Breeding conditions for waders in Russian tundras in 1994

P.S. Tomkovich

Tomkovich, P.S. 1998. Breeding conditions for waders in Russian tundras in 1994. *International Wader Studies* 10: 132-144. (Reprinted, with corrections, from *Wader Study Group Bull.* 79: 71-81.)

Correspondents for almost all of the 55 areas of the Russian arctic from Kola to the Chukotka Peninsula reported a late spring with cool but generally favourable weather conditions for breeding waders. The prediction of a peak in lemming numbers in some regions of Siberia was confirmed. Some regions were inhabited by breeding Arctic Foxes *Alopex lagopus*, Snowy Owl *Nyctea scandiaca* and skuas *Stercorarius* spp. at high densities. However, the decline of lemming numbers in many areas early in the season was the reason for predators switching from lemmings to bird clutches and chicks. In general, this led to a lower breeding success of waders than was expected. It is predicted that large numbers of predators and low numbers of lemmings in 1995 will mean low to moderate breeding success of waders.

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Томкович, П. С. 1998. Условия размножения куликов в тундрах России в 1994 году. *International Wader Studies* 10: 132-144. (Статья перепечатана с исправлениями из журнала *Wader Study Group Bull.* 79: 71-81.)

По сообщениям корреспондентов почти изо всех 55 районов наблюдений Российской Арктики, от Кольского п-ва до Чукотки, весна оказалась затяжной с прохладными но в основном благоприятными условиями для размножающихся куликов. Прогноз о пике численности леммингов в ряде регионов Сибири оправдался. В некоторых регионах обитали с высокой плотностью размножающиеся песцы *Alopex lagopus*, белая сова *Nyctea scandiaca* и поморники *Stercorarius* spp.. Однако, из-за снижения обилия леммингов, происходящего во многих районах в начале сезона, хищники переключились в питании с грызунов на кладки и птенцов птиц. В основном, это привело к более низкому размножению куликов, чем ожидалось. Можно сделать прогноз о том, что на фоне высокой численности хищников и преимущественно низкого обилия леммингов в 1995 г., успех размножения куликов будет низким или средним.

Introduction

The now annual reviews of breeding conditions for waders in Russian tundras have attracted the attention of specialists both in the countries of the CIS and more widely. Indeed, discussions have been held as to the feasibility of establishing a circumpolar network for the collection and analysis of such data. This information is important not only for understanding wader population dynamics, but also for forecasting the situation for the next season on the basis of the previous year.

The increase of lemming numbers recorded in 1993 indicated that peak numbers would occur in 1994 in at least several regions of the arctic. This was predicted to result in reduced predation on waders and thus high breeding success. That was the forecast made for 1994 (*WSG Bulletin* 75: 27-34). Below we discuss what actually was observed.

A large part of the data for this year was collected by the joint Russian/Swedish expedition "Tundra Ecology 1994" which visited 17 areas of the Russian arctic.

At each site four groups worked closely together. The sites located in the area from Kola Peninsula to the eastern Taimyr were surveyed twice, with the remainder surveyed once. Valuable data on the abundance of rodents and predators were collated by A. Bublichenko, E. Isaksson and M. Tannefeldt. All the accounts which were based on the material of the "Tundra Ecology 1994" expedition were prepared by E.G. Lappo and E.E. Syroechkovsky Jr., and thus their names are given as authors.

1. Aynovy Isles and the Murman coast

Spring started early with snow disappearing in late April - early May, but steady cool weather with intense rain and snowfalls occurred in the last third of May. This weather continued through the whole

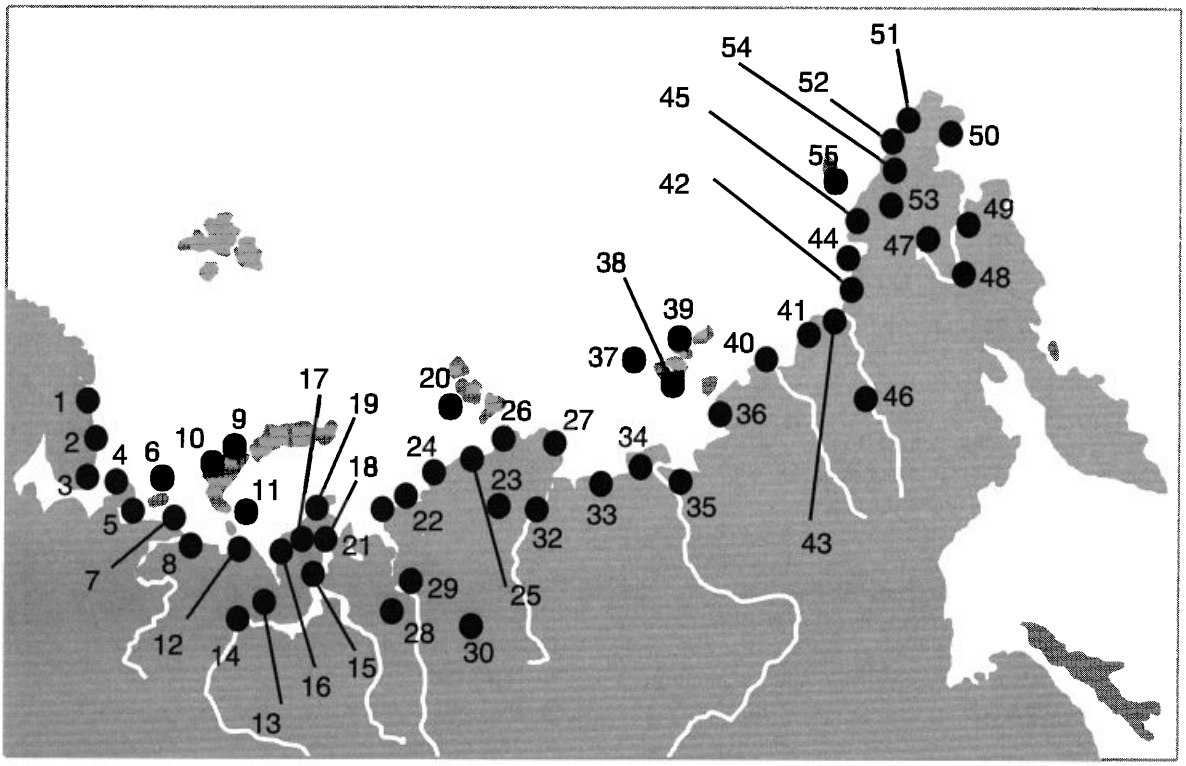

Figure 1. Study sites mentioned in the text.

of June and the first half of July. Therefore, wader breeding was late at the islands, and mortality of young broods was observed. Autumn migration of adults and juveniles occurred later than usual, and was noticeably prolonged. The abundance of some species such as Dunlin *Calidris alpina* and Turnstone *Arenaria interpres* was a bit lower than usual, whilst for others, such as Ruff *Philomachus pugnax* and Little Stint *Calidris minuta*, it was much lower than usual. Reports from the Murman coast indicate that lemmings and other small rodents were also recorded in low numbers.

I.P. Tatarinkova

2. Sem Ostrovov islands and Murman coast

Spring was three to four weeks later than usual, and both spring and summer were cold. At Sem Ostrovov an average number of Norwegian Lemming *Lemmus norvegicus* was recorded. At the Gavrilovskiye Islands average numbers of voles were observed, whilst on the mainland, rodents were still absent. Numbers of Arctic Foxes *Alopex lagopus* were low and Red Foxes *Vulpes vulpes* were common.

Yu.V. Krasnov

3. Eastern coast of the Kola peninsula (between the Ponoy and Kachkovka river mouths)

Spring was rather late. Although by 10 June approximately 80% of the tundra was free from snow, many waders were still only laying eggs. Some Golden Plover *Pluvialis apricaria* nests had incomplete clutches and many territorial birds obviously did not yet have nests. Lemmings were absent, few Common Voles *Microtus arvalis* and shrews *Sorex* spp. were caught. Skuas were not recorded. Rough-legged Buzzards *Buteo lagopus* bred in low numbers and several nomadic Snowy Owls *Nyctea scandiaca* were observed. Numbers of Arctic Foxes were also low, only one inhabited den was found late in August. Breeding success of waders was thought to be rather high.

E.E. Syroechkovsky jr. & E.G. Lappo

4a. North-western part of Kanin Peninsula

The first significant warming happened unusually early (3 April), but spring in general was cold and late. By 31 May partial snow-cover still remained at the coastal areas, snow disappeared by 2-4 June. Ice broke up in the lower reaches of rivers on 5-7 June. On the lakes, ice had melted by 10 June. A similar pattern was observed in placor tundras approximately one week later. In summary, phenological events were only five to seven days later than usual. The weather in summer was moderate without sharp temperature drops or hot days, but rather dry and windy. Lemming numbers were moderately high and voles had very high numbers. Arctic Foxes (as reported by local people) were common in winter, although less so in summer. Rough-legged Buzzards had average numbers at the placor tundras but were absent at the coasts.

Numbers of Long-tailed *Stercorarius longicaudus* and Arctic *S. parasiticus* Skuas were low, and large gulls were less abundant than on average, with most not breeding. Mass breeding was recorded in Little Stint. On 22-25 June coastal areas were flooded during extremely high tides, as a result of which many wader nests were destroyed. Some birds laid replacement clutches later. The success of surviving nests was average.

V.O. Avdanin & M.V. Glukhovsky

4b. North-western part of Kanin Peninsula (Torna river valley and coastal areas between Torna and Mesna rivers)

This season was unusual due to a late spring, with snow melting only in the first days of June; very low temperatures; very small amount of precipitation - even the local old people did not remember such a low water table in the lakes in previous years; high tides on 23-25 June which coincided with strong north-westerly storm winds which flooded all the coastal areas on 25 June. By June all the common waders except Red-necked Phalarope *Phalaropus lobatus* (which had arrived by 2 June) were already present on the breeding areas. Egg-laying occurred rather synchronously from 1-15 June. After nests were flooded on 25 June, several pairs of Oystercatcher *Haematopus ostralegus*, Dunlin and Little Stint laid new clutches. On this date only fresh clutches of Little and Temmincks Stint *Calidris temminckii* remained. In general, flooding negatively affected breeding success of all waders, and also of Terek Sandpiper *Xenus cinereus* and Ringed Plover *Charadrius hiaticula*, which breed on these coastal parts.

However, those bird species which breed in tundras and dunes, as well as those non-coastal waders that breed inland, had high breeding success. Hatching was synchronous, and broods remained large. Lemming numbers were high. Numbers of Glaucous *Larus hyperboreus* and Eastern Herring *Larus heuglini* Gulls were ten times lower than in 1993.

V.G. Vinogradov

5. North-eastern coast of Kanin Peninsula (from Padley river to Mikulkin point)

Spring was late, but waders were already breeding by 12 June. No signs of lemmings were observed in June and only one animal was caught in late August. Root Voles *Microtus oeconomus* were numerous. Long-tailed Skuas and Rough-legged Buzzards bred in single pairs, the latter had minimal clutch size. Territorial pairs were recorded in Peregrine Falcon *Falco peregrinus* and Gyrfalcon *F. rusticollis*, while Snowy Owls were observed only on migration. Arctic Foxes probably did not breed as only one empty den was found and no animals were recorded. Waders, however, probably bred rather successfully.

E.E. Syroechkovsky Jr. & E.G. Lappo

6. Kolguev island (southern and eastern coasts, central parts in the Peschanka river basin)

According to reports of local people, the usual weather conditions prevailed except that spring was about ten days late. Lemmings and voles are never found on the island. It was reported locally that Snowy Owls bred occasionally on the island and Rough-legged Buzzards were numerous and fed mainly on Willow Grouse *Lagopus lagopus* and other birds. In 1994, neither owls nor buzzards or skuas were recorded breeding. However, the local Nentsens people reported that they found several nests of Rough-legged Buzzard in the south-western part of the island. No occupied Arctic Fox dens were noted, although one pup was seen at the settlement. Red Foxes bred on the island also. Both these species fed on grouse, geese, other birds and their clutches, and also on items on the strandline. The latter provides staple food for these animals in winter (ice appears at the coasts only for a short time), which ensures stability of their population during this season.

Breeding waders were recorded in mid-June. At the south-eastern lowlands of the island, high Dunlin breeding densities were recorded. Judging by indirect data obtained in August, waders and geese were successful.

E.E. Syroechkovsky Jr. & E.G. Lappo

7. Timan coast of Malozemel'skaya tundra (between Khodovarikha and Tobseda settlements)

Weather conditions in mid-June were normal; spring was late, and August was warmer than usual. Lemmings were extremely rare and sporadically distributed; their populations were probably beginning to increase. Root Voles were recorded in small numbers at watersheds 30 to 40 km from the coast. Rodent-feeding birds did not have a succesful season (only one nest of Short-tailed Skua was found), and were rare on movements. Breeding Arctic Foxes were rare (two inhabited dens were found), and subsequently rare on movements.

E.E. Syroechkovsky Jr. & E.G. Lappo

8. South-eastern part of Russky Zavorot peninsula (near the Khabuika lake) and Lovetsky island (Korovinskaya bay near the Pechora delta)

Weather conditions in spring were characterized by rather low temperatures, slow snow-melt and little precipitation. Snow disappeared in the lowland tundra in the last third of June, and shallow lakes became ice-free in mid-June. In general, spring was about ten days late and this resulted in delayed wader display activity (the first Ruff lek was seen on 9 June and first displays of Common Snipe *Gallinago gallinago* on 13 June), as well as in late breeding (no wader nests were found until 18 June). The abundance of Common Snipe, Little Stint, Dunlin and Ruff was lower than usual. For the first time in spring and in autumn Knots *Calidris canutus* were observed.

Lemmings were almost absent (only single animals in human buildings), but Root Voles were quite numerous. Arctic Foxes were extremely scarce, although they did breed. Long-tailed and Arctic Skuas were as common as usual, Snowy Owls were few on movements, and some Short-eared Owls were also observed. Rough-legged Buzzard in this

area is always rare, Merlins *Falco columbarius*, Peregrine Falcons and Goshawks *Accipiter gentilis* bred in single pairs. Autumn migration of waders was intense, in particular that of Red-necked Phalarope and Ruff; Spotted Redshank *Tringa erythropus* and Curlew Sandpiper *Calidris ferruginea* migrated in larger numbers than in the previous year.

Yu.M. Schadilov & D. Bouler

9. Besymyannaya Bay, South island, Novaya Zemlya

Spring came two weeks later than usual and was cold. Summer also turned out to be rather cold with rain and strong winds. Lemmings were almost absent (only one animal recorded during the whole month). Arctic Foxes and avian predators were scarce, however four young birds fledged successfully in the only nest of Rough-legged Buzzard. Breeding was suspected in two resident pairs of Long-tailed Skua and in one pair of Snowy Owl. Flocks of non-breeding skuas were absent. Late in July and in early August, Purple Sandpiper *Calidris maritima* and Ringed Plover *Charadrius hiaticula* were commonly observed with broods (at the same time two pairs of Ringed Plover had only one chick each), although Little Stint was rare. Therefore the breeding of waders was generally successful.

E.A. Kuznetsov

10. Pukhovy Bay, South island, Novaya Zemlya (72°40'N 52°45'E)

According to local information there was little snow in winter. Spring was later than usual and extremely cold, probably as a consequence only five wader species bred. Arrival of waders and the start of breeding was noticeably prolonged. Density of Turnstone *Arenaria interpres* was large in contrast to all other species. Clutch sizes in some nests of Little Stint and Ringed Plover were reduced to three eggs. Summer temperatures were also rather low, however judging by the good body condition of birds there were no nest failures caused by weather conditions. Lemming numbers were at their lowest level (only three animals recorded). Arctic Foxes were scarce and did not breed.
Only one pair of Rough-legged Buzzard and several Long-tailed Skuas bred. Other predators were almost absent, therefore predation pressure on wader clutches was not high (about 30% of clutches were destroyed) except for Ringed Plover (in which all nests were destroyed). In summary the season was favourable for Turnstone, less successful than usual in Little Stint, Dunlin and Purple Sandpiper, and unfavourable for Ringed Plover.

V.V. Gavrilov

11. Vaigach Island

Spring was cold and prolonged. Average temperatures were below freezing for many days and there were strong winds and snowfalls until 20 June. Summer was rather cold but dry and sunny. Lemming numbers were at a low point (not recorded at all). Thus skuas and Snowy Owls did not breed and were recorded only on summer movements and migration. Numbers of Rough-legged Buzzard were low. Single pairs started to breed, although unsuccessfully.

Numbers of Arctic Foxes were rather large, single pairs bred, families consisted of two to four pups. Predation from Arctic Foxes was high: 30% of geese clutches were lost, in some waders (Ringed Plover) nest losses were similar, while in other species (Little Stint, Dunlin, Temmincks Stint) it was at least 50%. Weather conditions in summer were favourable for chicks. The breeding success of waders was in general lower than usual, in some species it was probably average.

V.V. Morozov

12. Yugorskiy Peninsula

Spring was cold and prolonged. Due to heavier winter snowfalls, it melted slowly especially in the central and south-western part of the peninsula. River floods on 6-8 June were unusually high. In the northern part, summer was rather cold with frequent fog, although in the south and south-west it was comparatively warm and similar to other years. Numbers of lemmings were at their greatest in April-May (judging by numerous records of winter nests), *i.e.* before the arrival of birds. By June, lemming numbers decreased, but were still rather high in some tundra areas. This enabled large breeding densities of Rough-legged Buzzards. Short-eared Owls bred in those areas with high lemming numbers. Snowy Owls and Pomarine Skuas *Stercorarius pomarinus*, however, did not start breeding. Arctic and Long-tailed Skuas *S. parasiticus*, *S. longicaudus* bred, the first in usual numbers, the latter in small numbers.

Numbers of Arctic Foxes were not high, only some animals bred and their productivity was low. Weather conditions in general were favourable for breeding waders, but the predation rate by Arctic Foxes, resident avian predators and nomad flocks of skuas was quite high, so breeding success of waders can be estimated as average or even low. Only in Grey Plover *Pluvialis squatarola* was breeding highly successful - almost all breeding pairs reared fledged young.

V.V. Morozov

13. Western and Eastern slopes of the Polar Urals

Spring was a little late in comparison with previous years, and summer was very dry and warm. Judging by observations in July-August small rodents, especially lemmings, were numerous, and in contrast to 1993, Rough-legged Buzzards bred everywhere. Wader numbers seemed to be rather high, however there were noticeable differences between species. Differences in breeding densities of Golden Plover *Pluvialis apricaria* were recorded between western and eastern slopes. At the upper reaches of the Kara River these birds were relatively

rare (about four times rarer than in 1993), whilst at the upper reaches of the Shchuchya River, broods and nests with signs of successful hatching were found as often as the year before. Numbers of Ringed Plover were average, Wood Sandpipers *Tringa glareola* were observed everywhere. Terek Sandpipers *Xenus cinereus* were less common than in 1993: only occasional broods were recorded at the Kara River. Whimbrel *Numenius phaeopus*, which were common at the Schuchya River in previous years, were rather rare this summer, and Bar-tailed Godwit *Limosa lapponica*, which was previously common, was not recorded at all.

P.I. Luzan

14. Lower Ob river area near Salekhard

May was cold with snowfalls, however ice break up on the Ob occurred at the same time as usual (1 June). On the same day mass wader migration commenced and lasted at low intensity until 7-8 June. The middle of June was cold with northern and north-eastern winds. Late summer was in general moderately dry and warm, with few cold spells. Rodent numbers increased slightly. Single pairs of Long-tailed Skuas and Hen Harriers *Circus cyaneus* bred. In the tundra, Whimbrel and Bar-tailed Godwit bred in high numbers. Wood Sandpiper and Golden Plover were common, Ruff and Red-necked Phalarope were not numerous, and single pairs of Greenshank and Ringed Plover were recorded. In general, abundance of waders was estimated to be below average. Judging by observations of Whimbrel, Bar-tailed Godwits and Reeves which alarmed late in July in those areas where spring observations are usually made, their breeding was successful.

S.P. Paskhalny

15. East of Middle Yamal ("Khanovey" station: 68°40'N)

Spring was late. On 11-12 June when many birds had already started to breed, the weather again became cold with strong winds and snowfalls. However, summer was warm without any sharp changes of temperature and without prolonged rains.

Numbers of rodents were estimated as average, although in the second half of summer more voles appeared. Except for Rough-legged Buzzards, which bred in rather high numbers (0.54 pairs/km^2), predators were scarce. Snowy Owls were not recorded and one hunting Short-eared Owl was occasionally observed. Pomarine Skuas did not breed, Arctic *Stercorarius parasiticus* and Long-tailed Skuas were scarce. Arctic Foxes were not numerous. Predation was mainly caused by non-breeding skuas. Breeding densities of most waders was average. Little Stint did not breed at all, and Ruffs were few, whilst numbers of Common Snipe were larger than usual. Breeding conditions for waders were favourable.

N.S. Alekseeva, Yu.A. Tulkin & E.A. Polents

16. West of the Middle Yamal (coast from Mordyyakha river - Mare-Sale polar station)

Spring was obviously late: large parts remained snow-covered until the end of June, and the weather was windy with low temperatures and precipitation. By 20 June waders were only starting to breed, thus only single clutches were found. At the same time large numbers of lemmings and Root Voles were recorded, and Northern Voles *Clethrionomys glareolus* were also found. In the last third of August lemming numbers were much lower, but vole numbers did not decrease to the same extent.

Breeding Rough-legged Buzzards were numerous (up to 1.5 nests/km^2). Peregrine was common at the Nebeyakha river. Migrating skuas were abundant in June, but much less so in August. Arctic Fox numbers were estimated as average to large: three out of five dens were occupied by breeding families. The breeding success of waders was perceived to be not high due to continuous predation as a consequence of the low numbers of lemmings.

E.E. Syroechkovsky jr. & E.G. Lappo

17. North-western Yamal, Bovanenkovo settlement area

Spring was relatively late. Numbers of rodents were above average. Arctic Foxes bred successfully. There were no owls recorded. Compared with 1993, a slight increase was recorded in Rough-legged Buzzard, whose clutches contained an average of five eggs. Numbers of skuas and Herring Gulls remained similar to 1993. Numbers of Willow Ptarmigan slightly increased, while those of waterfowl slightly decreased. Temminck's Stint, Red-necked Phalarope, Dunlin and Golden Plover were recorded three to seven times less often than in 1993. Other wader species either remained at the same level or decreased only slightly; the only exception was Golden Plover which was recorded very much more often. Curlew Sandpipers were observed for the first time in this area.

V.G. Shtro

18. North-eastern Yamal ("Yaibari" station: 71°04'N 72°20'E)

Spring started as normal but was interrupted by strong storm on 11-12 June. For waders, this was just before or at the start of breeding (Dunlin) thus causing their departure to more favourable areas. Only single Grey Plovers remained. After this cold period, ice break-up on the rivers occurred by 24 June, and snow had mainly disappeared (80% of snow-free area) by 25 June. Therefore spring was considered to be very late. However waders re-started nesting. Breeding populations were close to normal, but Curlew Sandpipers were completely absent, Little Stint were unusually few, and the number of Grey Plover was the lowest observed in six years.

Lemming numbers in spring were average; Arctic Foxes were few but did breed. Breeding skua numbers were high. Snowy Owls and Rough-legged Buzzards also started breeding but their nesting density was not very large.
Late in spring there was partial mortality of lemmings. Other animals were buried in dens and so were not available for predators. In the middle of summer nomad Arctic Foxes appeared which, together with skuas and other predators, destroyed many nests just before hatching. As a result only early nesting species bred successfully. Thus 77% of 70 Dunlin nests were successful, while only 27% of 11 Grey Plover nests remained undamaged. Undoubtedly there were great losses of chicks of all species. Local reports stated that breeding conditions for birds differed rather noticeably at the northern Yamal due to the variable distribution of rodents.

V.K. Ryabitsev, M. Gromadzki & T. Mokva

19. Belyi island and the northern coast of Yamal

Weather conditions in the first half of summer were unfavourable: by early July winter conditions were found at Belyi Island, and up to 70% of the area was still covered with snow. Conditions at the northern Yamal were only slightly better. In the latter third of August the weather remained rather cold. This time single lemmings were observed at the northern Yamal, but not found at all on Belyi Island. This was probably due to mid-summer decreases in rodents. Local people observed lemmings regularly at this island in 1993. At the Yamal, several nomad Snowy Owls, as well as one fledged Snowy Owl and one fledged Pomarine Skua were recorded; nests of Rough-legged Buzzard were found as well. Abundance of Arctic Fox was average: several single animals were observed, and at the coast of Yamal one inhabited den was found. Breeding success of waders was probably average; almost fledged broods of Grey Plover and Little Stint were found. At the northern Yamal numerous flocks of Bar-tailed Godwits were observed.

E.E. Syroechkovsky jr. & E.G. Lappo

20. Islands of the Arctic Institute

These islands have the appearance of sandy arctic desert. No trace of lemmings were observed there on 23 June. The weather was cold, and snow covered more than half of the surface, as is normal for these areas. Nomad skuas and gulls were common but were restricted to those areas with broken ice. Arctic Foxes were not recorded although they are common visitors here in some years. Glaucous Gulls *Larus hyperboreus* and Brent Geese *Branta bernicla* were common breeders, probably as well as Purple Sandpipers *Calidris maritima.*

E.E. Syroechkovsky Jr. & E.G. Lappo

21. Surroundings of Dikson in north-western Taimyr

At least in the second half of July the weather was warm, with little rain or fog. Large numbers of lemmings ensured successful breeding of avian predators such as Snowy Owls, Rough-legged Buzzards, Long-tailed, Arctic and Pomarine Skuas. Arctic Foxes were not recorded. Judging by regular records of broods, wader breeding was successful. Remains of an adult Turnstone were found near one of the six Snowy Owl nests.

A.E. Volkov

22. Meduza Bay area (20 km south of Dikson)

Snow melted fast at the beginning of June but a drop in temperature later delayed melting as well as wader migration and breeding (average hatching date was 20 July). Tundra was 50% snow-free on 21 June, the same day that river ice broke up. Summer was dry and warm (with several periods when temperatures reached as high as 20°-25°C). Dotterels, commonly breeding in 1993, were absent. Both lemming species had peak numbers: their abundance in June was 25 - 28 ind./100 trap-days in interstream areas, in July it averaged at 15 ind./100 trap-days in interstream areas and polygonal tundra bogs. Although lemmings bred, their numbers in August remained constant due to predation by large flocks of Pomarine and Long-tailed Skuas which appeared late in July following the arriving herds of Beluga *Delphinapterus leucas.*

Snowy Owls, Rough-legged Buzzards and especially Pomarine Skuas bred numerously and successfully. Arctic Foxes were observed regularly, and one den was found. Waders bred at relatively low densities (20 pairs/km^2), but their success was high (chicks hatched in 81% of seven wader species, n = 131) except Curlew Sandpiper in which 63% of clutches failed (n = 24). Successful breeding was also recorded in Brent Geese. At the same time, abundance of nomad skuas late in July and in early August suggests that total breeding success of waders was no more than average.

A.V. Rybkin, K. Günter, I. Hertzler, L.V. Korshikov, S.V. Kochanov, Yu.R. Kochanova, M.V. Chertkov & M.N. Nurov

23. Pyasina Delta

In the Pyasina Delta spring was very late. On 19 June more than 90% of tundra was still under snow, but then a sharp rise in temperature melted the snow within a week. Ice broke-up on 2-3 July and the warm weather lasted until 12 July. This was followed by a cold period (with temperatures mostly between 0°-4°C and with strong winds but without precipitation) which lasted until mid-August. Average capture rate of Siberian *Lemmus sibiricus* and Collared *Dicrostonyx torquatus* Lemmings was 6.0 and 1.7 ind./100 trap-days (the largest in five years). Even distribution of animals (contrary to the peak period in 1991) ensured their successful reproduction. Herring Gulls, Rough-legged Buzzards and Pomarine Skuas bred successfully as well as Snowy Owls (five broods were found within a 5 km radius). Arctic Fox

numbers were thought to be average and similar to 1993. They occupied about half the dens and families had five to ten pups; therefore large numbers of foxes can be expected in 1995.
Birds started to breed late, but in most species reproduction was successful.

Breeding in Little Stint, Curlew Sandpiper and Grey Plover was similar to 1993. There were probably fewer Pacific Golden Plovers *Pluvialis fulva* and Dotterels.

I.Yu. Popov

24. Sterlegov point (75°25'N 89°08'E)

On the coastal arctic tundra winter snow melted at least one week later than usual. After 18 June, average daily temperatures were above freezing, which caused the snow to melt rapidly (50% cover on 21 June), and the weather was favourable for birds until 4 July. Later in July and August, however, it turned cold and wet with fog, drizzle and heavy rain. In the period when birds had chicks, the temperature rarely exceeded 5°C. Numbers of lemmings were low, thus Snowy Owls and Arctic Foxes did not breed, and few nests of Pomarine or Long-tailed Skuas were found.

After the second week of July most wader nests observed were predated by Arctic Foxes, and predation of nests and chicks by skuas was also recorded. In spite of the cold weather and predator pressure, chicks in some broods of Knots, Turnstones and Grey Plovers fledged successfully. At the same time there were no resightings of colour-marked broods of Little Stint and Curlew Sandpiper, an indication of the increased level of their mortality.

Th. Piersma, H. Schekkerman, P. de Goeij, J. Jukema, J. van de Kam & I. Tulp

25. Northern Taimyr (Zarya peninsula, lower Tolevaya river and islands Pravda and Nansen)

Weather conditions in the breeding season was severe, but despite this, waders did breed. Following a peak in lemming numbers in July, a decline occurred in mid-August. Owls did not breed and only single birds were recorded. Pomarine Skua was common both breeding and on migration; other species of skuas were also rather common. Numbers of Arctic Foxes were low, and probably did not breed (few dens were found and these were not permanently inhabited).

Waders had started to breed by early July, and in the coastal parts where snow melted late, egg-laying was delayed by approximately one week. Judging by observations in mid-August, the breeding season was not unsuccessful as broods of Grey Plover, Curlew Sandpiper, Little Stint and Knot were recorded. In the same period small flocks of Bar-tailed Godwits were observed in Middendorf Bay.

E.E. Syroechkovsky jr. & E.G. Lappo

26. Western coast of Cheluskin peninsula (from Mod bay to the upper Tessema river)

Weather conditions in the breeding season were considered severe, as usual, although the weather in late June was sunny and warm. During June, clutches of Grey Plover, Dotterel, Turnstone and Little Stint were incubating. Collared Lemmings were recorded in low numbers in the Tessema river basin. Rodent-feeding birds almost did not breed. In August a young Snowy Owl was found dead at the Cheluskin Point. Herring Gulls and Glaucous Gulls bred in some canyons and all three species of skuas were observed on migration. In the southern part of the survey area (30 km^2) the only inhabited den of Arctic Fox was found; single nomadic animals were also recorded. Wader breeding success was probably better than average: broods of Purple Sandpipers were quite common in August at Cheluskin Point.

E.E. Syroechkovsky jr. & E.G. Lappo

27. North-eastern Taimyr (basins of Topographs, Radists and Neizvestnaya rivers, surroundings of Andrei arctic station)

Weather conditions during the breeding season were generally favourable, although it was cooler than usual. Lemming numbers in late June in the Byrranga foothills were average, on the coast they were much lower. A decline in numbers was recorded in August. Single nomad Snowy Owls were observed, and several Pomarine and Long-tailed Skua nests were found. Numbers of Arctic Foxes were low: tracks of a few nomadic foxes and only one inhabited den was found.

Breeding success of waders was presumably no higher than average and very few broods were observed between 10-15 August.

E.E. Syroechkovsky jr. & E.G. Lappo

28. Northern edge of forest-tundra in the lower Bolshaya Kheta river (area of Tukhart settlement)

Weather conditions were favourable except for a period of prolonged cold in spring. Numbers of lemmings and voles were not large. Rough-legged Buzzards were rare (2 pairs in 50 km^2), but bred successfully. Long-tailed Skuas were not numerous and fed mostly on rodents. Owls were not recorded. The following waders bred quite successfully: Ringed Plover, Wood Sandpiper, Terek Sandpiper, Temmincks Stint, Bar-tailed Godwit, Whimbrel, Pintail Snipe *Gallinago stenura*, Common Snipe and Great Snipe *G. media*.

Yu.P. Kozhevnikov

29. Lower reaches of Muksunikha and Mungui rivers (lower Yenissey)

There was unusually warm weather in the first half of summer with temperature reaching 30°C. Numbers of lemmings were estimated as close to average, and judging by abundance of their winter

nests (up to 30 on 10 ha, *c.f.* average 10 on 10 ha) there had been even larger numbers earlier. As they had overwintered successfully, numbers declined gradually. Root Vole abundance was also average, while that of Northern Red-backed Vole was less than average. Short-eared Owls were numerous, Short-tailed and Long-tailed Skuas stayed in the area and often hunted wader chicks. Breeding success of waders was probably better than average. Nests and broods of Ringed Plover, Wood Sandpiper, Temmincks Stint and Dunlin were found.

V.V. Yakimenko

30. Surroundings of Volochanka settlement (forest-tundra of the Central Taimyr)

Lemming numbers were not large. Only one pair of Rough-legged Buzzard bred, and Short-eared Owls were not numerous. Long-tailed Skuas fed on lemmings and wader chicks. Breeding success of waders was probably high.

Yu.P. Kozhevnikov

31. The centre of Taimyr peninsula, area of Sarytaturku lake (73°40'N 96°45'E)

Summer was cold, with an average temperature of 6-7°C in July and 2°C in August. The only warm period was 7-10 July when air temperature reached 17-20°C. The last ice melted on small lakes by 1-5 August, and on Sarytaturku Lake by 10 August. Snowfall occurred 13-14 August. Both lemming species had peak numbers: on average 4-13 individuals were caught per 100 trap-days in different habitats in early July. Although they bred in summer, the total lemming numbers in August decreased to 0.8-5 ind./100 trap-days. Arctic Foxes successfully bred: 20 out of 37 checked dens were inhabited, with up to eight pups in families. Breeding Rough-legged Buzzards were common (broods of three to five), as were Snowy Owls (one to five per brood). Breeding Long-tailed Skuas were numerous. One Pomarine Skua chick was found. Herring and Glaucous Gulls stayed near nests, but neither clutches nor chicks were found.

Thirteen wader species were found breeding. Ringed Plover clutches were trampled by Reindeer *Rangifer tarandus*. Pacific Golden Plover, Grey Plover, Turnstone, Spotted Redshank and Bar-tailed Godwit did not breed after 14 July due to chick mortality. Broods of Grey Phalarope *Phalaropus fulicarius* and Red-necked Phalarope were numerous, the former being most numerous. Little Stint, Dunlin, Curlew Sandpiper and Pectoral Sandpiper *Calidris melanotos* fledged young.

A.Yu. Voronin & M.N. Koroleva

32. South-east of Taimyr near Novorybnoye settlement (72°51'N 106°02'E)

Waders which had arrived on the breeding grounds had to move away between 13-18 June due to strong winds and snowfall which resulted in complete snow cover. First clutches (in Dunlin) appeared unusually late (24-25 June). Later the season was dry and warm, with cooler weather after the end of July. Intense egg-laying happened synchronously in all wader species.

Siberian Lemmings were regularly observed from 22 June - 9 July (c. two to three times per observer/ day), but later they became inconspicuous. As a result of this predation by Arctic Foxes on wader clutches (which did not occur earlier in the summer) intensified later. Arctic Foxes, owls and Pomarine Skuas did not breed, and only small numbers of Long-tailed Skuas and waterfowl bred, probably because of the late spring. From 14% to 15% of nests survived until hatching in numerous wader species (Dunlin, Pectoral Sandpiper and Little Stint).

M.Yu. Soloviev, M. Weston, A.A. Gavrilov, V.V. Golovnyuk, T.V. Sviridova, S. Grundetjern & T. Larsen

33. Western coast of Olenek bay (from Terpyai-Tumus peninsula southwards up to Pronchischev ridge foothills)

Weather conditions in early July were quite favourable for birds but lemmings were not recorded. Arctic Foxes did not breed but still predated birds nests. The employees of Terpyai-Tumus arctic station recorded that in winter Arctic Foxes even fed on their allies which had been caught in traps. One Wolf *Canis lupis* den was found. Of rodent-feeding birds, only Rough-legged Buzzard bred (one nest found in the south of the survey area); breeding was observed also in Herring and Glaucous Gulls. Pomarine and Arctic Skuas moved in small flocks. Long-tailed Skuas formed large flocks together with terns and Sabine's Gulls *Larus sabini*.

In early July only a few nests of waders were ruined, while nests of gulls and divers were continuously predated "in front of our eyes". It is supposed that although hatching success was large, chick mortality later was relatively large as well.

E.G. Lappo & E.E. Syroechkovsky jr.

34a. The Lena delta

Between 7-12 June the snow melted on the northern isles as usual. Ice broke-up on the main river channel on 11 June, and on the lower parts of the tributaries on 19-21 June. After cold weather returned on 14-15 June Curlew Sandpipers and Pectoral Sandpipers abandoned their clutches and did not breed again. An unexpected absence of lemmings resulted in high predation pressure from large gulls and skuas on clutches of waders and waterfowl. Numbers of Arctic Foxes were very low and Snowy Owls and Pomarine Skuas did not breed. Broods of Rough-legged Buzzards consisted of one or two chicks. Arctic Skuas and large gulls had average size clutches. Grey Phalaropes were few. Breeding success of Grey Plovers and Dunlins was low. Only Little Stint and Temmincks Stint bred successfully.

D.V. Solovieva

34b. The Lena delta

Dates of spring phenology were similar to the long-term average. Water levels in the river remained high and without sharp fluctuations after the spring floods, almost until the end of July. The weather in June and July was rather dry and warm. As lemmings again had low numbers, Arctic Foxes and skuas not only did not breed but were extremely rare. Snowy Owls were not recorded at all. Nests of Peregrines and Rough-legged Buzzards each contained not more than four eggs or chicks. In general, the season was favourable for waders. Grey Plover, Grey Phalarope, Turnstone, Ruff, Little Stint and Dunlin were numerous or common. Nests or broods of Pacific Golden Plover, Ringed Plover, Red-necked Phalarope, Temminck's Stint and Pectoral Sandpiper were also found.

V.I. Pozdniakov

34c. Typical tundra in the south of the Lena delta

The weather remained warm after 20 June and in early July, with temperatures ranging from 5°-15°C. There was no precipitation and winds were moderate or strong, from the north and east. Lemmings were absent. Arctic Foxes were few and no dens were inhabited. Rough-legged Buzzards bred sporadically, while Snowy Owls were not recorded at all. By late June Pomarine Skuas left the area, Arctic Skuas were rare but probably bred. In early July flocks of Long-tailed Skuas moved northwards, searching for food on the tundra. Dates of wader breeding were similar to usual: fresh and incubated clutches were found from 24 June - 5 July.

Yu.Yu. Blokhin

35. Tiksi bay

From 20 June to 10 July the weather was favourable for breeding waders with temperature reaching 12°-20°C. Rodents had low numbers. Pomarine Skuas, which were common in June, had already disappeared by July. Long-tailed Skuas were observed on passage. Single pairs of Arctic Skuas bred. On 23 June clutches of Dotterel and Ringed Plover were well incubated. By 8-10 ~July chicks of Common Snipe had hatched, and judging by their behaviour, so had those of other waders.

Yu.Yu. Blokhin

36. Shirokostan peninsula (north-east from the Yana delta)

The weather in July was quite favourable. Lemming numbers were high to begin with then declined. Snowy Owls bred at high densities, broods of six to eight well-grown chicks were numerous. Breeding Rough-legged Buzzards were less successful, with the majority of their nests failing for unknown reasons. Skuas had low numbers. Arctic Foxes bred successfully having eight to ten pups in each family. Breeding waders seemed successful: broods of Eastern Golden Plover, Grey Plover, phalaropes and Ringed Plover were common.

E.G. Lappo & E.E. Syroechkovsky jr.

37. Belkovsky island

Numbers of lemmings were low and numbers of breeding waders, rather large. Most Arctic Foxes and avian predators concentrated near seabird colonies. In such conditions, the breeding of waders was rather successful.

E.G. Lappo & E.E. Syroechkovsky jr.

38. Faddeyevsky island (Novosibirskiye Islands), the Ulakhan-Yuryakh and Khastyr river basins

The weather between 10-15 July was favourable for breeding birds. Lemming numbers were large, and no declines were recorded. The islands are inhabited by a distinct race of Siberian Lemming which occupies the habitat which elsewhere would be occupied by both Siberian and Collared Lemmings. Snowy Owls bred at densities up to 5 ~nests/km^2. Territorial pairs of breeding Pomarine Skuas were recorded, and groups of Long-tailed Skuas were observed on migration. Arctic Foxes bred at high density, inhabiting dens situated 1.5-2 km from each other. Breeding success of waders was presumably high.

E.G. Lappo & E.E. Syroechkovsky jr.

39. Western and southern coasts of Kotelny island, and the Balyktakh river basin (Novosibirskiye Islands)

Weather conditions were generally similar to those at Faddeyevsky Island (site 38), but the distribution of lemmings was noticeably less even. Thus, at the western coast their numbers by early August were low, in the southern parts average, and in the Balyktakh basin slightly higher than average. Probably in some areas peak numbers had already passed. Snowy Owls were recorded on migration, the largest numbers being in south-western and southern parts of the island. Their nests and broods were recorded as well. Although territorial pairs and groups of pomarine Skuas were common, they probably did not breed. Arctic Foxes were not numerous; they were observed mostly in the southern part of the island, where they probably bred in low numbers. Breeding success of waders was obviously not uniform throughout different parts of the island. Thus, in the area of Kieng-Urasy settlement on the west coast, only single broods of Ringed Plover were recorded, while further south broods of other waders were common.

E.G. Lappo & E.E. Syroechkovsky jr.

40. Coastal tundras north of the Indigirka delta (from Bogdashkina river mouth - southern coast of Gusinaya gulf)

Weather conditions in mid-July were quite favourable. Lemmings were distributed unevenly, but in general their numbers were average, although increasing. In the north of the area potential predators were more abundant than in the south. To the north of Mogotoyevsky Lake, Snowy Owls bred in large numbers, however they were not always successful (in several nests dead owlets were

found, and some nests were predated, probably by Arctic Foxes). In spite of the large numbers of lemmings, owls still predated birds heavily. At owl perches, remnants of Eastern Golden Plover, fledged phalarope and longspur young were found. Numbers of Arctic Foxes were large and several dens were found. Least Weasels *Mustela nivalis* were numerous. Rough-legged Buzzards bred only in the north-western part of the Indigirka Delta. Skuas almost did not breed, only a few territorial pairs of Pomarine Skua were recorded, and one nest of Long-tailed Skua was found. Judging by the abundance of wader nests and broods located, predation pressure during incubation was not high, however, the situation could have changed later.

E.G. Lappo & E.E. Syroechkovsky jr.

41. The Indigirka delta

Spring was prolonged with frequent periods of cold weather and snowfall which resulted in snow melting late. Coastal parts of the delta and adjacent tundra only became free from snow in the second half of June. The end of June and July were characterised by cold and winds.

Lemmings were rather common in spring, but after high floods on 14-17 June their numbers sharply decreased. In July, numerous Arctic Foxes searched mostly for clutches of Brent Geese and eiders. Snowy Owls were not numerous. Mass arrival and breeding of waders occurred one week later than usual. Only Grey Phalaropes occurred in large numbers and Ruffs were rare. Nests of Temminck's Stint, Little Stint, Grey Plover, Curlew Sandpiper, Dunlin, Pectoral Sandpiper and Turnstone were found regularly.

A.G. Degtyarev

42. Coastal tundras of lower Kolyma (at the Chukochya and Kuropatochya rivers)

Spring was late and summer was very cold. Lemming numbers were low and beginning to increase. Snowy Owls did not breed, but in the Kolyma Delta numerousy nests of Peregrines were found. Arctic Foxes bred and were numerous everywhere. Judging by observations in the second half of July, the breeding success of all wader species except Little Stint was low.

A.V. Andreev & A.B. Sokolov

43. Coastal tundras of lower Kolyma area

Most of July was much cooler than in the previous year (from -2°C - +10°C) with strong winds. Numbers of lemmings were low, and of Snowy Owls extremely low. Arctic Fox numbers were average. Peregrines were more common than usual, they fed on Temminck's Stint and Grey Phalarope. Complete clutches of waders were recorded from 17 June (Temminck's Stint), with hatching observed from 10 July. Numbers of common wader species (Temminck's Stint, Red-necked Phalarope) were lower than in 1993. Sharp-tailed Sandpiper *Calidris acuminata*, Curlew Sandpiper, Dunlin, Little Stint and Spotted Redshank were rare, as they were in 1993. Bar-tailed Godwits, however, were more common. In August there were noticeably few young birds, and waders departed early.

S.I. Mochalov

44. Pokhodskaya Yedoma in the Kolyma delta and the Medvezhka river basin (Keinguveem)

Weather conditions in summer were considered by local people to be slightly worse than usual; however there were no serious weather fluctuations that could have affected breeding birds. By 18-20 July, there were average numbers of lemmings, and Mouse-hares *Ochotona hyperborea* were numerous in the rocks, as were American Sousliks *Citellus parryi* and hares (especially near human settlements). One Narrow-skulled Vole *Microtus gregalis* was caught.

Snowy Owls and Pomarine Skuas did not breed; several nests of Rough-legged Buzzard, Peregrine and Short-eared Owl were found, the latter being common. Small flocks of Long-tailed Skuas were recorded, but Arctic Foxes were not recorded at all. Waders bred successfully: numerous broods of Eastern Golden Plover, Red-necked Phalarope, Pectoral Sandpiper and Bar-tailed Godwit were recorded.

E.G. Lappo & E.E. Syroechkovsky jr.

45. Ayon island

Spring was late, but in general, weather conditions were favourable. Lemming numbers were most probably very low. Owls and skuas did not breed. Only one nest of Rough-legged Buzzard was found. Arctic Foxes were not recorded, although their tracks were seen and many predated nests of Herring Gulls and Eiders were found. Probably the same fate occurred for waders. The number of recorded wader broods was low, and the season was probably not very favourable for breeding birds.

E.G. Lappo & E.E. Syroechkovsky Jr.

46. Lower Omolon river (Sparse larch woodlands up to 100 km from river mouth)

Weather conditions hardly differed from those in the previous year and did not have any negative effect on breeding waders. The majority of waders arrived early (23-27 May) and simultaneously. In the beginning of June nests of Terek Sandpipers and Ringed Plovers on the islands of Omolon were destroyed by floods, and they started second clutches only after 17 June. Wood Sandpiper *Tringa glareola* and Little Curlew *Numenius minutus* already had complete clutches by 15 June. In summer comparatively large numbers (in relation to previous years) of Common Sandpiper *Actitis hypoleucos* were recorded. In montaine tundras complete clutches of Dotterel and Great Knot *Calidris tenuirostris* were found in mid-June. Most waders bred successfully.

S.I. Mochalov

47. Montane tundras of Western Chukotka (Bilibino and NW Anadyr' districts) and adjacent forest-tundra and taiga

In early spring the snow covered larger areas than average but the phenology of snow melt was normal. Summer was warm and dry, with many uncloudy days and without significant changes in weather. Late in July there were short, cold snaps. Numbers of most species had not yet peaked. There were large numbers of Ptarmigans *Lagopus mutus*. Raptors and Long-tailed Skuas were more numerous than in 1993. However, negative effects from both avian and terrestrial predators (Common Weasel *Mustela erminea*, Red Fox *Vulpes vulpes*, Sable *Martes zibellina* and Brown Bear *Ursus arctos*) were low. In areas where wild and domestic Reindeer concentrated, between the upper Anadyr and Anyui Rivers, they sometimes trampled birds nests and ate both eggs and chicks. The number and breeding success of most wader species was above, or close to, average. The most successful breeders were Long-tailed Skua, Great Knot, Grey-tailed Tattler *Heteroscelus brevipes*, Ruff, Terek Sandpiper and Common Sandpiper.

A.I. Artyukhov & S.V. Zagoskin

48. Montane tundras of Schuchy mountain ridge (upper Anadyr' river area)

Large amounts of winter snow delayed the spring melt as well as causing high river floods. At some mountain ridges where snow-free patches appeared rather early, large breeding densities of Great Knot were observed. June was warm and sunny, July was rather cold with prolonged rain, thunder-storms, and sometimes fog. Voles, Northern Mouse-hares and American Sousliks had large, although not maximum, numbers. Predation by Long-tailed Skua, Snowy Owl, Raven *Corvus corax*, Rough-legged Buzzard, Peregrine, Common Weasel, Sable or Brown Bear was low. Great Knot chicks developed more slowly than in 1993. Breeding success of montane-tundra waders (Great Knot, Eastern Golden Plover and Solitary Snipe *Gallinago solitaria*) was slightly above average, while many of the waders breeding in the Anadyr flood-plain (Terek Sandpiper, Common Sandpiper, Temminck's Stint and Ringed Plover) suffered from the high floods. Numbers of Terek Sandpiper broods were lower than in 1993, and almost all Ringed Plovers had replacement nests.

P.S. Tomkovich & D.E. Te

49. Southern coast of Anadyr' estuary

In tundra areas there was heavy snow, spring was cold and prolonged, and ice broke late (12 June). June was windy and rainy. Lemmings had low numbers. Arctic Foxes bred, and actively predated clutches of waders and other birds (>90% of duck nests were destroyed). Only a few Long-tailed and Arctic Skuas bred, and non-breeding Long-tailed Skuas remained the whole summer in large flocks, especially in coastal tundras. Breeding populations of waders (Dunlin, Temmincks Stint, Red-necked Phalarope) were small due to large predation pressure from Arctic Foxes. As a result, only single broods of waders were recorded in July.

A.V. Kondratyev

50. Provideniya bay at Chukotka peninsula

The weather was cold and rainy throughout July and August. The number of rodents was at a low level: lemmings were absent, although several Root Voles and Northern Mouse-hares were caught. Arctic Foxes were not recorded.

N. Dokuchaev & P. Gudkov

51. Belyaka spit, Kolyuchins-kaya bay

Spring was late after a large amount of snow during winter. Late in June, part of the lakes were only 50% ice-free, and the sea was still covered with ice. Neither lemmings, Arctic Foxes nor breeding skuas were recorded. Large breeding densities of Spoon-billed Sandpiper *Eurhynorhynchas pygmeus* and Western Sandpiper *Calidris mauri* were observed. Rock Sandpiper *C. ptilocnemis* was also rather common.

I.V. Dorogoi

52. Kolyuchin island

On 28 June holes of Root Voles were found at the abandoned arctic station, but neither tracks of lemmings nor any waders were recorded.

I.V. Dorogoi

53. The area of Telekaiskaya woodlet (source of Ekityki river, tributary of Amguema)

Numbers of voles were low. In late June - early July only Grey-tailed Tattler was observed along the river (2-3 birds per 1 km transect), single pairs of Red-necked Stint *Calidris ruficollis* were recorded in the adjacent tundra.

I.V. Dorogoi

54. Surroundings of Mys Shmidta settlement

The season was characterised by a late spring and a cold summer: large amounts of snow remained until early July. Lemming numbers were higher than average. Arctic Foxes were not recorded and Pomarine Skuas bred at densities of 0.5 pair/km^2. The commonest waders were Temminck's Stint, Red-necked Stint and Red-necked Phalarope.

I.V. Dorogoi

55a. Vrangel Island

Spring was late with little snow, June was rather cold with snowfalls. Peak numbers of both lemming species were recorded. Snowy Owls bred in large numbers both in the foothills and in the Tundra of Academy (density *c.* 0.5 pairs/km^2 in the middle reaches of Neizvestnaya River and on the source of the Pestsovaya River). In the same area Pomarine Skuas bred at densities of 1-2 pairs/km^2. Numbers of the most typical waders (Grey Plover, Turnstone, Knot, Dunlin, Pectoral Sandpiper, Grey Phalarope) were less than usual in late July.

I.V. Dorogoi

55b. Vrangel Island (Gusinaya, Mamontovaya and Neozhidannaya river basins)

Weather in the latter third of July was quite favourable. Lemmings reached peak numbers. Thirty-two nests and broods of Snowy Owl were found. Pomarine and Long-tailed Skuas also bred at high densities. Arctic Foxes bred everywhere. Breeding waders were undoubtedly successful: broods of Grey Plover, Eastern Golden Plover, Turnstone, Dunlin, Pectoral Sandpiper and Knot were found.

E.G. Lappo & E.E. Syroechkovsky jr.

55c. Vrangel Island

Summer was unusually cold. Snow started to melt as usual in early June, with ice breaking-up on the main rivers by 20 June. Later, however, temperatures decreased, remaining slightly above freezing for the rest of the summer. Unusually, there were frequent snowfalls, rain and fog. As there had been heavy snow the preceding winter, and the summer was cold, snow and ice melt was late and incomplete, causing late floods of melt-water, exacerbated by high precipitation.

Numbers of both lemming species (especially Siberian Lemming) were very high during snow-melt, but the animals from late-spring generation were almost absent. As the vegetation cover was heavily damaged (several hectares of willows were completely eaten) the numbers of lemmings under snow were exceptionally large. In June their population declined quite rapidly (especially Collared Lemming), and in August they were several times less abundant than in June. In August, young Siberian Lemmings were extremely rare, unlike Collared Lemmings.

Snowy Owls and Pomarine Skuas bred in large numbers, but most of the latter left the area after 15 July. Numbers of breeding Arctic Foxes were much the same as in 1993. Common wader species (Grey Plover, Turnstone, Knot and Dunlin) started to breed at the same time and in the same densities as in 1993. In the second half of June, numbers of breeding birds decreased due to cold, and no late broods were recorded because of increased predation pressure.

Conclusion

As is obvious from the data, an exceptionally large number of reports was received (60) covering 55 areas. This enables us to get an overall idea of a very complicated situation of weather conditions, numbers of lemmings, predators, and finally, breeding conditions of waders throughout the vast area of the Russian tundras. At the same time, data from large areas such as Bol'shezemel'skaya tundra of Gydan Peninsula are completely absent, and also there is a lack of information from some other areas: from Yakutia, data came only for the coast, while data from the southern Yakutian tundras are missing.

Almost everywhere on the tundra spring was late, delaying the onset of wader breeding. In the western part snow started to melt early, but was delayed following the return of cold weather. In some other areas spring came as usual, but either windy snowfalls in the latter half of June caused a delay of breeding and even movements of recently arrived birds to the south again (as recorded in the middle and northern Yamal, south-eastern Taimyr and Lena Delta), or, large amounts of snow resulted in slow melting and thus high floods, which destroyed nests of clutches of waders in the flood-plains (eastern tributaries of the Kolyma and the Anadyr' basin).

Summer was cooler than usual at the Murman coast, at the Kanin Peninsula, at Novaya Zemlya, on Vaigach, at the north of Yugorskiy Peninsula, on the Belyi Island, in the north of central and eastern Taimyr, in the Kolyma tundra areas, and further east at the Chukotka coasts. It was warmer than usual only in the Yenissey Delta and at the south-east of Taimyr, while in other areas, weather conditions were close to normal. Local negative effects on waders were also caused by floods in coastal areas of the Kanin peninsula.

Differences in the timing of spring obviously affected many aspects of wader breeding distribution. This was noted by several respondents, but detailed analysis is impossible from the data presented. Redistribution of breeding plovers, Little Stint, Curlew Sandpiper and Bar-tailed Godwit was noticeable at the Yamal, of Dotterel at the Taimyr, of Curlew Sandpiper and Pectoral Sandpiper in the Lena Delta and of Great Knot in the mountains of upper Anadyr'.
The population trends of lemmings were uneven or patchy, both over geographically large areas and sometimes even at the local level. In European Russia, numbers of Norwegian Lemmings increased only at the Sem Ostrovov islands, average numbers of Siberian Lemmings were observed at the north-west Kanin peninsula, and locally high numbers (presumably after the winter peak) at the Yugorskiy Peninsula. In other areas, lemmings were either few (Timan tundra, Pechora Delta, Novaya Zemlya), or were completely absent. The situation in Siberia was similarly variable, with lemming numbers being larger than usual. Across most of the Yamal these rodents were numerous or common, but at the same time absent on Belyi Island and at the extreme south (Salekhard). In at least two of six Yamal areas declines were recorded during summer, and nowhere was an increase observed.

At the Taimyr, lemmings had large or average numbers (the largest estimates were in the north-west and centre of the peninsula). They were few in some coastal areas of the central Taimyr (Sterlegov Point and Cheluskin Peninsula). Further lemming increases was estimated only for the Pyasina Delta. In five out of 12 localities in the Taimyr, declining trends were observed. Lemmings were absent in

western Yakutia (Olenek, Lena Delta, Tiksi), numerous or common in the Yana-Indigirka tundras, at the western edge of Chukotka, and in some areas on Novosibirskiye Islands, and there were few to the west of the Kolyma River. For the latter area, and also to the north of Indigirka Delta, lemming numbers increased, and for at least two other areas declines were reported. In Chukotka, lemmings were absent in southern parts, but were recorded in large numbers at Mys Shmidta; they were abundant on Vrangel Island (decreasing during the breeding season), and had low numbers on Ayon Island.

As expected, Lemmings reached large numbers in some regions: at the Yamal, on the Taimyr, in Yana-Indigirka tundras and on Vrangel Island. It is interesting that these areas are similar (except Vrangel Island) to the core areas of large lemming numbers in 1991 (moderately high numbers of lemmings were also recorded in both years in some areas of Chukotka). At the same time the situation in 1994 was different in some respects to that in 1991:

- in many areas numbers were not at a maximum;
- areas with peak numbers did not cover large territories as in 1991; and
- decreases in numbers happened earlier, *i.e.* had already occurred in spring and summer, thus significantly influencing, the distribution and breeding success of predators, as well as of waders.

In some forest-tundra, southern tundra and typical tundra areas such as Kanin Peninsula, Pechora Delta, Polar Urals, middle Yamal and inland mountains of Chukotka, peak vole numbers were observed, which coincided with peak lemming numbers in more northern areas.

The distribution of specialised avian rodent-feeders was, in many respects, similar to the distribution of areas of large numbers of lemmings. Snowy Owls bred at the northern Yamal, at the north-west and in the centre of the Taimyr, in Yana-Indigirka tundras, at the Novosibirskiye Islands, and on Vrangel Island. Pomarine Skuas were found breeding in the same areas and additionally at the north-eastern Taimyr and at Mys Shmidta. Other skuas and Rough-legged Buzzards bred more widely, but their numbers depended to a certain extent on rodent abundance. Rough-legged Buzzard had the largest numbers of breeding pairs at the Polar Urals and Middle Yamal, Long-tailed Skua at the north-eastern Yamal, in the central Taimyr, and on Vrangel Island.

Similar peculiarities were observed in the distribution of Arctic Foxes. They were absent on some arctic islands, but were recorded in other places almost everywhere. They were numerous (and also bred) only in the eastern part of Yakutia: at Faddeyevsky Island, near the Indigirka Delta, and further east almost up to the Kolyma Delta. Arctic Foxes bred in a geographically large area, but in fluctuating numbers: inhabited dens were found from the east of the Kola Peninsula up to the Anadyr' Estuary and Vrangel Island, a significantly different situation from that of those years with lowest rodent numbers.

Breeding success of waders this year was only slightly dependent on the weather, as this was not noticeably unfavourable, in spite of the prevalence of comparatively low summer temperatures. Brood mortality caused by weather conditions was reported only for the Aynovy Isles and for the Sterlegov Point area. Predation by Arctic Foxes and skuas was the main factor that determined breeding success of waders. Many respondents recorded predators switching from feeding on rodents to birds in those areas where lemmings were declining during the season and in some other areas with low numbers of rodents. This increased predation pressure was most obvious late in the breeding season at the Yamal and Taimyr.

Estimates of waders breeding success differed greatly between the areas, but one common trend is revealed. Although in most areas estimates were given as about average, the European part with high breeding success was larger, and low breeding success was not observed anywhere. Further to the east this ratio changes gradually to low estimates. Thus, even taking into account the difference in reporters estimates, it can be estimated that breeding success of waders declined along a cline from west to east. Although waders bred rather successfully, reproduction was less than expected, and also less than in 1993 when there was an active increase in rodent numbers.

As in 1991, and the forecasts made in that year for 1992, it is predicted that although the decline of lemming numbers started in 1994, some areas with rather large numbers will remain in 1995, for example at the north of the middle Taimyr. After a rather good breeding season, predator numbers will remain large, and as the numbers of lemmings will be mostly low, these predators will noticeably affect breeding birds and their clutches. Thus, even if the best weather conditions occur, it is hardly possible to expect successful breeding of waders in tundras in 1995.

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