The Changing Seasons

*by Sidney A. Gauthreaux, Jr., and Harry E. LeGrand, Jr.**

Spring Migration, 1975. Unfavorable winds, low temperatures, and greatly delayed arrivals.

At Logan, Utah, a Black-throated Gray Warbler dropped off a branch, frozen, at the feet of a startled watcher. This incident reported by Dr. Keith L. Dixon in Hugh E. Kingery's Mountain West report is rather dramatic documentation of the wintry weather that characterized much of the spring season throughout North America. Nearly all regional editors reported that winter lasted well into spring, and migrants, particularly landbirds, were delayed at least one to two weeks.

In the northeast and north central regions the weather was colder than normal until about the second week of May when winter suddenly turned into summer. There were no massive flights or waves of migrants, and migration was thought to be slow during April. In mid-May the strong surge of warm air actually caused some overshooting of birds in the Ontario - Western New York Region.

The spring flow of warm, humid maritime tropical air into the southern states that normally begins in March and becomes more or less sustained after the first week in April was delayed. The migration in the Southern Atlantic Coast Region was slow in starting. Observers in the northeastern portion of Florida said it was the best spring in three years, but reports from the southern two-thirds of the state said the migration was dull. Most migrants were delayed about a week in the Central Southern Region, and observers in the South Texas Region said migration was below par in March and April and better in May. On the upper Texas coast where spring migration can be as exciting as any place on earth, it was the worst season in years for "wave watchers."

Migrants were at least two weeks late in the Northern Great Plains, and when they arrived, they did so in spurts. Several observers thought many of the birds overflew the area. In the Southern Great Plains the spring was disappointing with one of the poorest migrations on record, the result of no fronts or storms to down migrants

Because severe weather systems often move from west to east with the prevailing westerlies over much of the United States, one would expect the western mountains to have had a very frigid spring. This was most certainly the case in 1975 Reports from the Northern Rocky Mountain-Intermountain Region confirmed one of the coldest and snowiest springs on record. Plant growth was delayed from one to four weeks and even more at higher elevations. These conditions delayed migrants, caused winter residents to remain far beyond their normal departure time, and significantly delayed nesting. In the Mountain West Region almost weekly snowstorms delayed the leafing of cottonwoods by three weeks, and spring migration was also about that late Thousands of birds perished in the wintry weather, particularly in Utah. The cold spring also extended southward into the Southwest Region where most observers said migration was two weeks late and reported many more migrants at lower elevations than is normal.

As one might expect, most passerine migrants arrived late throughout the Alaska Region, and for good reason. The three Pacific Coast regions reported that the spring was one of the coldest and stormiest in many, many years. These conditions retarded the arrival of landbirds and caused

many to amass in lowland areas until mountian areas became habitable in middle May. The migration produced no large concentrations at desert oases or elsewhere east of the Coastal Range in the Southern Pacific Coast Region, and spring landbird arrivals were said to be from one to two weeks late in the Middle Pacific Coast Region. Reports from the Northern Pacific Coast Region said the spring migration there was rather retarded and decidedly unspectacular.

One or two observations can now be made in an overview of the season. The delaying effects of this spring's cold weather was multiplied as birds moved north. Near the coast of the Gulf of Mexico migrants were a week late, but by the time they reached the northern states they were two to three weeks late. Interestingly, this pattern appears to be the same for the East as well as the West. Despite these delays we were struck by the large number of reports that commented on the sparsity of waves and concentrations of migrants. It is a bit of a mystery how a spring's migration can be delayed by one to three weeks and end roughly on schedule without producing rather spectacular concentrations of migrants, unless mortality figured far more importantly than present reports indicate. The nesting season and fall migration will hopefully give us a clue.

WEATHER INFLUENCES

This year from March 13 to May 31 approximately 22 cold fronts entered the continental United States from the Pacific Ocean or Canada. Ten of these were strong enough to reach the northern coast of the Gulf of Mexico: three from March 13 to 31, three from April 1 to 30, and four from May 1 to 31. Five of these fronts were sufficiently powerful to move over most of the Florida Peninsula: two in March, two in April, and one in May. In comparison with the spring of 1974, there were actually *fewer* cold fronts (25 in 1974 and 22 in 1975), but this is not unusual in light of the very cold spring. Intense high pressure systems have a tendency to dominate huge areas of the continent for several days and block subsequent frontal passages. It is a fact that such was the case during the spring of 1975. The daily weather maps clearly indicate that day after day huge, cold, high pressure systems dominated much of the United States, and numerous spring records for low temperatures were broken.

In an attempt to correlate the events of this spring's migration with monthly wind patterns, we have again compiled wind data and drawn maps for March, April, and May. Small landbird migrants should be most affected by mean wind patterns, particularly in reference to a seasonal trend. As we pointed out last year (*American Birds*, 28 (4): 771-778), temperatures and wind direction are interrelated. Therefore we expect to find changes in the wind maps that reflect this spring's cold temperatures and delayed migration As before, the maps are a continental analysis of surface winds by the month based on daily winds recorded at 19:00 EST, 18:00 CST, 20:00 MST, and 22:00 PST. The maps (Figures 1-3) show the vector resultant wind direction and speed for numerous stations throughout the the United States for the months of March, April, and May The code for reading the maps is the conventional one used by the National Weather Service; that is, the wind blows from the direction indicated by the wind flag (toward the dot), and the speed is coded on the wind flag. The reader is urged to have last year's maps at hand to compare with this year's.

In Figure 1 the most noticeable change in March winds this year occurred in the area from Texas through the Mississippi Valley to the Ohio Valley. Whereas March winds last year showed a good flow from the Gulf of Mexico to these areas, the winds this year showed either marked variability or a northerly trend. The winds off the Gulf did not penetrate deeply into the central states. In fact, air flow over coastal Louisiana and Texas, where most trans-Gulf migrants make their landfall, was directed toward the west in contrast to last year. March winds last year helped carry migrants from the Gulf coast to Tennessee, the Carolinas, and Virginia; this spring the winds in Mississippi and Alabama largely prevented this flow of migrants. Likewise an air flow from the north penetrated farther south in the Plains in contrast to last year.

Perhaps the most dramatic difference between the wind maps for last year and this year can be found in those for April. The wind flow from south to north and then northeast was quite favorable for the advancement of spring landbird migrants in April, 1974. The reader will recall the incredible amount of overmigration that accompanied this wind pattern. In stark contrast, this April's continental wind pattern (Figure 2) clearly reflects the slow pace of the spring's migration, particularly for the areas from the Great Lakes and Illinois through the Northeast and south to the Virginias. The wind flow showed a much stronger northerly influence, a condition that probably retarded the movement of migrant landbirds into these areas. Winds from the Texas and Louisiana coastal areas tended to flow more northwesterly in comparison with the pattern in April, 1974. This may help to explain the num-

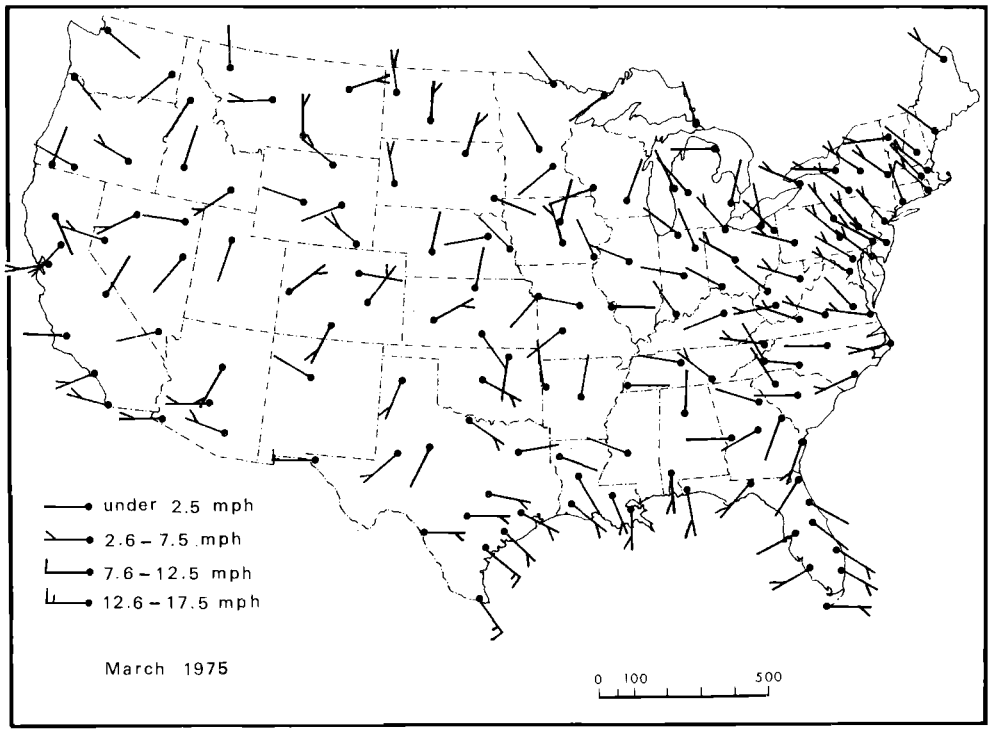

Figure 1. Vector resultant wind direction and speed for March, 1975.

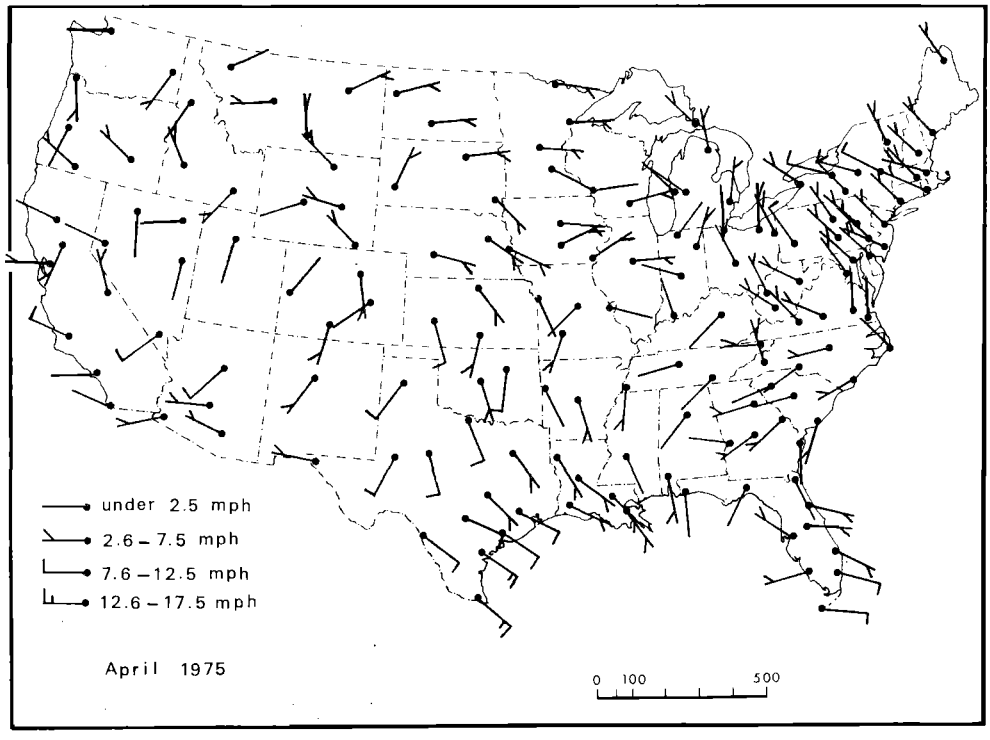

Figure 2. Vector resultant wind direction and speed for April, 1975.

bers of trans-Gulf migrants that appeared in the Colorado report.

The May winds of 1975 (Figure 3) were not appreciably different from those mapped for May, 1974. Once again this is in keeping with the reports of migration returning to normal by the middle of May. Upon close examination of the May, 1975 map, one notices that the wind arrows reflect a slightly stronger southerly flow in the Northeast (from southern Maine to Pennsylvania) and in the central United States (Nebraska, Kansas, Missouri, and Illinois) than in 1974.

In the western states the rough topography greatly affects the surface wind patterns to the extent that mean monthly winds are not as representative of synoptic weather patterns as they are in the East. Local surface winds are influenced more by the location of the wind meters (in a valley, on a mountainside, etc.) than by the weather systems. For this reason one must examine the geostrophic winds that blow parallel with the isobars (lines of equal barometric pressure) on a weather map. Such winds are outside the atmosphere's friction layer which extends 1,500 to 3,000 feet above the earth's surface. Although we do not include an analysis of this sort for the western United States in this report, we do use this approach in another section to clarify the role of winds in the occurrences of eastern songbird migrants along the Pacific coast

MIGRATION HIGHLIGHTS

In the Middle Atlantic Coast Region there was an interesting report of a heavy reverse migration of shorebirds that occurred in Delaware on May 16. Thousands of Ruddy Turnstones, Dunlins, and Least Sandpipers were observed flying southward between 2 and 4 p.m. A low pressure system off the New England coast caused northerly winds in the area. Herb Kale writes of an exciting migration event witnessed by Bryan Obst on the morning of May 4 at Anastasia Island, near St. Augustine, Florida. After hearing call notes from migrating birds all night, he saw the next morning literally thousands of warblers flying north in the heavily clouded sky and trees full of birds. Such an event, although unusual, is not unexpected, particularly when the eastern edge of a trans-Gulf flight is shifted eastward toward the west coast of Florida. The species composition of the flight strongly suggests that this was the case

In the Ontario report the effects of the April 1-3 snow storm are given, and concern is expressed over the consequences of the storm in terms of migrant fatalities. One response to the weather occurred on April 3 when a west-bound reverse migration including 10,000 Red-winged Black-

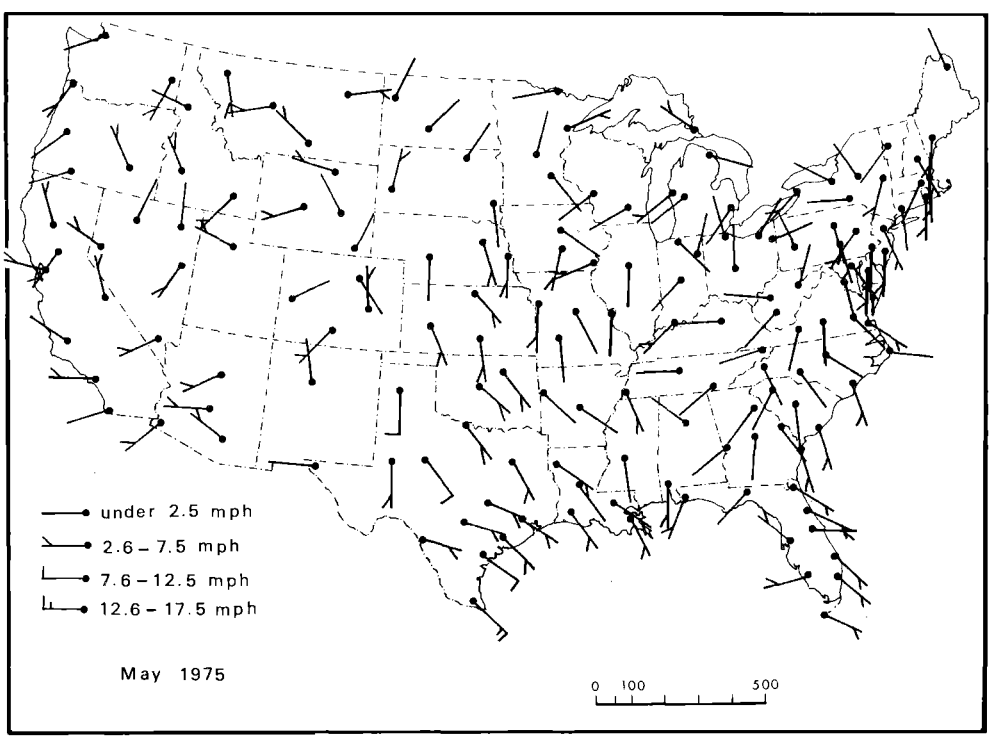

Figure 3. Vector resultant wind direction and speed for May, 1975.

birds and one Brewer's Blackbird was recorded. At the time a very deep low pressure system was located just south of Toronto, and winds were blowing from the northeast and east-northeast at 15 to 20 mph. In mid-May the cold spring that characterized much of the area from the Western Great Lakes to Maine and Virginia broke with an enormous surge of warm air from the South. This caused several southern species to overshoot their normal nesting areas. On May 19 and 20 some exciting migration was observed at Tobermorey, Ontario, and at Mississagi Light north of Lake Huron. Nocturnal migrants were found flying north in broad daylight with brisk south-southwest winds at Tobermorey on May 20, and, in contrast, on the same day many migrants were watched at Mississagi Light as they streamed south with northwest winds after overshooting in the surge of warmth the day before.

In the Southern Great Plains Region a rare migration spectacle occurred on the night of May 3-4 at Huntsville, Texas. From 11:05 p.m. until the hours just before dawn Kelly Bryan and Mike Pace witnessed an exciting nocturnal "fallout" of shorebird and landbird migrants on the lighted athletic fields of Sam Houston State University, and shortly after dawn Bryan counted over 200 warblers in one pecan tree! Every spring the Gulf coast of the South Texas Region usually has at least one interesting episode, and although this spring was below par, it was no exception. A squall line passing over Corpus Christi on the night of May 14-15 set the stage. The next morning at 7:30 a.m. on the west side of the city Catherine McCarty witnessed a spectacular movement of passerines going northwest on brisk southeasterly winds from over the Gulf of Mexico Thousands of birds moved northwest in waves. They came down into thickets, rested, fed briefly, and then resumed their flight in the same direction! Most were nocturnal migrants. The phenomenon was probably widespread, because another observer, Emilie Payne, south of Corpus Christi, witnessed the same thing.

The opening sentence of this season's summary is but one example of the migrant mortality that occurred in Utah in the Mountain West Region. To get the full impact the reader is urged to read Hugh Kingery's report carefully. Despite the disaster in Utah, the region had a memorable migration, particularly for Colorado.

EASTERN SONGBIRDS IN THE WEST

One of the more interesting items in the report from the Southwest Region concerns the intensive mistnet survey during May at two localitites on the southeastern plains of New Mexico. These oasis-like areas had never been so intensively worked in spring before, and John Hubbard and his co-workers recorded an impressive list of *eastern* migrants, including three first records for New Mexico. It is pointed out that *local wind patterns* during the time when the eastern warblers were being netted were dominantly out of the *southwest*, but the geostrophic winds during May in the area were more favorable, 22 out of 31 days with geostrophic winds blowing from directions between north-northeast and south-southeast and 15 out of the 22 days with a geostrophic wind from directions between east and south-southeast

The Middle Pacific Coast Region once again experienced a surge of eastern vagrants in the first two weeks of June, and it was called the "most incredible assortment of 'eastern' species of passerines yet witnessed." Most were banded, carefully examined, and photographed. Early May proved to be an excellent time to observe regular west coast migrants moving through the coastal regions of southern California, but in late May and early June the eastern stragglers began to appear at isolated desert oases and small offshore islands. Observers recorded thirty-two species of warblers alone during the latter period

The appearance of eastern species, particularly warblers, at western oases, coastal stations, and offshore islands in late May and early June is still very much an ornithological puzzle. Observers in the East have never recorded an equivalent event involving western warblers. Admittedly there are fewer western species and probably smaller numbers of individuals, but the lack of any conspicuous western invasions in spring along the East coast is as puzzling as the occurrence of eastern warblers in the West. There has been some discussion of the role that wind currents play in this western phenomenon, and additional hypotheses have been generated to help explain why many eastern songbirds regularly appear at western locations in fairly large numbers (e.g., mirror-image misorientation). Thus far in this spring's summary we have used maps of surface winds to help explain some of the migration events that transpired east of the 105° W meridian. But as cautioned earlier, these maps *should not* be used when considering some of the migration events that happened in the West, particularly the occurrence of eastern species at many locations in Colorado, New Mexico, Arizona, Utah, Nevada, and California. The geostrophic winds should be used in comparisons of wind and migration patterns in the West, because these winds are largely above the influence of major topographic features (coastlines, mountains, valleys, etc.) and flow along the lines (isobars) that

delimit atmospheric pressure surfaces (highs or lows). The flow of geostrophic winds around "highs" is clockwise and around "lows" is counterclockwise, and the speed of the winds is faster when the isobars are closer together.

We have included in this summary three maps (Figures 4-6) based on maps from the *Climatic Atlas of the United States* (U.S. Department of Commerce, Environmental Science Services Administration, Environmental Data Service, June,

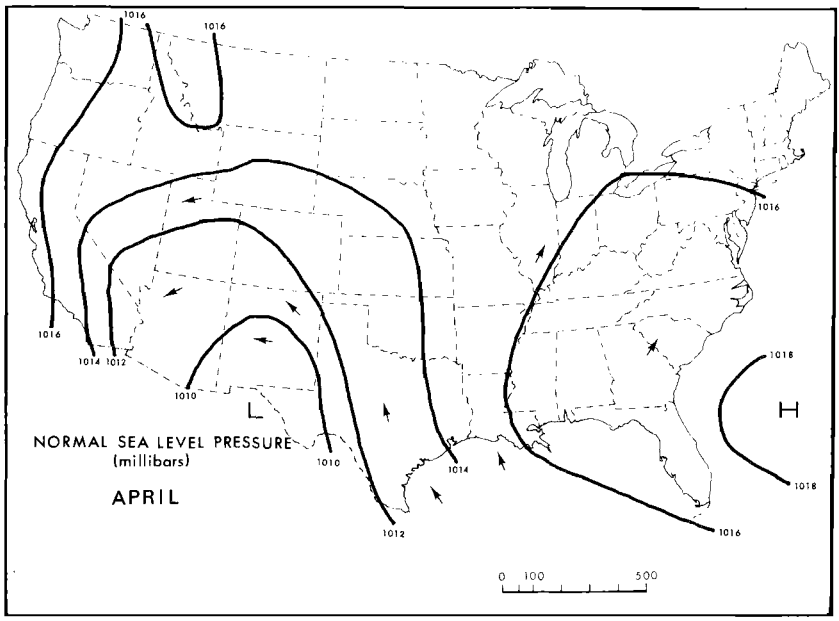

Figure 4. Normal sea level pressure and geostrophic winds for April, 1931-60.

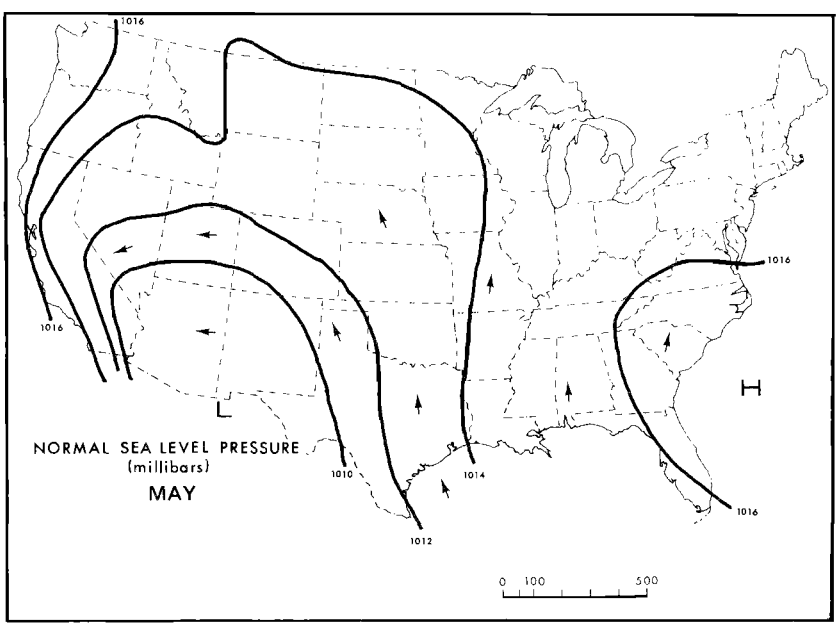

Figure 5. Normal sea level pressure and geostrophic winds for May, 1931-60.

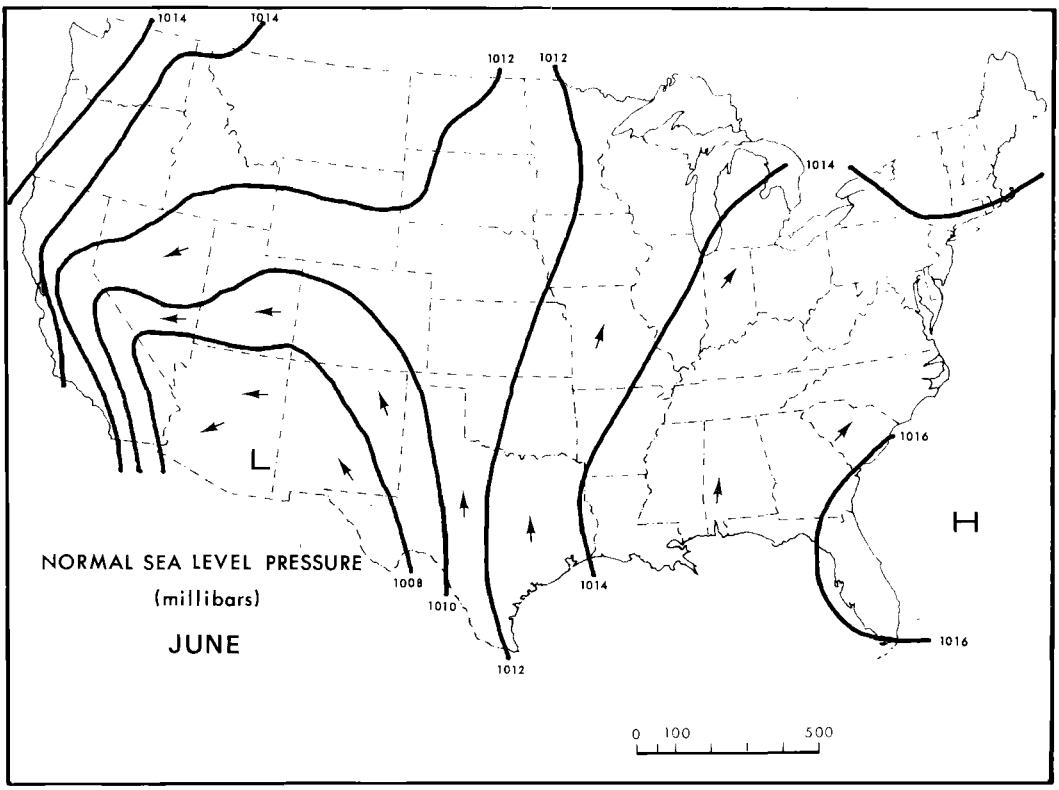

Figure 6. Normal sea level pressure and geostrophic winds for June, 1931-60.

1968) showing normal sea level pressure gradients for the months of April, May, and June based on data from 1931-1960. As can be seen the geostrophic winds moving along the isobars circulate counterclockwise around a low pressure center in northern Mexico. Thus these winds move up from the western coast of the Gulf of Mexico, arc westward through Colorado and New Mexico, and end up in California. In contrast, the geostrophic winds in the central and eastern United States move northward from the Gulf of Mexico and gently arc toward the northeast and east, a pattern that assists the flow of migrants into the eastern United States. In June (Figure 6) the isobars over the Southwest are closer together (stronger wind flow) and are oriented more east to west than in April or May. We have computed the resultant geostrophic winds for three 15-day periods from May 1 through June 15, 1975, above the point where Nevada joins middle California. For the periods May 1-15, May 16-31, and June 1-15, the geostrophic winds came from 70° (angular deviation of 41°), 78° (angular deviation of 36°), and 73° (angular deviation of 37°), respectively. As mentioned earlier the geostrophic winds above southeastern New Mexico during May were more from the southeast. Furthermore, the geostrophic wind flow from coastal Texas to Colorado and California this spring appears to have been better developed than last spring These wind patterns, we feel, demonstrate that wind currents above the earth's friction layer do help to explain why the West receives eastern songbird migrants and why western migrants tend to stay in the West.

The following pages will give the reader the details of this spring's migration. There are reports of spectacular hawk flights, invasions, and many unusual records. Several state records were established, and there were noticeable changes taking place in the status of several species Declines in the numbers of Loggerhead Shrikes were reported, and Swainson's Warblers appeared at many new localities, indicating that this species is increasing in population size. Other warbler species were reported in excellent numbers, and it was thought that the spruce-bud worm outbreak was in part responsible.

Once again we thank Anne Harshman for her assistance in preparing this summary; her work on the wind maps and typescript are particularly appreciated. We also wish to acknowledge the support of grant AFOSR-73-2534 to S. A. Gauthreaux.

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