bodies of water in regions with prevailing winds will have greater nesting success and perhaps the highest nest densities along their leeward shores.

Comparisons of temporally and/or spatially separated Osprey foraging appear of little use without accompanying data on prevailing weather. For instance, because Lambert (1943) did not record weather conditions, I cannot suggest other reasons why the Ospreys he studied (89% of dives successful) were 147% more effective than those I watched.

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THOMAS G. GRUBB, JR. *Department of Zoology, Ohio State University, Columbus, Ohio 43210.* Accepted 11 Aug. 75.

Impoundment of the Tombigbee River and bird distribution.—The impoundment of the Tombigbee River at Demopolis, Alabama forms a pool that backs up to Gainesville. This offers an opportunity to study the distribution of birds on impounded and unimpounded portions of a stream flowing through the Black Belt, a coastal plain formation.

I made 12 boat trips during the period 19 September to 16 November 1972, each trip approximately 10 miles, 7 of them up the unimpounded river, 5 down the impounded portion. During 5 of the 7 upstream trips I saw a total of 54 Spotted Sandpipers (*Actitis macularia*); on 6 of the upstream trips I recorded a total of 51 Killdeers (*Charadrius vociferus*). On the impounded portion of the river I saw no Killdeers or Spotted Sandpipers. The explanation of this disparity seems to be the association of these birds with sandbars. The sandbars of the unimpounded river are kept clear of vegetation while the sandbars of the impounded portion are overgrown, mainly by cockleburrs (*Xanthium stumarium*).

Further study is needed to determine if other species are affected in a similar manner. The Black Vulture (*Coragyps atratus*) is another bird closely associated with the unvegetated sandbars of the unimpounded river where their numbers were far greater than on the impounded river, but the large variation in numbers and small number of samples did not yield a significant difference between the two portions of the river ($P = 0.2$) although the number encountered was quite different (46 per trip vs. 6 per trip).

This study was supported by a grant from the U.S. Corps of Engineers (DACW01-72-C-0009) to the University of Alabama.—DAVID T. ROGERS, JR., *Biology Department, University of Alabama, University, Alabama 35486.* Accepted 3 Sep. 75.

A Caribbean Barn Swallow recovery.—An immature Barn Swallow (*Hirundo rustica erythrogaster*) that I banded (71-98120) 29 August 1964 at Vischer Ferry Wildlife Management Area (42°47′N, 73°48′W) near Schenectady, New York was recovered by P. H. Erkens 44 days later on 12 October aboard a freighter off the coast of Panama (direct recovery distance of about 2450 miles, 55.7 miles per elapsed day). The freighter left Cristobal, Canal Zone (9°20′N, 70°53′W) at or before dawn that morning bound northeastward for Europe. The last view of the Panamanian coast was at 1000 to 1100. During the morning, a flock of 12–24 Barn Swallows came in off the sea and began circling the ship, following it out to sea. Between 1400 and darkness at 1900, the birds settled on the ship and were so exhausted that they could be approached and picked up. By the following day all were dead.

When the freighter left port, the sky was overcast. It became sunny, and the air was very warm in the afternoon. The weather in the Gulf of Mexico and Caribbean Sea appears to have been influenced by at least two low-pressure systems. A low that was over Lake Huron at 1300 EST on 9 October had a trailing cold front extending south to Georgia and turning west paralleling the Gulf coast. By 1300 on 10 October the cold front had advanced out over the Gulf about one-half the length of the Florida peninsula; and a low-pressure system formed off the east coast of Yucatan. Winds in Florida and the Gulf were generally E and NE, while in the Caribbean they were E and SE at 15–20 mph.

At 0100 on 11 October the front reached the southern tip of Florida and by 1300 it was stationary over Cuba. It subsequently disappeared by 0100 on 12 October. Its passage on 9–11 October was followed by NE winds of 9–14 mph. The Yucatan low remained stationary through 11 and 12 October. By 13 October, it intensified and became hurricane Isabel and began moving ENE. On 11 October at 1300, the wind directions at Jamaica, Hispaniola, and Venezuela were easterly and southerly at 9–20 mph, whereas at Panama they were SE at 4–9 mph. This same general situation prevailed into 12 October.

Thus for the 36 to 48 hours immediately preceding encounter of the birds and the ship, the Caribbean wind direction averaged SE at 9–20 mph at the start and tended toward E at 4–9 mph at the time of encounter. Whether these birds originated their flight with the assistance of favorable NE winds accompanying the cold front over Florida or Cuba on 10 or 12 October, or whether they were drifted by easterly winds from one of the more easterly land masses of the Greater Antilles is not known. Their position at sea and their physical condition at the time of encounter suggest they must have flown through the night. Had they been migrating normally during the day of 11 October and been forced to fly through the night for lack of a suitable landing site, they could have been airborne for up to 30 hours at the time of encounter. The nearest northerly land masses of significant size are Jamaica (550 miles almost due north) and Hispaniola (650 miles northeast). Under normal circumstances the Barn Swallow is considered a diurnal migrant and is not known to cross the Caribbean. In this case these birds did not survive an attempt to do so.

I wish to acknowledge the loan of meteorological data from Raymond Falconer of the Atmospheric Sciences Research Center of the State University of New York at Albany.—R. P. YUNICK, *1527 Myron Street, Schenectady, New York.* Accepted 5 Sep. 75.

Audiospectrograms with pitch scale: a universal "language" for representing bird songs graphically.—Dissatisfaction with the frequency scale of conventional sonagrams prompted me to portray songs of brown towhees (*Pipilo*) by hand-tracing the graph onto a logarithmic scale of frequency, to equalize the intervals of pitch (Marshall 1964, Condor 66: 347). By pitch I mean position in the do-re-mi sequence or on the musical staff. Later I despaired at the labor of eye-fitting these graphs and used the linear scale audiospectrograms just as they came from the analyzing machine (Marshall 1967, Western Found. Vert. Zool. Monogr. No. 1). Meanwhile manufacturers inserted into newer machines a small, inexpensive device that automatically makes a logarithmic display. Yet ornithologists never use the log scale! Herewith I offer reasons for abandoning the linear scale—because it resembles nothing in the real world—and for adopting the log scale because it is reproducible and, like a musical score, constitutes a universal "language" or symbolism by which sounds can be recognized visually by their shapes on a graph.

The conventional sonagram paper displays notes or a theme as black smudges reading from left to right on a horizontal scale of equal time intervals. The equal intervals of frequency, in vibrations per second, on the vertical axis are not faithful to the intervals that we hear in natural sounds. The latter are stretched apart in the upper levels of the graph, whereas near the bottom they are so condensed that pitch differences cannot be detected. The shorter the time length of the theme displayed (which depends on the speed of rotation of the turntable relative to tape speed of the incoming signal), the flatter it becomes (Fig. 1), as if it were a wax model melting down into a puddle at the bottom of the paper. A single theme can take an infinite number of shapes when rendered at different speeds and on different analyzers. Results can be duplicated only if the machine model, speed at which it accepts the song, the horizontal scale, *and* the vertical scale are all specified and adhered to. Musicians read themes by their shape; they would rebel at having to decipher such distortions if the frequency scale were used on the musical staff.

On the other hand, Fig. 2 shows the same theme on the log scale. Musical intervals of pitch are the same throughout the vertical axis. They are based on the musical octave of doubling frequency. As pitch ascends we experience the recapitulation of a sequence of sounds (do, re, mi, etc.) at double, quadruple, etc., frequencies. Indeed it is much easier for the human ear to assign bird sounds to pitch values on the scale of do-re-mi than it is to discover in what octave of the pianoforte they lie. (For unfamiliar sounds the only way to tell the latter is to make a spectrogram of them with a calibration tone included on the graph. This difficulty is due to the marked similarity of any two tones an octave apart in pitch because of their possession of several harmonics in common.) Thus the log scale reflects the true relationship among sounds in nature. A given note, phrase, or theme has one and only one shape. If greater resolution is desired, the analyzer is speeded to accept only a short portion of the theme (or the tape speed is reduced), and the result is a tracing of the same shape as before, but beautifully enlarged. Results can be duplicated by any kind of analyzing machine at any speed, anywhere. The theme will always have the same shape (being subject