Breeding conditions for waders in Russian tundras in 1992

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The wader breeding season in 1992 was surprisingly similar over the vast area from the European north to the Pacific Ocean. Populations of both lemming species were either decreasing, had reached a population low point, or were close to it by the beginning of summer; only on Wrangel island were lemming populations increasing. Additionally, low numbers or absence was recorded for voles: only in some areas were the latter common or even numerous. Arctic Foxes *Alopex lagopus* were common or numerous almost everywhere except southern Yamal and Severnaya Zemlya; a decrease in numbers, starting in July, was reported from several areas, although in most regions they did not breed. High predation rates (mostly by Arctic Foxes) on clutches of waders and other birds was observed everywhere. Weather conditions were also not favourable for wader breeding. The coincidence of bad weather conditions and high predation rates in spring and summer 1992 caused late and unsuccessful breeding of waders almost everywhere in Eurasian tundras. Specific estimates of wader nesting success ranged from 0% to 10%.

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Based on the forecast of lemming numbers and abundance of rodent-feeding predators it was predicted that in summer 1992, the mortality of wader clutches would be significant, with low, or at best moderate, breeding success over the major part of Eurasian tundras (Ryabitsev 1993). The data presented below were received from both previous and new respondents at locations shown in Figure 1. These reports characterize summer 1992 in terms of weather, numbers of lemmings and their predators, and, where possible, the breeding success of waders. These data verify the forecasts of the previous year, as well as giving an insight as to the peculiarities of wader migration in summer and autumn 1992.

1. KOLA PENINSULA - AYNOVY ISLES (WESTERN MURMAN)

Snow melted in April; the lake ice disappeared by 3 May, in contrast to the long-term average date of ice-melting of 23 May. Spring wader migration also started earlier than usual. Between 10-20 June the weather became cold, and the whole summer turned stormy, cold and wet. Such weather conditions probably caused significant mortality of both wader clutches and broods. Reproductive success of the few waders breeding on the Aynovy isles was very low. Autumn migration of Turnstone *Arenaria interpres*, Red-necked Phalarope *Phalaropus lobatus* and Knot *Calidris canutus* started much earlier this year than the long-term average. Although young birds migrated on the usual dates, their numbers were extremely low. For some species which juveniles, in this area, are usually rather numerous on migration, were either very few in number or completely absent (Little Stint *Calidris minuta*, Red-necked Phalarope and Curlew Sandpiper *Calidris ferruginea*).

I.P. Tatarinkova

2. MALOZEMELSKAYA TUNDRA - RUSSKY ZAVOROT PENINSULA

Spring was long. Although the snow cover was not great it melted slowly as the temperatures were rather low; in May extensive tundra areas were covered with water. The weather in June and the first week of July was unusually cold and windy. Air temperature ranged from 0° C to +10° C, and usually did not exceed 3° - 4° C; winds (mostly northern and western) often reached storm force. From the middle of July to the middle of August the weather was rather warm, and the temperature sometimes reached +20° C. After 10 August it became cooler again (+5° - +7° C). During the whole season there were few rainy days. All seasonal phenology was at least two weeks later than normal. Lemmings were not recorded at all, except for two found in an inhabited building on the coast. Numbers of Arctic Foxes *Alopex lagopus* were greater than in 1991: two or three animals could be observed simultaneously almost every day in July. We considered the breeding success of waders in the coastal tundra areas to have been low.

Yu.M. Schadilov

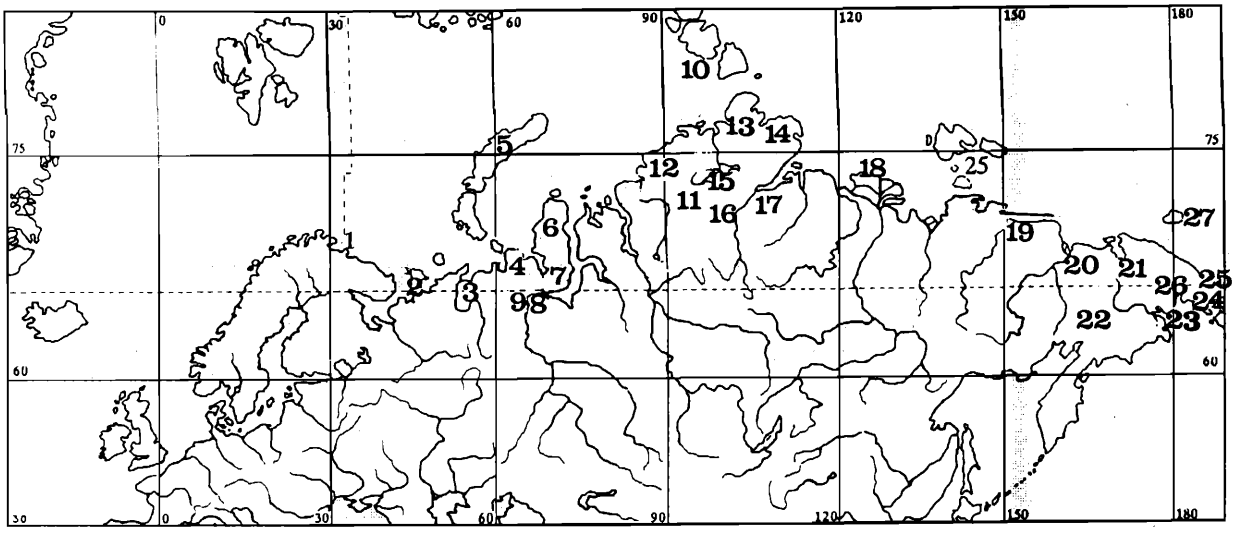


Figure 1. Location of study areas.

3. WESTERN PART OF BOLSHEZEMELSKAYA TUNDRA - SURROUNDINGS OF THE LAYATO LAKE AND THE SHAPKINOY RIVER (SOUTHERN TUNDRA SUBZONE)

Spring started later and was rather long: all phenological processes took place 2.5 weeks later than usual. Summer was cold and rainy with frequent frosts. Numbers of lemmings and Narrow-skulled Voles *Microtus gregalis* were declining close to population low points; other rodent species were already at population minima. The number of over-wintered Arctic Foxes was average; about 70% of dens were inhabited, although not all of these animals bred. Avian predators did not breed at all. In comparison to summer 1991 the diversity and abundance of waders was lower, and dates of breeding were much later. Overall reproductive success was probably low.

A.N. Petrov

4. EASTERN BOLSHEZEMELSKAYA TUNDRA (SOUTHERN AND TYPICAL TUNDRA SUBZONES)

Spring was generally late and prolonged, although in early May there were several warm days. Snowstorms and freezing temperatures were quite common even during the first ten days of June. All natural processes (except ice break-up) occurred 3-3.5 weeks later than usual. Summer and autumn was cold and wet with frequent prolonged rains and sometimes stormy north-westerly winds. The number of lemmings and voles was low and decreasing in spring, and reached a low point in summer. Abundance of Arctic Foxes was high especially around the Baidaratskaya Gulf of the Cara Sea, where single pairs were even breeding. In the rest of the region Arctic Foxes did not start breeding. Owls, Glaucous Gulls *Larus hyperboreus* and skuas *Stercorarius* spp. did not breed; the latter remained in flocks on the breeding grounds until mid-July and then departed. Rough-legged Buzzards *Buteo lagopus* did not breed in the typical tundra subzone; in southern tundras some pairs started nesting although none of them managed to rear young in natural landscapes. Successful reproduction was observed in southern tundras only for several pairs of Hen Harrier *Circus cyaneus*. As the conditions were unfavourable the number of breeding waders was lower than usual; significant clutch loss was observed for all species due to high predation rate. For example chicks hatched only in one of six nests of Whimbrel *Numenius phaeopus* under observation. Predation negatively influenced also ptarmigan *Lagopus* spp., waterfowl and Arctic Terns *Sterna paradisaea*. The breeding performance of waders was extremely low throughout the whole region, and waders were completely unsuccessful in the typical tundra subzone.

V.V. Morozov

5. NOVAYA ZEMLYA - WESTERN COASTS OF THE WHOLE ARCHIPELAGO

The timing of spring was normal. Summer was wet and cold, with frequent snows, and judging by the dates of nature development was also rather late. Lemming populations were at a low point: only one Siberian Lemming *Lemmus sibiricus* was recorded at Krestovaya Bay at the south of the northern island. Arctic Fox and Snowy Owl *Nyctea scandiaca* were common everywhere (2-3 Arctic Foxes were observed on each 10 km survey route), although did not breed. Skuas, especially Pomarine *Stercorarius pomarinus* and Long-tailed *S. longicaudus*, were numerous at the extreme south-west and at the north of Novaya Zemlya, as well as in some localities along the western coast. Breeding behaviour was recorded in Ringed Plover *Charadrius hiaticula*, Turnstone, Purple Sandpiper *Calidris maritima* at the south of the southern island. Reproductive performance of waders in many localities was close to completely unsuccessful. The low species diversity and abundance of waders in comparison with the 1988 and 1990 breeding seasons was striking at the south of Novaya Zemlya.

V.N. Kalyakin & I.V. Pokrovskaya

6. NORTHERN YAMAL - "YAYBARI" FIELD STATION (71° 04' N, 72° 20' E)

Spring was exceptionally late and cold. Snow-free patches, covering in total 10-15% of the area, appeared only by 17 June; snowstorms (when the ground became completely covered with snow again) continued until 22 June. Snow melted on about 80% of the area only at the beginning of July with the ice breaking up by 28 June. Birds arrived late, nevertheless the breeding population of waders was rather typical for the area. Those species, which were rare in the previous years (Ruffs *Philomachus pugnax*, probably Turnstones and Curlew Sandpipers) were either not breeding, or probably did not breed (the two latter species). Mass mortality of lemmings, which were abundant the year before, took place in winter. In spring their corpses, which melted out from under the snow served as a main food for numerous Arctic Foxes, Common Weasels *Mustela erminea* and nomadic skuas. All these predators switched to feeding on bird clutches later. Chicks hatched from only 13 of 62 wader nests, and mostly in those nests which were under protection of our field camp. Late in July only single fledged Little and Temminck's Stint *Calidris temminckii* young were observed Thus, the breeding performance of all wader species was close to being totally unsuccessful.

V.K. Ryabitsev, V.M. Popenko, K.V. Ryabitsev, V.V. Tarasov, J.F. Dempster, R.M. McGregor, K.J. O'Kein & J. Eibell

7. MIDDLE YAMAL - "HANOVEY" FIELD STATION (68° 40' N, 72° 52' E)

Spring was also very late. Heavy snowfalls occurred in the first ten days of June and until mid-June air temperature only rarely exceeded 2° C. At the Nurma river ice broke up by 17 June. The earliest wader nests (Temminck's Stint, Wood Sandpiper *Tringa glareola* and Ruff) with incomplete clutches were found in the last ten days of June, and in the majority of nests clutches were completed only in early July. Probably only a small proportion of waders started to breed. High breeding densities were recorded in Common Snipe *Gallinago gallinago* (seven nests found on 4.5 km^2), and in Jack Snipe *Lymnocryptes minimus* (five to seven pairs on 4.5 km^2; two nests found); breeding was recorded for Pectoral Sandpiper *Calidris melanotos*. No nests were found in Little Stint. Rough-legged Buzzards and Snowy Owls (which were abundant in spring) did not breed owing to mass mortality of lemmings. During the whole summer the number of Arctic Foxes and skuas was large. Thus, high predation rate together with severe weather negatively influenced the breeding of all birds including waders. Chicks hatched only in three out of 32 wader nests located.

E.A. Polents & Yu.A. Tyul'kin

8. SOUTHERN YAMAL - THE SCHUCHYA RIVER BASIN

Spring was very cold and late. Although by May the rivers were already free of ice, later decreases in temperature delayed lake ice break-up for 10-12 days (occurring after 20 June) than in usual years. Plant growth was also two to three weeks later and birds started breeding seven to ten days later than usual. Lemmings were absent, Arctic Foxes were rare (one record during almost one month). Breeding was observed only in a few Rough-legged Buzzards: three pairs were found along 180 km of river. The abundance of most waders was similar to previous years; but Bar-tailed Godwits *Limosa lapponica* mostly did not breed as they were moving from one place to another in groups of three to ten birds. The number of Spotted Redshank *Tringa erythropus* was larger than usual, while Red-necked Phalaropes were surprisingly scarce.

S.A. Mechnikova

9. SURROUNDINGS OF SALEKHARD TOWN

The first half of May was comparatively warm and the first waders arrived rather early: Wood Sandpiper was observed on 17 May and Whimbrel on 18 May. However, in the second half of May the weather became cooler, causing a prolongation of wader migration. June was cold with freezing temperatures in the middle of the month and snowfalls until 20 June, consequrently death of passerine birds from starvation was recorded. The number of rodents was lower than average and lemmings were completely absent from the area.

S.P. Paskhalny

10. BOLSHEVIK ISLAND (SEVERNAYA ZEMLYA) - CHELUSKIN PENINSULA (NORTHERN TAIMYR)

Spring was late. This probably caused the absence of Brent Geese *Branta bernicla* broods and the large proportion of non-breeding pairs in Glaucous Gulls. Air temperature after 10 June was similar to long-term averages. Between 1-10 August it snowed, with snow cover remaining for two days. Lemming numbers at the Bolshevik island were as low as in 1991: lemmings were not seen at all although winter nests and several inhabited holes were found. At the Cheluskin peninsula lemming abundance was evidently greater, as several very local areas were found which were regularly visited by Arctic Foxes. The number of the latter at Bolshevik island was low. Breeding of Purple Sandpipers at Bolshevik island was considered successful although hatching took place during a shorter period than in 1991. On this island a few breeding Sanderlings *Calidris alba* were recorded as well.

A.E. Volkov & J. de Corte

11. TAIMYR PENINSULA

After a long period with warm weather in May it became cooler and the dates of phenological events were generally two weeks later than usual. This influenced the numbers of lemmings: they were numerous in winter and but had almost disappeared by July. The number of Arctic Foxes remained at average levels, but during the summer a significant proportion of them died from rabies; almost no dens were occupied. During aerial surveys in July over the Central and Western Taimyr (typical tundras) no breeding colonies of Herring Gulls *Larus argentatus* were recorded, and observations of Snowy Owls, skuas and Rough-legged Buzzards were extremely rare. Broods of waterfowl were recorded only rarely. In general this breeding season resembled that of 1989. In the area 100 km to the north from Norilsk breeding behaviour was observed in July only in Pacific Golden Plovers *Pluvialis fulva* (2 pairs per 9 km survey route) and in several passerine birds. According to G.D. Yakushkin's observations at the Bikada river (eastern Taimyr), waders were almost absent in tundras in July and August; only one brood of Snowy Owl was recorded.

Ya.I. Kokorev

12. PYASINA RIVER DELTA - NORTH-WESTERN TAIMYR

Spring was unusually late following a very snowy winter. Freezing temperatures prevailed in June, and early snow-free patches became repeatedly covered with new snow. Snow along the streams became filled with water in the last five days of June, and even in early July 80% of the tundra area was still under snow. When the snow started to melt lemmings became visible; *Lemmus sibiricus* and *Dycrostonix torquatus* were recorded in equal ratio, their number was slightly lower than average. Arctic Foxes were very numerous (ca. 10 animals were observed every day) and did not breed; several dead individuals were found. In July their number slightly decreased. Waders arrived late and many of them probably could not start breeding as most of the tundra was still under the snow. It seemed that those birds which started breeding lost their clutches rather quickly due to Arctic Fox predation: thus, only one wader nest was found (Curlew Sandpiper) in the study area.

A.A. Moroz

13. NORTH OF CENTRAL TAIMYR - KNIPOVICH BAY (ARCTIC TUNDRAS)

Cold weather in June, following a snowy winter, resulted in a two week delay to the seasonal phenology. Average daily temperature exceeded 0° C only on 23 June and water in creeks started to run only on 28 June. Waders started to breed later (first complete clutches appeared only in early July), and their nesting density was very low. Many male Grey Plover *Pluvialis squatarola*, Curlew Sandpiper and Knot remained unpaired. Summer was cold, windy and with frequent precipitation (in July snowfalls were recorded on nine days); only in late July - early August were there periods of warm weather. Late in June the abundance of Siberian and Collared Lemming on snow-free patches was average, and as the snow melted the corpses of dead animals frequently emerged. Through the summer lemming populations were decreasing and young of the year were not recorded at all. Arctic Foxes were rather numerous (recorded every day). They regularly surveyed the tundra in search of food, predating bird clutches. Snowy Owls, Pomarine and Parasitic *Stercorarius parasiticus* Skuas did not breed. As the predation rate was high, no broods were observed in Grey Plover, Pacific Golden Plover, Knot, Curlew Sandpiper and Sanderling. Chicks hatched only from few nests of Little Stint (incubation success 8.6%) and Turnstone. As the birds which lost their clutches departed early, only few waders remained in study areas by the end of July.

P.S. Tomkovich, M.Yu. Soloviev & G.Th. de Roos

14. NORTH-EASTERN TAIMYR - PRONCHISCHEVA LAKE (SOUTH OF ARCTIC TUNDRAS)

Spring started almost three weeks later than in the previous year and summer was cold. Numbers of both lemming species were average late in June at the snow-free patches (75-78 ind./ha), decreasing later (32 ind./ha in optimal habitats by 20 July). Arctic Foxes were numerous but did not occupy dens. No nests were recorded in Snowy Owls and Pomarine Skuas. All the early clutches of waders, and the majority of later ones were destroyed by predators: less than 10% of found nests survived until hatching.

A. Rybkin, M. Mel'nikov, H. Speakman & N. Groen

15. CENTRAL TAIMYR - SOUTH-WESTERN SHORE OF THE TAIMYR LAKE

Few broods of gulls, waders and passerine birds were recorded in the second half of summer. Numbers of lemmings and Arctic Foxes were extremely low, although one family of Arctic Fox with young was found.

A. Rybkin

16. SOUTHERN TAIMYR - TONSKOYE LAKE (NEAR LABAZ LAKE)

Early June was very cold with frequent snowfalls. The first snow-free patches appeared only on 9-10 June and intense snow-melt started only after 18 June. Water in creeks started to run and the major part of the tundra became free of snow by 21 June. Later, the weather was warm and sunny only between 10-20 July, while at other

times cold foggy weather with rains prevailed. Air temperature in July ranged from 0° C to +24° C, and averaged in +8.3° C. Snow fell on 28 July. Lemming numbers were very low (only two Siberian Lemmings were recorded); Arctic Foxes were numerous but did not occupy the dens. Snowy Owl, Rough-legged Buzzard and Long-tailed Skua did not breed. Waders started to nest late: egg-laying started on 24-25 June and for the majority of nests was completed by 3 July. Breeding success was very low: out of 69 nests of different wader species (on the 12 km^2 study area) only two nests of Red-necked Phalarope survived until hatching. Single broods of Little Stint, Dunlin *Calidris alpina* and Curlew Sandpiper were found also, as well as several broods of Temminck's Stint which were nesting on small islets.

V. Karpov, T. Sviridova, D. Frohlich, E. Syroechkovsky Jr. & F. Romanenko

17. LOWER REACHES OF THE KHATANGA RIVER (RIGHT BANK)

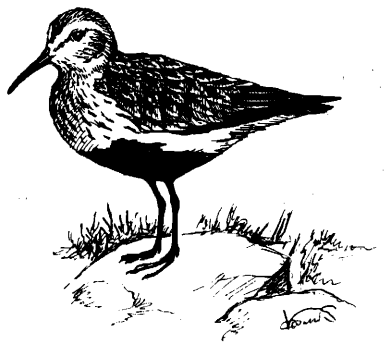
Spring was late and cold. Average daily temperatures exceeded 0° C on 10 June. Snow cover started to disappear only on 17 June. Spring river floods passed rapidly and the water level was high. The summer was generally cold, especially in June, while August was relatively warm. Only one Lemming was observed during the whole season. Single Arctic Foxes were recorded rather frequently, but no inhabited dens were found. Rodent-feeding birds did not breed. Among waders single nests were found only in Golden Plover *Pluvialis apricaria* and Common Snipe *Gallinago gallinago*. Bar-tailed Godwits were almost absent, while in 1989 their number in the same area was very large. For all birds breeding conditions were extremely unfavourable.

A.A. Gavrilov

18. THE LENA DELTA

Spring was prolonged and summer was cold. Populations of both lemming species were at a population low point. Abundance of Arctic Foxes was average.

S.V. Larionov



19. THE STANOVAYA RIVER - KOLYMSKAYA LOWLAND

Spring was late, and the summer was cold. Populations of both lemming species were at population minima, while that of Narrow-skulled Vole reached peak numbers.

E.G. Vladimirskaya

20. LOWER KOLYMA REGION - YAKUTIA

In montane and coastal tundras the weather during the breeding season was cold. Between 10-30 July, midday air temperatures ranged between 0° C and +12° C. Numbers of lemmings were low and Snowy Owls bred only occasionally. The number of many avian predators was low: that of Pomarine Skua being extremely low. Abundance of Arctic Foxes was average. Numbers of Temminck's Stints and Grey Phalaropes *Phalaropus fulicarius* were large, although predation of their nests by Herring Gulls, Long-tailed and Parasitic Skuas was recorded. Although conditions were generally unfavourable, at least partially successful breeding was were observed in Great Knot *Calidris tenuirostris*, Dotterel *Eudromias morinellus*, Wood Sandpiper, Little Curlew *Numenius minutus*, Spotted Redshank, Little Stint, Sharp-tailed Sandpiper *Calidris acuminata*, Pectoral Sandpiper, Temminck's Stint, Dunlin and Grey Phalarope.

S.I. Mochalov

21. BILIBINO REGION (WESTERN INLAND CHUKOTKA)

In the mountains the depth of snow was about average, but as spring was rather cold all natural events took place 10-15 days later than usual. The floods at rivers were prolonged and the water table that time was below average levels. July air temperatures were about average, precipitation was less than usual with no snowfalls. August was cold and windy with frequent snow. The crop of berries was low and they mostly did not ripen. Numbers of small rodents were average. Successful Rough-legged Buzzard breeding was observed in montane areas. Wader breeding conditions were unfavourable, and reproductive performance was very low especially in Bar-tailed Godwit, Wood Sandpiper, Ringed Plover and Ruff.

A.I. Artyukhov & S.V. Zagoskin

22. UPPER REACHES OF ANADYR' RIVER (AREA OF BALAGANCHIK RIVER)

Spring was late, prolonged, and with rather little snow. Summer was cold. Populations of all small rodents and of

mouse-hares *Ochotona* spp. were at a population low point.

V.G. Krivosheev

23. THE ANADYR' ESTUARY (SOUTHERN COAST)

In the tundras spring was frosty and lacked snow: snow cover disappeared almost completely in the last ten days of May. The weather in summer was typical for this area. Lemmings' populations were very low indeed: even traces of their winter presence were not recorded. Northern Redbacked Voles *Clethrionomys glareolus* were quite numerous in the narrow belts of alder forests along the rivers. Large numbers of Short-eared Owls *Asio flammeus* and migrating Rough-legged Buzzards stayed along the rivers in early June. Arctic Foxes, which did not breed, were very numerous; they destroyed wildfowl and wader nests (and even colonies of Herring Gulls) and then left the area in early July. Although many waders were seen at the start of breeding, only a few broods were recorded. The most spectacular difference between numbers of displaying birds and broods found was in Dunlin. Slightly better was the breeding performance of some sporadic species, such as Ruff, Long-billed Dowitcher *Limnodromus scolopaceus* and Temminck's Stint.

A.V. Kondratiev

24. EASTERN CHUKOTKA - SURROUNDINGS OF ANADYR' TOWN, PROVIDENIYA SETTLEMENT, GEKA LAND, LOWER AVTATKUUL' RIVER, PUOTEN RIVER, AND YTTYGRAN ISLAND

Spring was early and lacked snow. The weather in early summer was cold. Populations of both lemming species were at lowest levels and low numbers of voles were also recorded (first of all in Root Vole *Microtus oeconomus*). As predation by Arctic Foxes increased, wader breeding performance was almost completely unsuccessful.

I.V. Dorogoi

25. NORTH-EASTERN CHUKOTKA PENINSULA - SURROUNDINGS OF LAVRENTIYA SETTLEMENT AND THE CHEGITUN RIVER BASIN

Weather conditions, like in 1991, were characterized by lack of precipitation and slightly higher than average air temperatures. As a result the upper layer of soil and plant litter became dry, and numerous small creeks and ponds dried out. Lemmings were almost absent while voles and shrews *Sorex* spp. were quite common. Arctic Foxes were rare in the Chegitun river basin. In August waders were recorded in inland tundras only occasionally.

A.N. Romanov

26. SURROUNDINGS OF UELEN - EASTERN CHUKOTKA PENINSULA

Summer was very warm and dry. Therefore tundra areas in August were extremely dry and a good crop of berries ripened. The number of rodents was low and birds of prey were not recorded at all. Snowy Owls were present, although did not breed. The number of Dunlins, Rock Sandpiper *Calidris ptilocnemis* and Pacific Golden Plover was nearly average, while in other species it was much lower than usual.

A.B. Savinetsky

27. WRANGEL ISLAND

Spring was cold and started two weeks later than in several previous years. Lemming populations were increasing after the 1991 population low point, but some declines occurred again in mid-summer. Arctic Foxes and Snowy Owls bred locally, probably only in areas with higher density of lemmings. Similar patchy distribution was typical for waders as well, most obviously in Knot. Nests and broods were found in all numerous wader species, which had average numbers. This season was characterized by early autumn frosts (snow cover already existed by the beginning of September), and this influenced negatively the breeding success of some bird species (for example of Snow Geese *Chen caerulescens*). Such conditions probably influenced some wader species as well.

V.V. Baraniuk & M.S. Stishov

CONCLUSION

Analysis of the above data has revealed that the situation was surprisingly similar over a vast area from the European north to the Pacific Ocean. Populations of both lemming species were either decreasing (the northern Taimyr) or had reached a population low point (or close to it) by the beginning of this summer (Malozemelskaya and Bolshezemelskaya tundras, Novaya Zemlya, Yamal,

Central and Southern Taimyr, the Lena delta, the lower Kolyma, and Chukotka). Only on Wrangel island were lemming populations increasing. Additional to the low abundance of lemmings, low numbers or absence was recorded also for voles, and only in some areas were the latter common or even numerous (the Kolyma lowland, Bilibino region, the Anadyr' estuary, and the Chegitun river at Chukotka).

Arctic Foxes were common or numerous almost everywhere except in southern Yamal and Severnaya Zemlya. Decreases in numbers starting from July were reported from several areas (Malozemelskaya tundra, the Pyasina river mouth at the Taimyr and the Anadyr' estuary); low numbers of Arctic Foxes at the Central Taimyr and in the Chegitun river basin (Chukotka peninsula) probably also resulted from the departure of these animals. In the majority of areas Arctic Foxes did not breed. Single instances of breeding were reported for the Baidaratskaya Bay in Bolshezemelskaya tundra and for the Taimyr. More regularly Arctic Foxes bred at the western part of Bolshezemelskaya tundra and on Wrangel island. Among those birds specializing on rodents, only Snowy Owls were breeding in low numbers on Wrangel island, *i.e.* in the only area where lemming numbers were increasing. A single breeding record of Snowy Owl was reported for the inner parts of Eastern Taimyr.

High predation rates (mostly by Arctic Foxes) on clutches of waders and other birds was observed everywhere. Estimates of breeding success in waders ranged from 0% to 10%.

Weather conditions were also not favourable for breeding. Spring was late almost everywhere, and the summer development of flora and fauna was two or three weeks later than usual. At the northern Taimyr the situation was even worse due to deep snow cover, while near Anadyr' town and on the Chukotka peninsula there were unusually few snowfalls. In most areas summer was cold and rainy, in places even with snow. Typical summer weather was observed only at Severnaya Zemlya, in the Anadyr' estuary and on Wrangel island; the summer was warm only in Malozemelskaya tundra and near Uelen settlement at the eastern Chukotka. There was extremely dry weather at the Chukotka as in the previous year. Such weather conditions influenced waders differently. Firstly, in many areas the number of waders was lower than usual, and coincided with partial non-breeding. Secondly, some wader species were recorded in unusual areas: for example, breeding Pectoral Sandpipers appeared on the Yamal, Curlew Sandpipers and Little Stints at the southern Taimyr, and Sanderlings were nesting at the Bolshevik island. Finally, the drought on the Chukotka peninsula possibly caused a reduction of food available for waders on their breeding grounds.

It is obvious, that the coincidence of bad weather conditions and high predation rate in spring and summer 1992 determined late and unsuccessful breeding of waders almost everywhere through Eurasian tundras, and birds were evidently short of time to replace lost clutches. Therefore it is not surprising that only few young arctic waders arrived on wintering grounds in north-western Australia, although usually juveniles form a large proportion of wintering birds (C. Minton, pers. comm.). This summer was probably unique in that unfavourable conditions were observed uniformly over so large an area.

As the area with low levels of lemming populations is extremely large, it will probably cause movements and mass mortality of Arctic Foxes in winter. This will lead to a decrease in predation rates in 1993. Therefore, if the weather is good enough, we can expect successful breeding of tundra waders in Eurasia during summer 1993.

REFERENCE

Ryabitsev, V.K. 1993. Breeding conditions for waders in the tundras of Russia in 1991. *Wader Study Group Bull.* 71: 20-25.