ARCTIC BIRDS:
an international breeding conditions survey

supported by International Wader Study Group and
Wetlands International's Goose and Swan Specialist Groups

Newsletter **No. 2** **2000**

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A WORD FROM COMPILERS

We are pleased to present the second issue of newsletter of the International Breeding Conditions Survey on Arctic Birds with results for the 1999 summer season. Thus, a successful transition from the starting phase of the project to the phase of regular functioning can be stated. The Survey is aimed at improving our understanding of regularities in population dynamics of Arctic terrestrial birds (in particular waterfowl) by means of collating at pan-Arctic scale information on environmental conditions on breeding areas.

In the time that passed since publication of the first issue of the newsletter in summer 1999 gradual advances were made in areas of main priority for the project implementation. An existing network of respondents in Russia supported proposed change from the previous free-form version of data provision for subsequent publication in the Information Materials of the Working Group on Waders (CIS) to the use of standard questionnaires and publication of information both electronically to the Internet and in annual newsletter. A data flow on bird breeding conditions in summer 1999 for localities outside Russia slightly increased compared to summer 1998, but still remains mostly insufficient for wide scale comparisons. Improvement to this situation in future will depend on both activities of the project coordinators and primarily response from arctic research community. Perhaps, a critical number of data points for a given vast region should appear on the map before contribution to emerging picture with their own pieces of mosaic becomes really attractive to people.

During winter the database of International Wader Study Group and Wetlands International's Goose and Swan Specialist Groups along with the hot reports of 1999 field season was fed with data for the period starting from 1995 that were formerly published mostly in Russian. Accordingly, the database currently holds information for the last 5-year period, and extracts of these data have been made available at the WEB (URL: **http://www.soil.msu.ru/~soloviev/arctic/**) along with summary maps. This expands opportunities of making comparisons and conclusions on recent trends in bird breeding conditions in Eurasian Arctic.

The current issue of newsletter is centred around breeding conditions for birds in the Arctic in 1999 summer season, and encompasses the following topics:

- ◊ summaries of bird breeding conditions in various Arctic localities, provided by respondents;
- ◊ a review of these reports;
- ◊ contact information about survey contributors;
- ◊ contribution of S. Paskhalny et al. to discussion on techniques of lemming numbers' evaluation for the purpose of ornithological research (initiated in newsletter No. 1);
- ◊ an insight into wader breeding performance in 1999 made by the Australasian Wader Studies Group from Australian non-breeding grounds;
- ◊ a collection of maps illustrating situation with some basic climatic characteristics, rodent abundance and bird breeding performance (as qualified by respondents) in Arctic in summer 1999.

In the near future intensive efforts will be made in searches of data on breeding conditions during the summer 2000, and **we encourage Arctic researchers and other visitors of Arctic regions to support the survey by contributing their information and stimulating colleagues to do**

the same. ONLY OUR COMMUNAL EFFORT WILL MAKE POSSIBLE COMPARISONS ON CIRCUMPOLAR SCALE AND THE PROJECT RESULTS BECOMING OF REAL INTEREST FOR RESEARCHES AND CONSERVATIONISTS. We hope that information coverage for summer 2000 will be good enough to discuss in the next newsletter situation with bird productivity within and between most of the large regions of Arctic. Forms for filling can be requested as a paper copy or electronically (Word for Windows document) from any of the addresses below, or downloaded from the WEB site. High value is assigned to completed forms also from previous years, including from expeditions that may already have published material elsewhere, and to reprints of publications.

The issues of broader database availability for research and conservation purposes hopefully will be resolved before the end of this year by shaping over principals of data use and access. The latter task represents a real challenge due to vast diversity of accumulated data in terms of quality and quantity, but a solution will hopefully be found to satisfaction of interested parties. All contributors to the database in previous years will be asked to confirm readiness to allow access to already entered data on newly developed conditions.

This newsletter is intended for wide distribution, however, contributors to the database will automatically be put on the mailing list, while others should request a copy from the project coordinators. We are opened to feed-back of readers, and will consider with concern any comments and suggestions on contents of the newsletter and/or the project in general.

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For last-breaking information about the survey visit the website
http://www.soil.msu.ru/~soloviev/arctic/

Newsletter is distributed among contributors to the database. Others may request it from project coordinators. Free of charge.

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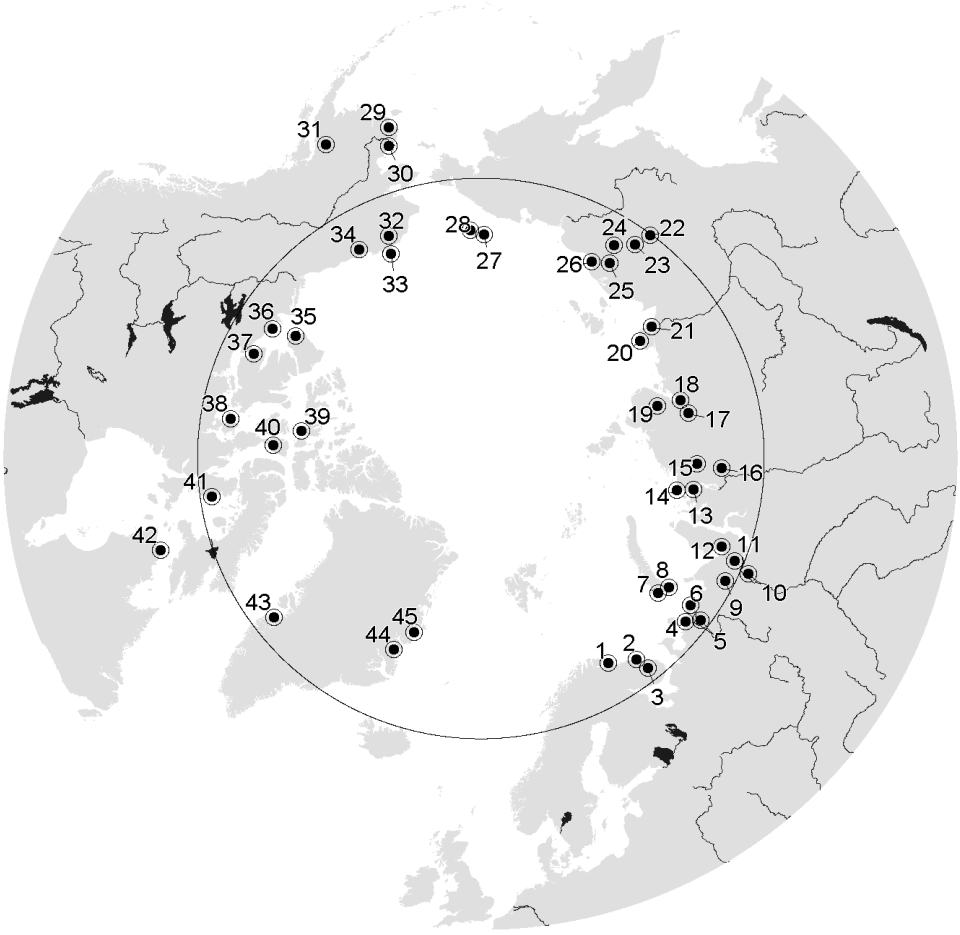

Figure. Arctic localities from which bird breeding conditions reports became available.

LOCALITY REPORTS

1. Ainovy Islands, Kola Peninsula, Russia (69°50'N, 31°35'E)

Spring was late, summer cold and dry, with frequent storms. Lakes became ice-free on 29 May. A storm with rain in the end of July caused death of all chicks in Arctic Tern *Sterna paradisaea*. Nesting was relatively successful for most bird species, although delayed, same as the autumn migration was compared to average dates. Numbers of Great black-backed *Larus marinus* and Herring *L. argentatus* gulls continued to increase, and their reproductive success was high. Big portion of non-breeders was observed among Arctic Terns and Black Guillemots *Cepphus grylle*, and many chicks of these species died. Puffins *Fratercula arctica* nested in big numbers and fledged. Common Eider *Somateria mollissima* had big numbers, and Gray-leg Geese *Anser anser* were increasing in breeding numbers.

Nesting of waders, which are not abundant on the islands, was successful. Dunlins *Calidris alpina*, Purple Sandpipers *C.maritima*, Turnstones *Arenaria interpres* and Little Stints *Calidris minuta* were relatively abundant on migration in autumn, while Ruffs *Philomachus pugnax* were very scarce. Norwegian Lemmings *Lemmus lemmus* were not recorded on mainland tundra, and only few solitary birds of prey were observed migrating over the islands.

I.P.Tatarinkova

2. Kharolov Island, Sem' Ostrovov Archipelago near Murman coast, Russia (68°49'N, 37°20'E)

Breeding conditions were favourable for colonial seabirds as food supply was good. Reproductive success was only seriously influenced by illegal egg-collecting. Norwegian Lemmings had average number.

Y.V.Krasnov

3. Yenozero Lake, eastern Murman coast, Russia (68°07'N, 37°57'E)

Local people reported that May was cold, while June - warm and dry. July was cool with air temperatures fluctuating in the range of 5-6 to 12-13°C. Rains were rare and not heavy in the middle of July, but became torrential in the last five-day period of the month. Generally weather conditions were favourable for bird reproduction, and heavy rains in late July already did not affect breeding success. Mammalian predators were absent in the study area, while avian predators (skuas *Stercorarius spp.* and Rough-legged Buzzards *Buteo lagopus*) were mostly feeding on voles which were common there. Fledglings of waders and passerines were taken by avian predators far less often than in 1998, when rodents were absent. Reproductive success of large gulls (Glaucous *Larus hyperboreus* and West-Siberian Herring *L. heuglini* gulls) was lower than in 1998 due to regular predation on their chicks of White-

tailed Sea Eagles *Haliaeetus albicilla*, that were practically not seen in 1998.

V.D.Kokhanov

4. Kolokolkova Gulf, Neruta River mouth, Russia (68°18'N, 52°20'E)

Late snowmelt prevented reproduction of many waterbirds. The weather was cool and rainy starting from 10 July. Lemmings *Lemmus sibiricus* were absent, while other rodents were very rare. Arctic Foxes *Alopex lagopus* were rare. Rough-legged Buzzards did not breed. Broods of birds were late and infrequent. Brood size of waterfowl was approximately 30% smaller than average. Breeding Terek Sandpiper *Xenus cinereus* and Common Snipe *Gallinago gallinago* were abundant among waders, Herring Gull among gulls.

O.Y.Mineev

5. Pechora River delta area and Russky Zavorot Peninsula, Russia (68°20'N, 53°07'E)

Ice on the Pechora River broke up later than during the last 100 years (ca. 20 June near Naryan-Mar, 67°38'N). Estimated 50% of snow-cover was reached on 18 June at 67°44'N and on 25 June at 68°46'N. The summer was late and characterised by reasonable air temperatures without major set-backs.

The area is very complex in structure and type of predators. Arctic Fox inhabits tundra, while Red Fox *Vulpes vulpes* the delta with bushes. Wolverine *Gulo gulo*, Wolf *Canis lupus* and Brown Bear *Ursus arctos* were present in 1999. Arctic Foxes, lemmings and voles all were rare. By general impression predators determined breeding success in this area to a far lesser extent than further East. Prey abundance for raptors is less cyclic than it is known at Taimyr. Lemmings play a minor role, while Root Vole *Microrus oeconomus* does instead. Willow Grouse *Lagopus lagopus* shows some cyclicity with 1998 being at a low. In a hilly area 1998 was peak year for Snowy Owl *Nyctea scandiaca* and Pomarine Skua *Stercorarius pomarinus*, but this could be due to factors further to the East more than local factors. In 1999 these species were absent.

M.R. van Eerden

6. Khabuika Lake, Russky Zavorot Peninsula, Russia (68°30'N, 53°50'E)

Small amount of snow was accumulated during very cold winter (up to -47°C), with nearly all the winter precipitation occurring during April and May. June temperatures were below the average. It was the worst breeding year of our study in terms of lateness (the ice on the Pechora River did not break until 15 June; normally it happens in late May).

No rodents were observed during the whole period of observations (21 June - 1 July). Abundance of Arctic Foxes and birds of prey was noticeably lower than in 1998, while Snowy Owl and Rough-legged Buzzard were entirely absent. Only White-tailed Sea Eagle was regularly seen among birds of prey. Two of four known Arctic Fox dens were uninhabited, while one of inhabited dens contained 4 young which is a half the number of young in the same den in 1998.

Numbers of skuas and gulls were lower than in 1998. Breeding numbers of ducks were the lowest for the 10-year series, likewise was the breeding density of Bewick's Swan *Cygnus bewickii* (15 nests in the core study area, where normally 20+ pairs bred). Also clutch size in most species of waterfowl was lower than average, not exceeding 3 eggs in geese and swans (mean for Bewick's Swan was 2.6 eggs). A pronounced reduction in numbers was recorded in nesting Dunlins, Temminck's *Calidris temminckii* and Little stints, and Ruffs, while Red-necked Phalaropes *Phalaropus lobatus* became a somewhat more common than in 1998. Incomplete clutches were not infrequent in nests of Dunlin and Temminck's Stint. Despite of low numbers of predators breeding conditions were unfavourable for many waterfowl, waders and birds of prey, mostly because of the cold spring.

Y.M.Shchadilov, A.V.Belousova, E.C.Rees

7. Belush'ya Guba, Novaya Zemlya Archipelago, Russia (71°32'N, 52°20'E)

Exceptionally late spring was followed by a very short and cold summer with unstable weather. More than a half of days from 10 July to 15 August were characterised by stormy winds, with only 4 sunny and 3 windless days. Southern and eastern winds predominated, bringing cold from the ice-filled Kara Sea and Karskie Vorota Channel. Phenological features of autumn, which are typical for late August, started to appear already from 10 August.

Lemming numbers on the Gusinaya Zemlya Peninsula were very low (but not the minimal), after the peak of 1998. Numbers of predators were minimal: one nesting pair and a single Rough-legged Buzzard, rare skuas of four species, no Arctic Foxes and Snowy Owls. Large gulls concentrated near seabird colonies. However, situation with Arctic Foxes and owls could be different before the start of observations on 10 July. Despite adverse weather, reproduction was successful in White-fronted *Anser albifrons*, Bean *A. fabalis*, and Barnacle *Branta leucopsis* geese, Common Eider (many broods recorded), Turnstone, Black-legged Kittiwake *Rissa trydactyla*, very bad in murres. Other species were rare, but fledglings were recorded in Little Stint, Dunlin, Purple Sandpiper, Shorelark *Eremophila alpestris*, Lapland *Calcarius lapponicus* and Snow *Plectrophenax nivalis* buntings. Nests of Temminck's Stint, King Eider *Somateria spectabilis* and Long-tailed Duck *Clangula hyemalis* in Belush'ye village were depredated by dogs.

V.N.Kalyakin

8. Novaya Zemlya Archipelago, southernmost of South Island, Russia (71°03'N, 55°12'E)

According to reports of local hunters lemmings became abundant at the south of Novaya Zemlya Islands, where Arctic Foxes moved to from Gusinaya Zemlya Peninsula at the south-west.

V.N.Kalyakin

9. Vorkuta River, Bolshezemelskaya Tundra, Russia (67°20'N, 63°45'E)

According to observations from 4 June to 20 August season was late, cold and rainy. Plain tundra became 50% snow-free on 15 June only, rivers broke up on 6-8 June. Snowfalls were frequent in the first half of June, and occurred once in early July. Lemmings were not seen, while voles and Arctic Foxes were rare (foxes did not breed). Owls and Pomarine Skuas were not seen, Rough-legged Buzzards nested, but unsuccessfully.

V.V.Morozov

10. Lower Ob' River, Russia (66°35'N, 66°55'E)

A lot of snow was accumulated during winter, the last snowstorms occurred in late May. Spring was late (ice-break on Ob' River near Salehard on 7 June is only 1 day earlier of the latest known date). Summer was cold in the beginning (1-20 June), with snow-patches on slopes remaining until 20 June, and last ice disruption on lakes by 27 June only. Mid-summer was warm and moderately wet, while end of summer and autumn were warm and rainy. Ice-formation on Ob' River occurred also late, on 6 November. There was very high spring water level in the Ob' River floodplain, which remained until late August. Plant greening and flowering developed later than usual. Among birds early migrants arrived later than usual. Most insectivorous passerines and waders appeared somewhat later or in average dates. Majority of birds arrived in the very last days of May or first days of June. Reproduction of many species (ducks, waders, passerines) was delayed about one week on average, and endured.

Numbers of voles on watersheds were low or average, judging by single visual records. Lemmings were not seen at all. In floodplain populations of Ground Vole *Arvicola terrestris*, other voles, and Muskrat *Ondatra zibethicus* presumably crashed at the largest part of the surveyed area due to high and prolonged flood. Arctic and Red foxes were not seen. Rough-legged Buzzards were only recorded in spring on migration outside the floodplain. Wandering Long-tailed Skuas *Stercorarius longicaudus* were observed at watershed tundra areas, while other rodent-specialised predators were not recorded at all.

Gulls were present in usual high numbers, while swans were a little less common than usual. Geese do not breed in the area. Ducks have probably moved for reproduction from the floodplain to adjacent areas, where they became more abundant than usual. In the floodplain duck numbers increased only with onset of autumn migration, but they were not high anyway. A few broods of Tufted Duck *Aythya fuligula* recorded there were very late. Breeding was the most successful in Meadow Pipit *Anthus pratensis*, trushes, redpols, White-winged Crossbill *Loxia leucoptera* among passerines by observations in late summer and autumn.

Numbers of almost all waders were low, with the only exceptions of Wood Sandpiper *Tringa glareola* and Whimbrel *Numenius phaeopus* which density was only slightly lower than usual. Among generally uncommon waders on migration in August in the Ob' River floodplain Ruffs, Little Stints and Wood Sandpipers predominated; Spotted Redshanks *Tringa erythropus* and Greenshanks *T. nebularia* were recorded relatively often. Because of flooded until the end of August mudflats along channel banks and on shallow lakes, available wader feeding habitats was substantially reduced.

Despite low numbers of predators and relatively favourable weather situation in mid and late summer, breeding conditions for birds can be evaluated as average or worse than average.

S.P.Paskhalny

11. Upper Schuchya River, Yamal, Russia (67°29'N, 67°22'E)

The season was extremely late, with very high and prolonged flood. Large lakes became ice-free in July only. Barring of northern winds by eastern spurs of the Polar Urals makes weather conditions in the Schutchya River catchment relatively good in a long-term norm. In spite of extremely unfavourable weather conditions in this late, cold, windy and rainy season birds nested in usual dates for the area on watersheds and gentle upper slopes. In floodplain and depressions of large lakes bird numbers were low because of the late ice-melt, but networks of ponds and small lakes, including those in former gravel pits, were quite densely populated.

Lemmings were rare, but high numbers of voles allowed breeding of Rough-legged Buzzards and Short-eared Owls *Asio flammeus*. Willow Grouse was practically absent. In early August floodplain of the lower Ob' River was still under water, and few birds, even gulls and ducks, used it. However, wader concentrations were recorded in that time on marshes along the railway under construction and on networks of lakes near Laborovaya settlement. Rough-legged Buzzards could be seen every 5-6 km along the railway Obskaya-Bovanenkovo, where also Short-eared Owls were not uncommon, Snowy Owls and Arctic Foxes were recorded sometimes. Local people reported nesting of a Snowy Owl pair in the area.

T.R.Andreeva

12. Erkuta River, Yamal, Russia (68°10'N, 69°00'E)

Breeding conditions were favourable for Rough-legged Buzzard due to the second successive season of both lemming and vole peaks, absence of Reindeer *Rangifer tarandus* herds in the study area in nesting period, and relatively favourable weather conditions. Arctic Foxes were common and bred, Pomarine Skuas nested successfully.

A.A.Sokolov

13. Medusa Bay, Taimyr, Russia (73°21'N, 80°32'E)

Minimum air temperatures were around freezing point and maximum temperatures were mainly around 10°C. Mean air temperatures of June and July were 0.6-1.0°C lower than average. Unusually abundant precipitation

was observed in 20-30 June (14 mm) and 1-10 July (36 mm, data of meteorological station at Dikson). Heavy snowfall on 28-29 June resulted in a snow layer of 5-7 cm, but this had no apparent negative impact on birds. After the first week of July the weather improved and there were some days with many sun hours. Winds varied enormously, both for speed and direction. Most days had some precipitation, mainly as heavy fogs.

In the whole study area good numbers of Siberian Lemming *Lemmus sibiricus* were found; densities approximating 50-60 animals/ha at maximum. So high numbers were recorded during the first week after arrival on 22 June, when tens of these rodents were seen every day, and dropped to a minimum around mid July, when days with seeing only one or two lemmings were possible. During the last weeks before departure on 27 July many nests with up to 10 young lemmings were found. Although 1999 was expected to be an 'intermediate year' in the three-year lemming cycle, it should probably be considered a peak year. Collared Lemming *Dicrostonyx torquatus* was present in good numbers, although being much scarcer than Siberian one and mainly restricted to dry parts of the study area.

Despite delay of spring for about 10 days and harsh weather conditions, densities of breeding birds were higher than in the two previous years probably due to higher lemming densities. In 1996 wader densities were even more high (49 vs. 32 pairs/sq. km.), but in 1999 more Pomarine Skuas, Brent Geese *Branta bernicla*, Snowy Owls and passerines were breeding, even though lemming densities declined during July.

Number of wader territories per sq. km. was 8 in Pacific Golden Plover *Pluvialis fulva*, 7 in Curlew Sandpiper *Calidris ferruginea*, 6.5 in Little Stint, 4.6 in Dunlin, 2.4 in Turnstone and 2.3 in Ringed Plover *Charadrius hiaticula*. Density of passerine territories per sq. km. was also high and equalled 29 in Shore Lark, 55 in Lapland Bunting and 14.75 in Snow Bunting. Pomarine Skua was breeding in very high density (4,7 nests per sq. km.). Snowy Owls had 7 nests in the area of 30 sq. km. (0,23 nest/sq. km.) with several big colonies of Brent Geese (152 nests around the owl nests). Predation by skuas and owls seemed low to moderate (no precise data), predation by Arctic Foxes not recorded. All birds had obviously successful nesting, also not specifically affected by abiotic factors.

H. van Kleef, S.V.Khomenko, F.Willems, A.Volkov, M.Berezin, A.Bublichenko

14. Dikson, Taimyr, Russia (73°30'N, 80°35'E)

Not much snow was still present on arrival at 10 July, but the sea was still frozen, and melted late. Both lemming species (Siberian and Collared) were abundant in their respective habitats. We collected samples from Siberian Lemmings for genetic analysis, thus not setting any standard trap lines. Some indications: on 15 July, on the island Dikson we trapped 15 Siberian Lemmings in 40 snap traps set for about 24 hours. Later we captured lemmings with a dog. On 20 August on the small Island Vern (73°27' N 80°11' E) the dog captured 19 rodents in 2 - 3 hours, on 10 August close to Brazhnikova (73°04' N 80°44'E) 25 lemmings in less than 2 hours were captured on an area of about 300 x 500 m (relatively wet slope with grasses and willow shrubs). Arctic Foxes were common, and their pups were seen several times.

As typical for a year of high lemming densities there were many birds (waders, geese and raptors), and many of them breeding. It was a clear contrast to 1998, when lemmings were scarce. Between Dikson village and Wilhelm Barents field station at the Medusa Bay we counted 6 Snowy Owl pairs and two Rough-legged Buzzard pairs while driving along the tracks (18 - 20 km). Eastward from Dikson many Brent Geese were breeding. Behind the magnetic study station "Kolba" one or two pairs were seen in every small valley with small stream we crossed. On the island Severok (between Dikson Island and Dikson mainland) there was a colony of several 100s Arctic Terns.

D.Ehrich

15. Pura and lower Pyasina rivers, Taimyr, Russia (72°08'N, 88°20'E)

On 4-5 June temperature reached +15°C, but in the following two weeks weather became cooler, with rains, and occasionally snow. Flood was a little later than usual and not high. Further phenological events developed according to scenario of an average season. However, in July and August there were few warm days, almost daily moderate to strong winds were blowing, often rained. Still, weather anomalies were generally not recorded.

High lemming abundance determined high numbers and good reproductive success of Snowy Owls, Rough-legged Buzzards and other rodent-specialised predators, as well as wildfowl, geese in particular. Numbers of waders were also substantially higher than in 1998. Peregrine Falcons *Falco peregrinus* were breeding successfully. Arctic Foxes were abundant and occupied 35-40% of known dens, but their impact on wildfowl was minimal. For example, eggs in all nests in a 5-pair colony of Red-breasted Geese *Branta ruficollis* near Snowy Owl nest hatched successfully, in spite of presence of an active fox den in 300 m. Reproductive success of passerines could have been affected by strong winds combined with rain and relatively low air temperatures. Generally, breeding conditions for birds can be characterised as "better than average", or favourable.

Y.I.Kokorev, J.Quinn

16. Nyapan elevation, upper Agapa River, Taimyr, Russia (70°04'N, 87°23'E)

There were 13 days with rains, but without heavy rains and eighteen sunny days in July. Both Siberian and Collared Lemmings were abundant, while neither Arctic Foxes, nor Wolves or their traces were seen in the period of studies from 2 to 30 July. All inspected dens of Arctic Foxes remained uninhabited for a number of years, although winter hunting on foxes was successful as reported by local people. Ermines *Mustela erminea* were rare. Supplemented by good weather the almost

complete absence of predators led to successful reproduction of numerous birds. Particularly high density in the study area was reached by Bar-tailed Godwits *Limosa lapponica* (up to 5 records per 1 km) and Willow Grouse, while common species included Turnstone, Rough-legged Buzzard (about 3 pairs/5 sq. km.), thrushes, Pomarine Skua, Arctic Tern, Bluethroat *Luscinia svecica*. Temminck's Stint, Grey *Pluvialis squatarola* and Ringed Plovers were also seen.

O.L.Makarova

17. Ary-Mas, Taimyr, Russia (72°28'N, 102°13'E)

There was little snow during severe winter at eastern Taimyr. Strong and long-lasting snow-storms were rare. Spring was early, cold and developed quickly, which resulted in a complete snowmelt on 1-2 June, which is 1-1.5 weeks earlier than usual. Flood was low, and the Khatanga River became ice-free near Khatanga settlement on 7 June, which is a week earlier than usual. Summer was cool and rainy, with frequent thunderstorms, but without snowfalls. In autumn snowcover established earlier than usual during the last 10-day period of September. Start of breeding season was generally favourable for reproduction of birds. Birds arrived earlier than average, even late migrants like phalaropes and Arctic Tern appeared in first days of June. Geese and duck numbers were lower than usual.

Lemmings were rare in spring, and almost disappeared in summer. Arctic Foxes were rare as well, and they did not breed. Rough-legged Buzzards had on average 3 chicks in nests, which is fewer than in "lemming" seasons. Among skuas Long-tailed Skuas were numerous, but they almost did not nest and were collecting food near human settlements. Predation, primarily by gulls and skuas was heavy, and wader broods were rarely seen.

A.A.Gavrilov

18. Bludnaya River mouth, Taimyr, Russia (72°51'N, 106°02'E)

Phenologically 1999 was the earliest among 6 study seasons with rapid development of snowmelt, resulting in 50% coverage on 3 June and complete loss of snow by 6 June. Flood in 1999 was also the earliest in 5 years (no flood occurred in 1997) and low, expanding only at about a half of the floodplain territory. Snowstorm on 8-9 June was early enough to have little influence on bird distribution and breeding schedule. Summer season was also the most wet among study seasons, but not cold and not particularly windy which made environmental conditions generally quite favourable for bird reproduction.

Lemming numbers increased in comparison with two previous seasons according to visual evaluation, although not reaching the maximum of 1996. As usual for the site, Siberian Lemmings prevailed in number, with only 10.1% of identified animals being Collared Lemmings. A pronounced peak of lemming records occurred in June and earlier than in other years, while in July lemmings became as rare as in some of seasons with rodent number depression. Arctic foxes were less common than in 1998, but did not differ in abundance from other years. Records of foxes were more frequent in early June during the peak of lemming numbers. A den with young close to the main study plot remained active at least until the end of July.

Spring peak of lemming numbers allowed breeding of rodent specialised avian predators such as Pomarine Skuas and Short-eared Owl. Long-tailed and Pomarine Skuas successfully produced chicks.

Early season phenology resulted in the highest numbers of Pectoral Sandpipers *Calidris melanotos* for the period of observations, while the total bird density on the main study plot was the next after 1995, when numbers of Red Phalaropes *Phalaropus fulicarius* and Little Stints were higher.

Nest success in waders was very high in 1999 (80.6%), due to low predation by Arctic Foxes. Although stage of the lemming cycle in 1999 could not be positively identified as a peak, reproductive performance of birds was typical for a 'good' lemming year.

M.Y.Soloviev, V.V.Golovnyuk, V.N.Krainov

19. Bikada River, Taimyr, Russia (74°50'N, 106°20'E)

Spring was early and developed quickly: snow melt started on 4 June and completed on 14 June (except for permanent snow patches), with 50% coverage on 11 June. Ice-break on the Bikada River on 13 June was the earliest for 20 seasons of observations, but flood was not high, although exceeded the one of 1998. Rain-flood on 7-11 July was moderately high, while the second one on 22-27 July occurred already in post-nesting period and did not affect nest success of floodplain-nesting birds, primarily Ringed Plovers. Air temperatures during summer remained mostly in the range of 8-14°C, and crossed the 20°C level only once, on 12 July. The season was rather rainy and very windy, with wind velocity reaching 30 m/s in some days.

Depression of lemming numbers continued from 1998, although in contrast with the latter season when lemmings were not recorded at all, in 1999 four Siberian Lemmings were seen, and three more were caught per 120 trapping nights, and 1 found in a nest of Rough-legged Buzzard. Arctic Foxes were rarely seen, although two animals were staying during the season in the study area on different banks of the Bikada River. None of 30 surveyed dens was inhabited, however, breeding was confirmed by a visit of the camp by a young in late August to feed on waste.

On our arrival on 1 June four bird species were already present in the study area, while most of birds arrived between 4 and 12 June. First nest (Little Stint) was found on 11 June, and by 20 June almost all birds had complete clutches. First wader chicks (of Red Phalarope) appeared on 7 July, while first passerines, Lapland Buntings and Shore Larks, hatched already in late June and fledged on 7 July. The latest chicks hatched in Bar-tailed Godwit, between 20-30 July, when most chicks of Curlew Sandpiper, Dunlin and Little

Stint already fledged. Steller's Eider *Polysticta stelleri* which has been becoming increasingly common in 1990s was only seen on 11-12 July during 16 hours on intensive migration of males to moulting areas. Numbers increased in comparison with 1998 in Pacific Golden Plover, and especially in Lapland Buntings, decreased in Snow Bunting, Wheatear *Oenanthe oenanthe*, Dunlin, Grey Plover, Ringed Plover. The latter species, however, expanded to dry sandy slopes from the usual habitat, riverine gravel beaches. At the same high level retained the numbers of Bar-tailed Godwit, Little Stint and Red Phalarope.

Despite low lemming numbers and rather unfavourable weather nesting was successful in most of breeding species. Only 5 of 25 monitored nests were depredated: 2 by Arctic Foxes, 1 by Long-tailed Skua, 1 by Herring Gull, and 1 trampled by Muskox *Ovibos moschatus*. Chicks of Rough-legged Buzzards hatched in one nest of four. Also chick mortality was high in Herring Gulls: a colony of 25 nests on an island in the Yamu-Neru Bay produced only 6 fledglings, while 18 chicks were found dead. One of 3 chicks survived in Pomarine Skuas, and one of 2 in Long-tailed Skuas. Wader broods in late July consisted of 1 or 2 chicks only.

I.N.Pospelov, M.N.Koroleova

20. Sagastyr Island, northern Lena River Delta, Yakutia, Russia (73°25'N, 126°35'E)

Spring was average in timing, but very warm and rapid in development. Snowcover reduced to 50% on 4 June, and was gone by 11 June. River broke up on 19 June, extremal flood was not observed. Summer was average in temperature.

Warm and rapid spring allowed mass breeding of southern for the site species like small-size gulls, Bewick's Swan, some waders. Nesting of Pintail *Anas acuta* and Long-billed Dowitcher *Limnodromus scolopaceus* was recorded in the area for the first time since the start of observations in 1992. A third in a row season of non-peak lemming numbers resulted in an almost complete absence of Arctic Foxes, non-breeding of owls, Rough-legged Buzzards, Pomarine Skuas. Predation was negligible and nesting successful in most species. Mild summer temperatures and somewhat prolonged autumn without frosts presumably promoted successful fledging.

D.V.Solovieva

21. Bykovskaya channel, SE Lena River delta, Russia (72°24'N, 127°28'E)

Spring was average in timing, but warm and developed quickly. Flood also occurred in usual dates and had average level. Summer was colder than usual, but dry, and without extremal weather events. Low numbers of Arctic Foxes and beginning of lemming population increase resulted in low pressure of predators. Nests, broods and flocks of young birds were seen for all common species of the Lena Delta: Grey, Pacific Golden and Ringed plovers, Ruff, Dunlin, Little and Temminck's stints, Pectoral and Curlew sandpipers, Turnstone, Red Phalarope. Common and Pintail *Gallinago stenura* snipes were recorded in the southern part of the delta, where they probably nested. Generally, the season was favourable for bird reproduction.

V.I.Pozdnyakov

22. Indigirka River middle reaches, Yakutia, Russia (67°05'N, 142°45'E)

Summer was rather warm (close to average) and dry, with a single night frost on 22 June. Breeding conditions were close to average, without pronounced deviations in numbers and reproductive success of most species. Lemmings and voles were rare and rodent-specialised predators had low numbers. Ground-nesting birds suffered from numerous Wolves, common Brown Bears, Sables *Martes zibellina* and Ermines.

A.I.Artyukhov

23. Abyi Depression, Yakutia, Russia (68°05'N, 145°00'E)

Snow reduced to 50% coverage by 13-15 May, and mostly melted off by 14-18 May. Snowfall of 20-22 May resulted in a 20 cm layer of snow, which melted off by 25 May. Rivers broke up on 30 May - 3 June. Summer was dry, which resulted in small precipitation amount in mountains and very low spring flood and summer water level in large rivers, the Indigirka River in particular. Weather conditions were favourable for reproduction of most local birds. Weather anomalies were absent, and basic phenological events occurred in average dates. Lemmings and voles were rare.

A.I.Artyukhov

24. Pokhvalny settlement, Indigirka River, Russia (69°24'N, 147°42'E)

The season was phenologically average, rather dry and relatively warm. Extremal events were not recorded. Nests or downy chicks of Common Snipe, Wood Sandpiper, and Great Knot *Calidris tenuirostris* were found. Low pressure of predators and low level of disturbance by humans allowed to assume high reproductive success.

E.G.Lappo, E.E.Syroechkovski, Jr.

25. Lower Indigirka River, Chokurdakh, Russia (70°34'N, 147°24'E)

The season was generally late and cold, but spring developed rapidly. Snowcover reduced to 50% on 11-13 June, and disappeared completely by 16 June. Rivers broke up on 11 June. According to local people opinion rains were more common than usual.

Lemming numbers were low, but in the forest tundra voles were abundant (in particular, Grey-sided Vole *Cletrionomys rufocannus*). Numbers of Arctic Foxes were lower than average, and inhabited dens were not found. Snowy Owls did not nest, but Short-eared Owls were common and bred. Rough-legged Buzzards were breeding only in forest tundra and southern tundra. Loss

of bird nests during incubation was not high, and main predation probably occurred in brood-raring period. Mass hatching of chicks coincided with the period of adverse weather, but this was unlikely to impact strongly bird reproductive success. Breeding success can be evaluated as average.

S.V.Volkov, M.N.Ivanov

26. Russkoe Ustie, Indigirka River delta, Russia (71°12'N, 149°25'E)

Extremal weather events were not recorded. Rivers broke up on 15-20 June. In mid July clear weather changed for worth: foggy and rather cold (±1°C in late July), with winds and snow-falls. Arctic Foxes were rare. Nests or broods of the following species were recorded: Bar-tailed Godwit, Turnstone, Spotted Redshank, Red Phalarope, Long-billed Dowitcher, Little Stint, Long-tailed Skua, Pintail, Spectacled *Somateria fischeri* and Steller's eiders, also in close vicinities to the settlement. White-fronted, Bean and Brent geese were successfully breeding in the delta. Absence of noticeable predation and extremal weather events allows to consider the season as generally favourable for birds.

E.E.Syroechkovski, Jr.

27. Tundrovaya River valley, Wrangel Island, Russia (71°18'N, 179°48'W)

Spring came with a delay of two weeks, and snow still covered 98% of surface at the start of the second week of June. The last three weeks of June were warm and dry. Snowfree patches reached 50% on 19 June and extended to the whole flat surface by 23 June. Cold weather returns with snowfalls catastrophic for birds were not recorded in the study period from 9 June to 15 August, with exception of light grainy snow on 26 July. Ice on the river broke on 13 June. The first half of July was mostly warm and dry, but windy, while the second half of July and first five days of August were rainy with frequent fogs. After that weather became more dry, but winds were strong, reaching 25 m/s at blasts.

Lemming populations were increasing, and ratio of Siberian and Collared Lemmings was approximately 4:1 according to visual records and numbers of identified bodies near nests of Snowy Owls and dens of Arctic Foxes. The total number of Arctic Foxes in the vicinity of Snow Geese *Anser caerulescens* colony was below average, but almost all territories were occupied by breeding foxes. Three dens that were surveyed in late July contained 7, 9 and 9 pups; 6 out of 9 pups in one of the dens were in good conditions, while other three - suffered from malnutrition. Nesting of Snowy Owls was late in general, and direct competition with Snow Geese for nest scrapes was recorded in two cases. Number of eggs in owl nests did not exceed 7, number of chicks before fledging varied from 1 to 3.

Breeding of Snow Geese in the main colony was complicated by pronounced deficiency of nesting area. Laying eggs into foreign nests and directly on the ground was common, as well as dump nests containing up to 52 eggs. Only about 10,400 pairs (1/4 of adults in the population) managed to settle in their nests at the main colony, and less than 2,000 pairs nested in small colonies associated with owl nests. 7,850 nests (75%) were successful at the main colony, that was left by approximately 25,000 of chicks. Yet about 5,000 chicks hatched in small colonies. These nesting results usually correspond to a fraction of juveniles on wintering grounds in November-December not exceeding 8-10%, however, in 1999 the fraction of juveniles was 14-16%. The fairly well result of the Snow Goose reproduction is uncommon in a sense that average reproductive performance was achieved after general failure of nesting. This became possible due to very high chick survival during brood-raring, promoted by favourable weather conditions, low Arctic Fox numbers and increasing lemming populations.

The increase in lemming populations and warm summer were also favourable for reproduction of other tundra birds. Late spring probably affected to a lesser extent nesting results of waders, passerines, some gull and skua species than of early breeders, like Snow Geese and Snowy Owls.

V.V.Baranyuk

28. Wrangel Island, centre, Russia (71°13'N, 179°20'W)

The season was late and rainy. A substantial fraction of island area was still snow-covered by the start of bird reproduction. Snow was unevenly distributed, and vast areas in the floodplain of the Gusinaya River, and about 40% of slopes at the west were snow-free in late May. At the east of the island snow-free patches were almost absent in the end of the first 10-day period of June. Birds were short of habitat suitable for reproduction in the central parts of the island. Snowcover reduced to 50% on 22 June and completely disappeared by 26 June in course of late, but intensive melt. The river broke up on 13-14 June. Flooding of goose and wader nests and of a nest of Snowy Owl was recorded. Snowfalls were common in late May, early June, July and August. A two-day cold spell in mid August resulted in formation of complete snowcover in tundra, which caused high rise of water in rivers when melted.

Numbers of lemmings, Arctic Foxes and Snowy Owls were average. Most predators bred, and the main study plot of 45 sq. km. was populated by 13 pairs of Snowy Owls, 5 pairs of Arctic Foxes, 2 pairs of Pomarine and 8 pairs of Long-tailed skuas. Arctic Foxes occupied about 40% of known dens, and had 5 to 9 pups in broods in August. Reproduction of Pomarine Skuas was unsuccessful, while success of Snowy Owls varied from 0 to 5 fledglings per a pair.

Insufficient supply of lemmings led to a substantial predation pressure on tundra birds, and Snowy Owls were taking not only chicks, but also adult waders. Almost no wader broods or alarming adults were seen on regular excursions at the study plot in August, and only twice fledged young Long-tailed Skuas were encountered. Thus, reproductive success of tundra birds was low due to shortage of suitable breeding habitats in

June and high predation pressure by rodent-specialised predators.

I.E.Menyushina

29. Yukon-Kuskokwim Delta, Alaska, USA (61°25'N, 165°28'W)

Spring was approximately one week later than normal along the outer coast of the Yukon-Kuskokwim Delta. Availability of nesting habitat was also delayed but only an estimated two days in comparison to 1998 which was reported as an early spring. Coastal lowlands were snow free by 1 June. Waterbodies in these lowlands were up to 50% ice covered on 28 May and ice free by 1 June. Ice break-up along the lower Kashunuk River occurred on 5 June (33-year average - 31 May).

Nesting delays reduced densities of nesting geese from 1998 (e.g. Canada Geese *Branta canadensis* -14.4%, White-fronted Geese -18.2%, Emperor Geese *Anser canagicus* -1.6%). It is likely that wader and other waterbird species also nested in densities lower than 1998. Of note was a breeding record of a Pectoral Sandpiper, normally seen only as a migrant to more northerly breeding areas. Also, the reporter has noted few Red Phalarope (approximately 1 Red to 10 Red-necked Phalarope) and Ruddy Turnstones since 1997. Both species were common throughout the 1970's.

C.Dau

30. Kanagayak, Yukon Delta National Wildlife Refuge, Alaska, USA (62°13'N, 164°47'W)

At this site, Dunlins are limited to low-lying sedge-graminoid meadows dominated by *Carex rariflora* and *C. ramenskii*. According to mapping of territorial males and/or intensive nest searches in 3 meadows totalling 73 ha Dunlin density was 1.06 nests/ha. Mayfield nest success in Dunlin was 30%, and in Western Sandpiper *Calidris mauri* declined from 56% in 1998 to 24% in 1999. Increased numbers of Mink *Mustela vison*, Arctic Fox, and Long-tailed Skuas apparently accounted for the annual variation. Seven of 52 nests of Western Sandpiper found on the plot were renests. Only 1 of these renesting attempts hatched successfully. In response to predation of early clutches, one female laid 3 consecutive clutches, producing 11 eggs in just 41 days. Among 16 broods monitored on the study plot, 12 fledged at least 1 young.

B.J.McCaffery, D.R.Ruthrauff

(From "[AKSWG:58] 1999 AK Shorebird Working Group Summary". *On-line posting*. 6 Apr. 2000. Alaska Shorebird Working Group Listserver).

31. Turquoise Lake, SW Alaska, USA (60°48'N, 153°59'W)

Still winter environment at the start of spring (1-10 May) caused late arrival of most birds, decreased numbers of some species (Least Sandpiper *Calidris minutilla*, Semipalmated Plover *Charadrius semipalmatus*, Greater Yellowlegs *Tringa melanoleuca*, Long-tailed Skua, several duck species and bush passerines), and delay in reproduction of some waders. Late ice-melt on lakes prohibited breeding of Arctic Terns and made nests of Common Gulls *Larus canus* on boulders at shallows accessible to Red Foxes, which then led to appearance of late replacement clutches. Rapid rise of snow-line in mountains during warm period on 14-22 May (due to thin layer of snow) allowed start of reproduction by birds, but further snowfalls (26-30 May and 1-3 June) resulted in desertion of some nests and arrested reproduction in yet not laying pairs. Regular summer rains probably had no impact on reproduction.

Lemmings and Arctic Foxes do not inhabit this area; voles were very rare, but shrews *Sorex spp.* had peak numbers. Predation on eggs of waders and passerines was moderate, but Common Gulls suffered heavy. Chicks in wader broods grew rapidly. Broods of Surfbird *Aphriza virgata* contained more chicks and were more common than in two previous summer seasons.

P.S.Tomkovich, R.E.Gill, Jr., M.N.Dementiev

32. Lower Meade River and Barrow to Wainwright, Alaska, USA (70°41'N, 157°15'W)

Local observers near Barrow, Alaska, reported the spring of 1999 as "normal to early", however, this area is often an anomaly with respect to conditions elsewhere on the arctic coastal plain. Heavy snow cover had been reported from Wainwright to Barrow to the Meade River suggesting mild conditions likely occurred which would have allowed for the "normal to early spring" report. In 1999, lemmings and Pomarine Skuas were reported as common near Barrow and Snowy Owls were increasingly common from Wainwright Inlet north to Barrow. Owls were rare to absent east of the Meade River suggesting lemming abundance may have been a local phenomena near Barrow.

C.Dau

33. Cape Barrow, Alaska, USA (71°18'N, 156°40'W)

All plants delayed flowering in accordance with delay of snowmelt in June. On many lakes in coastal area ice completely melted off only by 10 July, however, sea remained ice-free near the coast from the second half of July to mid August. July was warm and dry, without strong winds; August was cold, windy and rainy, with frequent fogs and predominant north-east winds.

Human activities have significant influence on numbers of large mammals (except for Polar Bear *Ursus maritimus*), as Eskimo people are not subject to general hunting regulations. They also actively use small all-terrain vehicle in tundra. This leads to avoiding of the area by Caribou and Arctic Foxes, while recrements of whaling attract many Polar Bears and even Grizzly Bears in summer. Voles were seen in tundra daily, lemmings - not every day, but their number increased compared to 1998. Relatively high rodent abundance allowed successful breeding in relatively high numbers of skuas, including Pomarine Skua, and Snowy Owls. Low pressure of avian predators on birds and virtual

absence of Arctic Foxes were responsible for high nest success: none of nests under control was depredated.

Impact of weather on breeding birds was ambiguous: late and cold spring caused delay of reproduction in birds, except for Dunlins, Pectoral and Baird's *Calidris bairdii* sandpipers, but July was favourable, and August cold again.

Generally, reproductive success can be considered high for Dunlin, Pectoral and Baird's sandpipers, eiders, redpols, Snow Bunting, judging by numbers of broods in tundra, and average in Red and Red-necked phalaropes, presumably more affected by late snowmelt and adverse weather in August.

D.V.Karelin

34. Arctic Coastal Plain, Meade River to the Canadian border, Alaska, USA (70°00'N, 150°00'W)

Observers in the Colville River Delta and Prudhoe Bay areas reported spring as 4-7 days later than 1998 which was reported early across the breadth of the coastal plain. Snowy Owls were rare to absent east of the Meade River suggesting lemming abundance may have been a local phenomena near Barrow. Limited investigation in the Prudhoe Bay area suggested very low small mammal populations. Abundant sea ice and in lakes, fresh-water ice was present until 1 July. In larger coastal lakes such as Teshekpuk Lake, ice cover was more extensive and likely persisted much longer.

C.Dau

35. Banks Island South, Canada (71°43'N, 123°43'W)

Total lemmming density on 28-29 July was 1.5 captured individuals per 100 traps set out for 24 hours, with 12 Greenland Collared Lemmings *Dicrostonyx groenlandicus* and one Brown Lemming *Lemmus trimucronatus* captured. The population of Collared Lemming was close to the low phase, either in early increase or in late decline.

From A.S.Angerbjörn et al. (2000)

36. Amundsen Gulf South, Canada (69°46'N, 122°05'W)

Rodent density on 26-27 July was 9.8 captured individuals per 100 traps set out for 24 hours. Root voles prevailed among captures (61 of 67 individuals), being in increase towards the peak phase of the cycle.

From A.S.Angerbjörn et al. (2000)

37. Wollaston Peninsula, Canada (69°23'N, 114°47'W)

Microtine and shrew density on 23-24 July was 0 captured individuals per 100 traps set out for 24 hours.

From A.S.Angerbjörn et al. (2000)

38. King William Island, Canada (69°06'N, 98°56'W)

Collared Lemming density on 20-21 July was 0.17 captured individuals per 100 traps set out for 24 hours.

From A.S.Angerbjörn et al. (2000)

39. Bathurst Island South, Canada (75°04'N, 98°34'W)

Collared Lemming density on 13-14 July was 1.3 captured individuals per 100 traps set out for 24 hours. The population of Collared Lemming was close to the low phase, either in early increase or in late decline. This site obviously had very low productivity of vegetation.

From A.S.Angerbjörn et al. (2000)

40. Somerset Island, Canada (72°54'N, 93°30'W)

Microtine and shrew density on 9-10 July was 0 captured individuals per 100 traps set out for 24 hours.

From A.S.Angerbjörn et al. (2000)

41. Melville Peninsula, Canada (67°33'N, 81°41'W)

Collared Lemming density on 5-6 July was 0.5 captured individuals per 100 traps set out for 24 hours.

From A.S.Angerbjörn et al. (2000)

42. Ungava Peninsula, Canada (62°22'N, 73°42'W)

Collared Lemming density on 1-2 July was 0.17 captured individuals per 100 traps set out for 24 hours.

From A.S.Angerbjörn et al. (2000)

43. Naternaq (Lersletten), Greenland (68°20'N, 51°58'W)

Following a very cold and wet spring the summer came suddenly in mid June with maximal temperatures during the whole of July of 20-22°C (almost every day), and minimal temperatures of 2-7°C (average approximately 15°C). Nearly no rain during July, and most flowers dried out by 15-20 July. In general no lemmings are present in West Greenland. Birds of prey: Gyr- *Falco rusticolus* and Peregrine falcons are dependant on Ptarmigans *Lagopus mutus* (also ducks) and passerines (Snow Buntings and Lapland Buntings), respectively. Since first time to the area no data on "between year changes" is available. Rock Ptarmigan, Lapland Bunting and Snow Bunting seemed to have a good breeding year and probably one pair of Gyr- and one pair of Peregrine Falcon were breeding in the area.

C.Glahder, A.Walsh

44. Traill Island, Karupelv Valley, Greenland (72°30'N, 24°00'W)

1999 in NE Greenland was the year with the latest snow melt (still more than 90% snow cover in early July) and the consequence was that wading birds suffered heavily from this situation. There was again an outbreak of lemmings in winter, but not so marked as the year before. And as now the rule in our system, decline was typical for summer. Stoats showed delayed response by "outbreak" in July, while the initial big outbreak was in spring 1998, i.e. more than 16 months earlier.

B.Sittler

45. Zackenberg, Greenland, (74°28'N, 20°34'W)

There was an extraordinary heavy snow cover and a very late snow melt, which resulted in delayed breeding in waders. Many Turnstones and Knots *Calidris canutus* did not breed at all. Snow melt was 10-14 days later than in the previous 4 years, and medians of first egg-laying dates in Sanderlings *Calidris alba* and Dunlins were six days late as compared to 1998, which may have been close to average. Those Turnstones, which bred, did so 12 days later than the year before. The remaining pairs either stayed at their territories without breeding or rambled over the tundra for 1-2 weeks before they formed post-breeding flocks and left. Even the average clutch size was reduced by 4.6-9.4% in Sanderlings, Dunlins and Turnstones. Lemmings and Arctic Foxes were common. It was a late breeding season, with good production of most species, but poor production in Turnstones, Long-tailed Skua, and probably also in Knots. Medium predation by Arctic Foxes.

H.Meltofte

Reference for localities 35-42:

Angerbjörn, A., S. Erlinge, A. Kenney, C.J. Krebs, M. Svensson. 2000. Cyclic population dynamics of Arctic lemmings. In: Polarforskningssekretariatets arsbok 1999. Polarforskningssekretariatet, Stockholm, pages 60-62.

INFORMATION PROVIDED BY RESPONDENTS WAS EDITED AND TRANSLATED INTO ENGLISH (IF NECESSARY) BY PROJECT COORDINATORS. IF NOT OTHERWISE STATED THIS INFORMATION SHOULD BE REFERRED AS PERSONAL COMMUNICATION.

REVIEW OF BIRD BREEDING CONDITIONS IN THE ARCTIC IN 1999

Pavel S. Tomkovich & Mikhail Y. Soloviev

On the second year of the project implementation at the circumpolar scale information on bird breeding conditions was received from 45 Arctic localities or regions. As previously, most of the data arrived from the Russian Arctic where collection of bird breeding information has already become the over 10-year tradition. Slight increase of data flow from Alaska and Greenland took place, but potential of these regions is still far to go from the current state. Non-Russian European north and Canada contributed nothing to the circumpolar picture, except for lemming data collected by Tundra Northwest 1999 expedition on Canadian Arctic (thanks to Liv Wennerberg for sending this information). An important gap in Russia is represented by continental tundras of extreme eastern Siberia that to our knowledge were not visited by ornithologists in 1999. A completeness of geographic coverage and soundness of conclusions about bird breeding conditions in below review will vary according to the mentioned limitations.

Weather and other abiotic factors

In June monthly average air temperatures exceeded 6-year averages in central Alaska, at south-east Greenland, Iceland, Svalbard, most of the European North, and in the vast region of Central and Eastern Siberia (from Eastern Taimyr to the Indigirka River) (Fig. 1 on p.23). Cold areas included south-west of Alaska, nearly whole Canadian Arctic, Western Greenland, Novaya Zemlya Archipelago and Western Siberia, and most of Chukotka area.

July brought an improvement (air temperature averages above the norm) to the north of Canadian Arctic Archipelago and largest part of Greenland, but not to Alaska, Scandinavia and Eastern Siberia (the area of the Indigirka and Kolyma rivers) where temperatures fall below the average (Fig. 2 on p.23). July was especially cold in three regions: west of Canada, north of Greenland, and the Kara Sea basin including Novaya Zemlya, Bolshezemelskaya Tundra, Western Siberia and Western Taimyr.

Temperature variables, however, are not sufficient for outlining the most important abiotic characteristics of a breeding season, in particular its initial period, because other factors like amount of snow accumulated during winter and dynamics of its melting are also of major importance. The role of the latter factors can be illustrated by situation in Eastern Greenland and at Wrangel Island, where June temperatures were close to average, while late melting of unusually heavy snowcover strongly affected distribution and numbers of breeding birds. In other regions timing of bird reproduction showed better agreement with June air temperatures. Late spring was reported at Pechora Delta, Novaya Zemlya, Bolshezemelskaya Tundra, Yamal, Western Taimyr, in some localities at Alaska and Western Greenland. Early spring, resulting from little snow amount and warm weather, was reported by all respondents from Eastern Taimyr.

Summer weather, as reported by respondents, generally is in agreement with average July temperatures (Fig. 2 on p.23). Summer was dry in Western Greenland, at Kola Peninsula, and in some localities of Yakutia (the Lena Delta, the Indigirka River, with exception of the delta). It was rainy season at the north of Western and Central Siberia (from Bolshezemelskaya Tundra to Eastern Taimyr). High and prolonged flood in Western Siberia (the Ob' and Schutchia rivers), and flood in central parts of Wrangel Island, resulting in substantial loss of bird egg clutches should be mentioned among other important factors affecting bird numbers and distribution in 1999. Low flood was recorded on rivers of Eastern Taimyr and at the Indigirka River in Yakutia.

Rodent abundance

This factor is of primary importance, because according to the prey-switching hypothesis it determines predation pressure on populations of breeding birds in the Arctic. Lemming (*Lemmus* and *Dicrostonyx*) peaks were recorded at Western Taimyr and locally at southernmost Novaya Zemlya and Southern Yamal (Fig. 3 on p.24).

Compared to 1998 lemmings numbers increased at Kharlov Island (the Kola Peninsula), Eastern Taimyr, Wrangel Island, and Cape Barrow area, Alaska, but did not reach maximum level. After two years of number depression an increase tendency was also noted in the Lena Delta, Yakutia, while lemmings retained a relatively high numbers for the second year in a row in the Karupelv valley, Eastern Greenland.

Certain Arctic regions attracted predators for breeding due to high abundance of voles (*Microtus* and *Clethrionomys*) rather than lemmings. Voles were numerous at southern Yamal. Average vole numbers were recorded in two localities at the Kola Peninsula, in forest-tundra at the lower Indigirka River, and in Barrow area, while lemmings had only average numbers there. Rodent numbers were average at one site only of eight in Canadian High Arctic also due to increasing density of Root Voles *Microtus oeconomus*. Elsewhere rodents were not recorded or had low numbers (Fig. 3 on p.24).

Predators

In most Arctic regions bird breeding success is primarily determined by predation pressure of Arctic Foxes *Alopex lagopus*. As reported by respondents, Arctic Foxes were common and bred in 1999 at north-western Taimyr, Wrangel Island and locally at Southern Yamal. Few occasions of fox breeding were also noted in the Pechora Delta area and at Eastern Taimyr. Arctic Foxes were either uncommon, or not seen at all in other localities, but increase of their numbers was reported for the Yukon Delta, south-western Alaska.

Among other mammalian predators Stoat *Mustela erminea* number was on peak at eastern Greenland, and Red Foxes *Vulpes vulpes* were numerous in an inland area of south-western Alaska. A variety of species (Wolf *Canis lupus*, Brown Bear *Ursus arctos*, Sable *Martes zibellina* etc.) were common in the middle reaches of the Indigirka River, Yakutia. Generally, abundance of mammalian predators was lower in the surveyed Arctic localities than in other seasons in 1999.

Numbers and breeding performance of rodent specialised avian predators, first of all Snowy Owls *Nyctea scandiaca* and Pomarine Skuas *Stercorarius pomarinus*, was in good agreement with spatial distribution of areas with abundant rodents. Snowy Owls were common and bred in Barrow area, at north-western Taimyr and on Wrangel Island. Breeding of Short-eared Owls *Asio flammeus* was recorded at Southern Yamal, south-eastern Taimyr and lower Indigirka River. Pomarine Skuas nested at Barrow, north-west and east of Taimyr, and Wrangel Island, though their numbers and breeding success were low, at least at Eastern Taimyr and Wrangel.

Reported areas occupied by breeding Rough-legged Buzzards *Buteo lagopus* and Long-tailed Skuas *Stercorarius longicaudus* were broader than in the above-mentioned rodent specialised avian predators, however, many respondents noted either breeding of solitary pairs, or low nest success and small broods in buzzards and skuas.

Distribution and numbers of waterfowl

Changes in breeding portions of populations and/or in configuration of breeding ranges were found in many bird species in accordance with particular features of snowmelt and weather. The most distinct changes will be mentioned. Breeding numbers of many birds were lower in majority of regions with spring delay: in south-western Alaska, Zakenberg valley at Eastern Greenland, the Pechora Delta and lower Ob' River. Geese numbers decreased in the Yukon Delta and at Wrangel Island, and despite unfavourable spring weather showed an apparent increase in the area of high lemming numbers at western Taimyr. Late spring resulted in nesting of Pectoral Sandpipers *Calidris melanotos* farther south compared to their usual distribution in Alaska: they were found breeding in the Yukon-Kuskokwim Delta and even at the Turquoise Lake. According to spring phenology, numbers of this species decreased at Wrangel Island and increased at south-eastern Taimyr. The Yukon-Kuskokwim Delta was reinvaded after a several-year interval by such northern breeding species as Ruddy Turnstone *Arenaria interpres* and Red Phalarope *Phalaropus fulicarius*. Data on number changes in large gull species were contradictory even in closely spaced localities of European Arctic which could be due to local fluctuations. However, numbers of Herring *Larus argentatus* and Great Black-backed *L. marinus* gulls at Ainovy Islands continued a long-term increase.

Breeding success

Bird breeding success was evaluated as good for more than a half of localities for which such information was available in 1999 (Fig. 4 on p.24). As anticipated, successful reproduction was observed in the areas of rodent peak numbers: at the Kola Peninsula, Southern Yamal, Western Taimyr, and Barrow area due to pronounced decrease of pressure by Arctic Foxes and other predators on bird clutches and broods. Interestingly, bird reproductive performance was good or average in many other regions with low rodent numbers: south-western Greenland, Novaya Zemlya, the Lena Delta, the lower Indigirka River. The most likely explanation for this phenomenon can be redistribution of unnumerous predators to the regions with high rodent numbers.

Although catastrophic for birds weather events did not expand to vast areas of Arctic in 1999, abiotic factors had strong local influence on nesting. Late spring at Zakenberg valley (Greenland) and Khabuika Lake (the Pechora Delta area) not only resulted in decreased numbers, but also in reduced mean clutch sizes in birds. Reduced size of waterfowl broods at the Kolokolkova Gulf (the Pechora Delta area) could result from either reduced clutch sizes, or increased loss of chicks. Storm with rain at Ainovy Islands, the Kola Peninsula, caused total dying out of Arctic Tern *Sterna paradisaea* chicks.

Comparison with predictions for 1999

Bird reproductive performance was predicted for the Russian Arctic in the previous newsletter (no. 1, p. 12). Some increase in lemming numbers was expected on the Kola, Yamal and Taimyr Peninsulas, and the Lena

Delta, with peak numbers on Wrangel and possibly north-western Taimyr and some patches at European North. This kind of spatial distribution of main prey of Arctic Foxes allowed to expect quite high breeding output of Eurasian waders, migrating by the East Atlantic to Central Asian flyways, and generally inferior breeding results of birds migrating along the East Asian-Australasian and West American flyways.

The forecast was confirmed for Yamal, Taimyr and the Lena Delta. Increase of lemming numbers on the Kola peninsula was recorded at Kharlov Island. Lemming peak at north-western Taimyr in 1999 has actually curtailed the three-year cycle to two years. However, increase of lemming numbers at Wrangel Island was slower than expected and did not result in high density values. Expectations of locally high lemming numbers at European Northern Russia were realised only at the southernmost Novaya Zemlya, while elsewhere (e.g., Khabuika Lake area) small numbers that appeared in 1998 did not evolve into high density and disappeared instead by summer 1999. Yugorsky Peninsula and the Kolyma Delta were mentioned formerly as regions of expected lemming number depressions in 1999, however this prediction was not checked.

Relatively high reproductive performance of Arctic waders belonging to the East Atlantic to Central Asian flyways was confirmed by both information collected in Arctic and mass southward migration of juveniles in Europe. This was made possible by good or average reproductive success (reported for 10 of 12 localities with indicated breeding success) at an area between the Kola and Taimyr Peninsulas. Breeding success in more eastern parts of Russia, where from majority of birds migrate along Pacific coasts of Asia and America, was expected to be lower than what came out from observations in the Lena Delta and lower Indigirka River. Unfortunately, the easternmost parts of continental Russia, from the Kolyma River to the Bering Strait, were not surveyed. According to the data from Australian non-breeding grounds (see information by C.Minton et al. below) fraction of juveniles, though variable among species and populations, was reasonably high in many Arctic waders, thus indicating a quite good bird reproduction success in some East Siberian regions.

Predictions for the summer 2000

According to geographic coverage in 1999 predictions for the next summer is possible again mostly for the Russian Arctic.

The peak of lemming numbers that occurred in 1999 at Western Taimyr will likely expand by summer 2000 to adjacent regions: Eastern Taimyr, Gydan and Yamal Peninsulas, changing to decrease or depression at its source. Number peak is also possible farther to the east, in the Lena Delta. Altogether this can result in formation of a vast area with abundant food supply for Arctic Foxes and avian predators at the north of Western and Central Siberia. Attraction of predators to this region from adjacent areas will promote successful reproduction of Arctic birds at even larger expanses.

A scenario of lemming population change at Wrangel Island is ambiguous, as 1999 state can develop either into a high density with associated successful breeding of birds, or into a number depression with heavy predation on bird egg clutches and broods. Similar uncertainty is applicable to locally increased rodent numbers in Barrow area which have potential for spreading to the whole Northern Slope of Alaska, or alternatively can be depressed by predators. Situation with bird breeding success can vary accordingly.

The lemming number peak at north-eastern Greenland in 1998 and partially in 1999 should give way for a depression in 2000. Taking into account high Stout numbers in at least one of the two closely spaced localities there, high results of bird reproduction become unlikely in the coming summer. However, isolated position of many coastal tundra areas in Greenland makes developing processes difficult to predict due to their local nature.

Thus, aside of unpredictable impact of abiotic factors, reproduction of Arctic birds, breeding in Eastern Europe and Siberia and migrating along the East Atlantic and Central Asian flyways, is likely to be successful again. The same is applicable to at least some of the areas providing migrants to the flyways of Pacific region. The situation of two in a row seasons of good reproductive performance in the same vast area is quite uncommon, but whether this prediction comes true will clear up with time.

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DISCUSSION AREA

ON LEMMING NUMBER EVALUATION BY COUNTS OF WINTER NESTS IN RELATION TO RODENT ABUNDANCE ASSESSMENT FOR PURPOSES OF ORNITHOLOGICAL STUDIES

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I.E. Menyushina (1999) has found correlations between numbers of winter lemming nests, summer rodent numbers and reproductive success of Snowy Owl (*Nyctea scandiaca*) on Wrangel Island, East Siberia, and recommended this technique for assessment of lemming (*Lemmus* and *Dicrostonyx* genera) numbers at large areas.

Our long-term studies at Yamal Peninsula, West Siberia, do not confirm a direct relation between summer lemming abundance and numbers of their winter nests. As choice of an effective technique for rodent number estimate is important for many field ornithologists working in northern regions, we provide below our opinion on the issue, based on results of our own data and literature sources.

Methods

Data on rodent numbers were collected at the Yamal Peninsula from 1974-1999. Terrestrial vertebrates were counted in all tundra varieties, including subzones: arctic, typical and shrub (by classification of Chernov 1985) from late June to mid August in 1978-1991 (Bakhmutov et. al. 1985, Sosin et. al. 1985). Rodent abundance was estimated using lines of 50 snap-traps, which is considered to be the most objective and the least labour-consuming count method by most researchers. Raisin was used for bait, and traps were placed in line 5 meters apart on tracks, near borrows or toilets of rodents, but not over 1 meter from a point on line. A line when possible was oriented to cross different vegetation associations. Each line was usually surveyed for two days, and checked twice a day, in the morning and evening.

Winter nests of lemmings were counted in 1984-1991 on transects evenly spaced within the study areas, and crossing all typical habitats there. Nests were counted within 10-meter wide stripe (5 m each side of the transect). In addition laika dog was used to count rodents which gives a plausible idea about rodent numbers and distribution (Elshin 1983), although dog was reported to be selective in catching rodents (Balakhonov et. al. 1988). Number of rodents caught by dog was recalculated on the transect part length at which the dog was visually monitored by an observer. Besides, we usually recorded on transects all rodents seen and their life traces (fresh tracks, inhabited borrows, damaged vegetation).

Results and discussion

Results of rodent counts by different methods: with traps, with dog, and counts of winter nests conducted in subzones of typical and shrub tundra (1984-1986) and shrub tundra (1987-1991) at Yamal are presented in the Table. Long-term data give grounds to consider dog count the easiest and relatively objective. Correlation coefficient between number of rodents caught by dog per 10 km of a transect and number caught in traps per 100 -trapping days (td) equals 0.85 ($P<0.01$).

Table. Relative rodent abundance at Yamal in 1984-1991 obtained by different methods.

Year	Snap-traps		Dog counts		Winter nests per 10 km
	trap-ping days (td)	animals/ 100 td	transect length, km	Caught by dog, animals/ 10 km	
1984	1500	0.5	413	1.4	3.1
1985	1870	10.0	464	8.3	2.9
1986	1700	0.12	470	0.2	18.4
1987	350	0.0	114	0.0	0.0
1988	800	11.7	55	32.0	8.7
1989	1625	1.5	65	1.5	17.8
1990	1200	2.9	66	0.9	2.0
1991	1050	1.3	166	0.5	0.4

The data of the Table also allow to make a conclusion that number of discovered winter nests in a season reflects both under-snow lemming numbers and their numbers in the preceding summer, but does not indicate high rodent abundance in the current season. Specifically, we can see that:

1. the highest numbers of winter nests were found after summer peak of lemmings;
2. maximal numbers of winter nests indicated high under-snow density of rodents and preceded their number depression;
3. very low numbers of winter nests were typical for deep depressions in lemming populations;
4. low numbers of counted winter nests makes difficult a prognosis for summer rodent abundance, because low nest density can correspond to the phase of

population growth which can result in successful reproduction of rodent-specialised predators;

5. vole (*Microtus* and *Clethrionomys* genera) numbers can not be successfully assessed from counts of winter nests.

Direct relationship between winter and summer rodent numbers is not observed, because summer counts cover a population cycle phase completely different from that in winter. Summer peaks of lemming numbers are known to result from under-snow reproduction (Chernyavski & Tkachev 1982, Dorogoi 1987). In this case, however, population density in winter is not maximal, because it corresponds to the growth phase (Sdobnikov 1957). In contrast, density peaks in some areas can be preceded by an unintensive under-snow reproduction (Kokorev 1999), while high under-snow density usually results in almost complete destruction of vegetation in wintering habitats by animals, leading to their death from starvation. The latter situation was observed in 1989 at Middle Yamal, where lemming wintering grounds emerged from under snow as bare blackish patches covered by winter nests and dead lemming bodies. Summer peak in that area occurred in 1988.

Catastrophic decrease of lemming numbers can occur in spring, early or mid summer (Kuksov 1969, Chernyavski & Tkachev 1982, our data) which can have different effects on reproductive success of rodent-specialised predators.

Thus, counts of winter nests contribute to revealing of lemming population dynamics in study areas, but do not clarify situation with prey numbers during reproduction period of predators. Perhaps, other tundra regions can differ in respect to relation between numbers of winter nests and summer numbers of rodents, likewise in respect of levels of these numbers. However, comparison of our data with those from Western Taimyr, the region relatively close to Yamal (Kokorev 1999) has shown nearly complete coincidence of the recorded levels of lemming numbers.

Still, very high level of lemming numbers (according to the scale of I.Y.Kokorev) was recorded only once, in 1988, in 20 years of our counts, excluding cases of summer aggregations of rodents after flooding of habitats.

Continental arctic tundra of Yamal experienced peaks of Siberian Lemming (*Lemmus sibiricus*) numbers in 1979, 1983, 1985 and 1988 (Figure). From 10-71 animals per 100 td could be caught in these years in different areas. Abundance was 0-3 animals/100 td in decreasing and growing phases, while minimal numbers were recorded in 1981, 1984 and 1986 (0-0.2 animals/100 td). Abundance in typical tundra varied from 6-86 animals/100 td at peaks, and from 0-3 animals/100 td (0.6 on average) at depressions.

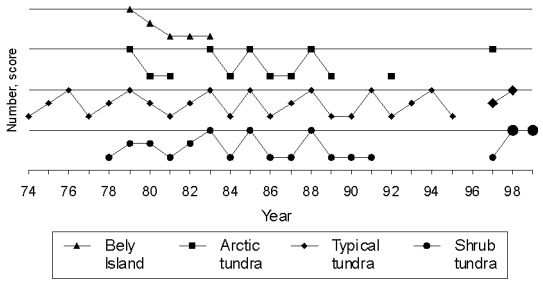

Figure. Rodent number dynamics in different regions at the Yamal Peninsula in 1974-1999. Numbers are evaluated as low, average and high scores. Vole peaks are shown separately with enlarged symbols.

Maximum numbers of Siberian Lemming were lower in shrub tundra in comparison with more northern regions. On average 12-17 lemmings per 100 td were caught in 1985 and 1988, with a maximum of 34 animals/100 td. Rodent numbers were variable within this subzone, but everywhere it was low (0-0.6 animals/100 td) in depression years (1981, 1984, 1986). In other seasons patches without lemmings along with densely populated areas could be found. In 1980 numbers were low at the west, but reached 10 animals/100 td at the east (Nurmayakha River). In 1982 numbers varied from 0-14 animals/100 td at different localities, and in summer 1983 some patches at the west of the subzone had few rodents, despite of a peak of Siberian Lemming number at the peninsula.

Rodent (in particular lemming) dynamics had different patterns in different regions of peninsula (Figure). Both lemming species numbers fluctuated in a specific rhythm at Bely island (Sosin & Paskhalny 1995). Continental arctic and typical tundra had more or less synchronous maximums of Siberian Lemming numbers, although they were better expressed in the northern areas.

This synchrony was violated in certain years in shrub tundra (Figure). For instance, in 1979 maximum numbers were reached in typical tundra, while to the south it was at an average level. In 1980 in shrub tundra numbers even grew up a little bit, although a pronounced drop-down was recorded elsewhere (Balkhonov et. al. 1988). During rodent number depressions in 1991 and 1997 in shrub tundra, average or high numbers were recorded further north.

In late 1990s rodents reached average or high numbers in the peninsula tundra due to dominance of voles (*Microtus gregalis* and *M. middendorffii*) rather than lemmings. These were the cases in 1997-1998 for typical tundra and in 1998-1999 for shrub tundra (Figure).

According to the common knowledge, reproduction of rodent specialised predators is synchronised to rodent dynamics. Snowy Owl and Pomarine Skua (*Stercorarius pomarinus*) are reliable indicators of high lemming numbers at Yamal as they normally breed only at high rodent abundance. However, they rarely nest in shrub tundra even at high rodent density.

Occupation of Arctic Fox (*Alopex lagopus*) dens in different tundra subzones at Yamal is maximal in years of lemming number peaks, but even then it is lower than at Taimyr and does not exceed 50-60% (Shtro 1986). Lemming abundance determines density and nest success of Rough-legged Buzzard (*Buteo lagopus*), which, however, can breed successfully in some years (likewise Arctic Fox) in areas with high local density of voles.

Our experience of visual recording of lemmings, voles, and traces of their activities leads to the conclusion that this technique allows to cover a wide variety of habitats in vast areas and to reveal basic tendencies in number dynamics of rodents and their distribution at a lowest additional labour cost. However, accuracy of the method is limited to assigning low, average or high number score, and discovering local concentrations of animals. Besides, registration of traces assumes certain training of observers.

Lemmings and voles are almost never seen on excursions at very low and low densities (single records on hundreds of kilometres). Discovering of fresh tracks and inhabited burrows is difficult, and even dog can show poor results in such situations. Counting with trap lines becomes effective only at a high census effort. Such situations are typical for number depression and initial stages of population growth.

During lemming peaks (e.g. in 1983 and 1988 at Middle and Northern Yamal) these animals could be regularly met on excursions, likewise their fresh tracks (usually over 10 per 1 km) and burrows. Tens of rodents could be caught in traps or captured by a dog in a short period of time.

Visual records of rodents at average and low density contributes little to quantitative evaluation of numbers, distribution and understanding of dynamics, because number of records is low, and reliable conclusions require very high effort. However, these data combined with registration of life traces are sufficient to assign a density to one of the three number categories at a study site: low, average or high. Quantitative interpretation of such data is associated with difficulties that we will not discuss in this paper, hence considering registration of life traces as an improving addition to visual counts of rodents or any other census techniques.

Choice of technique for assessment of rodent numbers is largely dependent on aims of ornithological research and available resources. In some cases score scale based on rodent records during excursions can be sufficient, while others will require more detailed information on rodent species composition, quantitative evaluation of densities, age and sex population structure, spatial distribution, dynamics, etc.

Generally, we believe that the scale for lemming numbers suggested by Kokorev (1999) and rank scale with three scores based on visual records of animals (low, average or high), *de facto* used by most ornithologists, appropriately reflect real ecological situation.

This 3-score scale covers the evaluation of lemming numbers based on frequency of visual lemming records suggested by Soloviev and Tomkovich (1999), which in fact underlays conclusions about animal number, and which is in good agreement with our observations. The only comment to do is related to survey effort: the longer transects, the lesser is an error of number evaluation. Few lemmings seen on a short route (e.g. 5 km) is a clear indication of high density, while recording of a single animal or none tells nearly nothing about numbers.

Counting with lines of traps (complexities of organising which should not be overestimated) and counting with a dog (laika) can be recommend as reliable methods of evaluation of rodent numbers. Counting rodents and their life traces (tracks, burrows, winter nests) on excursions is less labour-consuming, but also is less accurate. Results of such counting can be expressed as records per unit of a transect length and compared to the 3-score scale of numbers. It is quite obvious that the best results can be achieved by using a combination of all the above methods applied during the whole summer season at a sufficiently large area.

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1999 ARCTIC BREEDING SUCCESS FROM AUSTRALIAN PERSPECTIVE

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One of the main objectives of the annual wader catching programmes of the Victorian Wader Study Group in SE Australia and of Broome Bird Observatory/Australasian Wader Studies Group in north-west Australia is to catch sufficient samples of as many species as possible in order to gain an estimate of their breeding success in the previous arctic summer. This is achieved by measuring the proportion of juvenile/first year birds in catches. The catches used for this 'index' are those which have been made outside the main migration season i.e. November to mid-March in NW Australia and mid November to February in SE Australia.

Only cannon net catches are included, as mistnet catches sometimes tend to give a higher proportion of young birds. Wherever practical catches are made at exactly the same time and location each year, to reduce potential biases. Nevertheless the figures are more of an index of breeding success, which can be compared over the years, rather than necessarily being an absolute measure of the proportion of 1st year birds in the total population of that species. Note also that this measure is taken some six months after the breeding season and after (successful) completion of their first long distance migration. In spite of the above reservations the figures are considered a good measure of breeding success and correlate well with relevant count data in those species where this has been examined.

The tables 1 & 2 show the total catches and number/percentage of first year birds for each species in both NW Australia and SE Australia. These figures, obtained during the 1999/2000 non-breeding season, indicate the apparent breeding success of these species in 1999 breeding season on northern Siberia.

In broad terms we have in the past classified breeding success as:

poor	0-10%
moderate	10-20%
good	20-30%
exceptional	above 30%

Based on the above most species appear to have had moderate to good breeding success in the 1999 arctic summer. The exceptions appear to be Great Knot and the population of Bar-tailed Godwits which visit NW Australia. In contrast Red-necked Stints have had a second consecutive year of good breeding productivity. It is not surprising therefore that the austral summer population count figures have also been very high. This year the Curlew Sandpipers also did well, in contrast to their poor showing the previous year.

Although one has to be cautious about reading too much into these figures because of potential biases and because in some species sample sizes are small, it does appear that the Red Knot which visit NW Australia had a rather less successful breeding season than the Red Knot which come to SE Australia. When we have a few more years data to draw on it will become much more interesting!

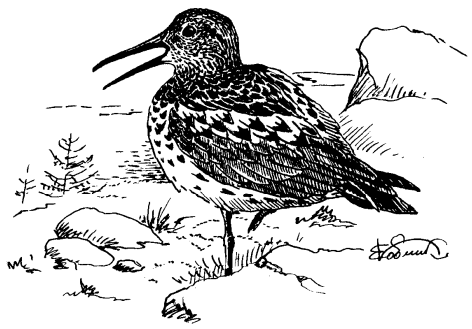

Table 1. Proportion of first year birds in wader catches at Broome, NW Australia, November 1999 to March 2000 (data collected by the Broome Bird Observatory).

Species	**Total no. of birds caught**	**Number of first year birds**	**% first year**
Red-necked Stint - *Calidris ruficollis*	326	151	46%
Broad-billed Sandpiper - *Limicola falcinellus*	25	11	44%
Curlew Sandpiper - *C. ferruginea*	46	11	24%
Ruddy Turnstone - *Arenaria interpres*	20	4	20%
Red Knot - *C. canutus*	88	13	15%
Bar-tailed Godwit - *Limosa lapponica*	182	14	7.7%
Great Knot - *C. tenuirostris*	770	34	4.4%
Non-arctic northern migrants:			
Greater Sand Plover - *Charadrius leschenaultii*	182	60	33%
Black-tailed Godwit - *Limosa limosa*	40	0	0%

Table 2. Proportion of first year birds in wader catches in Victoria, SE Australia, mid November 1999 to mid March 2000 (data collected by the Victorian Wader Study Group).

Species	**Total no. of birds caught**	**Number of first year birds**	**% first year**
Red Knot	320	121	38%
Red-necked Stint	4901	1108	25%
Curlew Sandpiper	1338	305	23%
Ruddy Turnstone	118	25	21%
Bar-tailed Godwit	36	7	19%
Sanderling - *C. alba*	493	64	13%
Sharp-tailed Sandpiper - *C. acuminata*	244	25	10%
Great Knot	40	3	7.5%

COMMENTS ON RELATING BREEDING SUCCESS OF ARCTIC WADERS IN 1999 TO NUMBERS OF YOUNG BIRDS IN AUSTRALIA

Pavel S. Tomkovich & Mikhail Y. Soloviev

The data on percentages of first year birds in catches of arctic waders in Australia presented above by Clive Minton et al. could be a good addition to the information of respondents from Arctic breeding grounds if we know precisely links between all breeding and non-breeding wader populations. Unfortunately our knowledge on migrations still is far from being complete. This and some mixing of populations on their non-breeding grounds in some species makes inference from the observed figures difficult if possible at all. Some biases due to small samples and/or flocking behaviour at catching sites is also possible. Nevertheless, such data do give general impression on how good or bad was final breeding output in populations on the East Asian - Australasian flyway.

From the data in tables 1 & 2 in the note of the Australasian Wader Studies Group people it is obvious that three species had quite similar proportion of young birds in both samples, NW Australia and Victoria: Great Knot (4.4 & 7.5%), Ruddy Turnstone (20 & 21%) and Curlew Sandpiper (23 & 24%). This means that all birds of these species either had same breeding success in different parts of their breeding range within the flyway or birds originating from different areas mix well on non-breeding grounds. The latter explanation seems to be more realistic for the first two species which have extensive breeding ranges: the alpine and southerly one in Great Knot and mostly High Arctic one in Ruddy Turnstone. Nucleus of the eastern breeding population of Curlew Sandpiper lays in New Siberian Islands and on nearby mainland Siberia (Lappo 1996). In absence of direct observations in that arctic area Australian data suggest moderate to low predation rate there. Such conclusion is supported by moderate to high proportion of young birds in other High Arctic wader species which certainly or supposedly originate from that breeding area: Sanderling (13%), one of two Red Knot populations (15 & 38%) some of Ruddy Turnstone.

Some species had quite different percentages of first year birds in NW Australia and Victoria which could be a result of bird origin from different breeding populations or age segregation on non-breeding grounds. The higher proportion of young Bar-tailed Godwits in Victoria (19%) in comparison with NW Australia (7.7%) means that in this species Alaskan population had better breeding conditions than East Siberian one in 1999, according to the subspecies non-breeding segregation (Higgins & Davies, 1996). This also means that not everywhere or not all bird species in West Alaska had poor breeding season as it can be judged from the information available from the Yukon delta in 1999. The East Siberian Bar-tailed Godwits occupy mostly subarctic mires between the Yana River and Chaun Gulf overlapping to a large extent in breeding range with Sharp-tailed Sandpiper. Thus, it is

not surprising that the latter species is also characterised by rather low breeding output (10%). It is surprising indeed to see very high proportion of young birds in another species with rather similar breeding distribution, Broad-billed Sandpiper (44%), however, this could be a bias of small sample size.

Two samples of Red-necked Stint differ notably in percentage of first year birds: 25% in Victoria and 46% in NW Australia. According to hypothesis of Minton (1996) birds of these populations cross their ways on migration and as a result Victorian Red-necked Stints breed in western patch(es) of the breeding range, while birds from NW Australia are linked with eastern one in mountains of Chukotka. If this hypothesis is correct the latter population had more high breeding success in 1999 than birds in Taimyr and the Lena River delta.

In Red Knot birds from two breeding populations, New Siberian Islands and Chukotka, mix in unknown proportions in Australasia (Tomkovich & Riegen, submitted). The pattern of their distribution on non-breeding grounds is still to be described. Very high proportion of young birds in one sample (38%) may mean that many Victorian Red Knots breed in the same general area where from the most successful Red-necked Stints originate, e.g. from Chukotka mountain breeding grounds.

This is how the Australian situation looks like from the Arctic "point of view" on breeding conditions in 1999 and current understanding of bird distribution. Unfortunately the information we got about breeding conditions in East Siberian section of Arctic is far from desired to make reliable explanations. So we need more data from the Arctic.

References:

Higgins, P.J. & S.J.J.F. Davies 1996. Handbook of Australian, New Zealand & Antarctic Birds. Vol. 3: Snipe to Pigeons. Oxford Univ. Press, Melbourne.

Lappo, E.G. 1996. Comparisons of breeding range structure for Dunlin *Calidris alpina* and Curlew Sandpiper *Calidris ferruginea*: conservative and nomadic tundra waders. Wader Study Group Bull. 80: 41-46.

Minton, C.D.T. 1996. The Migration of the Red-necked Stint. The Stilt 29: 24-35.

Tomkovich, P.S. & A.C. Riegen. Submitted. Mixing of Red Knot populations in Australasia: some thoughts. The Stilt.

RECOMMENDED READIND ON ARCTIC BIRDS:

C. Zöckler, I. Lysenko. Water Birds on the Edge. First circumpolar assessment of climate change impact on Arctic Breeding Water Birds. World Conservation Monitoring Centre. March 2000. <http://www.wcmc.org.uk/climate/waterbirds/report.pdf>

MAP COLLECTION

A set of 4 maps below is provided to highlight various aspects of bird breeding conditions in the Arctic in 1999.

Each of the figures 1 and 2 represent overlay of the map layers reflecting two different kinds of information. The first one is the deviation of mean June/July temperature in 1999 from mean June/July temperature averaged for the period 1994-1999. This deviation indicates whether respective month in 1999 was warmer (positive value) or colder (negative value) than average. Colour of the points at study sites reflects subjective evaluation by respondents of the spring as being early, average, or late (Fig. 1), and the summer as warm, average or cold (Fig. 2). Please note, that also referring to roughly same period during the summer, the two kinds of information reflect essentially different phenomena that should not necessarily agree - for example spring could be early and cold. Temperature data were obtained from the National Climatic Data Center (USA, http://www.ncdc.noaa.gov/ol/climate/climateresources.html). Only stations with 26 or more daily records for a month were used for interpolation. Grid map was constructed using inverse distance interpolation in MapInfo Professional GIS software, with the following settings: cell size 50 km, search radius 500 km, exponent 1. The area covered by the grid includes the territory obtained from overlay of Arctic boundaries, as defined by CAFF and AMAP, plus additional 100-km buffer around.

Figures 3 and 4 illustrate rodent abundance and bird breeding success basically as these were reported by respondents. In some cases when respondents did not explicitly qualified breeding success or rodent abundance, but these were rather obvious from the other information supplied, the site was assigned to a respective category based on the judgement of compilers.

Base maps had been downloaded from GRID-Arendal's WEB site (http://www.grida.no/db/gis/prod/html/arctic), projection - Lambert Azimuthal Equal-Area.

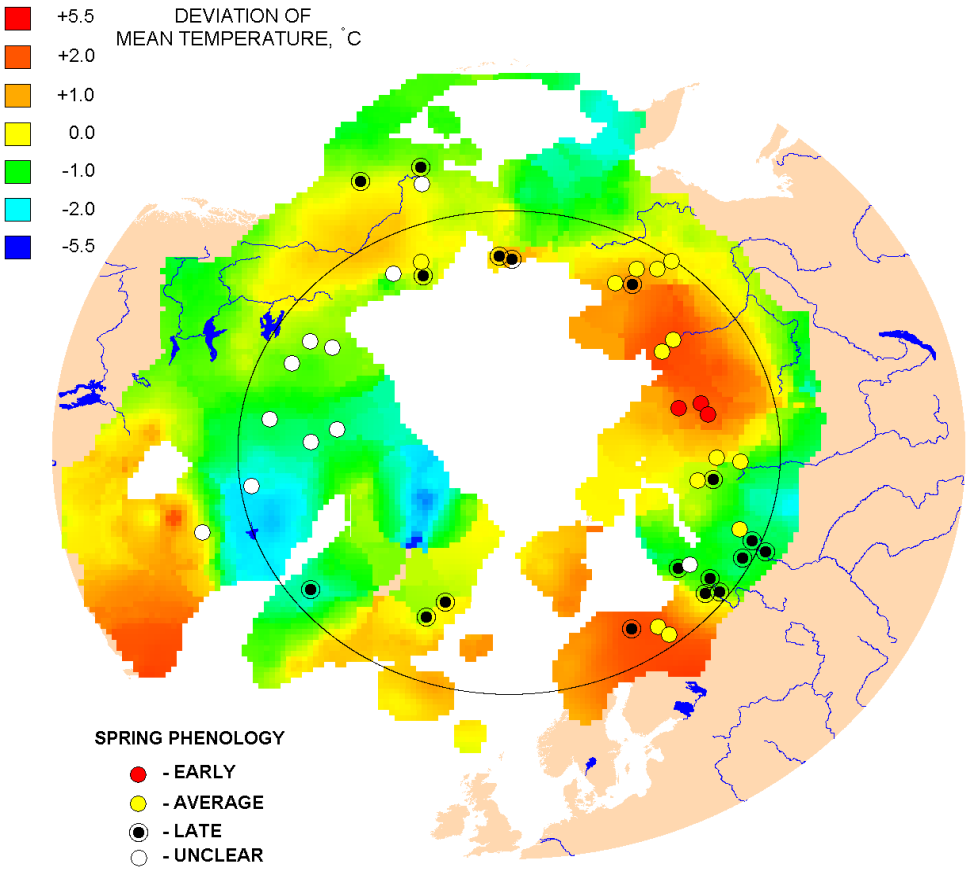

Figure 1. Temperature and phenological characteristics of early summer in the Arctic in 1999. See text above for extended legend.

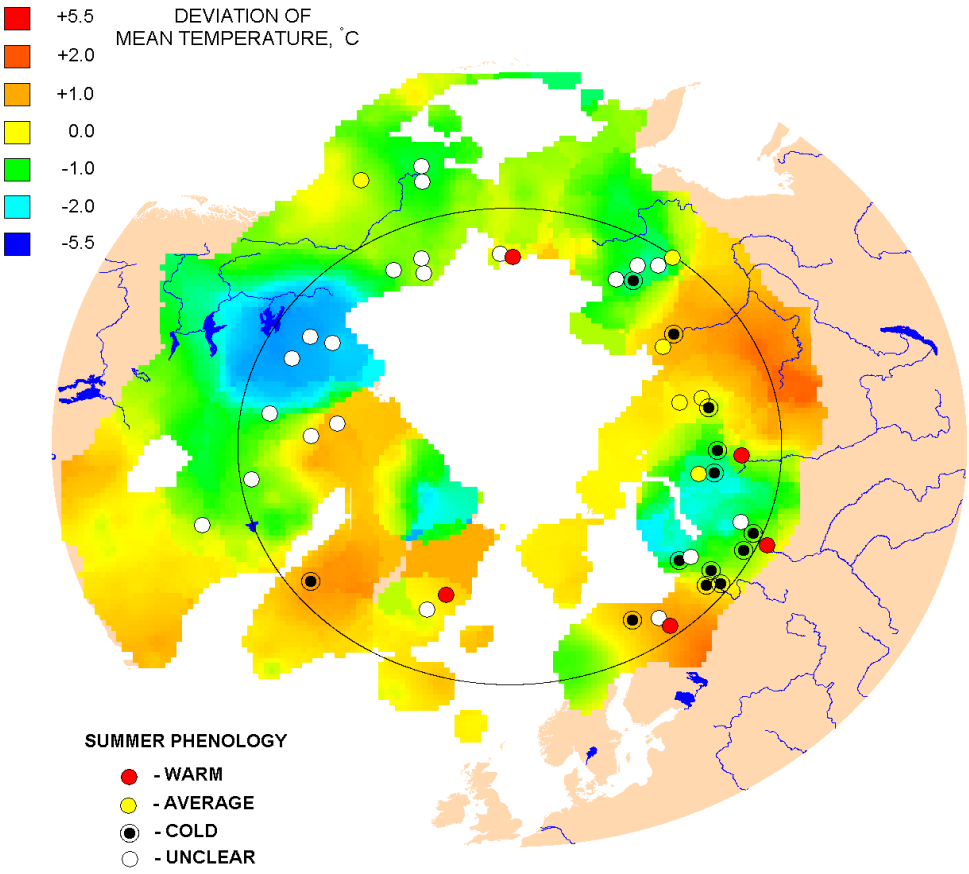

Figure 2. Temperature and phenological characteristics of mid summer in the Arctic in 1999. See text above for extended legend.

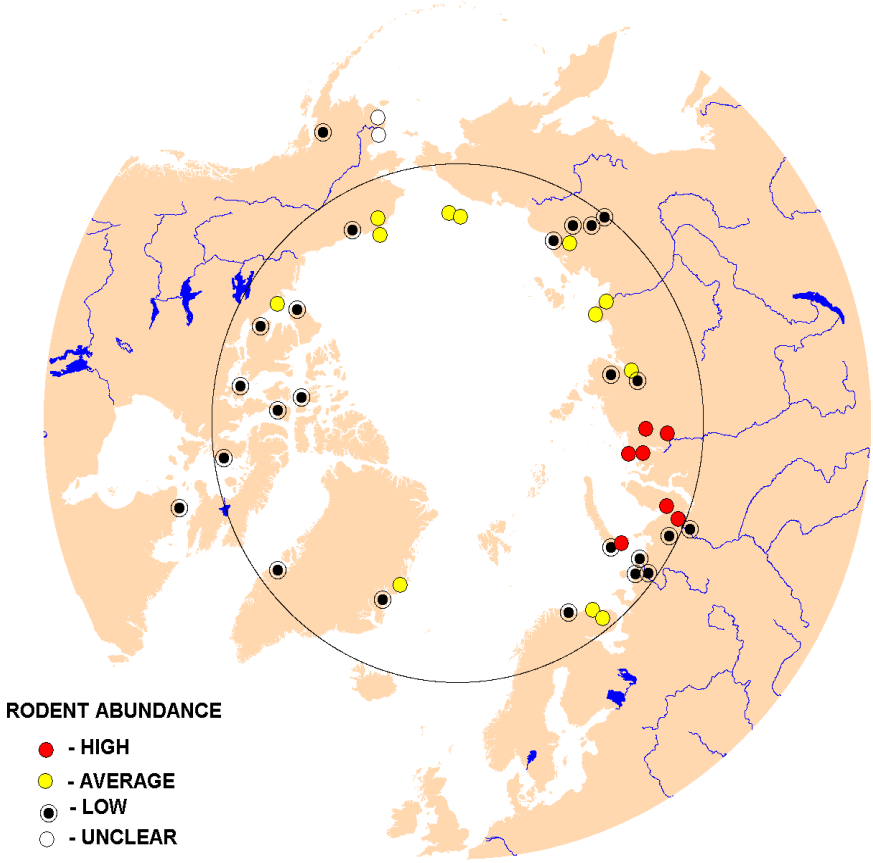

Figure 3. Rodent abundance in the Arctic in 1999.

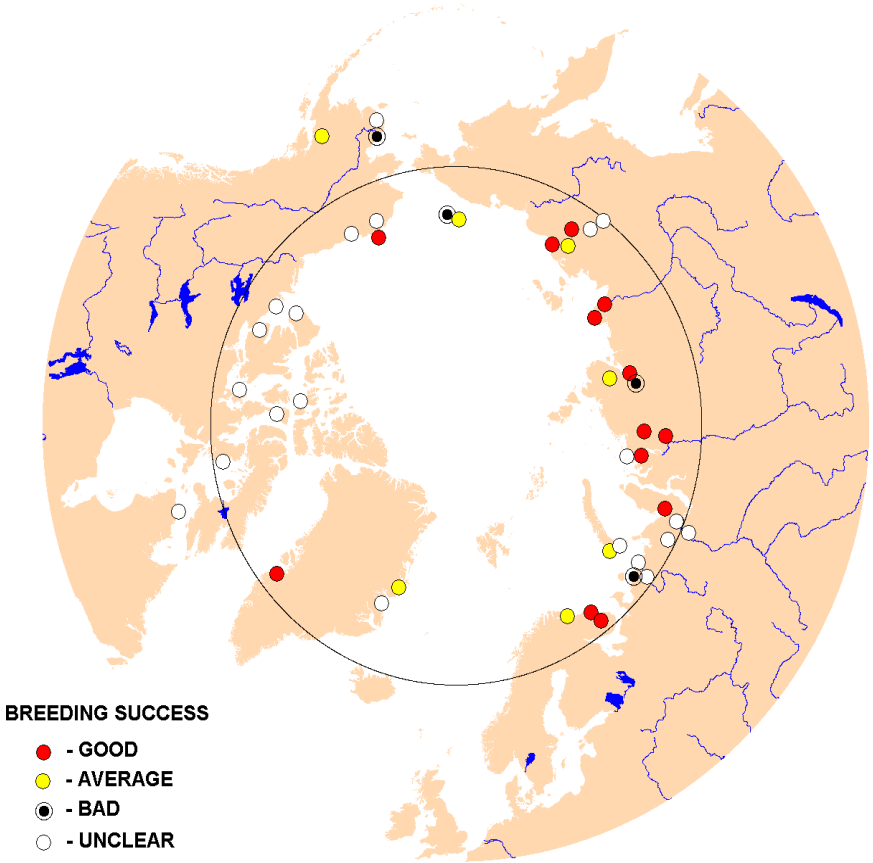

Figure 4. Bird breeding success in the Arctic in 1999.