

Distribution of waders during migration at Sakhalin Island

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During 18 years of explorations in different parts of Sakhalin island large concentrations of migrating waders have been found on the coasts of shallow bays and at the coastal lakes. The main areas of such concentrations are the coasts of Aniva Bay (Lososei Bay), of Terpeniya and Mordvinova bays, and the Nevskoye and Lebyazhye lakes in southern Sakhalin; the row of bays on the Sea of Okhotsk coast at the northeast, and along the Tatarsky strait and the Amur estuary at the southwest of the island. Inland migration is poorly expressed. Spring migrations at southern Sakhalin are most intense in the last third of May, while in the northern part of the island migration finishes 10-15 days later. For most wader species the main direction of spring movements is northwards, but some other species migrate to the northeast. In autumn, birds follow similar routes but in opposite directions. The total length of the migration period is about one month in spring, and about four months in summer and autumn. In the peak of spring migration the maximum number of waders per 3 km of coast is 2,000 - 8,000 birds. Summer - autumn movements take place from late June to October; in July the concentrations of waders reach 2,000 - 5,000 birds.

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В течение 18 лет исследований в разных районах острова Сахалин были обнаружены большие скопления мигрирующих куликов на побережьях мелководных заливов и на прибрежных озерах. Основные районы таких концентраций следующие: побережья заливов Анива (зал. Лососей), Терпения и Мордвинова, оз. Невское и оз. Лебяжье на юге о-ва Сахалин, цепь заливов на охотском побережье на северо-востоке и вдоль Татарского пролива и Амурского лимана на юго-западе острова. Миграция внутри острова выражена слабо. Весенние миграции на юге Сахалина наиболее интенсивны в последней декаде мая, тогда как в северной части острова пролет кончается на 10-15 дней позже. Для большинства видов куликов главное направление весенних перемещений - северное, но некоторые виды мигрируют на северо-восток. Осенью птицы следуют теми же путями, но в противоположных направлениях. В целом, период миграций длится около месяца весной и около четырех месяцев летом и осенью. В пик весеннего пролета, максимальное количество куликов на 3 км побережья составляло 2,000 - 8,000 особей. Летние, осенние кочевки имеют место с конца июня по октябрь; в июле концентрации куликов достигают 2,000 - 5,000 особей.

Introduction

Sakhalin Island is one of the areas where large concentration of waders wintering in south-eastern Asia and Australia, and breeding in northern parts of the Far East are recorded. Data on seasonal aspects of wader distribution there are rather scarce and only fragmentary information on the dates of migration has been published for several species (Nikolsky 1889; Yamashina 1927, 1928; Gizenko 1955; Voronov & Voronov 1980). In this paper we

summarize results obtained during 18 years of ornithological studies on Sakhalin.

Study area and methods

Sakhalin Island (Figure 1) stretches north to south for nearly 1,000 km. Its southern, south-eastern and south-western coasts are mostly steep and rocky with sandy or rocky beaches. The north-eastern and north-western coasts are low-lying with numerous shallow bays and lagoons of brackish water. Tides

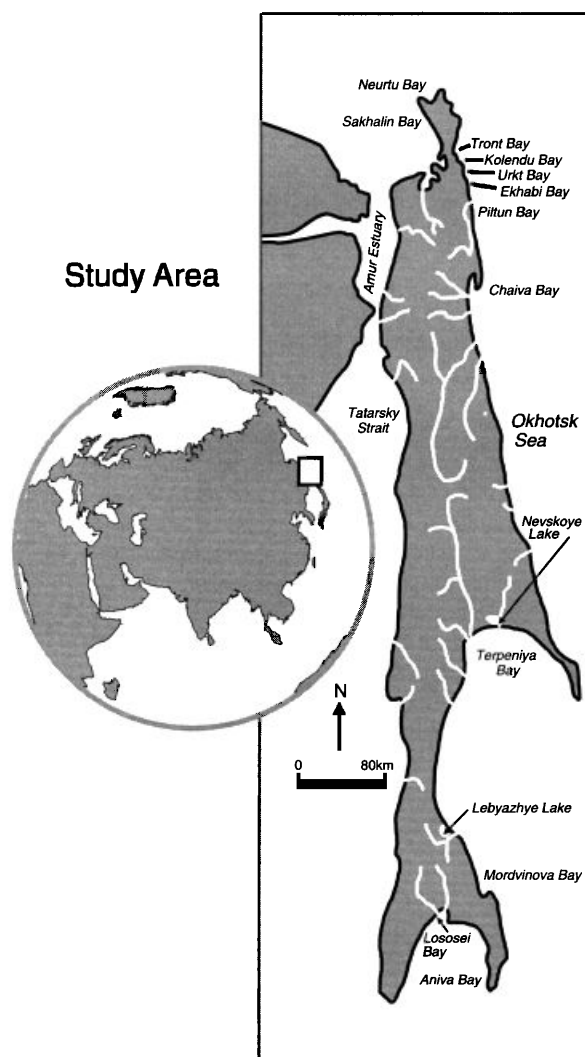


Figure 1. The main areas holding concentrations of migratory waders on Sakhalin Island.

are highest at the northern part of the island and reach 2.1-2.3 m, while at Aniva and Terpeniya Bays they do not exceed 1.5-1.6 m, and on the south-western coast are only 0.5 m (Komsomolsky & Siryk 1967). In the bays of northern Sakhalin the intertidal area stretches for 500 to 800 m offshore and for tens of kilometers along the shore.

The climate of the island is influenced by the cold Sea of Okhotsk and the warm Japanese Sea. Spring is usually prolonged, cold and windy. In some years, even in the south of the island, there can be snow in May or early June, whilst in July early frosts occur across the whole of the island. In the Sea of Okhotsk pack-ice is present until the end of June. On the eastern coast of Sakhalin average daily temperatures above 10°C are observed only in the second half of June, which is about a month later than Aniva Bay. Between 20-30 May, when intense wader migration takes place at Aniva Bay, all the bays and lakes of the Okhotsk coast are still covered with ice, and the snow has only started to melt. The Sakhalin summer is cold and rainy, while autumn is comparatively warm and dry.

Data were collected in different parts of Sakhalin Island in 1972, 1974-1981 and 1983-1991. Spring

migration was studied in 1976, 1979-1981, 1983-1991 at the coast of the Aniva Bay (Lososei Bay, where waders concentrate mostly on 3 km of mudflats), in 1977 at the coast of Terpeniya Bay (the Vladimirovka river mouth; at least 3 km suitable mudflats), in 1978 at the shore of the Ainskoye Lake. Summer and spring observations were conducted in different years at Lososei Bay, at the north-eastern coast (Nabilsky, Nyisky, Dagy, Chaivo, Piltun, Urkt, Kolendu, Tront Bays etc.), on the northwestern coast (Viakhtu, Tyk, Baikal, Pomr Bays etc.), and on the northern coast (Shmidt peninsula) of the island. Waders were counted by binoculars (x 8) on constant routes (1, 3, 5 km with 50 m transects) on foraging areas and roosts - mostly along the coast. Species whose numbers exceeded 300. km⁻¹ were considered as numerous, from 100-300. km⁻¹ - as common, from 20-100. km⁻¹ - as scarce, and from 5 - 20 km⁻¹ (and not every year) - as rare.

Results

In total 53 wader species were recorded on Sakhalin, 32 of them being migratory, only 15 being both migrants and breeding species, and six being vagrants. The latter species, *i.e.* Dotterel *Charadrius morinellus*, Grey-headed Lapwing *Microsarcops cinereus*, Pectoral Sandpiper *Calidris melanotos*, Jack Snipe *Lymnocyptes minimus*, Swinhoe's Snipe *Gallinago megala* and Long-billed Dowitcher *Limnodromus scolopaceus* are not analysed in this paper.

Grey Plover *Pluvialis squatarola*

Grey Plover *Pluvialis squatarola* is a common migrating species. Spring migration takes place in May - c. 10 June, mostly in the second half of May. Birds occur in flocks, usually of 5 to 10, rarely of 50 to 100. At Lososei Bay the earliest first Grey Plover were recorded on 22 April (1992). On 30 May 1979 at the same place, about 300 birds were counted on a 3 km route. Summer-autumn migration lasts from late July to the middle of October: flocks of 3-10 Grey Plovers were recorded on 23 July 1987 at Tront Bay; on 29 July 1989, 8 August and 18 August 1980 at Lososei Bay (Aniva Bay). At the latter area, 50 birds were recorded on 7 October 1990. The latest sighting was on 16 October (1984; Lososei Bay).

Pacific Golden Plover *Pluvialis fulva*

Pacific Golden Plover *Pluvialis fulva* is a scarce migrant. Spring migration at southern Sakhalin takes place in flocks of 10 to 20, rarely of 40 to 60 birds, from about 20 May to c. 10 June. At Lososei Bay about 50 birds were counted on 15-16 May 1986. Flocks of 43 and 60 Plovers were recorded on 27 and 28 May 1977 at the coast of Terpeniya Bay. Summer - autumn migration is observed from the second half of July till October. Flocks of 20-30 birds were recorded on 28-30 July 1988 and on 20 August 1978 at the coasts of Lososei Bay, and flocks of 28-30 birds on 26-27 August 1977 at the Nabilsky Bay. The latest record was on 13 October (1990; Lososei Bay).

Ringed Plover *Charadrius hiaticula*

Ringed Plover *Charadrius hiaticula* is a rare migrant, recorded only on spring migration. Single birds and flocks of three or four birds were observed at Lososei Bay from 9 May (1985) until 30 May (1976), one Ringed Plover was recorded on 24 May 1980 on the coast of Mordvinova Bay.

Little Ringed Plover *Charadrius dubius*

Little Ringed Plover *Charadrius dubius* is a common breeding and migrant species. The earliest birds arrive at southern Sakhalin in mid - April, in flocks of 3-10 individuals, and the most intense migration takes place there in the first half of May. In northern Sakhalin migration occurs in the second half of May - early June. Summer and autumn migration is observed 20 July. The latest birds were recorded on 6 October (1990; Lososei Bay).

Lesser Sandplover *Charadrius mongolus*

Lesser Sandplover *Charadrius mongolus* is a numerous migrant. Spring migration in southern Sakhalin takes place in the second half of May - 10 June. The earliest individuals were recorded on 10 May (1985; Lososei Bay). Peak migration is from 20-25 May, when flocks consist of 10-60, and even up to 100 or more individuals. Thus, about 600 Lesser Sandplover were counted on 22 May 1976 on a 3 km route on the coast of Lososei Bay; single birds and flocks of three to five birds were present there also in June 1983. Summer movements start in late June. In the first half of July the numbers increase so that the observed movements look like typical autumn migration. About 50 Lesser Sandplovers were counted on 2 July 1975, and about 500 birds on 13 July 1975 along the 3 km route on the Chaivo Bay coast. About 100 were recorded on 3 July 1984 at Viakhtu Bay. Young waders are observed after 1 August (1979; Golovacheva Cape). Large concentrations were recorded on 11 August 1979 on the coasts of the Baikal Bay (c. 500 birds), on 24 August 1976 and 23 August 1977 at the coasts of Pomr and Nyisky Bays (c. 300 birds). The latest sighting was on 7 October (1990; Lososei Bay).

Kentish Plover *Charadrius alexandrinus*

Kentish Plover *Charadrius alexandrinus* is a rare breeder and migrant. The earliest birds were observed on 25 April (1992) on the coast of Lososei Bay. Broods were observed in late June. Autumn migration occurs in August-September.

Lapwing *Vanellus vanellus*

Lapwing *Vanellus vanellus* is a rare migrant. Only six records of this species are known to me for the period of migrations and summer movements.

Turnstone *Arenaria interpres*

Turnstone *Arenaria interpres* is not a numerous migrant. The earliest birds were recorded at Lososei Bay on 15 May (1988). Approximately 100 were counted there on a 3 km route on 30 May 1979. Two to four Turnstones were present between 11-29 June

1981 near Terpeniya Cape. Summer - autumn migrations take place in the second half of July to September, birds are usually recorded in flocks of 5 - 12.

Black-winged Stilt *Himantopus himantopus*

Black-winged Stilt *Himantopus himantopus* is a rare migrant. At Lososei Bay two birds were observed on 27-29 May 1990, one on 3-4 June, and three on 5-8 June 1990. In 1991 at the same place three individuals were recorded on 20 May.

Oystercatcher *Haematopus ostralegus*

Oystercatcher *Haematopus ostralegus* is also a rare migrant. At Lososei Bay two birds were observed between 23-25 May 1976, three birds between 29-31 May 1983, and one on 6 June 1988. At Terpeniya Bay (the Vladimirovka river mouth) four Oystercatchers were recorded on 29 May 1977.

Green Sandpiper *Tringa ochropus*

Green Sandpiper *Tringa ochropus* is a rare breeding and migrant wader. At Lososei Bay the earliest birds were observed on 10 May (1986). During migration they usually occur in flocks of 3-10. Summer - autumn movements take place in August - September. The latest record was on 24 September (1976; Lososei Bay).

Wood Sandpiper *Tringa glareola*

Wood Sandpiper *Tringa glareola* is common on migration and breeds in low numbers. The earliest individuals were recorded at Lososei Bay on 7 May (1985) and on 9 May (1986). Intense migration in different years takes place from 17-25 May; during this period Wood Sandpipers occur in flocks of 20-40, more rarely of 60-100 individuals. About 200 birds were counted on 18-19 May 1976 and 1980 on 3 km route at Lososei Bay. Spring migration is completed between 1-10 June. In July summer - autumn migration starts. Thus, 30-35 birds were recorded between 13-17 July on a 3 km route at the coast of Nabilsky Bay. Intense migration of young birds takes place in August: at the coast of Kuegda Bay c. 200 Wood Sandpipers were counted on a 3 km route on 12-15 August 1976; at Lososei Bay about 100 birds were counted on a 3 km route on 8 August 1980, from 200-500 Wood Sandpipers were observed there daily from 17-19 August. The latest flock of 28-30 birds was recorded on 26 October 1978 (Aniva Bay).

Greenshank *Tringa nebularia*

Greenshank *Tringa nebularia* is common on migration but a rare breeding species. At southern Sakhalin the earliest birds were recorded on 7 May (1985; Lososei Bay). Greenshanks migrate in flocks of 5-20, rarely of 100 and more individuals. On a 3 km route at Lososei Bay two flocks (15 and 48 birds) were observed on 19 May 1976, c. 200 birds were counted on 22 May 1980 and on 25 May 1990. Spring migration terminates in the first third of June. The earliest autumn migrant flock of 16 adult

Greenshanks was observed on 15 July 1976 at Chaivo Bay; at Tront Bay the first flock of 30 birds was recorded on 23 July 1987. Young Greenshanks were recorded after 10 August, in September they prevailed over the adults. The latest autumn record was on 14 October 1990 at Lososei Bay.

Nordmann's Greenshank *Tringa guttifer*

Nordmann's Greenshank *Tringa guttifer* is rare both as a breeding and migrant species. Spring migration takes place between 1-10 May. As the major part of the Sakhalin population arrives on the island from the mainland, the birds are more common in spring on the northern coast than in the southern parts of the island. Thus, they were recorded only three times on the coasts of Lososei Bay: three birds on 29 May 1979, four birds between 22-28 May 1989, and five birds on 23 May 1991. The earliest birds, migrating south, were recorded at Nabilsky Bay on 21 July 1981 (flock of five) and on 20 July 1984 (about ten birds). Other sightings are three birds on 10 August 1979 on the coast of Baikol Bay, single birds on 15 August 1976 at Kuegda Bay, and on 19 August 1976 at Urkt Bay, two on 23 August 1977 at Nyisky Bay.

Redshank *Tringa totanus*

Redshank *Tringa totanus* migrates and breeds in low numbers. Like Nordmann's Greenshank most Sakhalin birds arrive in spring probably from the mainland, and a smaller number from the Japanese side. Therefore, this species is rare in southern Sakhalin: groups of 1-3 birds were recorded at Aniva Bay between 20-30 May but not every year. Summer - autumn movements start in the second half of June: flocks of 20-30 non-breeding birds were recorded between 20-30 June 1984 at Tyk Bay. On 15 July 1976 at Chaivo Bay, 52 birds were counted on a 5 km route, on 21 July 1988 a flock of 50 Redshanks was observed at Pomr Bay. Young birds were prevailing in flocks already in August.

Spotted Redshank *Tringa erythropus*

Spotted Redshank *Tringa erythropus* migrates in low numbers. The first birds arrive in southern Sakhalin at the end of April (Gizenko 1955), and main migration takes place in May. Birds do not form large flocks and are recorded usually in groups of 5 - 20 individuals. On summer - autumn migration the earliest flocks of 20 birds were observed on 2-3 July 1975 at the Chaivo Bay coast; four birds were recorded there on 4 July 1985. Single Spotted Redshanks and flocks of three to five were recorded in August and September, the latest were observed on 6-14 October 1990 at Lososei Bay.

Marsh Sandpiper *Tringa stagnatilis*

Marsh Sandpiper *Tringa stagnatilis* is a rare migrant. Single individuals were recorded at Aniva Bay on 15 May 1986, 26 May 1987 and 17 May 1990.

Grey-tailed Tattler *Heteroscelus brevipes*

Grey-tailed Tattler *Heteroscelus brevipes* is common on migration. The earliest birds were observed at southern Sakhalin on 15 May (1991; Lososei Bay). Migrating birds in flocks of 3-10, rarely of 20 or more individuals were recorded until 10 June. Summer - autumn movements start between 1-10 July. At Lososei Bay (3 km route) a flock of about 80 birds stayed between 27-31 July 1981, about 150 Grey-tailed Tattlers were counted there on 27-29 July 1984, and from 100-400 birds on 23-31 July 1989. Migration occurred also in August and September.

Wandering Tattler *Heteroscelus incanus*

Wandering Tattler *Heteroscelus incanus* is a rare migrant. Single birds were recorded at Terpeniya Cape on 14 and 25 June 1981.

Common Sandpiper *Actitis hypoleucos*

Common Sandpiper *Actitis hypoleucos* is common both on migration and as a breeding species. Along the coast migration is not obvious; flocks consist usually of three to five, rarely of 10-15 birds. The earliest Common Sandpipers were recorded on 5-8 May (1984; Lososei Bay). Summer - autumn movements take place in the second half of July to September. Up to 10 Common Sandpipers were present between 8-15 August 1976 on a 3 km route at the Shmidt peninsula; at the coast of Nyisky Bay 12 birds were counted on 23 August 1977 on a 3 km route; a group of four Common Sandpipers was observed on 27 August 1977 at Nabilsky Bay.

Terek Sandpiper *Xenus cinereus*

Terek Sandpiper *Xenus cinereus* migrates in small numbers. On spring migration at southern Sakhalin it is recorded in flocks of 3-10 birds after the second half of May. Rarely birds formed larger aggregations up to 100: on 25 May 1990 such an aggregation was recorded on a 3 km route at Lososei Bay. Single Terek Sandpipers were observed until 12 June (1983; Lososei Bay). Summer - autumn movements take place from late June - early July until September; the peak of migration falls between 20-30 July and in August. Thus, at Lososei Bay flocks of 20-30 birds were recorded on 27-30 July 1984, flocks of 50-120 birds on 28-31 July 1987 and 1988. The earliest record of young birds was 1 August (1979; Golovacheva point). At Nyisky Bay coast young birds were prevailing among 30-100 Terek Sandpipers counted on a 1 km route during 21-23 August 1977.

Grey Phalarope *Phalaropus fulicarius*

Grey Phalarope *Phalaropus fulicarius* is rare on passage. Migration passes over the open sea, mostly during storms, it rarely occurs along the coast of the island. Flocks of two to five birds were recorded on 28 May 1980 at the coast of Mordvinova Bay and on 17 June 1981 near Terpeniya Cape. Summer - autumn movements take place in July - August. Flocks of up to 60 birds were recorded on 19 August 1983 at the Aniva bay (Glustchenko 1987).

Red-necked Phalarope *Phalaropus lobatus*

Red-necked Phalarope *Phalaropus lobatus* is common on migration but a rare breeder. Like Grey Phalarope, migration occurs mostly over the open sea. On the coast it occurs rarely, in flocks of 5-20, sometimes of c. 100 birds. Spring passage takes place in May - first half of June. Near the Terpeniya peninsula (Davydova Cape) flocks of 10-30 birds were recorded from 9-11 June 1981; in total almost 300 Red-necked Phalaropes were counted there on a 1 km route. Flocks of 20-150 birds stayed from 12-18 June 1981 at the Terpeniya Cape, in some flocks up to 40% of birds were still in winter plumage. Only one or two birds remained there from 19-28 June 1981. Summer - autumn movements start after mid-July. About 20 birds were observed on 18-19 August 1980 on a 3 km route at the coast of Lososei Bay. At Aniva Bay Phalaropes were recorded from 20-30 September (Glushenko 1987).

Ruff *Philomachus pugnax*

Ruff *Philomachus pugnax* is rare both on migration and as a breeder. Most of the Sakhalin population arrives on the island from the mainland. Records of single birds are most common. At Lososei Bay Ruffs were seen only three times in May during seven years of studies. Summer - autumn migration occurs in late July - September. Young birds (one to three) were recorded at Lososei Bay three times in the period from 8 August (in 1980) to 19 August (in 1978).

Spoon-billed Sandpiper *Eurynorhynchus pygmeus*

Spoon-billed Sandpiper *Eurynorhynchus pygmeus* migrates in small numbers. At southern Sakhalin it is recorded on passage from mid-May - c. 10 June in flocks of 3-30, rarely of 100 or more. About 200 birds were counted on a 2 km route at Lososei Bay on 30 May 1979, but only five Spoon-billed Sandpipers were present there on 2 June 1979. Summer - autumn movements occur from late July until mid-October. At Lososei Bay about 20 birds were counted on a 1 km route on 23-26 July 1989 and 31 July 1987. At Sakhalinsky Bay coast eight Spoon-billed Sandpipers were recorded on 1 August 1979.

Little Stint *Calidris minuta*

Little Stint *Calidris minuta* is a rare migrant. Single birds and groups of two to four individuals were recorded in the period from 19 May to 7 June (1987-1990) on a 1 km route at Lososei Bay.

Red-necked Stint *Calidris ruficollis*

Red-necked Stint *Calidris ruficollis* is one of the most numerous migrants. The earliest birds were recorded on 9 May (1986; Lososei Bay); peak migration occurs from 20-30 May; spring movements are completed by 10 June. On a 3 km route at Lososei Bay Red-necked Stints were recorded in aggregations of varying size, from 5-20 up to 2,000-3,000. Summer movements start in mid-

June. Probably some non-breeding birds spend the whole summer on Sakhalin - mostly in its northern part where they were observed in June. In July the number of Red-necked Stints increases. At Viakhtu Bay coasts c. 30 were counted on 7 July 1984, at Dage Bay c. 100 were present on 12 July 1976, at Chaivo Bay at least 200 were observed on 10-12 July 1975, and about 400 on 13-17 July 1975. At Lososei Bay from 200-500 were counted on a 3 km route from 22-31 July 1989. The earliest young Red-necked Stints were recorded on 2 August (1979; the Sakhalinsky Bay coast). The latest flocks of up to 20 birds were observed on 25 October (1978; Lososei Bay).

Long-toed Stint *Calidris subminuta*

Long-toed Stint *Calidris subminuta* is common on migration but a rare breeding species. The earliest birds were recorded on 8 May (1986; Lososei Bay); intense movements occurred on 17-27 May when Long-toed Stints passed in flocks of 3-30. About 200 were observed on 17-19 May 1980 along a 3 km route at Lososei Bay. Spring migration lasts until about 10 June. During summer - autumn migration at the coast of Nabilsky Bay 20-25 birds were recorded daily per 3 km route on 11-17 July 1981; at the coast of Dage Bay 100 Long-toed Stints were counted on 23 July 1975; at Lososei Bay 10-50 were recorded every day between 23-31 July 1989.

Temminck's Stint *Calidris temminckii*

Temminck's Stint *Calidris temminckii* is a rare migrant. Birds are found in flocks of 3-10. At Lososei Bay they were recorded after 13 May (1989) until the end of May. A record of three birds on 11 July 1981 at Nabilsky Bay indicated the beginning of summer - autumn migrations, which usually last until September. Two young individuals were observed at Lososei Bay on 19 August 1978.

Curlew Sandpiper *Calidris ferruginea*

Curlew Sandpiper *Calidris ferruginea* is a scarce migrant. The earliest birds were observed on 18 May (1980; Lososei Bay). The peak of migration occurs from 23-27 May, when Curlew Sandpipers were observed singly and in flocks of three to six, rarely 20-30. Only once, on 30 May 1979, about 150 birds were counted on a 3 km route at Lososei Bay. Spring migration is completed by 10 June. On summer - autumn migration these waders were observed at Lososei Bay on 1 and 3 July 1984, 13 July 1983, and 27 July 1984; flocks of 15-30 composed of both adults and young were recorded there on 21-24 August 1978.

Dunlin *Calidris alpina*

Dunlin *Calidris alpina* is numerous on migration but a rare breeding wader. The earliest birds were observed on 9 May (1984 and 1986; Lososei Bay). Intense migration took place in the second half of May, when Dunlins were recorded in flocks of 10-40 and sometimes up to 100-200. On 19-26 May 1976 up to 1,000 Dunlins were counted daily on a 3 km

route at Lososei Bay, on 31 May 1979 about 2,000 were recorded there. In the Vladimirovka river mouth from 100-500 Dunlins per 3 km route were counted every day between 23-29 May 1977. Spring migration was completed by 10 June, but after late June, summer - autumn movements were recorded. Large concentrations of Dunlins were observed in northern Sakhalin: at Chaivo Bay about 1,500 were present on a 3 km route from 7-15 July 1976, about 1,000 were counted there on 23 August 1975; and on an equal route at Nabilsky Bay up to 800 Dunlins were recorded from 18-21 July 1981. In southern Sakhalin aggregations of up to 500 Dunlins were observed from 20-30 July. Flocks of c. 200 (mostly young) were recorded on 21-22 August 1978 at Lososei Bay, on 21-23 August 1977 at the coast of Nyisky Bay, and on 24 August 1976 in Pomr Bay. The latest Dunlins were observed on 4 November (1978; Aniva bay, Busse Lake).

Sharp-tailed Sandpiper *Calidris acuminata*

Sharp-tailed Sandpiper *Calidris acuminata* is a scarce migrant. The earliest birds were observed on 18 May (1976; Lososei Bay); intense migration occurred from 20-30 May, when these waders were recorded in flocks of 3 - 30 or more individuals. At Lososei Bay flocks of 80 - 100 birds were seen on a 3 km route on 27 - 29 May 1987. Spring migration is finished by 10 June. Records of single Sharp-tailed Sandpipers on 9 July 1988 at the Shmidt peninsula and on 13 July 1983 at Lososei Bay refer to the beginning of summer - autumn migrations. In August, flocks of up to 100 include both young and adult birds. The latest sightings of single young Sharp-tailed Sandpipers were on 28 October and 2 November (1978; Lososei Bay).

Great Knot *Calidris tenuirostris*

Great Knot *Calidris tenuirostris* is a common migrant. The earliest birds were observed on 9 May (1985; Lososei Bay); intense migration takes place from 20-30 May in flocks of 3-20 to 100 or more. At Lososei Bay about 100 Great Knot were counted on a 3 km route on 30 May 1979. Summer - autumn migration starts in July. The first two birds were recorded on 11 July 1975 at Chaivo Bay, on 15 July 1976 there were about 40, and on 11 July 1976 about 100 Great Knots were counted on a 1 km route. At the coast of Dagy Bay a flock of c. 300 Great Knots was observed on 13 July 1976. The earliest young birds were recorded on 3 August (1979; coast of Sakhalinsky Bay). Flocks of 10-40 young birds were observed at Lososei Bay on 18-19 August 1980 and 21-22 August 1978. The latest five Great Knots were seen in this area on 30 October and 2 November 1978.

Knot *Calidris canutus*

Knot *Calidris canutus* is a scarce migrant. In spring it is rare at Aniva Bay in the second half of May, where only single birds are recorded. Migration mostly goes through northern Sakhalin in flocks of 5-10, rarely in larger groups. Summer - autumn movements take place from 20 July to September. At Lososei Bay a flock of 10 young birds was

observed on 18 August 1980, at Sakhalinsky Bay two young and one adult Knot were recorded on 5 August 1979. About 1,000 Knots were counted on 10 August 1979 on the coast of Baikal Bay.

Sanderling *Calidris alba*

Sanderling *Calidris alba* is also a scarce migrant. At Lososei Bay flocks of five to eight birds were observed in different years from 17 May to 2 June; on 23 May 1990 about 40 Sanderlings were counted there on a 2 km route. On summer - autumn migration at this locality, the earliest birds (ten) were recorded on 13 July 1983. At the coast of the Sea of Okhotsk (near Chaivo Bay) flocks of 5-10 Sanderlings were observed on 5 July 1976 and 11 July 1975. On the coast of Sakhalinsky Bay (Golovacheva point) 60 Sanderlings were counted on a 2 km route on 1 August 1979, the next day an equal number was registered on a 10 km route.

Broad-billed Sandpiper *Limicola falcinellus*

Broad-billed Sandpiper *Limicola falcinellus* is a rare migrant. In southern Sakhalin migration takes place in the second half of May until September, with single birds and flocks of 10-12 individuals. During summer movements these waders were recorded on 16 July 1987 at the coast of Piltun Bay, on 23 July 1987 at the coast of Tront bay. At Lososei Bay single Broad-billed Sandpipers were present on 27-30 July 1986 and 1988, 20-30 individuals were counted on a 3 km route on 18-19 August 1980 and 21-22 August 1978.

Common Snipe *Gallinago gallinago*

Common Snipe *Gallinago gallinago* is common on migration but a scarce breeder. Spring passage takes place in May; summer - autumn movements occur in the second half of July to September, in October only single birds were observed.

Latham's Snipe *Gallinago hardwickii*

Latham's Snipe *Gallinago hardwickii* is a scarce breeding species. The earliest birds arrive in southern Sakhalin after 22 April (1992; Lososei Bay); intense migration takes place in late April until the first third of May. Summer - autumn movements are observed from the second half of July to September.

Pintail Snipe *Gallinago stenura*

Pintail Snipe *Gallinago stenura* is a rare migrant, recorded in May on spring passage and in August-September on autumn migration.

Solitary Snipe *Gallinago solitaria*

Solitary Snipe *Gallinago solitaria* is a scarce migrating and wintering wader. Spring passage takes place in April-May and autumn migration in September-October.

Woodcock *Scolopax rusticola*

Woodcock *Scolopax rusticola* is a common migrant

and breeding species. The earliest known records in spring are on 16 April (Voronov & Voronov 1980), migration lasts till the first half of May. Departure to wintering grounds starts in September; the latest birds were observed on 19 October (1984; Lososei Bay).

Little Curlew *Numenius minutus*

Little Curlew *Numenius minutus* is a rare migrant. A single bird was observed on 26 June 1988 on Neurtu Bay (Shmidt peninsula); six Little Curlews were recorded on 10 September 1983 near Aleksandrovsk town (V.I. Vorobyev pers. comm.).

Far Eastern Curlew *Numenius madagascariensis*

Far-eastern Curlew *Numenius madagascariensis* is a scarce migrant. During the spring migration at southern Sakhalin (mid-April to May) the flocks consist of 5 - 200 birds. At Lososei Bay three Far Eastern Curlews were recorded on 13 May 1979, about 100 birds on 23 May 1990; at Ainskoye lake about 60 were observed on 19-23 May 1978. Summer - autumn migration takes place from July to October: at Nabilsky Bay single Far-eastern Curlews and flocks of up to 12 birds were recorded on 11 July 1981; at Lososei Bay flocks of 16 - 30 birds were seen on 22-28 July 1989 and 27-31 July 1981.

Whimbrel *Numenius phaeopus*

Whimbrel *Numenius phaeopus* is numerous on migration. At southern Sakhalin spring passage takes place from mid-May to 10 June. During the peak of migration, on 20-23 May, Whimbrels were observed in flocks of 5-20, sometimes up to 50. About 300 were recorded on a 3 km route at the coast of Lososei Bay on 27-28 May 1987. The earliest flocks of 15-20 Whimbrels were recorded on summer - autumn movements on 18-20 July 1979 at Pogyby Point. At the Dagy Bay coast a flock of 100 birds was observed on 23 July 1984; flocks of 25-30 and 50-150 Whimbrels were recorded from 20-30 August (1975-1979) on the coasts of Nabilsky, Nyisky, Dagy, Chaivo and Piltun Bays. Autumn migration is complete in September.

Black-tailed Godwit *Limosa limosa*

Black-tailed Godwit *Limosa limosa* is numerous on migration but a rare breeder. The earliest birds were recorded on 9 May (1985; Lososei Bay); peak migration was observed from 20-30 May when flocks consisted of 3-10, rarely of 20-30. On summer - autumn migration after late July to October, Black-tailed Godwits fly in large flocks. Thus, a flock of 50 - 60 was recorded on 12 July 1975 at Chaivo Bay, and a flock of 250-300 on 13 July 1976 at Dagy Bay. At Nabilsky Bay at least 200 Black-tailed Godwits were counted in one flock on 18-19 July 1981, about 150 on 20-23 July 1985, and 300-400 on 19 July 1986. The latest Black-tailed Godwits were observed on 6 October (1990; Lososei Bay).

Bar-tailed Godwit *Limosa lapponica*

Bar-tailed Godwit *Limosa lapponica* is a common migrant. The earliest birds were recorded on 13 May (1979; Lososei Bay). In spring flocks range from 5-50, rarely up to 100. From 5-50 Bar-tailed Godwits were counted daily between 23 May-1 June 1977 at Terpeniya Bay (the Vladimirovka river mouth). During summer - autumn migration (second half of July - October) at Nabilsky Bay we recorded 10-20 birds every day from 16-19 July 1986, at Nyisky Bay 220 Bar-tailed Godwits were counted on a 2 km route on 21-23 August 1977. The latest records were on 30 October and 2 November (1978; Lososei Bay).

General patterns of migration

From the above data it is clear that the spring passage of most (northern) waders lasts for about one month: during May in southern Sakhalin, and until early June in the northern part of the island. If the weather at southern Sakhalin remains warm and dry in the second half of May, migrating waders that have reached Aniva Bay, leave after only seven or eight days. Some flocks do not stop there at all and fly further northwards. When the weather is cold and windy with rain or snow migration is prolonged until 1-10 June. On cloudy days large concentrations of waders are observed and their number increases as the weather conditions become worse. Thus, in the cold rainy springs of 1976, 1979-1980, 1984, 1986-1987 and 1989 the migration of waders at Lososei Bay lasted until 4-6 June. Most birds arrived there on 18-20 May, with a peak of migration observed from 20-30 May when, in different years, from 2,000 - 8,000 waders were counted on the coast per 3 km route. For example, at least 7,000 - 8,000 birds were recorded there on 30 May 1979, including Dunlins and Red-necked Stints (c. 2,500 each species), Grey Plovers (c. 300), Curlew Sandpipers (c. 150), Spoon-billed Sandpipers (c. 200), Great Knots, Lesser Sandpipers, Terek Sandpipers, Turnstones and Black-tailed Godwits (up to 100 each). The next day (31 May) these numbers fell by almost a half. A total of 5,000 - 6,000 waders were recorded at that place on 23-25 May 1990. In contrast, in the warm springs of 1983, 1985 and 1988 most waders passed through Lososei Bay from 17-28 May.

The southwards summer - autumn migration, is prolonged and lasts for four months. It starts late in June - early July, reaching a peak between 20-30 July - first half of August. The earliest records of wader concentrations were between 20-30 June: for example 300-400 Dunlins were observed on 23-25 June 1984 at Tyk Bay. Presumably, the birds migrating in July are non-breeders or left breeding areas early. Most immature birds of species such as Lesser Sandplover, Red-necked Stint, Dunlin and some others probably do not reach their natal area at all in their first year and spend the summer (June-July) on the coasts of the Sea of Okhotsk, and in particular in northern Sakhalin.

In July large concentrations of waders are recorded. At Chaivo Bay from 2,000-5,000 waders of 10-12 species were counted along 2 km of coast from 10-16 July 1975 and from 1-10 July 1976; most of them were Dunlins and Lesser Sandpipers. At Dage Bay on 12-13 July we recorded 1,500-2,000 waders, Dunlins and Black-tailed Godwits prevailed; on 23 July 1975 there were c. 2,500 birds (on a 2 km route), mostly Dunlins and Red-necked Stints.

Large concentrations of waders were observed also at Nabilsky Bay. For example, about 1,000 birds were counted there on 17-19 June 1986, including c. 500 Black-tailed Godwits, c. 300 Great Knots, c. 100 Dunlins and c. 100 Red-necked Stints. At the same place on 20 July 1985 there were 150 Black-tailed Godwits, and up to 200 Red-necked Stints. At Tront Bay a large flock of waders observed on 23 July 1987, consisted of Black-tailed Godwits (c. 500), Red-necked Stints (c. 100), Dunlins and Knots (c. 50 each species). A large flock of roosting waders was observed on 10 August 1979 at Baikal Bay, most of them were adult Great Knot (c. 1,500 birds), Knot (up to 1,000), Bar-tailed Godwit (c. 500) and Dunlin. Concentrations of 1,500-2,000 waders were observed also at Lososei Bay, in southern Sakhalin, from 20 July - mid-September.

Conclusions

Waders mostly concentrate on Sakhalin on the coasts of shallow bays and on the shores of coastal lakes, where biological productivity is comparatively high.

The main wader concentrations in southern Sakhalin are on the coasts of Aniva Bay (Lososei Bay and Busse Lake), Mordvinova and Terpeniya Bays, and the Lebyazhye and Nevskoye lakes. At the north-east of the island the main wader concentrations are on the coasts of the Lunskey, Nabilsky, Nyisky, Dage, Chaivo, Piltun, Urkt, Kolendu, Tront Bays etc. In north-west Sakhalin wader concentrations are found on the coasts of Viakhtu, Tyk, Baikal and Pomr bays; at the Shmidt peninsula - the coasts of Neurtu and Kuegda Bays (Figure 1). Comparatively smaller flocks also stopover at the other parts of the marine coast, on the shores of lakes and at river mouths.

Judging by the distribution of birds on the coasts, as well as by direct observations of wader migrations it is clear that inland migrations are poorly expressed. Most waders fly in spring to the north, some species (Nordmann's Greenshank, Redshank, Ruff etc.) migrate mostly from the mainland in a north-easterly direction. Due to differences in climate, influenced by the Sakhalin seas, the first flocks of waders arrive earlier on the north-western than the north-eastern coasts of the island. Summer - autumn migration passes in the correspondingly opposite directions.

The total daily number of waders between 20-30 July on the whole island can be estimated at about 30,000-40,000 birds.

Recently those areas inhabited by waders have been subject to intense development by people. The northern parts of the coast of Sakhalin are polluted by oil (for example the Urkt, Ekhabay, Dage Bays) and floating timber, intertidal parts and beaches are damaged by vehicles making ruts and tracks. Birds are also negatively influenced from disturbance by game-hunters, fishermen and tourists. In spring and autumn they are shot as gamebirds, mostly when autumn game-hunting for ducks is allowed after late August. Game-hunting of Whimbrel is allowed in northern Sakhalin after 15 August. For the protection of waders and their habitats, i.e. coastal and inland wetlands, it is necessary to declare parts of coastal bays (Nabilsky, Dage, Chaivo etc.) as seasonal sanctuaries during the periods of bird migration. These coastal sites lie within areas of intense oil and gas exploitation and include large human settlements. In the less developed Shmidt peninsula it would be desirable to establish a permanent nature reserve at the existing regional sanctuary. It is also necessary to ban game-hunting of small waders in order to prevent shooting such rare endangered birds as Nordmann's Greenshank and Spoon-billed Sandpiper.

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