

Reactivation of Spoon-billed Sandpiper Population monitoring: why is it declining?



by Ivan Taldenkov and team

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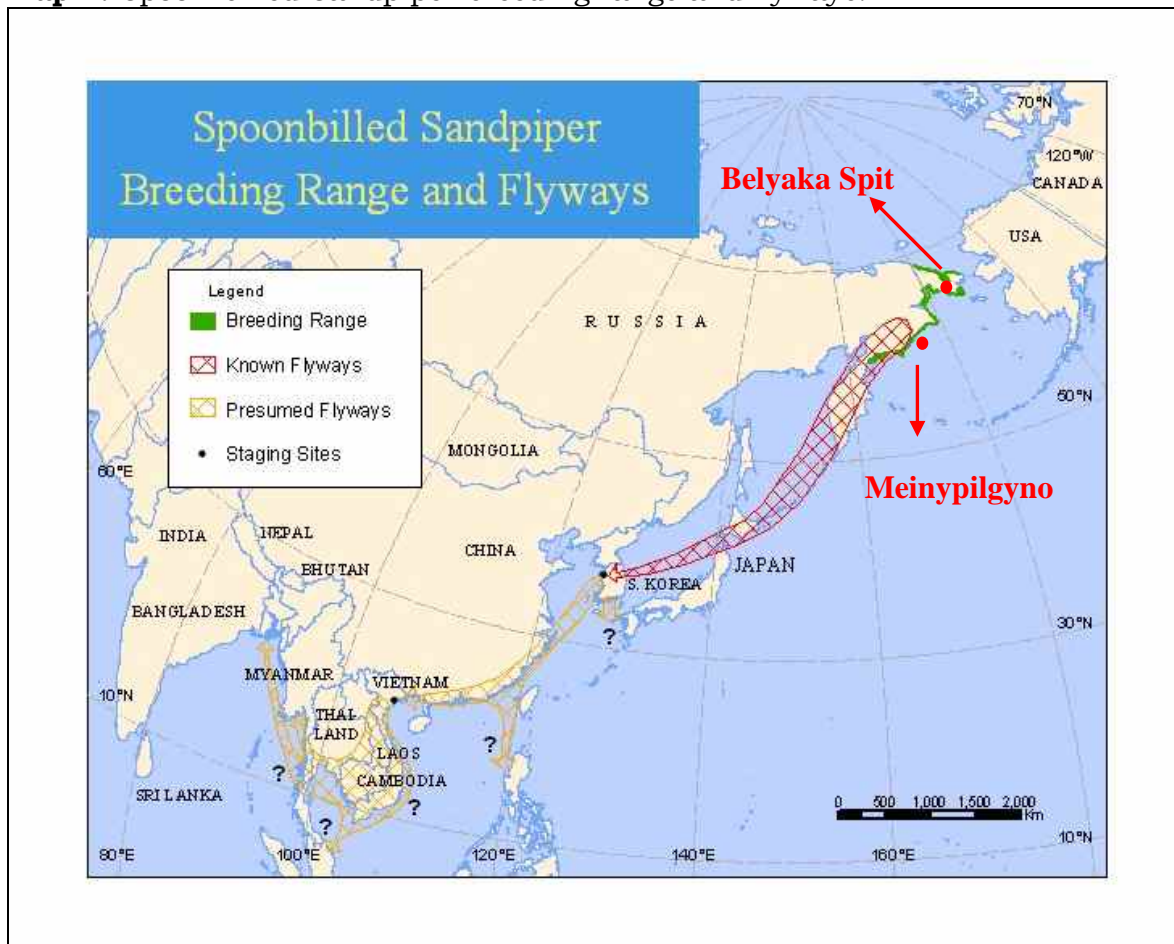
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Background

The species. With its spatulate bill the Spoon-billed Sandpiper (*Eurynorhynchus pygmeus*) is one of the most charismatic wader species. The Spoon-billed Sandpiper (SBS) is a globally threatened species, with sharply declining population trend and less than 500 breeding pairs left. This East Asian endemic breeds only in tundra of North-Eastern Russia, where small isolated nesting populations are located in peculiar coastal habitats. Wintering and stopover grounds include tidal flats and deltas in South and South-East Asia.

Distribution and population number. At the present moment there are two known breeding populations each consisting from significant number of breeding pairs (see **Map 1**). One is situated at the Belyaka Spit and Yuzhny Island (northern Koliuchinskaya Gulf, northern Chukotsky Peninsula; 67 ° N, 174° W) consisting from approximately 20 breeding pairs. Another population numbers more than 50 breeding pairs was recently discovered in the vicinity of Meinypilgyno village (north-eastern Koryak Plateau, 62 ° N, 177° E).

Map 1. Spoon-billed Sandpiper breeding range and flyways.



Breeding biology of the species was investigated at Belyaka Spit in 1972-74 and 1986-1988 (Kondratiyev, 1974, 1982; Tomkovich, 1992, 1994, 1995, 1998; Tomkovich, Soloviev, 2000). Individual color flagging allowed tracking breeding adults returning back to nesting sites every year. It was found that site fidelity is very high and all survived adults return to breed in the same site (Tomkovich, 1994). This allows estimating of annual SBS survival rate by tracking of previously banded birds.

Accurate counts of displaying males made in coastal tundra habitats set a base for population monitoring of species number in the area.

Recent population decline. In 2000 ongoing Spoon-billed Sandpiper conservation project on the breeding grounds was started by Russian ornithologists. It was found out that all known nesting populations have declined, for instance, number of SBS breeding at Belyaka Spit in 2002 was 2.5 times less than fifteen years ago. A good base for further monitoring was established in both populations since many birds (20 adults and 27 chicks at Belyaka Spit and 55 adults and 80 chicks in Meinypilgyno) were color-banded in 2002-2003. Last estimates of the total species population do not exceed 500 breeding pairs (Tomkovich, 2003). Such sharp decline may cause species extinction in a few decades.

Aims & Objectives

Although the situation with Spoon-billed Sandpiper is critical, conservation priorities are still not known without clear understanding of causes of the decline. It is thought that the decline might be either a result of decrease of breeding success on the breeding grounds (due to changes in predation pressure and human impact), or because of increase of adult mortality rate on non-breeding grounds, supposedly caused by intensive habitat loss on tidal flats.

Breeding population monitoring will help to clarify reasons of the decline. Number of population is driven by two antagonistic processes: **population mortality** and **population productivity**. In SBS populations we estimate mortality rate through **annual survival rate** of adult birds. Based on previous studies of the species we expect high site fidelity and plan to evaluate a return rate of individually-banded adults. This index reflects an annual survival rate of SBS adults. More over, at the northern Koliuchinskaya Gulf accurate counts of displaying males were done in 1973-74, 86-88 and 2002 and this allows direct comparative estimation of total population number. Population productivity is defined by **annual breeding success** (number of fledged juveniles per one breeding pair). Numbers of fledged juveniles per breeding pair are estimated by accurate monitoring of nests and broods. Comparison with the same data from 1980s will clarify a tendency. If breeding success will be critically low it may indicate that the problems of the species are in the breeding grounds. Conversely, high breeding success with low rate of adult's survival elicits negative processes on the wintering grounds and stopover sites. Understanding of this is crucial for next steps in conservation planning.

1. Particular challenges faced

The following particular challenges were set for obtaining of mentioned aims:

1. Intensive color-banding of Spoon-billed Sandpipers for providing base of future population monitoring and for potential recording of these birds at the East Asian – Australasian Flyway to reveal important staging and wintering areas for the species
2. Evaluation of the bird's survival rate through calculation of returning rate of previously banded birds for both populations for comparison with data of mid 80's
3. Repeating of spring counts of displaying SBS males at northern Koliuchinskaya Gulf (Belyaka Spit and adjacent territories) and comparison

with results of the same counts undertaken at 1973-74, 1986-88 and 2002 for understanding of species population number trend.

4. Evaluation of population productivity for both populations
5. Identification of natural threats and human impact on breeding population's productivity.
6. Making efforts on public awareness campaign within and beyond species breeding range and improving collaboration with conservation organizations on the local level and worldwide

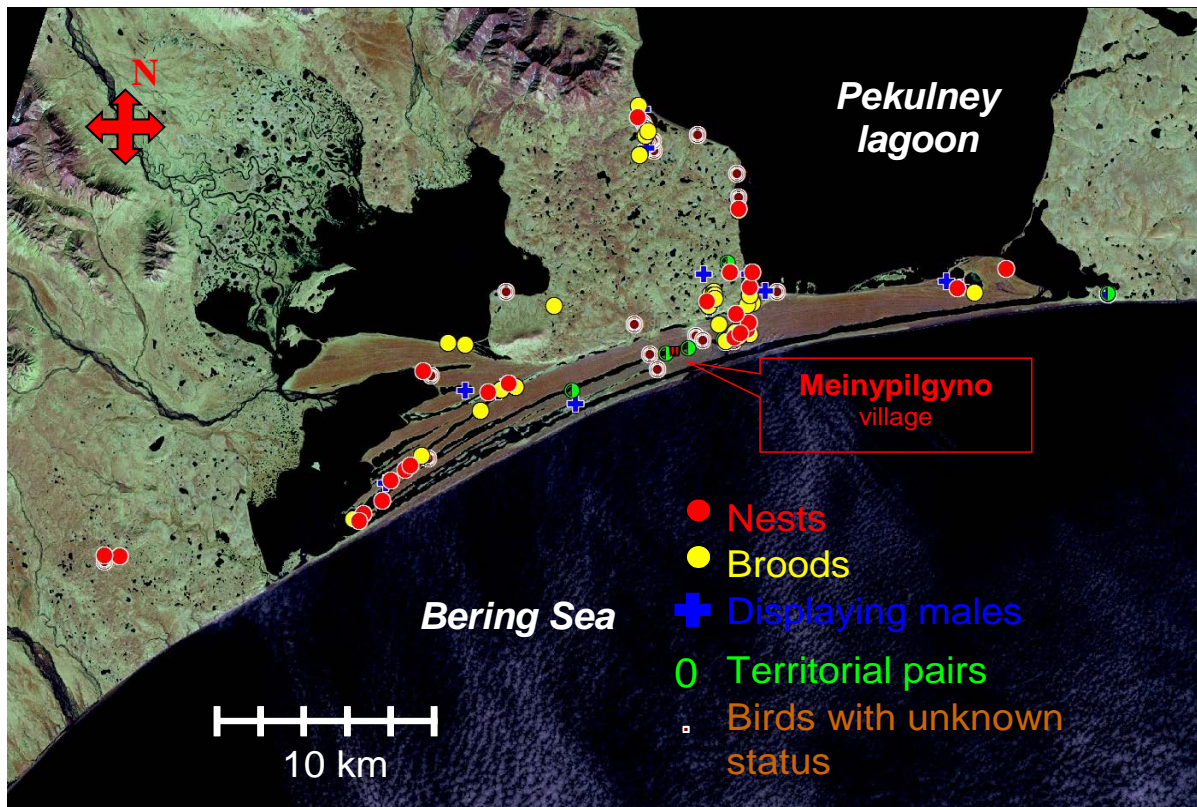
Results

Brief characteristics of the fieldworks and working environment.

a) Study area.

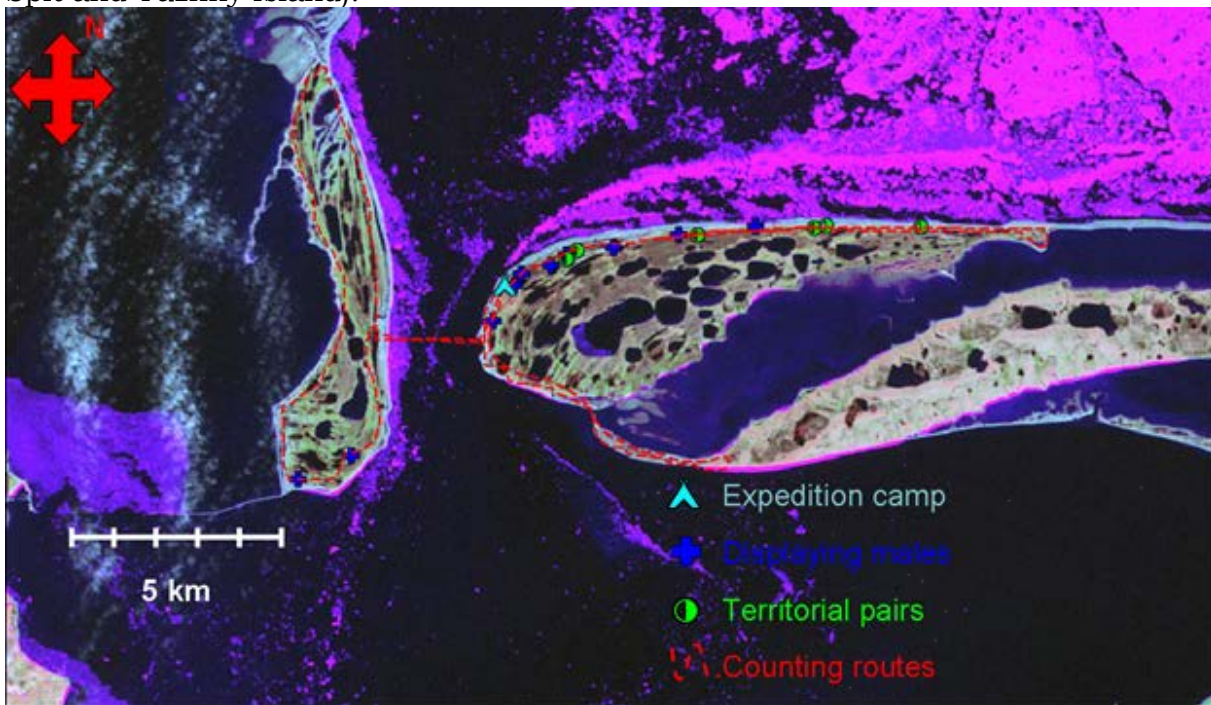
2004. Field studies of Spoon-billed Sandpiper population at north-eastern part of Koryak Plateau were operated out from Meinypilgyno village in 2004. From this village expedition participants started surveying adjacent and distant territories (**Map 2**).

Map 2. Spoon-billed Sandpiper population near Meinypilgyno, north-eastern Koryak Plateau (data of 2003 survey).



2005. Field studies of SBS were based at stationary camp at the Belyaka Spit, Northern Koliuchinskaya Gulf, northern Chukotsky Peninsula (**Map 3**.)

Map 3. Study area and counts in 2005 at northern Koliuchinskaya Gulf (Belyaka Spit and Yuzhny Island).



**b) Participants
2004.**



Ivan Taldenkov - project leader.



Elena Kazanskaya, field assistant. Russian, 22 years old, M.Sc. in zoology, Vertebrate Department of Moscow State University. Elena generally works in the field of conservation genetics and she actively participates in wild bird's conservation researches. Elena helped greatly being a qualified field technician performing nest search, color-banding of birds and other field work

2005.

In 2005 research was done in close collaboration of Vertebrate Dept. of Moscow State University and Wrangel Island State Natural Reserve (WISNR) and self-funded WISNR personnel joined in the survey.

Ivan Taldenkov - project leader.



Alexey Dondua, fellow researcher. Russian, 41 years old. Junior Research Scientist in WISNR. As a field scientist, Alexey spent 10 seasons in different parts of Russia emphasizing in ornithological research. Three recent field seasons were spent in Chukotka in various bird conservation expeditions. Alexey played a role of research scientist in our study and he was the most experienced for maintenance in severe and unpredictable conditions of wild Arctic.

Natalya Vartanyan, field assistant of WISNR, Russian, 45 years old. Natalya participated being a qualified field technician and her assistance was especially advantage for participating in counts, nest searching, color-banding of birds as well as in camp duties.

c) Schedule.

In 2004 because of bad weather conditions 3 weeks were waited for helicopter in Anadyr and thus expedition arrived to Meinypilgyno only at 18th June. In 2005 logistic was more complicated and included local flight Anadyr – Egvekinot and caterpillar trip. Thus expedition started very early and timely reached the study area when tundra was still covered by snow.

Table 1. Working schedule in 2004-05.

Year	Number of participants	Arrival to Chukotsky Autonomous Region, Anadyr town	Arrival to study area	Departure from study area	Departure from Chukotsky AR	Longevity, days
2004	2	25 May 2005	18 June 2005	18 July 2004	19 July 2004	55
2005	3	6 May 2005	20 May 2005	22 August 2005	26 August 2005	112

d) Methods.

2004. In the course of daily excursions project participants noted all observations of met sandpipers. Nests and broods were searched intensively and all adult birds and chicks were banded where possible. During these observations all accessible information concerning the species biology was collected. All methods of nest & broods checking as well as birds banding and field observations etc. were successfully used by the participants previously.



2005. Special spring counts of displaying SBS males were performed at coastal zone of Belyaka Spit and Yuzhny Island for three days during the pre-incubation period. The same counts were done in the area in 1973-74, 1986-88 and 2002. Breeding sandpipers were counted and followed up to the end of season at the key control study plot with the highest nesting density of SBS. All methods were used in the same way as in 2004 and previously.

e) Weather and birds breeding conditions.

Weather and birds breeding conditions were reported to Arctic Birds Breeding Conditions Bulletin (see hyperlinks below). There are brief characteristics of these conditions below.

2004. Late snow melting, particularly in low-level habitats, and anomalous flooding early in the nesting period, probably, adversely affected reproduction of some waders and waterfowl. Some birds nested in 2004 in more elevated areas compared with 2003 and it is suspected that some nests were also flooded. Summer was

colder than in 2003; precipitation and fog also were more common. Rodent abundance was high. Nesting success of most breeding birds was moderate (<http://www.arcticbirds.ru/info04/ru163ru32104.html>).

2005. Summer was cold and dry and nesting success of most birds was moderate. Nevertheless, natural predation of nests and chicks increased at the end of season. This was caused first of all by high density of Arctic foxes which probably became abundant in previous year when rodent abundance was likely high. In 2005 rodent abundance was low to moderate and arctic foxes started to actively feed on eggs and chicks when there were not enough food for their juveniles. (<http://www.arcticbirds.ru/info05/ru163ru11705.html>).

Banding activity and sightings of banded birds.

1.1 Banding

Adult sandpipers were caught by traps on nests or near chicks. Metal Ring of Moscow Ringing Center was put on tibia (above the “knee”) of all birds. A plastic



“flag” ring also was applied on another tibia of every bird. We used Light-green flag for birds from Meinypilgyno and Light-blue flag for birds from Belyaka Spit. Those flags were applied on the right tibia of all chicks and juveniles and on the left tibia of adults. Metal rings were put inversely. For individual recognition of adults they also got two plastic color rings. Results of Spoon-billed Sandpiper color banding in 2004-05 are listed in **Table 2**. Totally 98 birds were banded (38 adults and 60 non-flying chicks).

Table 2. Spoon-billed Sandpiper banding in 2004 and 2005

Age class	Number of banded birds	
	2004	2005
Adults	15	13
Chicks	45	25
TOTAL	60	38

1.2. Recoveries from non-breeding range

Intensive banding at the breeding sites resulted in a couple of recoveries from South Korea, Japan, Thailand and China (see **Table 3**). Observations of banded Spoon-billed Sandpiper which is a “key species” for wetlands along the East-Asian Flyway contribute to the both species and habitat conservation.

Table 3. Recoveries of Spoon-billed Sandpiper banded in 2003-05 from the non-breeding range in 2004-2006

Date of observation	Where observed	Date of banding	Where banded	Bird's age while banded
19.09.2004	Okayama-shi, Okayama-ken, 150 km west of Osaka, Japan	2004	Meinypilgyno	chick
02.10.2004	Yuboo Island, lower mouth of Kum River, South Korea	July 2004	Meinypilgyno	chick
15.09.2005	Toyama, Japan	2000 - 2004	Southern Chukotka and Koryak Plateau	chick
17.09.2005	Ebie beach, Shinminato, Japan	2002, 2004, 2005	Belyaka Spit, or Providenya area	chick
03.11.2005	Khok Kham, Phanthai Norasingh, near Samut Sakhon, Thailand	2000 - 2005	Southern Chukotka and Koryak Plateau	chick
01.03.2006	Ban Pak Thale, Ban Laem District, Phetchaburi, Thailand	2002, 2004, 2005	Belyaka Spit, or Providenya area	chick
08.04.2006	Putian, Fujian province, China	summer 2005	northern or southern Chukotka	adult

2. Evaluation of adult bird's survival rate: monitoring of previously banded birds on the breeding grounds. Counts at the northern Koliuchinskaya Gulf.

2.1. Returning rate and site fidelity of birds banded in 2003 at Meinypilgyno (data of 2004).

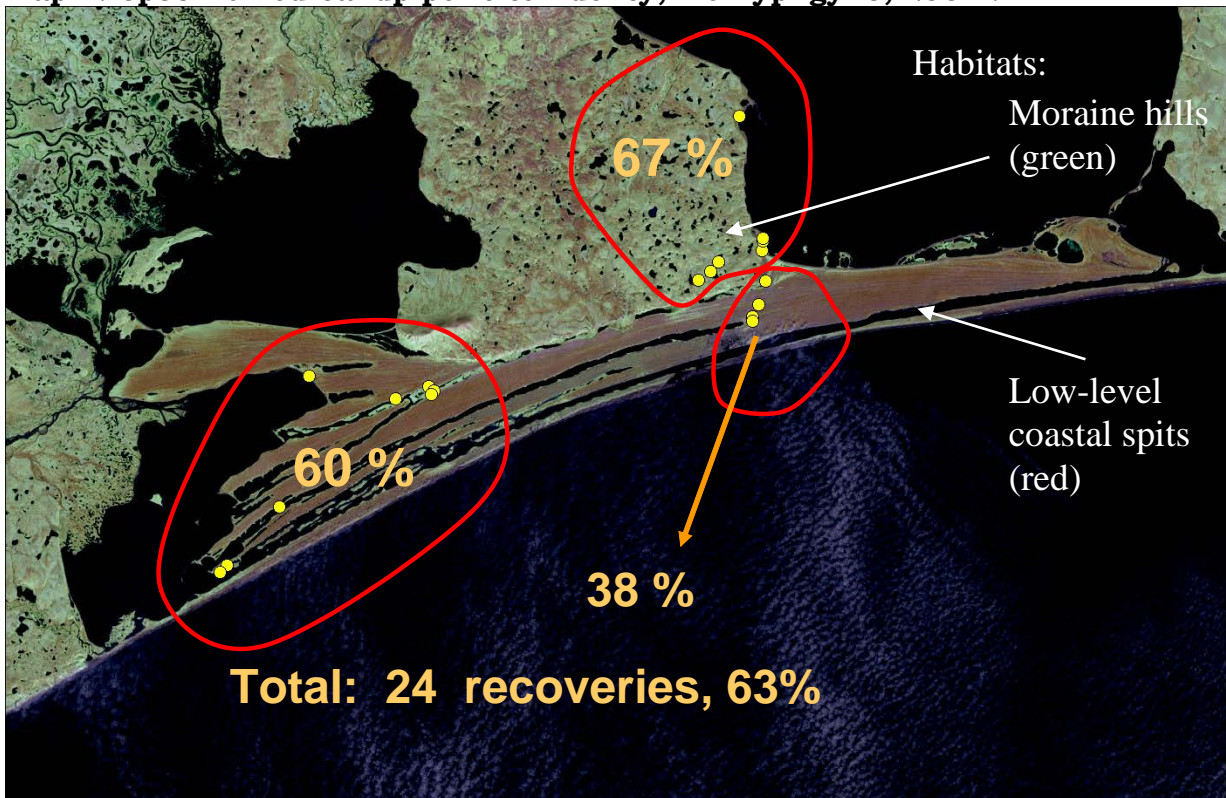
In 2004 we found 24 breeding adults from 53 banded in 2003 (45%). Since different parts of the region were surveyed with different regularity, we came to exclude some sites, where birds were banded in 2003 but nothing was found on the occasional excursions at 2004. After this specification the total returning rate appeared to be **60%** (24 recoveries from 38 banded SBS). It is approximately equal to results of 1986-88 obtained at the Belyaka Spit, where survival rate of adults ranged from 63.6% in 1987 to 67.6% in 1988 (Tomkovich, 1995).

Distances between nests of the same pairs in 2003 and 2004 ranged from 59 to 180 meters (average 128.5, n=5). At northern Chukotka average distance between nests of the same males in different seasons (1986-88) equals to 111 m, n=26 (Tomkovich, 1992). In the same way almost all birds were found in 2004 in several hundred meters from their last-year territories (N=21, 87.5%). There were only 3 cases when birds were found far away from their last-year territories (distances ranged from 1900m to 3000m) but in two cases birds probably were feeding far away from their home area. Thus, as well as at northern Chukotka, SBS demonstrates extreme site fidelity and distant displacement of banded sandpipers seems to be exclusion. This contributes to the point of view that all survived birds

return in the same area for breeding and adult birds do not disperse within the breeding range normally.

More careful analysis shows that returning rate significantly differs in various sites (**Map 4**). Returning rate of SBS breeding closely to Meinypilgyno village was sufficiently lower (**38%**), than in moraine hills or other areas distant from people. From other side, returning rate in moraine hills was the highest (**67 %**) and was equal to the highest index obtained in 1988 at Northern Chukchi Peninsula (Tomkovich, 1995). It seems like this index reflects the true survival rate of adults. Low returning rate in other areas resulted because of low breeding success and probable departure of some birds from the breeding area before we started our observations. It is also supposed that early departure of some adults was caused by human impact in the vicinity of the village (disturbance, dog predation on nests) and also by anomalous flooding in all non-elevated areas (nests or nesting habitats were flooded).

Map 4. Spoon-billed Sandpiper site fidelity, Meinypilgyno, 2004 .



2.2. Returning rate and site fidelity of birds banded in 2002 at the Belyaka Spit (data of 2005).

In 2005 we met only 3 adults from 25 banded in 2002. The method of counts and observations allow us to exclude probable mistakes because of scrutinizing daily searches on the same area. All three previously banded birds were met during first days of searches and seen regularly after that. The returning rate for 3 years from 2002 to 2005 is equal to $3/25 = 12\%$. The index of annual returning rate is equal to a third root from returning rate for the three years and approximately equal to **49,32%**. This is sufficiently lower than the indices obtained in 1987 (63, 6%) and 1988 (67, 6%). If suppose that survival rate in 2002-05 was equal to 65, 6% (average for 1987-88) then the number of survived banded birds should be more than seven. Actually only 3 birds survived after 3 years which is less than a half of

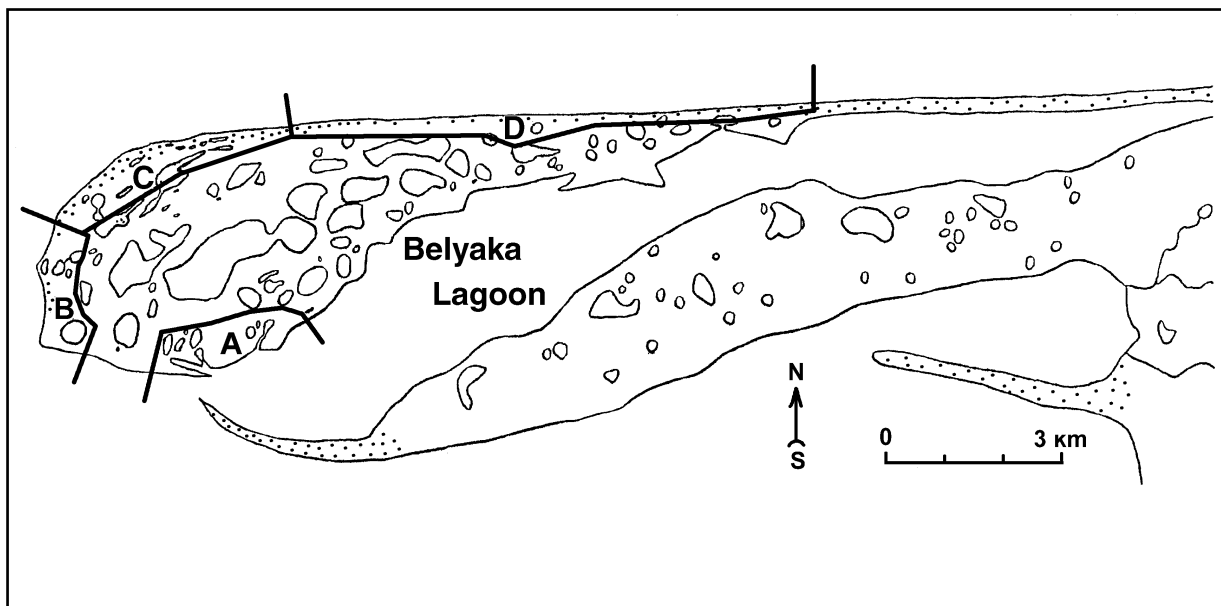
proposed. This shows that adult mortality rate of Spoon-billed sandpipers in northern Koliuchinskaya Gulf population had sufficiently increased in recent years.

2.3. Site fidelity of Spoon-billed Sandpiper’s juveniles.

In both 2004 and 2005 we didn’t found any bird banded at the same site previously as a chick. This might be caused by both low site fidelity of young birds and their low survival rate. Since that, it is still unclear about mechanisms of recruitment in the populations because young birds do not return for breeding to the sites of their birth.

2.4. Spring counts of displaying SBS males at northern Koliuchinskaya Gulf (Belyaka Spit and Yuzhny Island) in 2005.

Map 5. Four sections of the Belyaka Spit.



Counts of Spoon-billed Sandpipers at the Belyaka Spit and Yuzhny Island were performed in 1973-74, 1986-88 and 2002 by method of A. Ya. Kondratyev (Kondratyev, 1974; Tomkovich, Soloviev, 2000). Counts were done at the period before clutch incubation when SBS males are very active in mating and territorial demonstrations. Displaying (singing) males are very obvious at this time. Only ~20% of breeding pares are missed by the method (Tomkovich, Soloviev, 2000). Two or three observers follow along the seashore and survey the narrow (500 – 700 m wide) zone of specific coastal habitats which are only chosen by Spoon-billed sandpipers for breeding. For better counting and data analyzing the Belyaka Spit was divided onto 4 sections (**Map 5**). In 2005 the counting survey was done in the same way as previously (see above **Map 3**). Results of counts in past years (1986-88, 2002) and in 2005 are shown at the **Table 4**.

Table 4. Results of spring counts of SBS males at northern Koliuchinskaya Gulf in 1986-2005. There are numbers of counted males figured in cells.

Survey area	Year				
	1986	1987	1988	2002	2005
Belyaka Spit:					
Section A	No count	4	2	0	0
Section B	3	4	4	2	1

Section C	20	17	18	8	7
Section D	13	13	13	8	6
Yuzhny Island:	9	13	8	0	2
Total:	45	51	45	18	16

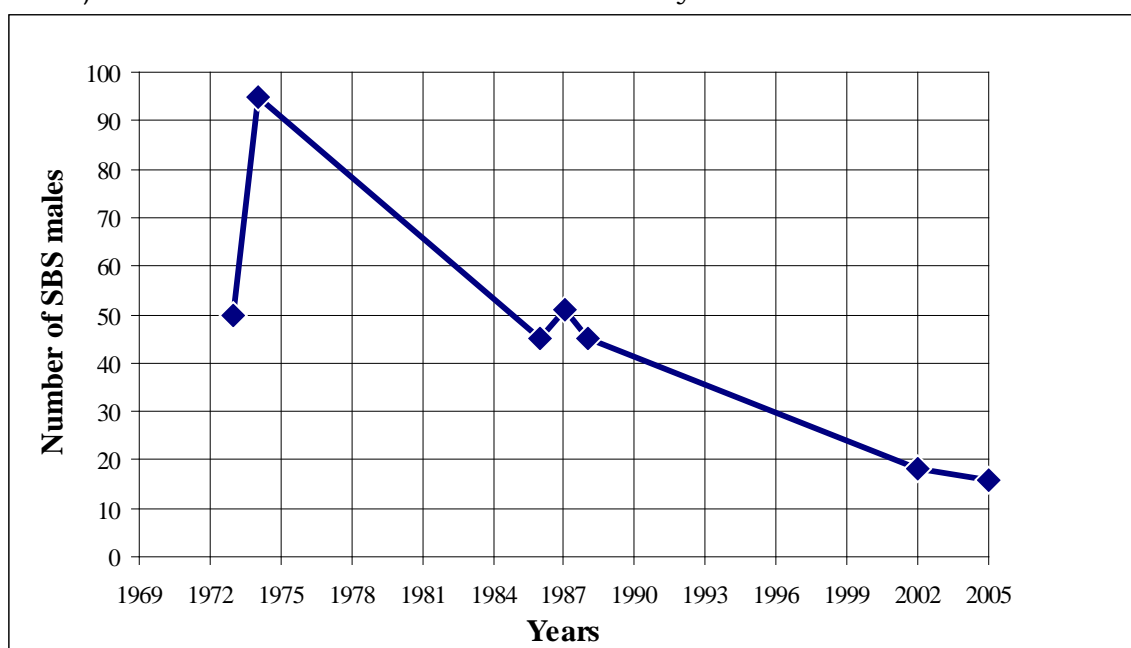
All Spoon-billed sandpipers breeding in sections “B” and “C” of Belyaka Spit were exactly counted because this area was surveyed by observers every day during all years. This is another good source of data of population number dynamics. Results of inventory of SBS at those two sections are shown in **Table 5**. The declining in number of SBS pairs breeding in this limited area is similar to those for the whole population.

Table 5. Total numbers of Spoon-billed sandpiper’s displaying males, nests and broods at sections “B” and “C” of Belyaka Spit.

Year	1986	1987	1988	2002	2005
Number of SBS males	25	30	27	13	10

Resulting trend of SBS population number dynamic in 1973-2005 is shown at the **Figure 1**. (Data from Kondratiyev, 1974 also included). SBS population at northern Koliuchinskaya Gulf had declined in period between 2002 and 2005 and declining rate is rather similar to those in 1988-2002. According to our calculations (Taldenkov, in preparation), average annual increase rate in population (ratio between population numbers at the moment and one year ago) was equal to 94,4% in 1973-74, 93,7% in 1988-2002 and 96,1% in 2002-2005. Our data make clear that results of counts in 2002 and 2005 reflect true population number declining after 1986-88 and those low numbers are not a “one year” fluctuation similar to one happened in 1974 (likely caused by initial non-correct count in 1973).

Figure 1. Population number (results of spring counts of Spoon-billed Sandpipers males) at northern Koliuchinskaya Gulf in 1973-2005.



3. Population productivity (breeding success).

3.1. Meinypilgyno population

Incubation. Destiny of 12 nests was followed in 2004. Five nests were perished by predators. Chicks hatched in 7 (58%) of nests. Calculation of hatching success using Mayfield-Paevsky method (Paevsky, 1985) evaluates the incubation success by calculation of probability for one egg to survive during one day. Hatching success calculated by this method is 27.6% hatched chicks per egg (n=622 eggsXdays observation). Since average clutch size was equal to 3.93 eggs, the resulting nesting success was 1.09 chicks per nest. Data of nesting success in 2004 is shown in

Table 6 with data of 2003 for comparison.

Table 6. Incubation success of Spoon-billed Sandpipers at Meinypilgyno, 2003-2004

Year	Nests under observation	Successful nests	Mayfield-Paevsky method result (hatched chicks per egg)	Average clutch size, eggs	Nesting success (hatched chicks per nest)
2003	22	17 (77%)	36.8%	3.83	1.41
2004	12	7 (58%)	27.6%	3.93	1.09

Chicks rearing and breeding success. .



It is difficult to observe Spoon-billed sandpiper's broods because of behavior of adults and chicks. Survival of chicks might be estimated by comparison of brood size in different ages. Average brood size for the chicks older than 15 days (after they start to fly) is 2.25 chicks (N=8, broods). Since average size of hatched brood is 3.77 chicks (N=13), we suppose chicks' survival to be approximately equal to 60%. Calculations of breeding success in are presented in the **Table 7** below.

Table 7. Breeding success of Spoon-billed Sandpipers near Meinypilgyno village (data of 2003 for comparison)

Year	Average clutch size, eggs	Nesting success, chicks per nest	Fledgling success	Breeding success, fledged juveniles per nest
2003	3.83 (N=24)	1.41 (N=22)	~60%	~0.85
2004	3.93 (N=14)	1.09 (N=12)		~0.65
Total	3.87 (N=38)	1.3 (N=34, nests)		~0.78

3.2. Belyaka Spit population

Incubation. Results of breeding success study in 2005 are shown in **Table 8** and **Table 9** with data of 1986-88 and 2002 for comparison. Incubation was successful and nesting success in 2005 was the highest even recorded at the Belyaka Spit.

Table 8. Incubation success of Spoon-billed Sandpipers at Belyaka Spit, 2005

Year	Successful nests	Mayfield-Paevsky method result (hatched chicks per egg)	Nesting success (hatched chicks per nest)		
			2005	2002	1986-88
2005	5 from 9 (55.6%)	62.0%	<u>2.41</u>	1.42	1.27 (from 0.71 to 2.00)

Breeding success. In the same time mortality of chicks was extremely high (only 11.4% of chicks survived to fledgling) mainly due to Arctic fox (*Alopex lagopus*) predation increase at the middle of July. SBS were not able to made compensatory clutches and resulting breeding success was extremely low.

Table 9. Breeding success of Spoon-billed Sandpipers at the Belyaka Spit in 2005

Year	Average clutch size, eggs	Nesting success, chicks per nest	Fledgling success	Breeding success, fledged juveniles per nest
2005	3.89 (N=9)	2.41 (N=9)	11,4%	0.27

3.3. Breeding success in both populations in different years.

Our results and former data show high variability of breeding success in two populations in different years (**Table 10**). In average, breeding success is significantly higher in Meinypilgyno population likely due to low natural predation. Breeding success of SBS in 2005 at the Belyaka Spit was the lowest ever registered.

Table 10. Breeding success in the Spoon-billed Sandpiper populations

Area	Year	Breeding success, fledged juveniles per nest
Meinypilgyno	2003	~0.85
	2004	~0.65
	<i>Average</i>	~0.78
Belyaka Spit	1986-88	0.58 (between 0.31 and 0.95)
	2002	0.71
	2005	0.27
	<i>Average</i>	0.54

4. Threats for reproduction.

Natural predation is the main negative factor on population productivity at northern Koliuchinskaya Gulf and main predator is arctic fox (*Alopex lagopus*). The predation of arctic foxes on clutches, chicks and even adult SBS was recorded several times and in most cases they are suspected to be a predator. Rodents are general food source for arctic foxes thus predation on nests decreases in years with high or moderate rodent number (Tomkovich, 1995; our observations). In 2005 arctic foxes were very numerous at Belyaka Spit but mortality of SBS nests was very low in June since voles were abundant in tundra. Nevertheless in the middle of July mortality of SBS broods dramatically increased at the moment when arctic fox juveniles had turned out from milk diet. Thus, high population number of arctic

foxes causes low breeding success of SBS even in years with sufficient rodent abundance.

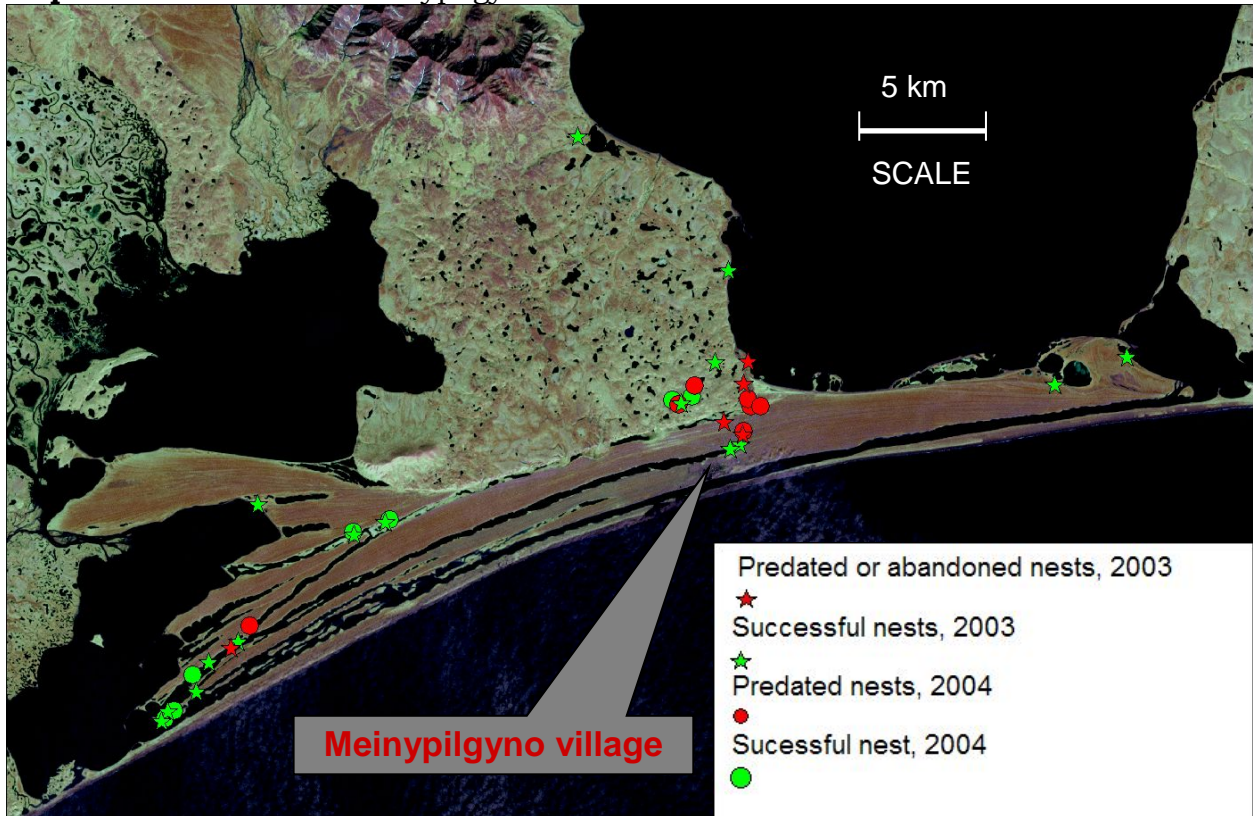
Arctic foxes are the main threat for breeding Spoon-billed Sandpipers at least at northern Chukotka. Arctic foxes do not inhabit Meinypilgyno area thus natural predation on SBS is significantly lower there. Other probable predators include long-tailed and arctic skuas, herring and glaucous gulls, ravens and also ground squirrels and red foxes (*Vulpes vulpes*) in Meinypilgyno area.

Weather and climate. Bad weather and low temperatures are strong negative factors for all arctic breeding birds. Cold and rainy weather could directly bring to chicks death (Tomkovich, 1995) and reduce breeding success through decreasing of food availability (Taldenkov, in prep.). Northern SBS population is much more vulnerable for that because of significantly sever conditions. Since that, warming climate probably does not directly threat reproduction of Spoon-billed Sandpipers. In the same time intensive snow melting and anomalous flooding in Meinypilgyno in 2004 most probably adversely affected reproduction of some waders and waterfowl. Some birds nested in 2004 in more elevated areas compared with 2003 and it is strongly suspected that some nests were flooded. Thus, the effect of climate change on reproduction on SBS is considered to be more complicated. Further understanding of this need particular research activities targeted on both species biology and environmental changes at the breeding habitats.

Human impact is suggested to be a serious threat for breeding Spoon-billed Sandpipers in Meinypilgyno area. It was found out that in 2004 (as well as in 2003) nesting success was significantly lower in the vicinity of Meinypilgyno village. Most of unsuccessful nests (83%) were located near village (**Map 6**). Returning rate of SBS adults was the lowest in the close vicinity of the village (see above, **Map 4**) probably because of early departure of some adults caused by predation of their nests and disturbance. Nests are thought to be predated firstly by domestic dogs searching for food near the village. Fishery is very intensive at the end of June, and, especially, at July and this causes concentration of herring and glaucous gulls near the village. Human disturbance by adults and children seems to be very high especially for the nests situated just in hundreds meters from buildings. Evaluation of negative effect of human factor on breeding SBS need further population research and full inventory of SBS population in Meinypilgyno.

Northern Koliuchinskaya Gulf is occasionally visited by local people (sea-hunters, fishermen, reindeer herds) but they are often accompanied with unleashed dogs and usually their activity take place in a coastal zone where SBS occurs.

Map 6. Nest survival in Meinypilgyno area in 2003-2004.



5. Making efforts on public awareness campaign within and beyond species breeding range and collaboration with conservation organizations on the local level and worldwide



The everyday activities of indigenous people in Meinypilgyno are considered to be an important negative factor for breeding SBS in close vicinity of Meinypilgyno village. Lessons for local people (adults and children) were done in this relation (see photo). Another source of probable troubles is booming development of Chukchi National Area after 2001 arising economical activity in coastal villages which might be destroying for adjacent habitats. In 2004 project leader together with specialists from Chukchi Environmental Agency made a

petition to the Chukchi NA governor R. Abramovich to stop construction of the fish-works factory near Meinypilgyno which can disturb nesting Spoon-billed Sandpipers or destroy their habitats. As a result, the factory was designed as a barge and putting it in the operation was safe for birds.

In 2005 we improved our collaboration with local conservation organizations. Two research assistants of the Wrangel Island State Reserve will join the field survey. Wrangel Island is the only one State Reserve in Chukchi NA and specialists of WISNR have a wide experience of biological studies in the area. We also successfully collaborated with the Nature - Ethnic Park "Beringia" whose territory also includes our study area. The "Beringia" Park staff consist from native people who investigate

the nature in the vicinity of their home villages and report about their observations. Both Park personnel and we expect promising the experience exchanging in the field and enforcing the native people participation in conservation-related researches.

In addition, Ivan Taldenkov visited South Korea and Japan (not funded by RSG) during 5th – 21st September 2004 for participation in collaborative shorebird census along Yellow and Japan sea coasts. Particular search for passaging Spoon-billed Sandpipers was undertaken in Saemangeum estuarine system, Korea. This is the major tidal wetland in Korea which is now threatened by huge construction and the circumstance that this area is maybe the most important staging site for endangered Spoon-billed Sandpiper. In the same time, the Spoon-billed Sandpiper is one of the most important “flag” species for conservation in Saemangeum. The visit targeted on collaborative surveys as well as on meetings with local conservation NGO’s and “grass-root” citizen groups where presentation on Spoon-billed Sandpiper conservation studies undertaken at the breeding grounds in Russia were performed. The partner organizations included Korean Federation for Environmental Movement, Japan Wetland Action Network, Wild Bird Society of Japan, Citizen Survey Team for Saemangeum, Osaka Nanko Bird Sanctuary and others.

Discussion and conclusions

Survival rate of adult birds.

Meinypilgyno. Adult bird’s annual survival rate is similar to those at the northern Koliuchinskaya Gulf in mid 80’s. These indices ranging between 63% and 68% seem to be typical for the whole species.

Koliuchinskaya Gulf. Adult bird’s annual survival rate in 2002-2005 was significantly lower than in mid 80’s. Causes of the high mortality remains unknown.

Population productivity.

Meinypilgyno. Spoon-billed Sandpiper’s breeding success is significantly higher in Meinypilgyno population likely due to low natural predation and warmer climate (**Table 10**). In the same time breeding success in a close vicinity of Meinypilgyno settlement seems to be critically low because of the human impact (**Map 6**).

Koliuchinskaya Gulf. Breeding success at the northern Koliuchinskaya Gulf is lower than in the southern population due to natural predation and severe climate (**Table 10**). Breeding success of SBS in 2005 at the Belyaka Spit was the lowest ever registered.

Population number monitoring.

Meinypilgyno. The biggest known population of SBS still had not been accurately counted and since that there is no good base for population number monitoring. Since that it is unknown about could the population be self-sustainable due its relatively high population productivity and survival rate.

Koliuchinskaya Gulf. SBS population at northern Koliuchinskaya Gulf had declined in period between 2002 and 2005 and declining rate is rather similar to those in 1988-2002 (**Figure 1**). In the same time declining rate is not as high as it could be predicted by analyzing of survival rate of adults and population productivity

(Taldenkov, in prep.). This means that SBS population at northern Koliuchinskaya Gulf subsists on immigration from other more successful populations.

Discussion. Total population balance and causes of decline.

Monitoring of breeding populations of endangered Spoon-billed Sandpiper aims to define causes of species population number decline. Two markedly different populations were monitored in the course of the project. It was found out that demographic situation is more complicated than expected and causes of species population number decline could not be clearly identified at the present moment. General conclusions of the population monitoring are as follows:

4.1. Adult bird's survival rate in 2002-05 was approximately equal to that in mid 1980's. Population productivity is widely varying index (Table 10). In the same time no factors affecting productivity were definitely changed since mid 80's. The survival rate of 1st and 2nd year birds seems to be very low. This probably shows that population declining is generally caused by low survival rate of sandpipers and the negative factors at the non-breeding areas producing it operated at least till mid 80's. The hypothesis needs further verification by population studies.

4.2. Spoon-billed Sandpiper population at the northern Koliuchinskaya Gulf is in the most critical condition firstly because of low productivity caused by natural predation. The declining is compensated by immigration from other populations in some extent. The population needs regular monitoring and urgent conservation action targeting on breeding success increasing.

4.3. Survival rate of adults at northern population in 2002-05 was significantly lower than in 1980's and in 2004 at southern population. If the tendency will be confirmed the northern population declining should be explained by negative processes affecting birds at the wintering and stopover grounds. It is likely that migration route and wintering area might be different for two populations in this case.

4.4. Southern Spoon-billed Sandpiper population in Meinypilgyno has relatively high productivity due to low natural predation. In the same time demographic parameters in 2003 and 2004 were not good enough for the population to be self-sustainable (Taldenkov, in prep.). The population is not studied as well as northern one thus it is suspected that breeding success is higher there in general.

4.5. Breeding success of SBS pairs in a close vicinity of Meinypilgyno settlement seems to be critically low because of the human impact. Estimation of negative effect and local conservation actions are needed.

Conservation priorities for SBS.

Recommended conservation priorities on the Spoon-billed Sandpiper based on the results of the project include special actions and continuation of population monitoring for further understanding of the species population dynamic and evaluation on undertaken conservation efforts effects.

Continuation of population monitoring.

Tracking on the most vulnerable Spoon-billed Sandpiper population at the northern Koliuchinskaya Gulf

Counting and mapping of breeding Spoon-billed Sandpipers for further clarifying of population number and distribution in the Meinypilgyno area for providing a base

of population monitoring. Special study targeting on understanding of negative effect of human activity on breeding birds near Meinypilgyno settlement.

Development of predictive demographic models by compiling of key populations monitoring data. Designing a conservation genetics study for better understanding of processes in populations and species population state.

Inventory studies for survived breeding populations of Spoon-billed Sandpipers Preference should be given to the populations situated on the arctic coast of Chukotka which are supposed to be the most vulnerable.

Urgent conservation action.

Development a protection strategy for the northern Koliuchinskaya Gulf as a key area for the globally endangered species.

Regular control of Arctic fox numbers (“fox-control”) at coastal spits and islands of northern Koliuchinskaya Gulf and other limited coastal areas inhabited by breeding Spoon-billed Sandpipers for increasing of breeding success. Fox-control must be planned and performed very carefully and should be accompanied with population monitoring for effect estimation. Indigenous people could be involved in this conservation activity.

Making efforts on restriction of human disturbance and domestic dogs’ depredation on SBS nesting in a close vicinity of Meinypilgyno village by designing an area with limitations of visit and use.

Designing of Spoon-billed Sandpiper Action Plan, collaboration with conservation organization and “grass-root” citizen groups for identification of threats and conservation of habitats on the species stopover and non-breeding grounds.

Changes to the project. Expenditures and budget.

Due to successful fund-raising it became possible to organize two expeditions in 2004 and 2005 targeting application requirements instead one proposed in grant application. This let to greatly improve output of the study. Additional co-funding of the Spoon-billed Sandpiper monitoring project was received from Keindanren Nature Conservation Fund (KNCF) in 2004, Wrangel Island State Natural Reserve (WISNR) and Russian Foundation for Basic Research (RFBR) in 2005 year. Visit in South Korea and Japan was covered by personal funds. Funds spending in details differ from proposed because in 2004 RSG was received after the field expeditions started and expenses had to be reduced and primarily covered by KNCF. Other changes arisen due to flight discounts, increasing of number of participants and longevity of expedition etc. Funding from Rufford Foundation covered about 55 % of total project expenditures (Appendix 1).

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Appendix 1. Budget (in USD).

Abbreviations: KNCF – Keindanren Natural Conservation Fund; WI – Wrangel Island State Reserve; RFBR – Russian Foundation for Basic Research

Proposed activities	Proposed Funds, USD	Expenditures	Covered from Rufford Small Grant, USD	Co-funding from other sources, USD	Total, USD	Cofunding source
Round-trip by air Moscow – Anadyr and back including overweight payment (2 person)	3075		2301	2774	5075	
		Round trip by air 1 person Moscow-Anadyr-Moscow 2004 year and city-airport transfers	813	813	1625	KNCF
		Round trip by air 3 persons Moscow-Anadyr-Moscow 2005 year + overweight luggage and city-airport transfers	1488	1962	3450	WI, RFBR
Co-funding of helicopter flight to local village	724		1031	457	1488	
		Local helicopter flight 2004, 1 person	36	0	36	
		Local plane\helicopter flights 3 persons 2005 + overweight payments (local flights Anadyr-Egvekinot-Nuteplemen (round))	995	457	1452	WI
Local accommodations (co-funding)	724		2130	536	2666	
		2004: 2 personsX60 days	0	536	536	KNCF
		2005: 3 personsX110 days, food and accommodation	2130	0	2130	RFBR, WI
Local transportation and fuel (boats and motorcycle) (co-funding)	904		179	789	968	
		2005 local transportations (boat, ATV + fuel)	0	254	254	WI
		2005 caterpillar trip to Belyaka spit	179	536	714	WI
Co-funding (30%) of	724	Used Labtop purchasing	0	250	250	KNCF

buying of the Notebook computer for data logging in the field and data processing						
Co-funding (30%) of buying of telescope for field observations of individually marked birds	543	Spotting scope purchasing	0	246	246	KNCF
GPS for field records of species distribution	362	2004-2005; 2 Garmin e-Trex GPS + interface cabel	0	332	332	RFBR and WI
Communication costs and office expenses	271	Communication costs and office expenses	268	0	268	
Selected field equipment and supplies, ropes and strings, tent and stove, reparation, rubber boots, pliers and caliper, nails, glue, batteries etc.)	543		1915	969	2884	
		Expedition equipment 2004 for two persons 2004. All-road bicycle was bought to minimize money spending on local transportation	411	224	635	KNCF
		2005. All expedition equipment (tent, stoves, field clothes, repellents, office supplies, fuel for stoves etc. and others)	1504	745	2249	RFBR and personal costs
Miscellaneous and unforeseen	181	Construction materials for restoration roof of expedition hut at Belyaka Spit, 2005	120	0	120	
Photography (films, batteries, film processing)	181		287	0	287	
		2004	71	0	71	
		2005	215	0	215	
TOTAL:	8230		8230	6353	14584	