

Studies of wader migration in the Middle Asian - West Siberian Region

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INTRODUCTION

The territory of the Middle Asian - West Siberian region including Middle Asian Republics, Kazakhstan and Middle Siberia through which mass seasonal migrations pass - is a highly suitable area for study of this phenomenon. The variety of landscapes (tundra, taiga, steppe, desert, mountain-masses) and successive migration of birds through them allow the process of migration to be observed and studied over the greater part of the migration route for a considerable number of wader species.

The special interest in this group of birds that has arisen over the last few years has not been accidental. Being extremely mobile, waders are an important indicator of environmental changes, being very sensitive to the state of food reserves. This, in turn, depends on such factors as temperature, humidity and economic activity of man. Great in numbers, waders are of importance in the functioning of near-water biocenoses, and present a convenient model for the study of a wide variety of adaptations. Large species have been a target of shooters for a long time. Waders are also of importance as high-speed, long-distance migrants in the transcontinental transfer and maintenance of natural arbovirus infections.

In 1984 the Soviet-Indian Convention on Protection of Migratory Birds was signed. This provided for a broadening of studies of species common to both countries. The Convention lists 54 species of waders, 50 of which migrate through the Middle Asian - West Siberian region.

The migration of waders has only recently been the subject of special study. Formerly only scanty information (mainly phenological) was collected incidentally during faunistic research. This data is included in the regional reports of Kazakhstan, Tadjikistan, Kirgizia, Turkmenia and Western Siberia, and only indicate the

character of waders' stay, estimation of their numbers and timing of migration phenology.

Since the 1970s however, the systematic study of wader migration has been started in Western Siberia and Kazakhstan, and more recently the Zoological Museum of the Krasnoyarsk State University has taken an active part in the work. Some research work was carried out in Uzbekistan (Goncharov 1984) but it did not progress properly. The situation is even worse in other Middle Asian Republics.

WEST SIBERIA

Interesting research into the wader migration was undertaken by A.K. Yurlov (1978, 1979, 1981, 1986) in the south of Western Siberia (Lake Chany) between 1971 and 1987. The main methods used there were as follows: daily records from permanent observation posts, periodic records on constant tours, shooting, and catching of birds with nets 7, 10 and 16 m long, 1-1.8 m high. A standard index of the number of birds caught was taken as the corrected total per 100 square metres of net. The migration phenology, period of stay of local and northern waders, structure of accumulations and a series of other ecological problems were studied with the help of continuous lines of nets.

In the forest-steppe zone waders migrate on an extended front covering great numbers of reservoirs. The summer-autumn migration of all species starts with the flight of adults. In species nesting in the forest and steppe-forest zones, young waders follow adults 8-20 days later, whilst those nesting in tundra and forest-tundra follow 25-45 days later. The period of mass migration of juvenile waders is longer than that of adults and lasts from 5 to 20 days. The duration of mass flight of adults is 2-6 days. Young waders of many species often gather, while adults rarely accumulate and their concentration is of short duration.



Sexual differences in migration timing are more marked in tundra waders than in forest and forest-steppe waders. In spring the proportion of first-year birds range from 38% Wood Sandpiper *Tringa glareola* to 56% Temminck's Stint *Calidris temminckii*. The migration sequence of adult males and females has been studied for nine species. Two groups have been isolated. In the first group (Ruff *Philomachus pugnax*, Temminck's Stint, Little Stint *Calidris minuta*), males prevail at the beginning of the migration and females at the end. In the second group (Lapwing *Vanellus vanellus*, Wood Sandpiper, Marsh Sandpiper *Tringa stagnatilis*, Red-shank *Tringa totanus*, Common Sandpiper *Actitis hypoleucos*, Red-necked Phalarope *Phalaropus lobatus*), females fly first and males follow them. Among young birds the reverse occurs: in most species, either females prevail at the beginning of migration, or females and males are equal in numbers.

MIDDLE SIBERIA

In the south of Middle Siberia waders were regularly caught on the reservoirs of Tuva and Khakassia during six years (1982-1987, 1989). In all, 8,344 waders of 39 species were ringed.

The following species prevailed: Temminck's Stint (2,758), Least Sandpiper *Calidris minutilla* (1,179), Curlew Sandpiper *Calidris ferruginea* (613), Little Stint (526), Wood Sandpiper (488), Ruff (454), Rufous-necked Sandpiper (255), Marsh Sandpiper (209), Terek Sandpiper *Xenus cineris* (182), Dunlin *Calidris alpina* (138 specimens). Birds were caught with mist nets and portable traps, recorded at permanent observation posts (visually and with instrumentation) and during constant walking tours. Full treatment of live birds was carried out.

The greatest numbers of waders were caught in 1984 (2,645 specimens). This was connected not only with favourable ecological conditions at the reservoir but also with the use of a wide variety of traps: 22.9% of all birds were recaptured during that season. For most species the chance of recapture correlates with the length of their stay in the area. The most favourable trophic conditions on Lake Khadin (the Central Tuvyn Hollow) for Temminck's Stint were observed in 1982 and 1984. Over 35% of birds were caught repeatedly in those years, although in 1987 it was only 17.5%. Quite the reverse was the concentration and consequent recaptures of Least Sandpiper (15% and 28.9% correspondingly). Though these species may meet while feeding, there is a marked inter-specific difference in their favoured locations.

In autumn a significant number of sandpipers fly in the

meridional direction. The migration through taiga is transitory, which is clear from sporadic findings in the valley of the middle Enisei, and great numbers of birds in Mongolia and some regions of Tuva and Khakassia.

The intensity of visible sandpiper migration is connected with the presence or absence of favourable places for rest and feeding. The sporadic nature of observations reflects the uneven distribution of suitable stop-over locations. Thus transit flight is the main form of sandpiper migration in the south of Middle Siberia (Savchenko 1986). The composition of the migratory wader assemblage also depends to a large extent on the evolutionary history of this region. The pattern of migration routes through the mountain systems of the south of Middle Siberia is dynamic and still evolving. This is confirmed by active expansion of range of species and changes in the course and character of their migration. The proportion of Curlew Sandpipers and Dunlins in the catch has changed from 2% to 17%. In 1982 they migrated forming gatherings of hundreds of birds in the principal areas of concentration, but in the following years only small flocks and even solitary birds were observed. In this connection the migration of Pectoral Sandpiper is of significance. This species is common on the basins of Tuva and Mongolia. The middle dates of migration are constant between years, but nowadays only adults migrate.

During the research period five ring recoveries were received: two from Australia (Curlew Sandpiper and Rufous-necked Sandpiper), and one from Yakutia (Ruff). Two birds were caught with Australian and Indian rings (Curlew Sandpiper and Little Stint respectively).

KAZAKHSTAN

Since 1975, the Ornithological Laboratory of the Zoological Institute of the Kazakhstan Academy of Sciences has started the study of wader migration in the Republic, mainly in its central, south and south-east regions, and especially at the low reaches of the rivers Turgai, Sarisu, in the delta of the Syr Daria, on the lakes Kipshak, Alakol and Susikkol. For a long period (1976-1985) the stationary work was carried out at the catching basin Sorbulak in the Alma-Ata region. Special study was made of the summer-autumn wader migration taking into account their poorly marked spring migration in the southern half of Kazakhstan.

The study included catching waders with mist nets which were placed at the waterline so that one pole was on ground and the other in water. The nets were 10-25 m long, 1.8-2 m high, and the mesh size 20-30 mm. Birds were taken out every 2-3 hours which consider-



ably reduced cases of death and injury. In addition to ringing, each caught bird was weighed, measured, and its moult registered. The age of waders was determined according to their coloration and the degree of feather (mainly proximal secondaries) wear. The presence of a brood patch (initial, formed, being feathered again) and its size were recorded for adults.

Migration dynamics was determined according to the quantity of birds caught within 100 net/days (with standard mist net of 10 m long). Total catch effort varied between 2,700-9,225 net/days per season in different years. Catching with mist nets sometimes gives unexpected results and may lead to faunistic findings. In 1977 Siberian Pectoral Sandpiper and Mongolian Plover were caught at Sorbulak (Erokhov *et al.* 1978), in 1979 Rufous-necked Sandpiper (Khrokov *et al.* 1980) was found there, and in 1985 Grey Phalarope. Little Whimbrel was caught at Alakol in 1987. Three species of the above are new for Kazakhstan.

During 15 years 72,976 waders of 45 species were ringed in Kazakhstan. Common species as Little Stint (18,361), Red-necked Phalarope (14,293), Little Ringed and Kentish Plovers (5,803 and 6,918), Temminck's Stint (5,933), Redshank (4,110), Curlew Sandpiper (3,390) were chiefly caught. The largest wader numbers (more than 11,000) were caught in 1983 on Lakes Kipshak and Sorbulak, more than 8,000 being ringed in July - August on Kipshak (the Tselinograd region). In other years between 1,715-6,898 waders were ringed annually.

Of the total number of ringed waders, 5,823 birds of 29 species were recaptured in the same season. Waders were recaptured between 1-42 days after first capture. The period between capture and recapture and changes in weight indicates the turnover rate at staging areas and indicates the character of migration of a species. Changes in weight indicates food availability at staging areas. This is of importance when identifying important areas for conservation. Large numbers of repeatedly caught fat birds indicate that the lack of energetic resources is not the main reason of long stay of many waders on the lakes of Kazakhstan during autumn migration.

The following species were recaptured most frequently: Little Stint (19.1%), Little Ringed and Kentish Plovers (13.9 and 15.6%), Red-necked Phalarope (12.9%), Temminck's Stint (9.0%) and Terek Sandpiper (8.2%). From all ringed birds Terek Sandpiper was most often caught again (18.3%).

During the research period about 120 ring-returns were

obtained involving 23 species (14 foreign rings among them). Most returns were from Little Stint, Curlew Sandpiper and Ruff. We should mention that the majority of returns came from wintering places (India, Africa, Italy etc.) and only three from nesting areas (Curlew Sandpiper from Yakutia, Terek Sandpiper and Wood Sandpiper from the Tomsk region). This shows the insufficient attention given to this group in our country. Most of home returns represent repeated captures at our stations in subsequent years.

Colour marking

The low rate of ring-returns may be enlarged using colour-marking and a few attempts were made several times, but because of the small number of marked birds it has given no results. In 1987 more than 3,000 waders were marked with colour (red, blue, green, orange, black, brown, pink, white) plastic rings. They chiefly included Kentish and Little Ringed Plovers (1,118 and 298 specimens), Redshank (811), Terek Sandpiper, Common Sandpiper, Ruff and some others. Figures were used to mark the position of a ring and a tag and its colour (Levin 1983). Information about this work was sent to several countries (Malaysia, India, Sri Lanka, Australia, Indonesia and Pakistan) and we hope to receive reports about our waders, although we haven't had any results up to the present.

The main results of the research work in Kazakhstan are as follows. The relationship between the timing of migration and the location of nesting areas has been identified: the more northerly a wader species nests, the later their mass migration occurs. The mode of feeding is also of importance: those species which search for food mainly by eye migrate first, species using eye-sight as well as touch follow them, and the last to migrate are waders which feed chiefly by touch. This dependence is explained by the fact that lowering of temperature at the end of summer and in autumn affects the activity of surface invertebrates. As for aquatic invertebrates and their larvae, they become inaccessible to waders only when water surfaces freeze, which takes place considerably later.

In practically all studied species, adults start and finish the autumn migration before the young of the year. The date of the autumn migration of different age groups depends upon many factors: the form of participation of sexes in the reproduction, speed of accumulation of fat reserves, breeding success, and the number of nesting attempts. An early start of adult migration for those nesting in the tundra and forest zones is a biological phenomenon that promotes lowering of intraspecific trophic competition and enhances the survival of young birds both in the nesting areas and



along the migration routes. The sexual differences in migration is explained mainly by peculiarities of reproduction ecology and has a genetic basis (for Red-necked Phalarope, Temminck's Stint etc.).

A prevalence of males has been recorded for most wader species on migration, apparently reflecting the ratio of sexes in nesting populations as well. Especially important is the prevalence of males for Little and Temminck's Stints, since males of these species independently incubate and raise chicks.

Numbers of migrating waders are two times greater in Central Kazakhstan than in the South-East of the Republic. During autumn migration numbers depend upon the following: the spatial distribution, mortality level in different years, success of reproduction, ecological situation at reservoirs, change of migration routes, state of the weather etc. For individual species (Red-necked Phalarope, Wood Sandpiper, Terek Sandpiper, small stint species and some others) it is possible to regularly monitor numbers with the help of mist net catches.

The study of wader morphology during autumn migration has shown the distinct sex dimorphism in the size of both adults and young. Females of many species are bigger than males, possess longer wings and weigh more. Differences between adult and young specimens are seen after the analysis of great numbers of birds. Research of waders captured in central and South-east Kazakhstan has shown that seasonal variability depends on, amongst other factors, the status of forage which influences the body mass of migrants staying at reservoirs.

Migration strategies

The common strategy of the autumn migration consists of transit flights and stops in places suitable for rest and feeding. The ratio of flights and stops differ between species. Forest and desert species generally fly through Kazakhstan on transit to other areas. For the former, the arid zones are an ecological barrier, for the latter - their starting area. After transit migration through the forest zone, the tundra species which are adapted to open landscapes, often stay for a longer period at basins of the Republic. Their flight across Kazakhstan may occur in the form of short movements from one basin to another following the general direction of the migration.

Asian flyways

The territorial connections of waders migrating through Kazakhstan are extremely vast - westward to Great

Britain and Italy, southward to South Africa and Malaysia, northward to Finland and the northern part of Western Siberia. Two main migration directions cross in Kazakhstan: west - south-west leading to African wintering grounds, and the south - south-east leading to Indian and South-east Asian wintering quarters. Central Kazakhstan is a cross-over for wader migration routes from African and Indian winter quarters.

CONCLUSIONS

On the whole, research into wader migration in the Middle Asian-West Siberian region cannot be considered satisfactory. This group of birds is practically paid no attention at the ornithological stations in the Middle Asian Republics. The extent of wader ringing is also poor. This gives a feeling of regret, for unless all landscapes are involved in research into wader migration, a thorough understanding of the waders passing through this vast Middle Asian-West Siberian region is not possible. We do not know of the peculiarities of wader migration through the mountain regions of Kirghizia and Tadjikistan. It would be very interesting to undertake research at Issik-Kul Lake over a number of years. An increase in ringing activity is necessary throughout the whole region. Colour ringing, in particular, should be considerably expanded in scope, taking into account the network of observers interested in waders in South and South-east Asia, and Australia. The programme of colour-ringing should be quickly developed with regard for colours of plastic available from the Moscow Ringing Centre. It is essential that this programme is co-ordinated with foreign schemes, otherwise the work may be senseless.

Research into the nesting biology of waders using individual colour marking should also be made more active. Much information on wader migration has been gathered, and the time is right to summarize material on individual species of waders (Gavrilov *et al.* 1983, 1985). The Working Group on waders has been created in our country. The co-operation of ornithologists interested in these wonderful birds, of both theoretical and practical importance, favours the intensification and co-ordination of research. It is hoped to involve amateur ornithologists, despite the small number in our country.

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