

AN INVESTIGATION OF FALL-MIGRATING DOWITCHERS IN NEW JERSEY

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DURING July and August, the Short-billed Dowitcher (*Limnodromus griseus*) is one of the commonest of the shorebird migrants along the Atlantic seaboard. Two populations, the nominate race, *griseus*, and the interior race, *hendersoni*, are known to migrate coastally (Pitelka, 1950) but their relative abundance has not been investigated thoroughly. Pitelka suggested that on the central and southeast coast *griseus* outnumbered *hendersoni* by 2 or 3 to 1, but that north of Chesapeake Bay the proportion of *griseus* increased rapidly. Specimen data from Massachusetts (Griscom and Snyder, 1955) suggest that *griseus* may be more than twenty times commoner there than *hendersoni*. Griscom and Snyder also considered all July migrants as the nominate race and implied that *hendersoni* was a later migrant, arriving in August after the peak of *griseus* migration. Their conclusion was tentative, however, for they emphasized that "local specimens of supposed *griseus* are quite inadequate and badly need supplementing."

The Long-billed Dowitcher (*L. scolopaceus*) is generally thought to be a late September and October migrant along the east coast, but its exact status is uncertain. In examining virtually all dowitchers in American collections for his monograph, Pitelka (1950) found that "on the basis of specimen evidence, *griseus* and *hendersoni* together outnumber *scolopaceus* on the Atlantic coast by about 10 to 1"; Massachusetts specimens alone show a 5 to 1 ratio (Griscom and Snyder, 1955). Most field workers in the northeast would consider these ratios very highly biased in favor of *scolopaceus*.

The reason for this discrepancy is probably twofold: (1) unfamiliarity of field workers with *scolopaceus*, and (2) highly selective collecting. These alternatives are not mutually exclusive. However, I believe that the second is more important, and that the ratios from the specimen data are untenable. Moreover, we must note that the race *hendersoni* was not proposed until 1932, and that perhaps the bulk of east coast specimens were taken before that date. It follows that earlier collectors, in selecting for the larger, brighter, longer-billed *scolopaceus*, unwittingly took many examples of the then undescribed *hendersoni*. Therefore, the proposed *griseus* : *hendersoni* ratio is also open to question. Regardless of the actual ratio, Pitelka's (1950) finding that the proportion of *griseus* to *hendersoni* decreases southward along the Atlantic coast is valid beyond question.

This paper presents the results of a brief investigation of fall-migrating dowitchers along the New Jersey coast, which attempted to determine: (1)

the relative status of the races of *L. griseus*, (2) the status of *L. scolopaceus*, and (3) the basis for inferring that races of the short-bill migrate at markedly different times.

METHODS

This report is based mainly upon a small series of dowitchers collected from the barrier beach and tidal mud flats of Ocean County, New Jersey, during the summers of 1958 and 1959. Some field work and supplemental collecting were continued in this area through 1961. Adult dowitchers in breeding plumage were taken throughout the summer, commencing with their arrival in early July. The end of the collecting period, in mid-August, was determined by the departure of adult birds, and the assumption of winter plumage. Winter plumaged short-bills are identifiable to race only on mensural characters (Pitelka, 1950), in which there is a great deal of overlap.

Nearly all specimens were taken nonselectively by firing into small flocks, but there was some slight, conscious selection for individuals of *hendersoni*. Counts of dowitchers present at several localities were made weekly, and the *griseus* : *hendersoni* ratio was visually estimated.

In the summer of 1962, field work was confined to the brackish Hackensack River marshes near Lyndhurst, Bergen County, New Jersey. These extensive marshes are dominated by vast stands of *Phragmites*. A few selected specimens were taken here.

Identification.—Using Pitelka's (1950) criteria, I found little difficulty in separating breeding-plumaged adults of *griseus* and *hendersoni* in the field. Very briefly, *hendersoni* may be distinguished from *griseus* on the basis of extended reddish on the underparts, reduced ventral spotting, and the more golden dorsum, a reflection of the wider, buffier feather edgings in this race. Immature dowitchers are easily distinguished from adults, but even in the hand a great many cannot be named to race.

Adult Long-billed Dowitchers may be distinguished from *hendersoni* by the deeper salmon red of the underparts, the barred throat, and the dark dorsum. My field observations agree with Rowan's (1927) findings that *scolopaceus* often retains its breeding plumage longer than either *griseus* or *hendersoni*. Many, if not most, long-bills reaching the Atlantic coast in mid-August are still in this plumage; they are easily separated from short-bills, which by this time are decidedly gray. Replacement of the head feathers apparently takes place early in *scolopaceus*' postnuptial molt. The result is that adult long-bills in late August take on a very *gray-faced*, red-bellied appearance, which is distinctive.

Juveniles of *L. scolopaceus* may be distinguished from young *L. griseus* under favorable field conditions, the former being darker above and grayer

below, especially on the neck and chest. Adults in winter plumage are difficult to separate by morphological characters. Bill length, except in extreme cases, is not a valid field mark, for some female short-bills have longer bills than some male long-bills. (For a full discussion of this problem see Pitelka, 1950.)

Voice.—Although some earlier writers (e.g., Nichols, 1920) reported that they were unable to separate the dowitchers on the basis of call notes, most recent workers (Nisbet, 1961; Peterson, 1961; Small, 1958) agree that the calls of the two species are diagnostic. A whistled *tu-tu-tu*, reminiscent of the call of the Lesser Yellowlegs (*Totanus flavipes*), is characteristic of *griseus*, while a single-noted *keek* is ascribed to *scolopaceus*. Agreement on the value of this character is not universal (cf. Eisenmann, 1961, 1962; Bull, 1962). Eisenmann (1961) cogently observes: "So far as I am aware, nobody has demonstrated by collecting an adequate series of calling dowitchers that it is *scolopaceus* and only *scolopaceus* that utters the single 'keek.' Quite possibly *scolopaceus* may have calls that are recognizably different from nominate *griseus*, but for all we know that may also be true of *hendersoni*."

In my experience, the distinct call notes constitute the most reliable basis for separating the species in the field. The following observations are relevant. First, the familiar *tu-tu-tu* of the short-bill is the only call issuing from the tremendous flocks of dowitchers along the New Jersey shore from early July through mid-August, the peak migration period for *L. g. griseus*. Moreover, it is the only call heard in this region during the spring migration, when long-bills do not occur. Second, the race *hendersoni*, many individuals of which may be identified under field conditions, is a common July and August migrant; its call, to my ear, is indistinguishable from that of nominate *griseus*. Later-migrating, immature short-bills give identical calls. Third, the single, strident note, which I have generally recorded as *kee*, is not usually heard before mid-August, the beginning of *scolopaceus*' migration period, and even then only rarely from the tidewater regions. I have identified many individuals of *scolopaceus* in breeding plumage which have given only this call. When the birds are alarmed, the call is often trebled or drawn out into a long *kee-kee-kee*. . . . Immature birds give identical calls. Fourth, Dr. Pitelka writes (pers. comm.) that on the Alaskan breeding grounds difference in call note between *scolopaceus* and *L. g. caurinus* is similar to that described above.

In summary, the *tu-tu-tu* call of the short-bill seems to be independent of age, season, or race, while only long-bills, adult or immature, are known to utter the single *keek*. Field work in the nesting regions may determine whether the long-bill has some notes which resemble those of the short-bill. However, in my opinion, there is no reasonable doubt that the *keek* note is confined to *scolopaceus*.

STATUS IN NEW JERSEY IN FALL

L. g. griseus.—Specimens taken: adults, 45; immatures, 3. Dates: 30 June–26 August.

The eastern short-bill is the commonest dowitcher along the tidewater. Cruickshank (1942) found that migrants begin to arrive in late June in the New York City region and that “numbers rapidly increase until maximum abundance for the entire year is reached during the last two weeks of July. During August numbers gradually drop off, but there is often a noticeable influx in early September.”

My field work indicates that some nonbreeders summer each year. These birds often have undergone incomplete molts; their mixed plumage easily distinguishes them from the early July migrants.

Weekly censuses have shown that there are three, not two, peaks in fall migration. A few birds may arrive in early July, but the first real influx comes with a tremendous rush, usually about 10 July, with hundreds of birds arriving almost simultaneously. Maximum numbers for the year are reached immediately; the highest count is $10,000 \pm 1,500$, at Brigantine Refuge, Atlantic County, 9 July 1960. These first migrants remain for up to two weeks, and numbers are usually greatly diminished by the end of July. The second influx, which occurs in late July or early August, is not as pronounced as the first. The beginning of this movement may not always be evident to the field observer because some birds from the first movement linger along the coast. Birds arriving in this movement also linger for a week or two, but most depart by mid-August.

Numbers build up again in mid-August with the arrival of birds of the year. Occasionally a juvenile may occur as early as 8 August, but generally it is not until the fifteenth that they appear in small flocks. Young continue to arrive into early September. Because this movement is protracted, numbers involved are never so great at any one time as in either earlier movement. Only a few stragglers remain by the end of September.

Migrants arrived in the Hackensack River marshes on 4 July 1962, and a flock of 250 was present by mid-July. Nearly all of these birds were referable to *L. g. griseus*. The first young birds were seen on 12 August.

L. g. hendersoni.—Specimens taken: adults, 12; immatures, 1. Dates: 30 June–14 August.

A few examples of this race have been found summering at Beach Haven, Ocean County, recently (one specimen), and undoubtedly several summer each year. The arrival of postbreeding birds coincides with the first arrival of *L. g. griseus*, although the main flight appears to average several days to a week later. Weekly field estimates in Ocean County indicate that about 10 per

cent of the adults observed were probably referable to this race. The highest percentage noted was 30 per cent (of 450 birds at Beach Haven, 18 July 1959), but this may be an artifact caused by a somewhat earlier emigration of *L. g. griseus*. The highest count for this race is about 1,000 (10 per cent of the estimated 10,000 at Brigantine, 9 July 1960).

L. g. hendersoni is extremely rare in the Hackensack marshes. Only about 1 per cent of the dowitchers observed there could be definitely ascribed to this race. I suspect that this is a significant reflection of the migration route (see below), but no firm statement can be made on the basis of one summer's observations.

The arrival of juveniles is probably synchronous with the arrival of young *griseus*; one juvenile *hendersoni* was taken in the Hackensack marshes on 14 August. Further collecting will probably do little to clarify this point, for only extremely large individuals of *hendersoni* can be identified in the hand in juvenile plumage.

I would suggest that the adult *griseus* : *hendersoni* ratio is about 8 or 10 to 1 in Ocean County. The immature ratio is underminable.

My data do not support the suggestion that *hendersoni* is a later migrant than *griseus*. Furthermore, Pitelka (1950) lists mid-July specimens of this race from Long Island to Florida. Evidently, postbreeding adults which migrate in July and early August move directly to the mid-Atlantic coast, and occur only rarely north of the mid-Jersey coast. The New England records, however, are concentrated in late August and early September (Pitelka, 1950; Griscom and Snyder, 1955) during the migration period of the young birds. It is reasonable to assume that these records actually refer to birds of the year, which in most species studied, follow less precisely defined migration routes than do adults.

I have detected no differences in habitat utilization between *griseus* and *hendersoni*. Any suggestion that *hendersoni* lingers along the northeast coast later than *griseus* is speculative. Scattered reports of short-bills inland in the northeast probably refer to this race.

L. scolopaceus.—Specimen taken: adult, 1. Date: 13 August.

Since the preference of this western species for fresh-water ponds is well documented, it is not surprising that I was unable to collect any long-bills from the Ocean County flats. In fact, on only the rarest occasions was I able to identify this species in the area. The bulk of my collecting, though not observing, was completed prior to the usual arrival period of this species.

However, long-bills do occur with some frequency on the impounded brackish ponds of the Brigantine Refuge. In 1959 and 1961, I encountered flocks of 35 and 55 birds there on 15 August, a date which would be considered unusually early by most observers. These flocks consisted largely of adults in

breeding plumage, although one flock contained several immatures. There were no short-bills in either of these flocks, yet many were present elsewhere on the refuge. It is quite possible that these birds had just arrived, for there was no obvious difference in the feeding areas.

Most sight records are from September and early October (Kunkle et al., 1959) and probably refer to birds of the year (see Pitelka, 1950).

In the Hackensack region long-bills freely associated with short-bill flocks. The first bird was observed on 21 July, and a few birds were seen through 14 August, with a peak of about 10 on 13 August. No birds were seen between 14 August and 1 September, at which time I had to cease observations.

Extensive efforts were made to collect this species, but the birds were extremely wary. One male in heavy molt, including primaries, was taken on 13 August.

It should be obvious that the question of the *griseus* : *scolopaceus* "ratio" in fall along the northeast coast is largely academic, because it assumes that the entire migration periods of both species are in synchrony. This is not so. *Scolopaceus* probably cannot be expected with any regularity until mid-August. Prior to this time there is essentially no ratio—all birds may be assumed to be *griseus* subspecies. What is relevant to the field worker is the ratio after *scolopaceus* begins to arrive (the actual "migration period" of *scolopaceus* may begin several weeks earlier, since the birds must travel over 4,000 miles to reach New Jersey from the Alaskan breeding grounds). This ratio still cannot be determined satisfactorily. Long-bills occur in varying numbers each year, and the number of short-bills lingering fluctuates with the fall weather conditions. Perhaps the most definite statement that can be made is that even after 1 September *scolopaceus* is the much less common form along the coast. There is no justification for assuming later migrants to represent the western species simply on the basis of date.

Differential migration by sex and age in L. g. griseus.—As noted above, there are three peaks in fall migration. Bent (1927) suggested that "probably the first arrivals are birds that, for one reason or another, have failed to raise broods of young, for the time elapsing between late-spring migration and the early fall flight is not sufficient for successful breeding."

The sheer numbers of early migrant dowitchers should have warned against any such conclusion. It is now clear that the composition of each migratory peak is highly characteristic (Fig. 1). The first is composed largely of post-breeding adult females; that these birds have actually laid eggs is evidenced by the presence of unresorbed blood on the ovarian follicles of over 90 per cent of the females collected in early July. A few males with small testes are mixed in with these flocks, and it may be that nonbreeding males migrate

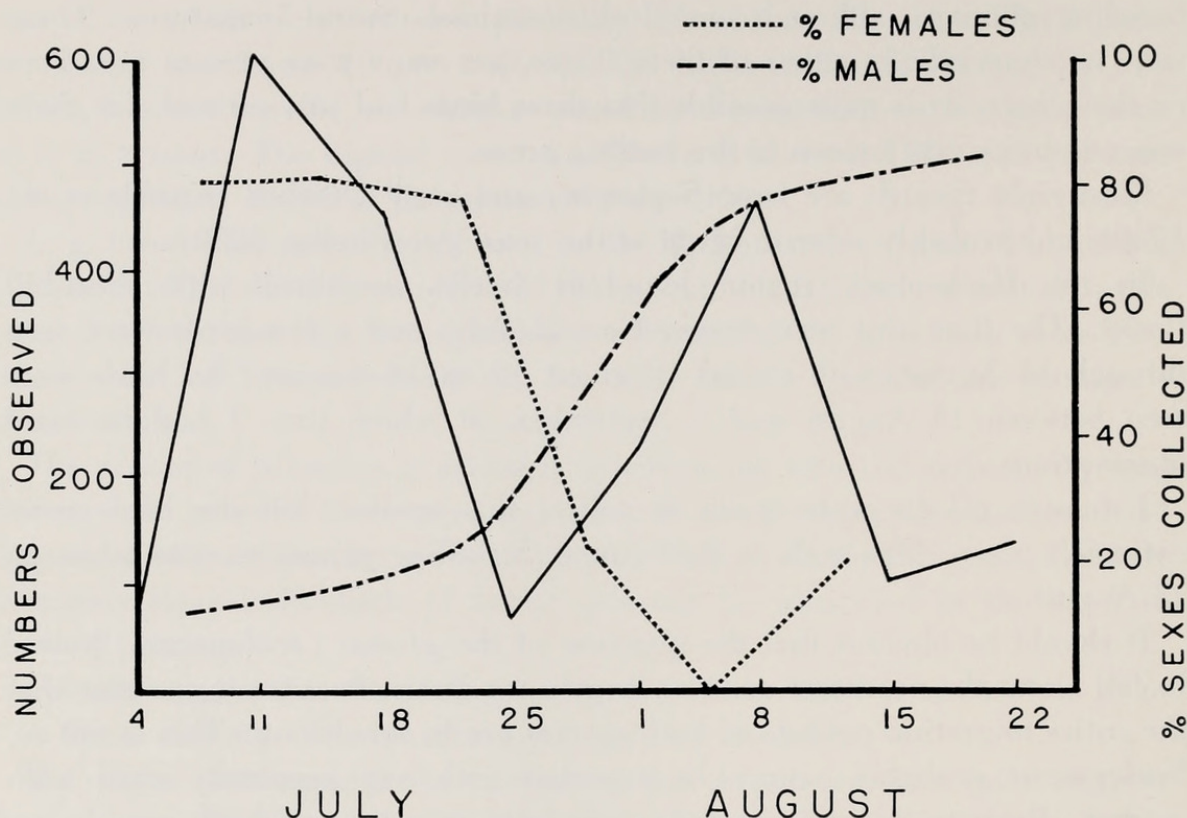


FIG. 1. Numbers of Short-billed Dowitchers (*L. griseus* subspecies) observed at Beach Haven, Ocean County, New Jersey, July–August 1959, and per cent by sexes collected. The per cent female curve is calculated from the data (55 specimens, 1958–62). Instead of being graphed as a mirror image of the female curve, the per cent male curve has been fitted to the data and probably represents the average annual arrival pattern.

from the breeding grounds with the breeding females. The second peak, in late July, consists mainly of adult males, while the young, as noted, do not make an appearance until mid-August.

Because of apparent nonrandom sampling and the lack of collecting throughout the course of a season, sex ratios as well as species ratios computed from specimens in existing collections may fail to indicate differential migration. Furthermore, collections of significant size are often broken down and housed

TABLE 1
WEIGHTS OF FALL-TAKEN ADULT DOWITCHERS

Race	Sex	Number	Range and average (in grams)
<i>griseus</i>	♀	30	82.5–153.6 (116.2)
<i>griseus</i>	♂	12	73.0–153.0 (110.5)
<i>hendersoni</i>	♀	3	114.0–121.5 (117.0)
<i>hendersoni</i>	♂	7	75.3–129.0 (99.9)

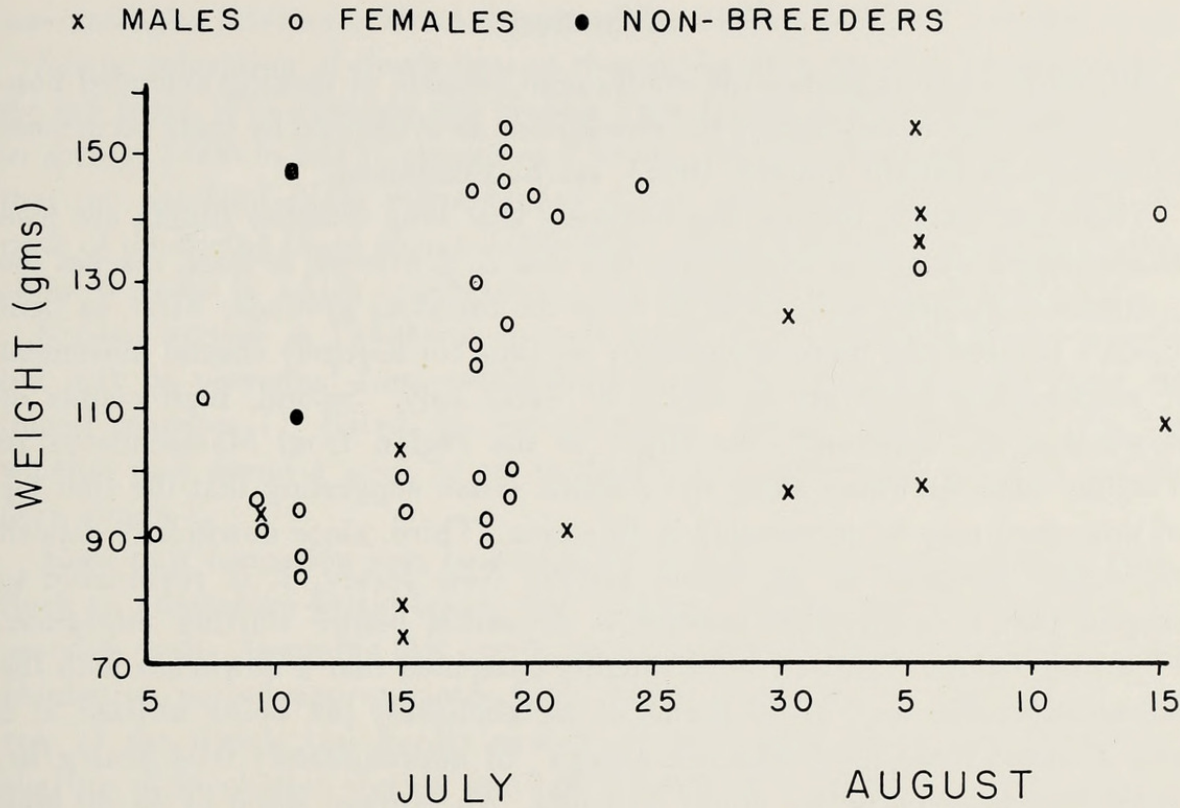


FIG. 2. Weights of fall-taken adult *L. g. griseus* presented by date of collection. The earliest arrivals average about 90 grams. Fat reserves are replenished in 10 days to 2 weeks. Weights prior to departure approximate 145 grams.

in different museums. The researcher without access to all available collections must hope that the specimens available to him are truly representative. Therefore, I mention with some reluctance that a small series in the U.S. National Museum clearly illustrates differential migration. Eight birds taken on Long Island, New York, 14 July 1917, are all females, while nine birds taken by the same collector in Ocean County, New Jersey, on 28 July 1917 are all males.

The weights of migrating dowitchers, as presented in Table 1, are highly variable because of differing amounts of fat. However, when presented by date of collection (Fig. 2), they are more meaningful. The earliest arrivals of both sexes are very light and nearly devoid of subcutaneous fat; they average about 90 grams. Fat is laid on rapidly and maximum weights of 140–150 grams may be attained within 10 days. At this time the birds begin to depart (see Fig. 1). I extracted 49.4 grams of fat from a 139-gram female. This is slightly more than 35 per cent of the net weight, and I suspect that loads of 40 per cent are not uncommon.

DISCUSSION

Migration.—Most shorebirds are thought capable of making extended non-stop flights, and in this regard the dowitchers, as evidenced by their occasional occurrence in Britain (Nisbet, 1961), are no exceptions.

There are several reasons for believing that long nonstop flights are also characteristic of typical migrations, and that *L. g. griseus*, at least, reaches the northeast coast after a direct flight from the breeding grounds. First, as Bent (1927) pointed out, there is obviously no time for leisurely coastal movement if postbreeding birds are to arrive by early July. Second, high counts of dowitchers are apparently far larger in the region from Massachusetts to Virginia than elsewhere along the Atlantic coast, suggesting that the first leg of migration may be terminated in this area. Third, since dowitchers deposit substantial amounts of fat before leaving New Jersey, it is reasonable to suspect that a comparable amount is deposited before starting migration. Following Odum (1958), I have roughly computed that a dowitcher with the not-unreasonable load of 50 grams of metabolizable fat, being utilized at a rate of three times the "existence energy" of approximately 0.04 kcal/g/hr, could remain airborne for about 35 hours. An average speed of 35–40 mph (Cottam et al., 1942) would allow flight ranges of 1,200–1,400 miles. This distance is roughly the airline distance from Labrador to New Jersey.

If the above calculations are approximately valid, a bird leaving Labrador in the early evening would be expected to reach New Jersey with reserves expended in about a day and one-half. Interestingly, unpublished visible migration observations indicate that most dowitchers arrive in New Jersey in the early morning, while observations of birds departing in both spring and fall, are confined to the predusk hours.

Howell's (1932) data indicate that arrival dates in Florida average 10 days to 2 weeks later than in New Jersey, which leads me to suspect that dowitchers fly nonstop from the northeast coast directly to Florida and beyond, as soon as fat reserves are replenished.

The distance from central Manitoba to New Jersey is not much greater than the distance from Labrador to New Jersey. The synchronous arrival of *hendersoni* with *griseus*, and the relative scarcity of dowitchers inland, strongly suggests that many *hendersoni* reach the Atlantic coast after a non-stop flight from the breeding grounds.

Postulated breeding schedule of L. g. griseus.—Practically nothing is known of the breeding biology of any dowitcher, least of all the nominate race. The long-suspected Quebec–Labrador breeding grounds of this form have only recently been confirmed (J. Baird, R. C. Clement, pers. comm.). The demonstration of differential migration of sexes and the available migration data

warrant some inferences about aspects of the eastern short-bill's annual cycle.

Spring migration of dowitchers in the northeast is never as pronounced as the fall flight. For example, the highest daily counts in Massachusetts are 400 in spring, 5,000 in fall (Griscom and Snyder, 1955); these writers suggested that the overland flight starts farther down the coast. In New Jersey the peak of the spring flight comes in late May. Thus, breeding females have only about 6 weeks in which to migrate to the breeding grounds and return.

Griseus arrives in Labrador in early June (R. C. Clement, pers. comm.) but may be prevented from establishing territories until ice melts from the inland marshes (J. Baird, in conversation). Birds "dammed up" by the weather may spend a week or so on the St. Lawrence coast (R. C. Clement, pers. comm.).

Some pair formation may be completed before arrival in the nesting areas. Such an adaptation would insure that nesting could be started as soon as the marshes open. Assuming that egg-laying is completed by 15 June, and that the incubation period approximates three weeks (Conover, *in* Bent, 1927), the role of the female can hardly consist of more than laying and occasional sharing of incubation during the first 2 weeks if an additional 10 days will be needed to lay on premigratory fat.

Young probably hatch in early July. Two "barely fledged" young were taken by H. Ouellet and R. McNeil at Boundary Lake, Quebec, on 28 July 1958 (W. Earl Godfrey, pers. comm.). Once flying, the young are on their own, for as I have shown, the males appear along the northeast coast in late July. The young follow about 2 weeks later.

It is probably fair to assume that the regular arrival of birds in early July indicates a synchrony in the start of nesting which, in some seasons at least, is climatically controlled. The breeding grounds of nominate *griseus* are undoubtedly confined to the interior of the Ungava peninsula. If we may treat this vast area as a climatological unit, it may be possible to arrive at some rough estimate of the number of breeding pairs of this race. For all practical purposes, *griseus* is exclusively a coastal migrant in which the breeding females arrive en masse along the northeast coast, primarily from Massachusetts to Virginia, in early July, and remain for about 10 days. A census made from the Del-Mar-Va peninsula northward at this time could probably give such an estimate—were the *griseus* : *hendersoni* ratio known for each census point.

While a number of important papers on the breeding biology of shorebirds have appeared in recent years, most species are still inadequately studied. The lack of definitive data might be circumvented in part, for some species, by a study of their migratory behavior. For example, species which arrive from

their northern breeding grounds in early July, such as the Least Sandpiper (*Erolia minutilla*) and Stilt Sandpiper (*Micropalama himantopus*), may exhibit differential migration of sex classes, reflecting a strong division of labor with respect to nesting duties. On the other hand, the main arrival of a species in August probably indicates that both sexes share in rearing the young. Such studies need not be based entirely on collecting. Sexual dimorphism is great enough in some species that many individuals may be sexed by measurements.

Nisbet (1957) has presented evidence that the Ringed Plover (*Charadrius hiaticula*) and Dunlin (*Erolia alpina*), and possibly the Ruff (*Philomachus pugnax*), Eurasian Curlew (*Numenius arquata*), and Green Sandpiper (*Tringa ochropus*), have trimodal peaks in autumn migration. While his suggestion that different breeding populations migrate through England at slightly different times is probably true for some species, it would be instructive to reanalyze these migration peaks in terms of differential migration of the sexes.

SUMMARY

During fall migration along the New Jersey coast, *L. g. griseus* outnumber *L. g. hendersoni* by 8 or 10 to 1. *L. scolopaceus* occurs annually in small numbers after the middle of August.

Most breeding-plumaged adults of these forms may be identified in the field by morphological characters. Furthermore, difference in call note is a valid method of separating *L. scolopaceus* from *L. griseus*, subspecies.

In *L. g. griseus*, and undoubtedly in *L. g. hendersoni*, there are three main peaks in migration; the first, in early July, consists of postbreeding females; the second, in late July or early August, consists mainly of adult males; the third, extending from mid-August to early September, is composed of birds of the year.

L. g. griseus apparently reaches the mid-Atlantic coast after a nonstop flight from the breeding grounds; the same is probably true of *L. g. hendersoni*.

The demonstration of differential migration of sexes allows us to postulate several aspects of the still-unstudied breeding biology of *L. g. griseus*. It appears that females play only a minor role in incubation and probably do not participate in caring for the chicks. Thus, males must assume the bulk of the nesting duties, remaining on the breeding grounds until the young are able to fend for themselves.

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