

# Post-breeding stopover sites of waders in the estuaries of the Khairusovo, Belogolovaya and Moroshechnaya rivers, western Kamchatka Peninsula, Russia, 2010–2012

Dmitry S. Dorofeev<sup>1</sup> & Fedor V. Kazansky<sup>2</sup>

<sup>1</sup>All-Russian Research Institute for Nature Protection (ARRINP), Znamenskoe-Sadki, Moscow, 117628 Russia  
dmitrdorofeev@gmail.com

<sup>2</sup>Kronotsky State Biosphere Reserve, Ryabikova St. 48, Elizovo, Kamchatskiy Kray, 68400 Russia. f.kazansky@gmail.com

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During the northern summer and autumn seasons of 2010–2012 we collected data on the numbers of waders that stop on the estuaries of the rivers Khairusovo, Belogolovaya and Moroshechnaya on the west-central coast of the Kamchatka Peninsula, Russia. Among known wader stopovers on the west coast of Kamchatka, this is the area that supports the largest numbers. We found that the most abundant species were Great Knot *Calidris tenuirostris*, Bar-tailed Godwit *Limosa lapponica*, Black-tailed Godwit *L. limosa* and Red-necked Stint *C. ruficollis*. Two globally-threatened species were also recorded: Eastern Curlew *Numenius madagascarensis* and Spoon-billed Sandpiper *Eurynorhynchus pygmeus*. At least 35 Great Knots colour-marked in NW Australia, one from South Australia and two from China were recorded in the area. We also observed several colour-marked Bar-tailed Godwits, Red-necked Stints and a Ruddy Turnstone *Arenaria interpres* marked in different areas of Australia and in China.

## INTRODUCTION

The vast lowlands and tidal flats of W Kamchatka are used by large numbers migrant waders and waterfowl in the East Asian–Australasian Flyway. Studies focused on the (mostly northward) migration of waders through Kamchatka started in the 1970s (Gerasimov 2006). Counts of waders on southward migrations were only conducted at a few sites: the Penzhina Gulf (Gerasimov 2004), the Moroshechnaya estuary (Gerasimov & Gerasimov 1998, Gerasimov 2000, Schuckard *et al.* 2006), Bolshoe Lake (Matsyna *et al.* 2009) and Lopatka Cape (Lobkov 2003). Some information about wader concentrations on the west coast of the Kamchatka Peninsula was also collected by Lobkov (1986, 1998); however, details were not published.

In this paper we present results of wader counts conducted during 2010–2012 in the twin estuary of the Khairusovo and Belogolovaya rivers. It is already known from the publications of Lobkov (1986, 1998) and Kazansky & Shulezhko (2011) that the Khairusovo estuary is a very important feeding area for thousands of migrant waders, especially Great Knot *Calidris tenuirostris*, Bar-tailed Godwit *Limosa lapponica*, Black-tailed Godwit *L. limosa* and Red-necked Stint *C. ruficollis*. However, no precise information has been published about the abundance or migration phenology of these species.

We also present data on wader numbers on the Moroshechnaya estuary obtained in 2011 and 2012, which add to knowledge about waders in that area.

## METHODS

The Khairusovo and Belogolovaya rivers reach the sea in a single estuary on the west coast of the Kamchatka Peninsula,

Far Eastern Russia (57°N, 156.7°E; Fig. 1). The Khairusovo Cape shelters the estuary from strong south-west winds and storms. The tidal range fluctuates between 5.7 m in June and 3.8 m in September (Gorin *et al.* 2012). The topographic and hydrographic characteristics of the area are responsible for the formation of c. 47 km<sup>2</sup> of mud- and sand-flats, which are an important feeding habitat for migrant waders. Counts of waders were conducted in this area in 2010 and 2012 in the course of the Russian White Whale Program expedition of the Institute of Ecology and Evolution of the Russian Academy of Sciences. Ornithologists played the role of regular whale observers during this expedition, and therefore had no opportunity to make bird counts on regular basis. However, we were able to make several wader counts in the area between late Jul and mid Aug 2010. Most observations in that year were made from the northern shore of the Khairusovo River so a major part of the tidal flats could not be seen. Only one count was made from the western bank of the Belogolovaya River.

In 2012, counts were conducted in the same area between 15 Jul and 1 Sep and between 18 Sep and 1 Oct, with the period from 2 Sep to 17 Sep being spent on the Moroshechnaya estuary, a river 40 km south-west of Khairusovo. As in 2010, counts were made opportunistically, whenever there was time, and varied between one and four per week. Sometimes counts were carried out from boats, and this was particularly helpful for surveying the larger areas of the mudflats (see Fig. 1).

The Moroshechnaya River has about 13.5 km<sup>2</sup> of intertidal mud- and sand-flats (Fig. 2). There are no tidal flats of similar size farther south on the west Kamchatka coast. Our counts in Moroshechnaya were conducted between mid Aug and late Sep 2011 and during the first half of Sep 2012. As in Khairusovo-Belogolovaya, all bird counts were made irregularly during our free time.

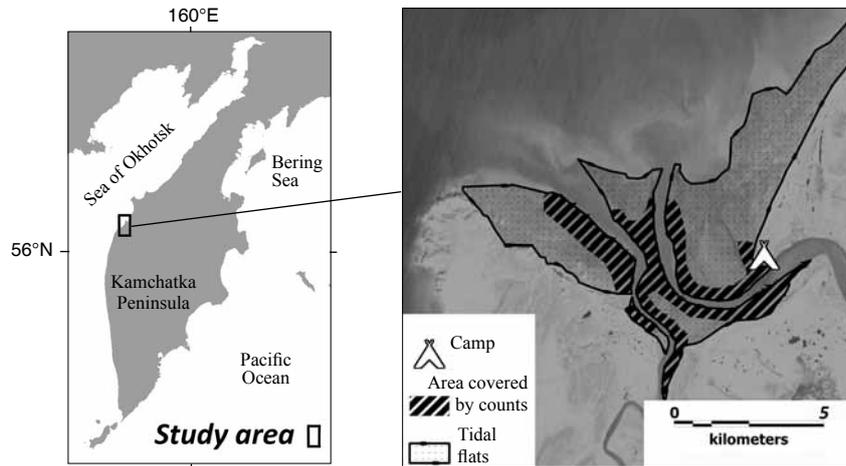


Fig. 1. The tidal flats of the Khairusovo-Belogolovaya estuary showing the area covered by wader counts in 2012.

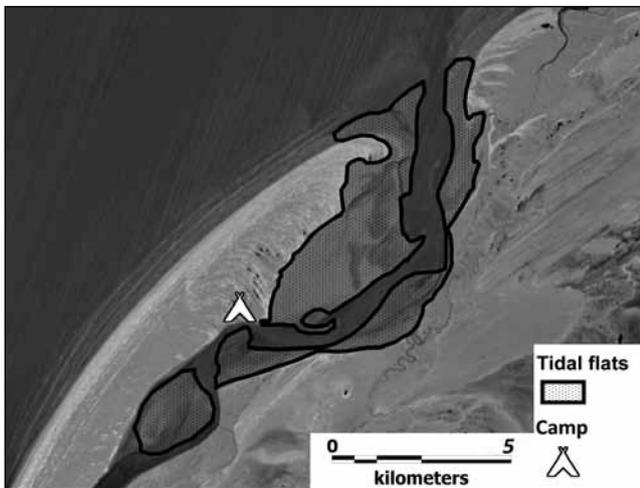


Fig. 2. The tidal flats of the Moroshechnaya River estuary.

Because of the irregularity of the counts, it is likely that our results underestimate the abundance of the commoner species (i.e. we probably missed counting peak numbers). Our counts are also likely to be underestimates because we did not count birds if we could not identify them with certainty. We estimated that the maximum distance over which we could identify small stints in reasonably good weather conditions was about 150 m, ranging up to about 400 m for large waders. The numbers of the commoner species were estimated to the nearest 100 or 1,000 while abundant species were counted with greater precision. We used 10× binoculars, and 18–55× and 20–60× telescopes.

## RESULTS

On the Khairusovo-Belogolovaya estuary, the six most abundant species, with at least one count of  $\geq 2,000$ , were Lesser Sand Plover, Great Knot, Red-necked Stint, Dunlin, Black-tailed Godwit and Bar-tailed Godwit (Table 1). Great Knot was the top species in this area in both 2010 and 2012 with around 10,000 birds counted in late July and the first half of August; numbers decreased rapidly in September and only about 10 were recorded in the second half of the month (Table 1). Whimbrel numbers followed a similar pattern to those of Great Knot, reaching a peak in early to mid August, but only small numbers in September. Red-necked Stints were most abundant in late July and August; but significant

numbers persisted throughout September; and the occurrence of both Bar-tailed Godwits and Black-tailed Godwits was similar. Eastern Curlews were most common at the end of July and beginning of August with up to 150 birds recorded. Nearly all Eastern Curlews left the study area in early September.

The phenology of Dunlin on the Khairusovo-Belogolovaya estuary was rather different to the other species. They were fairly common from the second half of July and throughout August, but by the second half of September their numbers had greatly increased and they were then the most numerous wader species on the estuary (Table 1). Lesser Sand Plovers also reached peak numbers in mid and late September.

In addition to the species listed in Table 1, four more species were recorded on the Khairusovo-Belogolovaya estuary: Pacific Golden Plovers *Pluvialis fulva* (three times) and Spoon-billed Sandpipers *Eurynorhynchus pygmeus* (twice: two and three birds on 19 Aug (Kazansky & Shulezhko 2011)) in 2010, and Terek Sandpipers *Xenus cinereus*, a flock of Long-billed Dowitchers *Limnodromus scolopaceus* and one Spoon-billed Sandpiper (17 Aug) in 2012.

Generally the numbers of waders recorded on the Moroshechnaya estuary were lower than those at Khairusovo-Belogolovaya, but the variety of species and their phenology was similar (Table 2). However, many more Eurasian Oystercatchers were recorded at Moroshechnaya (max. 600 on 16 Sep 2012) than at Khairusovo-Belogolovaya (max. 30). Long-billed Dowitcher *Limnodromus scolopaceus* was only an occasional visitor to Khairusovo-Belogolovaya, but rather common at Moroshechnaya.

In addition to the species listed in Table 2, four more species were recorded on the Moroshechnaya estuary: several flocks of Pacific Golden Plovers, seven Green Sandpipers *Tringa ochropus*, and several Long-toed Stints *Calidris subminuta* in 2011, and a flock of juvenile Grey Plovers *Pluvialis squatarola* in 2012.

In the course of our observations, we recorded a number of waders with colour flags, all on the Khairuzovo-Belogolovaya estuary. In 2010, there were two Great Knots with yellow flags from NW Australia. In 2012, adult Great Knots with regional or individual flag combinations or inscriptions were seen from the first days on which observations were made. In total we were able to distinguish 36 individuals in that year, five of them were observed several times. Four Great Knots spent at least 3 or 4 days on the estuary, another (flag code VVX) was first seen on 2 Aug and resighted again on 18 Aug. Thirty-three Great Knots had been marked at Broome, NW Australia;

**Table 1.** Minimum estimated numbers of common wader species on the Khairusovo-Belogolovaya Estuary in different periods of southward migration in 2010 and 2012. The figures are the maximum numbers of birds of each species counted in one day.

Species	28 Jul to 14 Aug 2010	15 Jul to 1 Aug 2012	2 Aug to 15 Aug 2012	18 Aug to 1 Sep 2012	16 Sep to 1 Oct 2012
Lesser Sand Plover <i>Charadrius mongolus</i>	30	10		200	2,000
Ruddy Turnstone <i>Arenaria interpres</i>		10	10		
Eurasian Oystercatcher <i>Haematopus ostralegus</i>		10	10	10	30
Greenshank <i>Tringa nebularia</i>	10	10	10	10	10
Grey-tailed Tattler <i>Heteroscelus brevipes</i>	250			10	10
Common Sandpiper <i>Actitis hypoleucos</i>	10	10		10	50
Red-necked Phalarope <i>Phalaropus lobatus</i>		10	10	10	50
Red-necked Stint <i>Calidris ruficollis</i>	400	5,000	5,000	1,000	1,000
Dunlin <i>C. alpina</i>	2,000	500	1,000	2,000	5,000
Great Knot <i>C. tenuirostris</i>	15,000	10,000	10,000	5,000	10
Red Knot <i>C. canutus</i>	1	10	10	10	
Common Snipe <i>Gallinago gallinago</i>		10		10	10
Eastern Curlew <i>Numenius madagascariensis</i>	10	150	150	100	
Whimbrel <i>N. phaeopus</i>	1,500	500	1,000	1,000	
Bar-tailed Godwit <i>Limosa lapponica</i>	700	2,000	1,000	1,000	500
Black-tailed Godwit <i>L. limosa</i>	700	500	500	3,500	1,500
Total	20,611	18,730	18,700	14,010	10,170

two others had been marked in Chongming Dongtan Nature Reserve, China, and another bore an orange flag from Victoria, SE Australia. Red-necked Stints with regional markers had been banded in NW Australia (two birds), Queensland, Australia (one bird) and Chongming Dongtan Nature Reserve (one bird). We also saw a Ruddy Turnstone with a flag combination from Chongming Dongtan Nature Reserve, China, and six Bar-tailed Godwits with individual or regional marks from Broome, NW Australia.

We noted that Red-necked Stints, Lesser Sand Plovers, Ruddy Turnstones and to a lesser degree Great Knots and Dunlins fed mainly on firm, more sandy mudflats, while godwits preferred to feed in areas with softer, finer sediments.

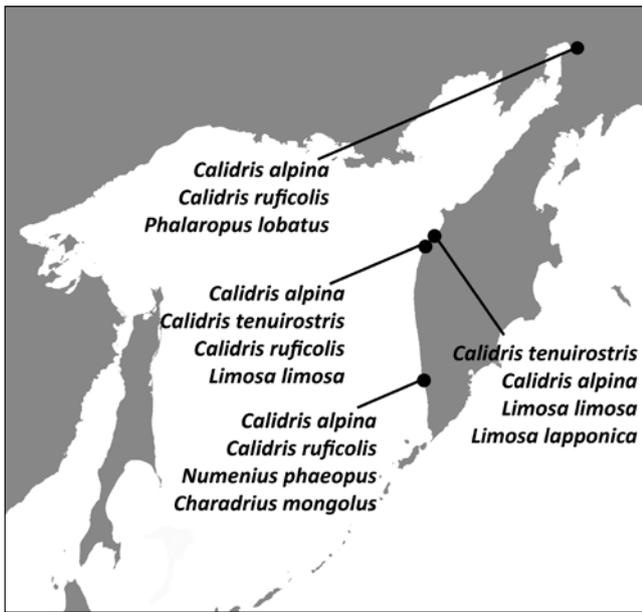
## DISCUSSION

According to previous studies, our counts and our observations of banded birds, a significant proportion of waders using the East Asian–Australasian Flyway stop at the Khairusovo-Belogolovaya estuary on southward migration (Kazansky & Shulezhko 2011). Many Great Knots, Bar-tailed Godwits, Black-tailed Godwits, Whimbrels, Red-necked Stints, Dunlins, Lesser Sand Plovers and some other species use this area as a stopover at the start of their southward migration and probably also for the accumulation of body reserves for subsequent migration. The totals of birds counted in 2010 and 2012 were different, with numbers in 2012 significantly higher than in 2010. It is likely that this is the result of better coverage of the area in 2012. However, even in that year we were unable to cover the whole of the twin estuary's extensive mudflats. Therefore it is likely that the actual number of waders that visit the area is significantly higher than those counted.

Previously knowledge about wader stopovers on the west coast of Kamchatka during southward migration was inadequate (Huettmann & Gerasimov 2006). Now, with the combination of our data for the Khairuzovo-Belogolovaya and Moroshechnaya estuaries, those of Gerasimov (2004) for the Penzhina Gulf in the north, those of Matsyna *et al.* (2009) for the Lake Bolshoe area further south and those of Lobkov (2003) for the Cape Lopatka area at the southern end of the peninsula, we have sufficiently detailed information

**Table 2.** Minimum estimated numbers of common wader species on the Moroshechnaya Estuary during different periods of southward migration in 2011 and 2012. The figures are the maximum numbers of birds of each species counted in one day.

Species	12–25 Aug 2011	26 Aug– 10 Sep 2011	1–17 Sep 2012
Lesser Sand Plover <i>Charadrius mongolus</i>	100	300	500
Ruddy Turnstone <i>Arenaria interpres</i>	10	10	10
Eurasian Oystercatcher <i>Haematopus ostralegus</i>	100	400	600
Wood Sandpiper <i>Tringa glareola</i>	10	10	10
Greenshank <i>T. nebularia</i>	10		10
Grey-tailed Tattler <i>Heteroscelus brevipes</i>	10	10	50
Common Sandpiper <i>Actitis hypoleucos</i>	1	10	20
Red-necked Phalarope <i>Phalaropus lobatus</i>	100	400	50
Red-necked Stint <i>Calidris ruficollis</i>	500	1 500	300
Dunlin <i>C. alpina</i>	200	800	300
Great Knot <i>C. tenuirostris</i>	2,000	800	200
Red Knot <i>C. canutus</i>	1	20	20
Common Snipe <i>Gallinago gallinago</i>	10	10	10
Whimbrel <i>Numenius phaeopus</i>	1,000	5,000	800
Bar-tailed Godwit <i>Limosa lapponica</i>	10	400	1,000
Black-tailed Godwit <i>L. limosa</i>	10	600	2,000
Long-billed Dowitcher <i>Limnodromus scolopaceus</i>	10	10	
Total	4,082	10,280	6,080



**Fig. 3.** The most abundant wader species on the known stopovers on the west coast of Kamchatka. From north to south: the Penzhina River estuary, the Khairusovo-Belogolovaya estuary, the Moroshechnaya River estuary, and Bolshoe Lake.

for almost all the main sites (Fig. 3). Taken together, these studies show that there is considerable variation in both wader species composition and wader abundance along the coast of W Kamchatka. In the Penzhina Gulf (62.45°N, 165.06°E) at the isthmus of the peninsula, Dunlin, Red-necked Stint and Red-necked Phalarope are numerous species, Wood Sandpiper, Spotted Redshank *Tringa erythropus*, Terek Sandpiper and Grey-tailed Tattler are common or fairly common, while only 12 Great Knots were counted there (Gerasimov 2003, 2004). In contrast, at Khairusovo-Belogolovaya and Moroshechnaya we found Great Knot to be one of the most numerous species, and Dunlin, Red-necked Stint, Whimbrel, Lesser Sand Plover, Black-tailed Godwit and Bar-tailed Godwits were also abundant. Gerasimov & Gerasimov (2000) found a similar pattern on the Moroshechnaya estuary during earlier investigations. At Lake Bolshoe (52.50°N, 156.33°E) Great Knot and both godwits were almost absent, but Red-necked Stint, Whimbrel, Lesser Sand Plover and Dunlin were abundant (Matsyna *et al.* 2009). At Cape Lopatka, Red-necked Phalarope, Lesser Sand Plover, Whimbrel and Dunlin were the most numerous species, but the total number of

waders migrating through the area was not large (200–1,800 individuals per day), probably because it is an area with rather small tidal flats (Lobkov 2003).

We conclude that the tidal flats of the Moroshechnaya and Khairusovo-Belogolovaya estuaries are among the most important stopover sites for Great Knot, Red-necked Stint and both godwits on the west coast of Kamchatka during southward migration. Flocks of thousands of birds of these four species spend around two months there (from at least the middle of July until mid or late September). Large numbers of Great Knots and both godwits are never recorded to the south of Moroshechnaya in Kamchatka. This suggests that when they depart from the Moroshechnaya and Khairusovo-Belogolovaya area on southward migration they cross the Sea of Okhotsk towards their next stopovers. Whimbrel is also an abundant species in our both study sites. However, this species not only feeds on the mudflats, but also on crow-berry *Empetrum sp.* coastal tundra-like habitat (Huettmann & Gerasimov 2002) not surveyed in our study. Therefore our counts for this species are likely to be far less than the actual numbers that occur in the area. According to data collected by Gerasimov & Gerasimov (1998, 2002), Moroshechnaya is one of the most important sites for Whimbrel in Kamchatka. Therefore it seems likely that the Khairusovo-Belogolovaya estuary is of similar importance for this species.

Red-necked Stint is an abundant species along the whole of the west coast of Kamchatka; therefore it is possible that some of them migrate south along the coast of the peninsula and then further south following the chain of the Kuril Islands.

If the maximum figures obtained in our counts (which we acknowledge to be underestimates) are compared with East Asian–Australasian Flyway population estimates (Bamford *et al.* 2008), five species recorded on the Khairusovo-Belogolovaya estuary reach the 1% threshold of international site importance, as do three species on the Moroshechnaya estuary (Table 3). Thus, both study areas support significant proportions of several flyway populations at levels of international importance.

Both the large numbers of waders that use the Moroshechnaya and Khairusovo-Belogolovaya estuaries during southward migration and the evidence of long stays by individually recognizable Great Knots indicate that these estuaries provide at least six species (Great Knot, Red-necked Stint, Dunlin, Bar-tailed Godwit, Black-tailed Godwit and Whimbrel) with high quality feeding habitat. Moreover it is likely that significant proportions of the flyway populations of these species are highly dependent on the feeding opportunities available at

**Table 3.** Species for which numbers counted in the study areas in 2010–2012 exceeded 1% of the East Asian–Australasian Flyway population.

Species	Khairusovo-Belogolovaya estuary % of flyway population	Moroshechnaya estuary % of flyway population	Flyway population estimate (Bamford <i>et al.</i> 2008)
Lesser Sand Plover <i>Charadrius mongolus</i>	1.5	0.3	130,000
Eurasian Oystercatcher <i>Haematopus ostralegus</i>	0.3	6.0	10,000
Red-necked Stint <i>Calidris ruficollis</i>	1.5	0.5	325,000
Great Knot <i>C. tenuirostris</i>	3.9	0.5	380,000
Whimbrel <i>Numenius phaeopus</i>	1.5	5.0	100,000
Black-tailed Godwit <i>Limosa limosa</i>	2.2	1.25	160,000

these estuaries. However, current information about the area – especially within and between season variation in wader numbers, duration of stay, abundance and availability of food and other factors that may limit use of the stopover – is rather sketchy and the issue needs more study.

To date there is no information about the importance of the Khairusovo-Belogolovaya estuary for waders during northward migration as there have been no counts in late May. It is probable that many waders use the area for a short stopover as recorded on the Moroshechnaya estuary (Gerasimov & Gerasimov 2000). This assumption is supported by local people who have told us about intensive wader migration during the second half of May and first half of June. However, it was suggested by Bamford *et al.* (2008) that waders cannot feed effectively in this area during spring migration and have to rely on body stores. This is a matter that still needs to be investigated.

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