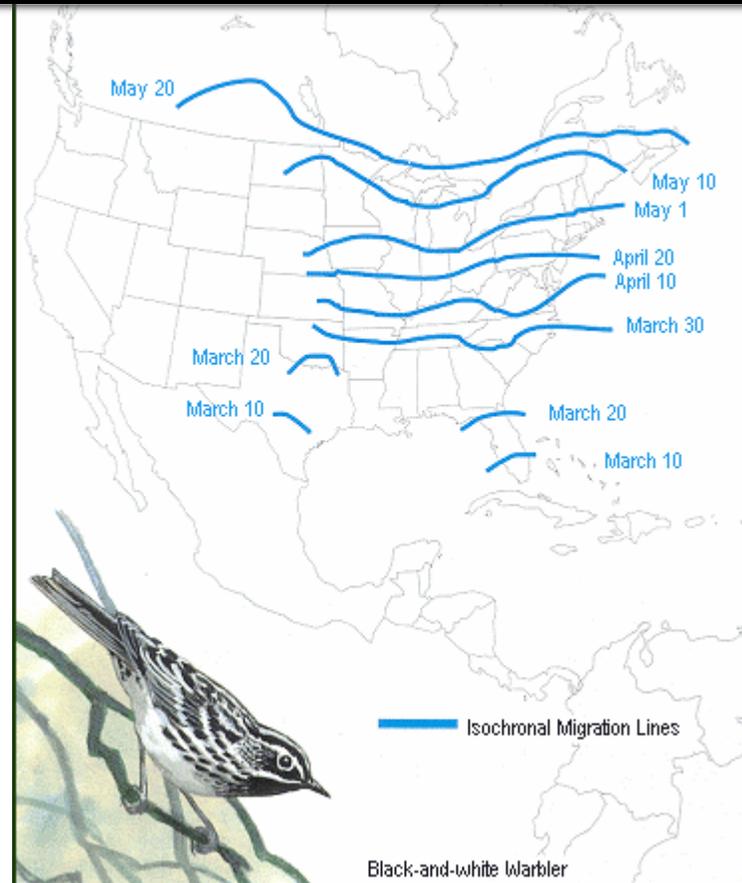


Figure 2. *Isochronal migration lines of the Black-and-white warbler, showing a very slow and uniform migration. The solid lines connect places at which these birds arrive at the same time. These birds apparently advance only about 20 miles per day in crossing the United States.*

Many similar cases might be mentioned, such as the Black-throated Blue Warblers still observed in the mountains of Haiti during the middle of May when others of this species are en route through North Carolina to New England breeding grounds. The more southerly breeding American Redstarts and Yellow Warblers are seen returning southward on the northern coast of South America just about the time the earliest of those breeding in the north reach Florida on their way to winter quarters. Examples of the Alaska race of the Yellow Warbler have been collected in Mississippi, Florida, and the District of Columbia as late as October.

Students of migration know that birds generally travel in waves, the magnitude of which varies with populations, species, weather, and time of year.

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such as flycatchers, vireos, and warblers. Each of these species in turn has its own frequency curve of migration within the major wave.

Time of Day

Because most birds are creatures of daylight, it seems remarkable that many should select the night for extended travel. Smaller birds such as rails, shorebirds, flycatchers, orioles, most of the sparrows, the warblers, vireos, and thrushes are typical nocturnal migrants. It is common to find woods and fields on one day almost barren of bird life and on the following morning filled with newly arrived migrants that came during the night. Waterfowl hunters sitting in their blinds frequently observe the passage of flocks of ducks and geese, but great numbers of these birds also pass through at night; the calls of Canada Geese or the conversational gabbling of flocks of ducks are common night sounds in spring and fall in many parts of the country. Observations made with telescopes focused on the full moon have shown processions of birds, and one observer estimated their passage over his area at the rate of 9,000 per hour. This gives some indication of the numbers of birds in the air at night during migratory peaks. Radar observations have shown that nocturnal migration begins about an hour after sundown, reaches a maximum shortly before midnight, and then gradually declines until daybreak. Bird echoes during peak migration periods may cover a radar screen.

It has to be suggested that small birds migrate by night to avoid their enemies. To a certain extent this may be true because the group includes not only weak flyers, such as the rails, but also the small insectivorous birds, such as wrens, small woodland flycatchers, and other species that habitually live more or less in concealment. These birds are probably much safer making their flights under the protecting cloak of darkness. Nevertheless, it must be remembered that night migrants also include sandpipers and plovers. Most shorebirds are usually found in the open and are among the most powerful flyers, as some of them make annual nonstop migratory flights over 2,000 miles of open ocean.

Night travel is probably the best for the majority of birds chiefly from the standpoint of feeding. Digestion is very rapid in birds, and yet the stomach of birds killed during the day almost always contains food. To replace the energy required for long flight, it is essential that either food be obtained at comparatively short intervals or stores of fat be laid on prior to migration. If the smaller migrants were to make protracted flights by day, they would arrive at their destination at nightfall almost exhausted. Since they are entirely daylight feeders, they would be unable to obtain food until the following morning. The inability to feed would delay further flights and result in great exhaustion or possibly even death should their evening arrival coincide with cold or stormy weather. By traveling at night, they can pause at sunrise and devote the entire period of daylight to alternate feeding and resting. This schedule permits complete recuperation and resumption of the journey on a subsequent evening after sufficient fat deposits have been restored. Banding studies have shown that the number of days an individual lays over during a migration stop is inversely dependent upon the amount of its fat stores upon arrival.

It has also been hypothesized that nighttime migration is advantageous because environmental temperatures are typically cooler: The effort involved in migratory flight generates considerable heat. The primary way in which flying birds lose heat in order to maintain an optimum body temperature is through the evaporation of water from air sacs that are part of its breathing system. Indeed, dehydration resulting from regulation of body temperature rather than the amount of fat stores probably limits the distance a bird can fly nonstop. Thus, by flying in cooler air, which increases heat loss by conduction and convection, less cooling by evaporation of limited body water is required and flight distances are extended.

The day migrants include, in addition to some of the ducks and geese, loons, cranes, gulls, pelicans, hawks, swallows, nighthawks, and swifts. Soaring birds, including Broad-winged Hawks, storks, and vultures, can only migrate during the day because their mode of flight makes them dependent on updrafts created either by thermal convection or the deflection of wind by topographic features like hills and mountain ridges. Swifts and swallows feed entirely on diurnal flying insects, and circling flocks of these species are frequently seen in late summer feeding as they travel gradually southward. Similarly, large flocks of Franklin's Gulls in the Great Plains feed on insects caught in thermals, using these updrafts as a source of food as well as the means permitting soaring flight that carries them on their journey with minimal expenditure of muscle power. Large flocks of Swainson's Hawks also

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ducks that submerge when in danger, often travel over water by day and over land at night. Strong flyers like Snow Geese can make the entire trip from their staging area in James Bay, Canada to the wintering grounds on the Louisiana Gulf coast in one continuous flight. These birds are seldom shot by hunters enroute between these two points but are often observed migrating by aircraft pilots. Graham Cooch of the Canadian Wildlife Service tracked a flight of the blue phase of this species in 1955. The birds left James Bay on October 17 and arrived on the Gulf coast 60 hours later after a continuous flight of over 1,700-miles at an average speed of 28 miles per hour.

American Golden-Plovers, likewise, probably make the southward flight from the Maritime provinces to the South American coast in one giant leap. Other arctic shorebirds make spectacular flights. Baird's Sandpipers, for example, congregate in the Great Plains after a flight southward from above the Arctic Circle and then depart on a nonstop flight of several thousand miles. This flight takes them off the western coast of Mexico and Central America to eventual landfall in Peru. From there they continue southward at a more leisurely pace until they reach their wintering grounds in Tierra del Fuego.

An interesting comparison of the flights of day and night migrants may be made through a consideration of the spring migrations of the Blackpoll Warbler and the Cliff Swallow. Both spend the winter as neighbors in South America, but when the impulse comes to start northward toward their respective breeding grounds, the warblers strike straight across the Caribbean Sea to Florida (Figure 3), while the swallows begin their journey by a northwestward flight of several hundred miles to Panama (Figure 4). From there they move leisurely along the western shore of the Caribbean Sea to Mexico and, continuing to avoid a long trip over water, go completely around the western end of the Gulf of Mexico. This circuitous route adds more than 2,000 miles to the journey of the swallows that nest in Nova Scotia. The question may be asked: "Why should the swallow select a route so much longer and roundabout than that taken by the Blackpoll Warbler?" The explanation is simple. The swallow is a day migrant while the warbler travels at night. The migration of the warbler is made up of a series of long nocturnal flights alternated with days of rest and feeding in favorable localities. The swallow, on the other hand, starts its migration several weeks earlier and catches each day's ration of flying insects during flight.

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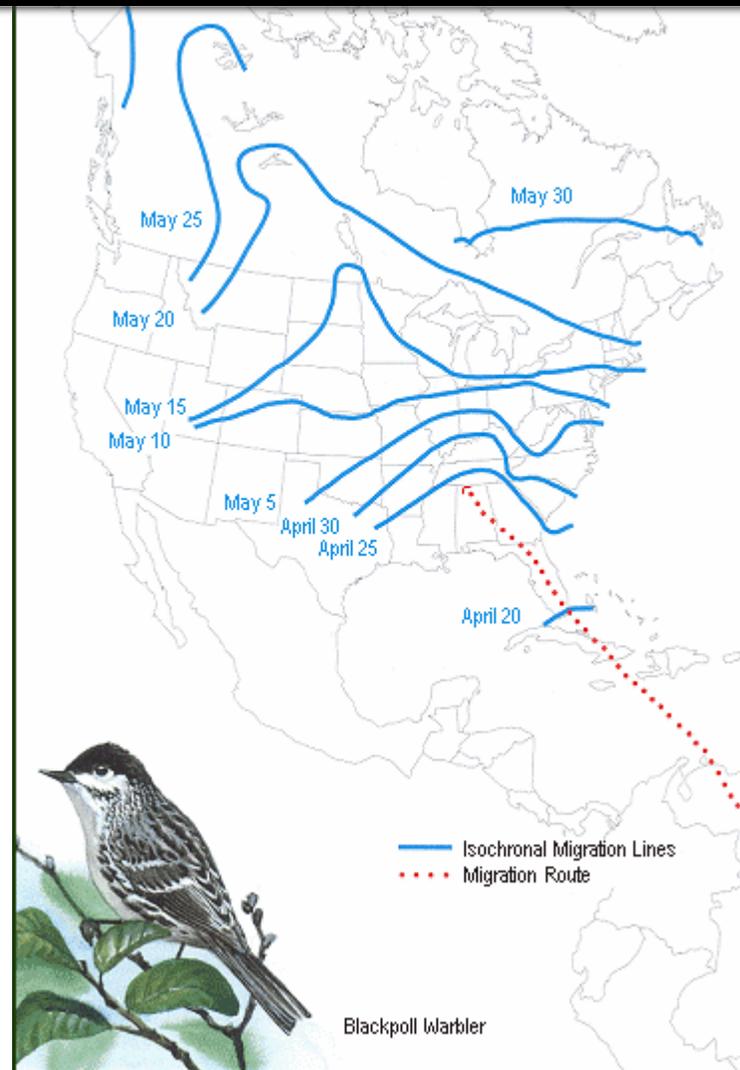


Figure 3. *Migration of the Blackpoll Warbler.* As the birds move northward, the isochronal lines become farther apart, which indicates that the warblers move faster with the advance of spring. From April 30 to May 10 the average speed is about 30 miles per day, while from May 25 to May 30 it increases to more than 200 miles.

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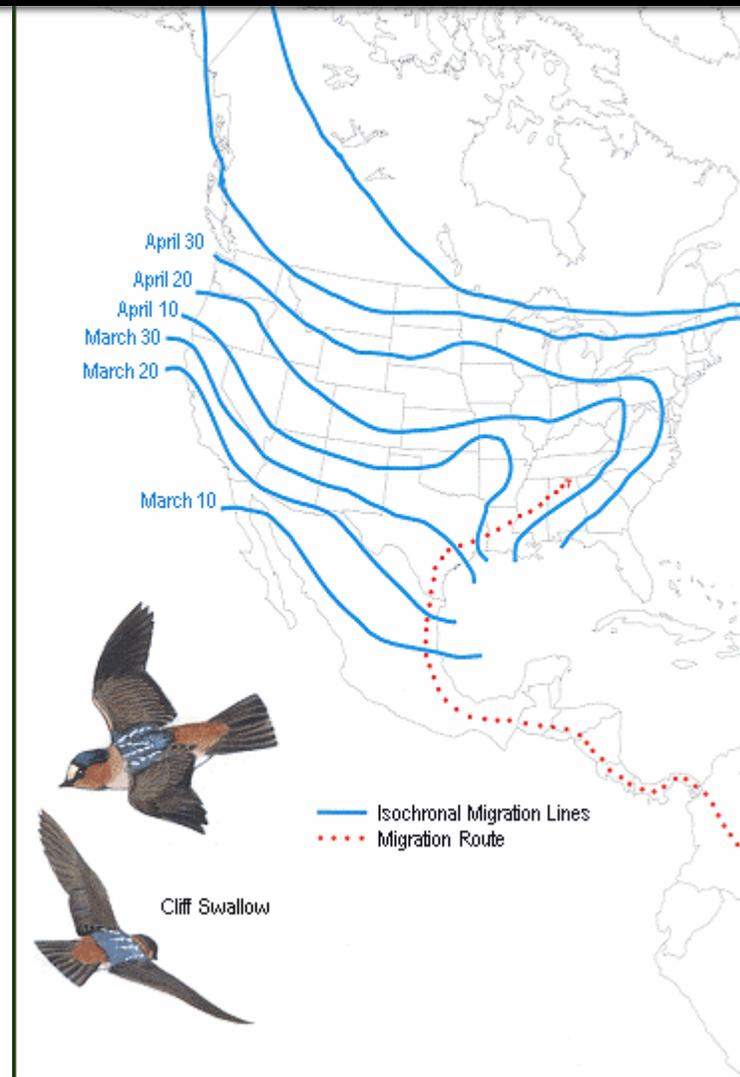


Figure 4. *Migration of the Cliff Swallow. A day migrant that, instead of flying across the Caribbean Sea as does the Blackpoll Warbler (see Fig. 3), follows the coast of Central America, where food is readily obtained.*

Although most of our smaller birds make their longest flights at night, close observation shows travel is continued to some extent by day. During the latter half of a migratory season birds may show evidence of an overpowering drive to hasten to their breeding grounds. At this time flocks of birds

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