# Changes in reindeer population numbers in Russia: an effect of the political context or of climate?

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*Abstract*: This paper analyses trends in domesticated reindeer numbers at the federal, regional, and local levels based on official statistics and interviews with herders in different northern districts across Russia. During the second half of the last century, the domesticated reindeer population in Russia shifted dramatically from a maximum of 2.5 million head to a minimum of 1.2. The most important trends were connected to changes in social and economic conditions linked to government directives. Post-Soviet reforms in the 1990s resulted in a nearly 50% reduction in the total number of domesticated reindeer. However in some regions, these political events had the opposite effect. The contrast was due to the abilities of herders to adapt to the new conditions. A detailed analysis of these adaptations reveals an important difference between reindeer-holding enterprises with common ownership (i.e. kolkhozes, sovkhozes, municipal enterprises, etc.) and households with family owned reindeer. The paper concludes that the effect the political context is so large as to conceal the impact of other natural factors on reindeer populations such as climate change. However, a gradual increase of reindeer populations in the north-eastern part of Russia in the 1960s can be associated with changes in atmospheric circulation patterns.

**Key words:** atmospheric circulation; domesticated reindeer; households; indigenous peoples; post-Soviet reforms; reindeer enterprises; reindeer husbandry; reindeer populations; Russia; taiga; trends of reindeer numbers; tundra.

**Rangifer,** 32 (1): 19 - 33

## Introduction

Over the second half of the last century, the domesticated reindeer population in Russia shifted dramatically from a maximum of almost 2.5 million head in 1970 to 1.2 million head in 2001 (Fig. 1). The causes of the changes are not obvious and need careful research. Over the last decade, researchers have tended to associate dramatic social and environmental changes in the Arctic with global climate change However detailed interdisciplinary studies of Sami reindeer herding in Finnmark (Norway) and Sweden proved that factors other than climate can assert a greater effect on reindeer husbandry and pose more potent threats to its future (Tyler *et al.*, 2007; Brannlund & Axelsson, 2011). I completely agree with B. Forbes & F. Stammler (2009:

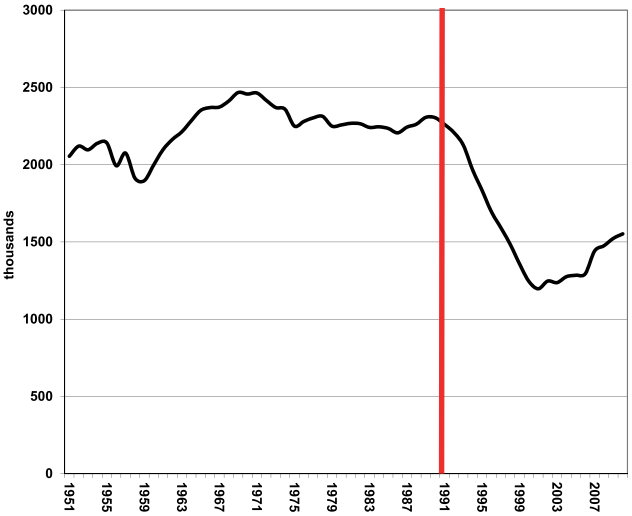



Fig. 1. The population of domesticated reindeer in Russia from 1951 to 2010, in thousands. The vertical line represents the date of the USSR's collapse in 1991. After a decline in the first decade following the end of the Soviet period culminating in a minimum number of 119 700 in 2001, the number of reindeer started to recover.

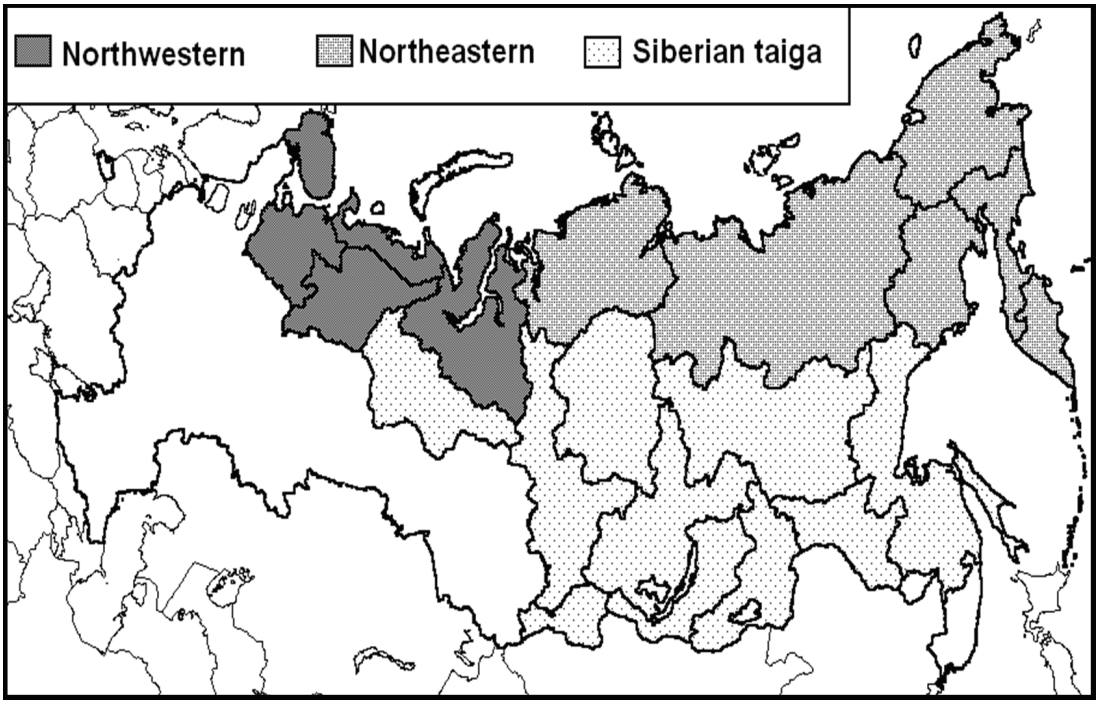



Fig. 2. Map of reindeer husbandry zones across Russia. **Northwestern zone** (predominantly tundra type of reindeer husbandry): Murmansk oblast', Arkhangelsk oblast', Nenets okrug, Komi Republic, Iamal-Nenets okrug. **Northeastern zone** (predominantly tundra type of reindeer husbandry): Taimyr okrug, northern districts of Sakha (Iakutiia) Republic, Chukchi okrug, Koriak okrug, Magadan oblast, Kamchatka oblast'. **Siberian taiga zone** (predominantly taiga type of reindeer husbandryKhanty-Mansi okrug, Krasnoiarsk krai, Evenki okrug, Tuva Republic, Irkutsk oblast', Buriatia Republic, Chita oblast', southern districts of Sakha (Iakutiia) Republic, Amur oblast, Khabarovsk krai, Sakhalin oblast'.

31) who argued that we need to weigh objectively the effect all possible causes: "We caution against a rush to analyse adaptation to ongoing rapid climate change through the eyes of the Nenets by using prevailing Western approaches. Climate change and adaptation must therefore be placed in their proper context and temporal framework".

Another driver which many suppose has a negative impact on reindeer husbandry is industrial development. Nevertheless as it will be demonstrated, a great decline in reindeer numbers is often observed in the regions without industrial development (for example, in Evenkiia), and, conversely, reindeer husbandry developed successfully in areas with intensive gas and oil extraction (for example, in the northern areas of western Siberia).

Apparently, not only external impacts are important but also the ability of reindeer herders to adapt to or to resist different kinds of challenges. Understanding of vulnerability of reindeer husbandry requires the one assess at least three separate aspects: the external impacts on the social-ecological systems, the ability of these systems to cope and adapt to these impacts, and the extent to which environmental or societal conditions hinder herders in adapting to change (Tyler *et al.*, 2007). The detailed analyses of statistical data from different regions of Russia show that reality is complex and that changes in reindeer populations can

be explained by many different drivers. Economic and social factors will change population numbers in very different ways. Here, I argue that we should pay special attention to the shifting political context, which has played a very important role in the economic life of indigenous peoples of Russia over the last 100 years.

**Data and methodology**

This paper is based mainly on the analyses of official statistics of domesticated reindeer numbers in Russia at the federal, regional, and local levels. The statistics are contextualised with important information gathered during interviews with reindeer herders, their families, managers of reindeer herding enterprises and local decision makers during the author's numerous field expeditions in the North including the Kola and Kanin peninsulas, Kolguev Island, Iamal, Taimyr, Iakutiia, Chukotka, Turukhansk and Bodaibo districts.

**Different types of reindeer husbandry in Russia**

Reindeer husbandry in Russia (see map of reindeer herding zones in Fig. 2) is diverse and includes several quite different economic strategies in different natural and social environments. One can therefore assume that the response of different kinds of reindeer herders to the same external impacts would be different. For this reason, I will first categorize the most important institutional, ecological and ethnocultural types of reindeer husbandry in Russia.

*Institutional types of reindeer husbandry*

The main specific institutional type of reindeer husbandry in Russia are the reindeer enterprises (hereafter REs). The creation of REs is linked to the political history of Russia. Before the Soviet period, reindeer herding in Russia was organized within households with most of herding being organized by extended families travelling as nomads. In the 1930 to 1940s, as a result of collectivization and sedentarization, most households were united into collective reindeer herding enterprises named kolkhozes. Later kolkhozes were transformed into state enterprises (sovkhozes, municipal enterprises, etc.). Through these reforms, the vast majority of the domesticated reindeer were transferred into collective or state ownership. Herders and their families worked in teams (brigades) for the REs. The brigades were made up usually of 4 to 7 families who travelled with the herd during their annual round, and maintained a close connection with the reindeer even though the animals were no longer their private property.

Besides REs, independent reindeer herding households (RHs) have also always existed in Russia even up to the present day. In several areas, mostly in the northern part of western Siberia, many herding households were not collectivized into REs and remained independent, despite the attempts made by local authorities to control them. In some districts, RHs owned the majority of reindeer. On the contrary, in other regions (for example, in Chukotka) there were only a few reindeer independently owned by RHs while REs predominated.

REs have the status of legal entities, RHs do not. REs are managed by state agencies and regularly receive considerable state support. On the other hand, RHs are more independent of state agencies and regional authorities and they are not supported by the state to any large degree. Most self-managed family economic units are focused on subsistence. As a rule, they are not registered as tax-payers, do not have any legal rights over pasture lands, and have very restricted resource access rights. In the taiga areas, the households which hold very small herds use the reindeer mostly for transportation. They do not slaughter domesticated reindeer for meat. They earn their cash income by hunting wild reindeer, or moose, and selling the meat and skins of fur animals. In tundra ar-

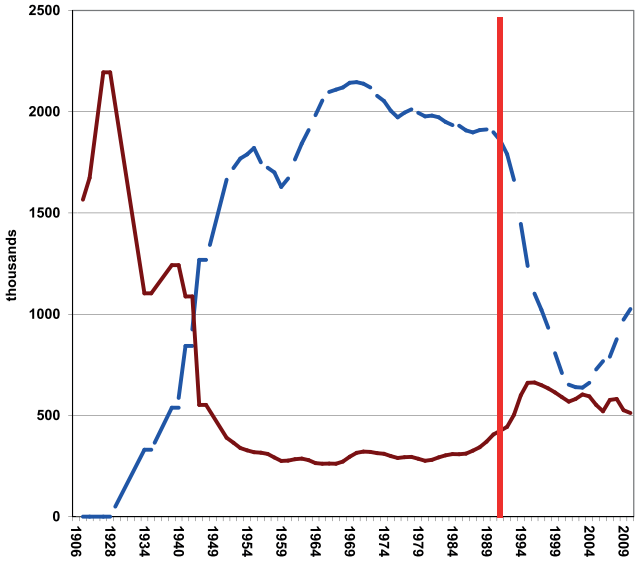



Fig. 3. A comparison of domesticated reindeer numbers in different forms of ownership in Russia. During Soviet and post-Soviet periods, reindeer populations within enterprises (REs - - - ) and households (RHs —) were quite different and sometimes even opposite to each other. All reindeer were owned by reindeer herders until 1928 when reindeer-herding enterprises were first created. Collective enterprises (kolkhozes) were formed after collectivization. Later kolkhozes were transformed into state enterprises (sovkhozes). From 1960 to the 1980s, reindeer enterprises (kolkhozes and sovkhozes) owned about 85-90% of the total number of domesticated reindeer, and herding households owned the rest. In the first post-soviet decade some reindeer were privatized back into households. Since 2004 the number of reindeer in enterprises has increased due to an increase in state support. However the state does not support family businesses.

eas, rich herders often have several hundred or more domesticated reindeer and they slaughter these animals for sale.

It should be emphasized that the recent post-Soviet reforms created a much more diverse institutional structure than was present in Soviet times. By the end of the 1990s, nearly all REs were reorganized. In some cases, herds belonging to state enterprises were divided between the RHs. Later, parts of these RHs were merged into associations named "clan communities" (*obshchiny*). This could be understood as a type of "post-Soviet collectivization". At present, only some of these clan-communities are really operating as associations of RHs. Most of them function as if they were enterprises, that is, they differ from sovkhozes only on paper.

The main point is that during Soviet and post-Soviet periods reindeer populations within REs and RHs were quite different and sometimes even opposite to each other (Fig. 3). This fact alone demonstrates the necessity of distinguishing between REs and RHs institutional types.

*The ecological diversity of reindeer husbandry*

Both reindeer-holding households and enterprises differ in the size of their herds and in the way they use pastures in different seasons and different landscapes. Their ecological diversity is closely connected with economics, and each ecological type has its own economic strategy. Large-scale reindeer husbandry has the economic goal to produce meat. It uses summer and winter pastures which are located long distances from each other in contrasting landscape zones (tundra – forest-tundra – taiga). Small-scale husbandry is designed to meet the subsistence and/or cultural needs of the herders' families, usually without long migrations. The latter form is typical for the taiga and for mountainous regions. Between these two main types, there are many intermediate ones.

*The ethnic and cultural diversity of reindeer husbandry*

From an ethnic and cultural point of view there are five types of reindeer husbandry in Russia (Vasilevich & Levin, 1951):

- Sami type (only Samis on Kola Peninsula);
- Samoed type (Nenetses, Komis, etc. mainly in the western part of the tundra and taiga);
- Chukchi-Koriak type (in the eastern part of the tundra);
- Tungus type (Evenkis, Evens, Iakuts, etc. in the eastern part of taiga);
- Saian type (only Tuvins and Tofalars in the central Siberian taiga).

The cultural features of reindeer husbandry are closely connected to the natural environment. Historically, each ethnic group developed its own traditions within a particular natural landscape. Thus, the Samoed and Chukchi-Koriak cultural types are two different versions of the tundra large-scale type featuring long migrations. The Tungus and Saian cultural types are two versions of the taiga small-scale ecological type.

The ethnic and cultural traditions of reindeer herding peoples are still significant in the context of economic and social changes (Klokov, 2007: 727-729; Klokov, 2011). During the recent post-Soviet reforms, ethnic traditions greatly influenced the way that herders chose an economic strategy and survival strategy. On the basis of the interviews I have conducted, it is possible to identify three distinct ethnic survival strategies in different regions (Klokov, 2000: 46):

a. escaping the official control of state agencies and local governance (i.e. to try to be "invisible");
b. not to resist innovations and modernizations and to agree to reject a traditional lifestyle in favour of a modern one;
c. to try to create indigenous institutions and to establish formal links with the legal institutions of the dominant society and to be integrated in their social and economic systems, while at the same time keeping a traditional way of life.

*Case studies*

All of the above-mentioned husbandry types are interrelated. The specific strategy of each concrete community is often a combination of several types. Here are three examples from my own field research.

Case 1: The western part of the Kanin peninsula[1]:

1. large-scale reindeer husbandry with very long seasonal migrations (up to 300 km) alternating between tundra in the summer to the taiga in the winter;
2. a 'Samoed' cultural type where herders live in relatively small mobile tents and keep constant contact with their herds winter and summer. They harness reindeer for transport and use sledges;
3. a combination of both institutional types (RHs and REs) with RHs predominating. Family households are all formally united in an association called obshchina "Kanin".

Case 2: The central part of Chukotka[2]:

1. large-scale reindeer husbandary with relatively long seasonal migrations (about 100 km) from the open tundra at near the sea in summer to a mountainous location in the winter;
2. a 'Chukchi-Koriak' cultural type where several families live communally in large dome-shaped 'iaranga' lodges. The herders travel on foot in warm periods without harnessing reindeer. The design of winter sledges differs considerably from the Samoed type;
3. hold the RE institutional type without family owned animals. In this case, the State Unitary Enterprise *"Pevek"*.

1 Fieldwork conducted in 2007 in a mixed Nenets and Komi-Izhzemets community.

2 Fieldwork in 2003 in a homogeneous Chukchi community.

Case 3: The northern part of Irkutsk province[3]:

1. small-scale taiga type of husbandry focused upon the hunting of ungulates and fur-bearing animals. The herders have short seasonal migrations of up to 50 km;
2. 'Tungus' cultural type featuring the use of saddle- and pack-reindeer, the milking of females, the use of smudges in the summer, and the unattended pasturing of reindeer;
3. RH institutional type of almost completely independent households.

**Change in reindeer populations: political and socio-economic contexts**

*Trends at the federal level*

A general analysis of reindeer population trends at the federal level reveals a close connection between changes in reindeer numbers and shifts in the political context. More detailed analysis at regional and local levels suggest that general changes in the social and natural environment had differential effects on the various kinds of reindeer husbandry in different parts of Russia.

The changes to the total number of domesticated reindeer in Russia can be connected most closely with changes in the political context (Figs. 1 and 3).

The most dramatic declines of reindeer numbers were closely associated with the years of institutional reforms wherein ownership rights changed. The largest decline can be associated with the recent withdrawal of state subsidies. In the 1970s and 1980s the state provided considerable support to reindeer enterprises including free veterinarian assistance, the possibility to rent helicopters at a low price, and different kinds of social welfare assistance for herders. The sudden end to state procurements of reindeer products has also had a dramatically negative effect on the quality of life of herding families (Klokov, 2011: 27).

As a result of these changes, reindeer herding families have been led to the brink of severe social crisis. Many have been forced to choose between two options: either they converted to a subsistence economy supported by non-monetary barter, or they quit reindeer husbandry altogether and moved into settlements. With the last option they had to abandon the nomadic way of life and to support themselves with welfare payments.

Such choices were forced onto pastoralists not only in reindeer husbandry but also in all branches of agriculture in Russia. In the period from 1991 to 2003 the population of reindeer in reindeer enterprises decreased to approximately 35% of their previous populations. The number of other kinds of domestic animals in enterprises decreased even more: livestock of great cattle and pigs to 33%, and livestock of sheep and goats to 25%. By contrast, the number RH-reindeer slightly increased when part of RE-herds were given to RHs. However conditions for family business development remained unfavourable and many RHs had to slaughter their reindeer very soon.

A similar drop in populations was only recorded during the early collectivization at the end of 1920s when private herds were transferred to collective ownership. Many families refused to transfer their animals to kolkhozes and slaughtered them. This also happened not only with reindeer, but also with all cattle in Russia.

On the other hand, the reorganization of kolkhozes (enterprises with collective ownership) into sovkhozes (enterprises with state ownership) in the 1960s resulted in a total increase in reindeer number. This can be associated with the fact that with state ownership began the system of subsidies that we associate with the maximal number of animals.

In the 2000s, after the stabilization of Russian economy, the number reindeer crept up gradually but not everywhere. The total num-

3 Fieldwork conducted in 2009 in a mixed Evenki and Iakut community.

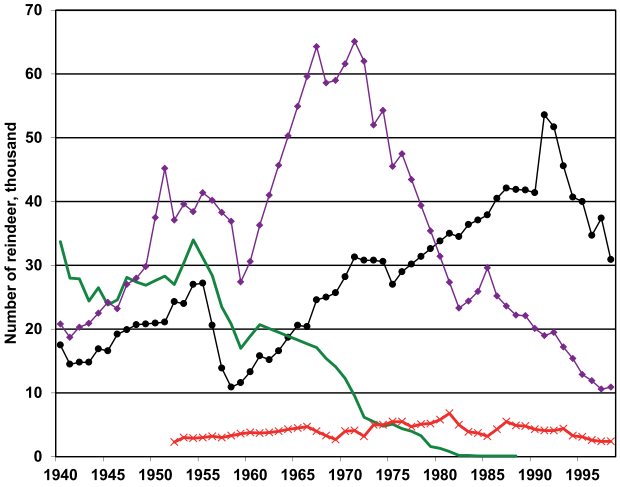



Fig. 4. Domesticated reindeer populations (in thousands) in different ethno-economic areas of the Taimyr Autuonomous okrug; Nenets' (-●-), Nganasan's (—), Dolgan's (-✦-), and Evenk's (-✶-). Within several local ethno-economic areas of the same administrative district, reindeer populations vary greatly. The sharp rise in the wild reindeer population in the central part of Taimyr resulted both in the complete loss of reindeer husbandry in the Nganassan area and in the depression of reindeer husbandry in the Dolgan area. By contrast, the domesticated reindeer numbers in the Nenets area situated on the West of the Enisei River increasd in the 1970s and 1980s. The number of domesticated reindeer in the Evenki area (in the Lake Khantaika basin, situated in the southern part of Taimyr) has gradually decreased since 1981.

ber of domesticated reindeer population in the Russian Federation had reached 1 552 900 by January 1, 2010. There were several different reasons for the growth. Firstly, the development of market economy opened new markets for reindeer meat in the northern regions and REs started to receive a relatively stable income. Secondly, observing the distress of indigenous communities, the governments of many regions started supporting REs financially. Thirdly, the legal framework that supported independent reindeer households was improved. Soviet-era policies restricted the size of all private businesses including reindeer herding households. Special regulations which limited the number of reindeer that one owner could have in many northern regions (from 20 to 50 heads, depending of the region) were abolished after the *perestroika*. Now regional governments neither hindered the growth of reindeer herder households nor provided them with any significant support. On the other hand, REs began to receive state assistance regularly. The only households who received some state support were those which united into legal clan communities.

*Trends at the regional level*

Post-Soviet reforms led not only to a change in the reindeer total number but also to a change in the geographical distribution of reindeer husbandry. All reindeer herding areas in Russia can be divided into three large zones (Fig. 2) according to their geographical, ethnic and economic characteristics. Two of them are located in the tundra areas: The northwestern zone (from the western borders of Russia to the Enisei River) and the northeastern zone (from the Enisei River to Chukotka). The third one includes the Siberian taiga (Jernsletten & Klokov, 2000: 31). There are several reindeer herding peoples in each of the three zones. In general, Nenets reindeer husbandry dominates in the northwestern zone, while Chukchi, Koriak and Even reindeer husbandry is located in the northeastern zone. Evenki reindeer husbandry predominates in the Siberian taiga zone.

An analysis of variations of across these three zones shows different patterns of response to the social and economic events. For instance, during the economic crisis of the 1990s, reindeer numbers increased in the tundra districts of the Iamal-Nenets Autonomous Okrug while declining in Chukotka, Koriakiia and northern Iakutiia.

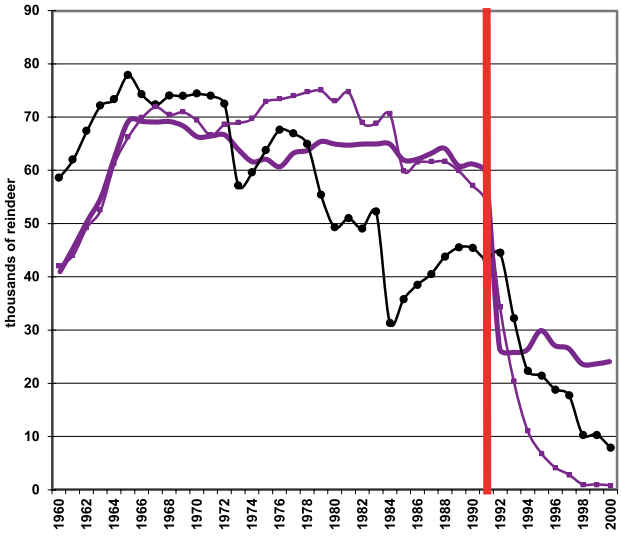
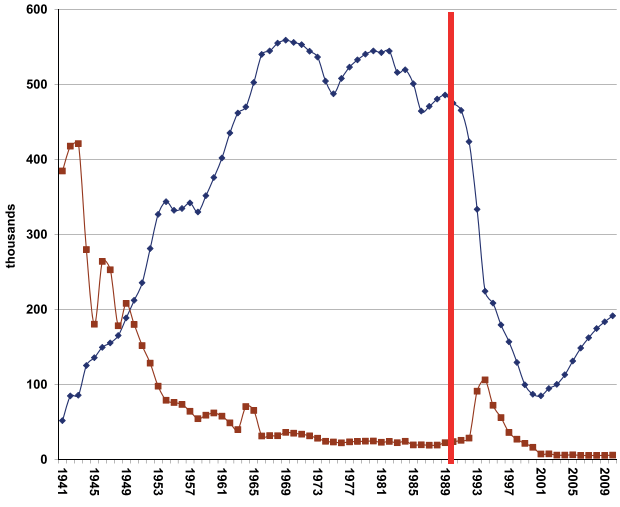



Fig. 5. The population of  of domesticated reindeer (in thousands) in different regions [central (—), northeastern (-●-), and southeastern (-■-)] of the Chukotka okrug.Reindeer numbers fell dramatically in the so-called zone of risky reindeer husbandry (eastern part of Chukotka) in the 1990s during the post-Soviet economic crisis. In the central part of Chukotka with favourable natural conditions, the number of reindeer declined only during the two first years of the crisis.

During the Soviet period, more than a half of all domesticated reindeer (53-58%) was located in the northeastern zone. Chukchis held an especially large number of reindeer (595 000 by January 1, 1969). The number of reindeer in this northeastern zone fell dramatically in 1990s as a result of the reorganization and privatization of reindeer. In Chukotka, reindeer number decreased to 92 500 by January 1, 2001 (about 25% of its maximum level). Now Chukchi reindeer husbandry is re-establishing itself and the number of reindeer has doubled (to 196 700 by January 1, 2010). In spite of this, the northeastern zone represents less than 30% of the total domesticated reindeer population across Russia.

One can also find contradictory tendencies within certain regions. Thus in four different parts of the Taimyr Autonomous Okrug, the reindeer population from 1960 to 1990 were completely different (Fig. 4). Returning to Chukotka, we can see that the dynamics of specific reindeer populations was different in different districts in the 1990s (Fig. 5).

Fig. 6. A comparision of reindeer populations in different forms of ownership in the Chukotka okrug; Enterprises (-✦-), Households (-■-). In Chukotka, collectivization finished as late as the middle of the 1950s (about 10 years later than in Iamal-Nenets okrug). In the 1970s and 1980s, reindeer enterprises owned nearly all domesticated reindeer. Herding households held only 3 to 4% of the reindeer. During the post-Soviet crisis, enterprises lost most of their reindeer. Some of these reindeer were transferred to small scale communal enterprises, but this experiment collapsed quickly due to the lack of markets and lack of support from the regional authorities. In recent years, the regional government has greatly supported reindeer enterprises but family based reindeer husbandry has continued to suffer.



Across most regions, the dynamics of domestic reindeer populations differed between REs and RHs. In the northeastern zone (see Fig. 2) the main reindeer husbandry institutional type was an RE (sovkhozes). RHs were practically eliminated in the 1980s. The collapse of the state sector in the 1990s led first of all to a dramatic decline of REs. Many REs went bankrupt and part of their animals became property of clan-communities and so-called farmers' economies (rural household registered as a juridical person). However, these new formed institutions did not have access to a market and they did not obtain any state or regional government assistance. In several years, the number of their reindeer reduced to zero.

The restoration of reindeer husbandry in Chukotka started in 2002 when the government of the region allocated resources to support REs and indigenous villages. As only REs were supported by the state, reindeer number of the RHs practically did not increase. On January, 1, 2010, RHs possessed only 3% of the total number of reindeer in Chukotka (Fig. 6).

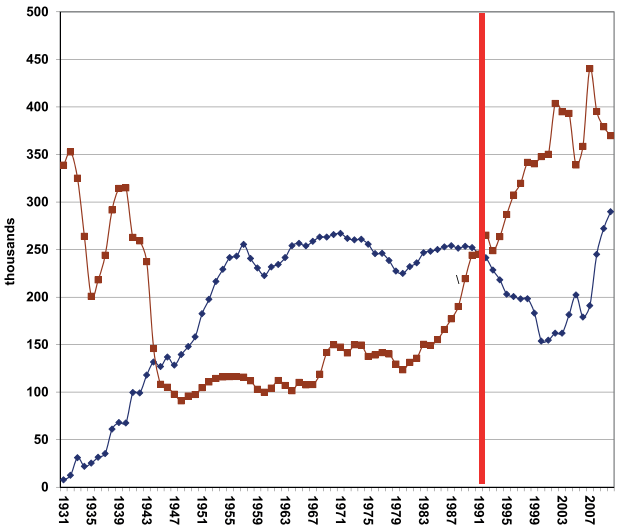



Fig. 7. A comparison of domesticated reindeer populations in different forms of ownership in the Iamal-Nenets okrug; Enterprises (-✦-), Households (-■-). From the 1930s to the end of WWII, the population of reindeer in enterprises increased while the population of family households fell due to collectivization. Indeed, herders owned up to 50% of the total reindeer stock in the Soviet period. Since the 1980s, the number of reindeer in households increased to around 400 000 head in the 2000s while during the crisis from 1991, the number of reindeer in enterprises declined considerably from 250 000 to 150 000 animals but is on its way up from 2000 due to support of regional authorities. In recent years, some family households joined together into small-scale clan-communities which are officially classified as reindeer enterprises. This explains why the population of reindeer in households fell.

In the northwestern zone, and especially in the districts where Nenetses and Komis live, the role of RHs has always been significant. On the Iamal and Gydan peninsulas herding households possessed more than 200 000 reindeer (about 40% of the total livestock) even during the height of the Soviet planned economy in the 1970 and 1980s. The average proportion of reindeer held by RHs in the Iamal-Nenets Autonomous Okrug has never fallen below 30% (Fig. 7).

During the post-Soviet reforms, the total number of reindeer held by Nenetses even increased. However, this growth was uneven in different places. The important growth took place only in two tundra districts of the Iamal-Nenets Autonomous Okrug on the Iamal and Gydan peninsulas. During the last five years, the adjacent Priural'skii district also recorded growth. By contrast, the southern districts of the Iamal-Nenets Autonomous Okrug as well, as in Murmansk and Arkangel'sk oblasts and the Komi Republic, the number of reindeer fell during the 1990s. However, here the fall was gradual and unlike the collapse of reindeer husbandry in the northeastern zone.

The Iamal-Nenets Autonomous Okrug is well known as the place with the most inten-

sive industrial development in northern Russia. Industrial development is often associated with the degradation of reindeer pastures due to the disruptive effect of urban settlements, pipelines, roads, and other infrastructure. Nevertheless the Iamal-Nenets Okrug is the only region in Russia where the number of domesticated reindeer has constantly increased during last 50 years even during the crisis of the 1990s (Fig. 7). To explain this fact, we can assume that the combination of the two different institutional forms of reindeer husbandry (REs and RHs) in the region gave the reindeer economy the ability to adapt to the changes introduced by industry. Another important reason is the high degree of nomadism among the Nenetses (Klokov, 2011). However, the support of the rapidly growing industrial towns should not be underestimated as they provided stable markets for venison. Oil and gas companies gave a stable tax base which was reinvested also in rural economy including reindeer enterprises.

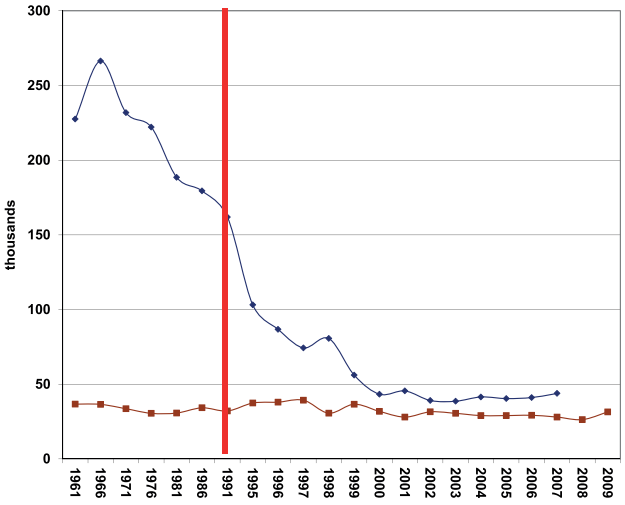



Fig. 8. A comparision of domesticated reindeer populations in different forms of ownership in the Siberian taiga; Enterprises (-♦-), Households (-■-). In contrast to tundra regions, the number of reindeer held by enterprises in Siberian taiga zone began to fall long before the post-Soviet crisis. Recently, the population has leveled off at a low number. In the last fifty years, the number of reindeer owned by herders' households has been consistently low. Reindeer husbandry in several taiga localities is now endangered or has even disappeared.

The actual status of reindeer husbandry in the Siberian taiga (Fig. 8) is quite different than in the two tundra zones. Taiga reindeer husbandry was never designed for the production of meat but instead to provide reindeer transport for other activities. Saddle-reindeer as well as reindeer sledges still remained an important kind of out-road transport in remote taiga areas in the 1950s. REs (kolkhozes) in taiga area received most of their income from transporting geologists, surveyors, and topographic expeditions. REs during the Soviet period were also required to produce meat, and this led to an increase in herd sizes. However this activity was never profitable. The decrease in taiga reindeer numbers began in the mid 1960s (Fig. 8) when helicopters replaced reindeer for transportation. The proportion of reindeer in the Siberian taiga in the 1950s was 11-12% of the total number of domesticated reindeer in Russia but by the turn of the century it fell to 5% (80 000). After the crisis of the 1990s, the REs collapsed in many taiga districts and only indigenous households continued to hold small scattered herds. During the crisis, families used their saddle reindeer to hunt sable and other fur animals. Their small herds of 10-50 head also provided their families with a source of milk, meat, and skins. Cargo-reindeer were also used to carry the meat of wild reindeer, moose, and Siberian deer to market. The meat of domesticated reindeer was sold only in extreme cases.

It could be said that the RHs of taiga hunters were also adapted to the industrial development in their own fashion. In eastern Siberia,

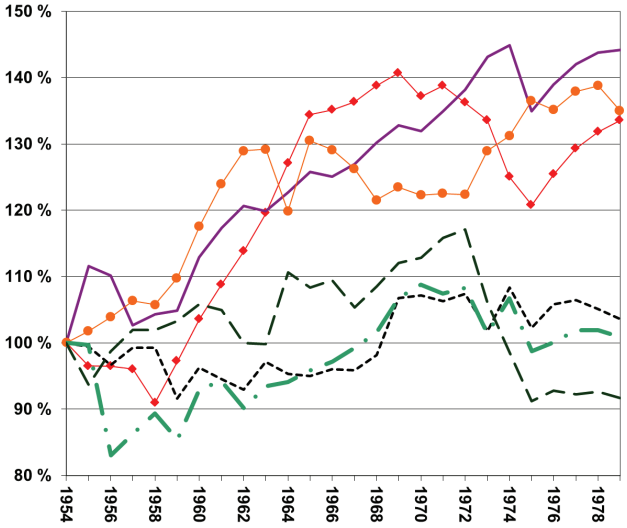



Fig. 9. A comparison of domesticated reindeer populations in the eastern and western parts of the Russian tundra in the period from 1954 to 1979. The baseline year is 1954. **The eastern tundra** is defined as Chukotka (-✦-), north-east of Iakutia (—), and north-west of Iakutia(-●-). **The western tundra** is defined as the Kanin/Timan tundra (---), Nenets okrug (—-), Kola peninsula (–-). During this period, the reindeer population in the eastern part of Russian tundra was increased slightly while numbers in the western tundra remained stable.

there are many placer gold operations which typically destroy the vegetation and the top-soil along river valleys. However, the indigenous reindeer herding families still co-exist with these operations by abandoning some pastures but returning twenty or thirty years later after they recover. On the other hand, it seems that state-owned REs can never develop successfully in the taiga in spite of their access to enormous pastures. The production of reindeer meat production in Siberian forests is too costly and can not be profitable (Klokov, 2007: 763). In the future, traditional taiga reindeer herding can be a resource developing tourism – a kind of northern *safari* with hunting, fishing and travelling riding a reindeer.

**Changes in reindeer number: possible climatic impacts?**

In Russia, the huge changes in reindeer numbers provoked by the instability of political, social, and economic life make it nearly impossible to find any link to long-term climatic changes. However, it is possible to identify some trends when we compare the numbers across different regions of northern Russia. During the period of 1960 to 1990, there was a slow growth in reindeer numbers in the northeastern zone, but in the northwestern zone this tendency was not present (Fig. 9). This difference may be connected with climatic drivers. It is possible to associate these changes with the classification of atmospheric circulation by Dzerdzeevski (Kononova, 2009; 2010). His classification includes 41 different types of atmospheric circulation in the northern hemisphere and each type gives detailed representation of circulation processes in certain regions. Analysis of the climatic changes on the base of this methodology showed that one of the circulation type (namely the southern meridian type) was very frequent in the second part of the 20$^{th}$ century. In the 1970s, this type indicated that cyclones predominated in east Siberia and far east tundra while in the western part of the tundra (from Kola peninsula to the Urals) high atmospheric pressure predominated (Kononova, 2009: 68). Connected with cyclones, cool and windy weather in east Siberia and far east tundra during the summer seasons was favourable for reindeer (both domesticated and wild). Subsequently, the conditions for reindeer summer pasturing were better in eastern part of Russian tundra than in the western part at that time.

During the 1990s, the negative impact of social and economic drivers overshadowed the favourable climatic conditions and depressed the population of domesticated reindeer although the frequency of southern meridian type of circulation reached its height.

The above-mentioned association is merely a hypothesis which needs further research to be confirmed or not. The fact that the numbers of domesticated reindeer grew in the northeastern zone could also be caused by economic reasons. However, one argument against the "economic-hypothesis" is the fact that several large populations of wild reindeer in eastern Siberia, i.e. Taimyr population and three populations in northern Iakutiia (in Lena-Olenek and Iana-Indigirka interfluve areas, and the Sundrun river basin), dramatically increased at the same time. One would not expect the growth of wild reindeer populations to be influenced by human markets. Only after the point when wild reindeer numbers multiplied and hunters started their harvesting them, one could say that human interference became significant.

The growth of the wild reindeer populations in several regions of eastern Siberia, in turn, resulted in the decrease of domesticated reindeer number in the same areas (Klokov, 2004; 2007). In some restricted areas reindeer husbandry even disappeared (for example in Nganasans area in the central part of Taimyr, see Fig. 4).

Why does the impact of global climate change on the domesticated reindeer population dynamics seem to be much feebler than the influence of social and economic drivers in Russia? The main reason may be the fact that reindeer herders adapted to unstable weather conditions by reducing slaughtering.

Diagram (Fig. 10) shows the number of calves per 100 females in three REs in northeastern part of Chukotka in the last 20 years of the Soviet period. The northeastern part of Chukotka is situated in a so-called *zone of risky reindeer husbandry* where large scale losses of reindeer due to bad weather conditions are common. Years with dramatic declines (1971, 1973, 1984) were most probably connected with very bad weather conditions. The year 1982 was especially bad in one area – the southeastern part of Chukotka. The severe reduction of reindeer during these years is associated with the formation of ice-crusts on the snow according to local publications. Nevertheless, sovkohzes tried to adapt to climatic adversity by rebuilding their herds by the end of the year (Pantin, 1985: 7)[4].

REs in the Nenets Autonomous Okrug also tried to compensate for losses in a similar manner. I have analyzed the rate of survival of adult reindeer in 8 REs of this area in 1960-1986. The index oscillated most often between 88% and 98%. In 1985 the rate of survival fell down to 74%-82% in five REs and in 1972 it dropped down to 80%-85% in four REs. However, these losses are impossible to notice in the statistics of reindeer number because the losses in reindeer numbers were compensated for by reduced slaughters.

During the crisis of the 1990s, slaughtering was not reduced, and losses were not compensated any more. Consequently the number of reindeer was reduced, first in the districts with unfavourable climatic conditions. Thus in the southeastern Chukotka (the former Beringovskii district) where formation of ice crust in the snow is common, the number of reindeer in the 1990s was reduced practically to zero (Fig. 5).

4 Our attempts to reveal a correlation between the number of calves per 100 female and weather statistics have not brought any results. The reason could be nonlinear type of correlation between weather conditions and reindeer population dynamics. Thus, in the central part of Chukotka, reindeer often perish during the summer with extremely hot weather and in eastern areas situated along the Pacific Ocean coast, warm winters with ice-crust on the snow are especially dangerous for reindeer (Korchagin, 1986: 31).

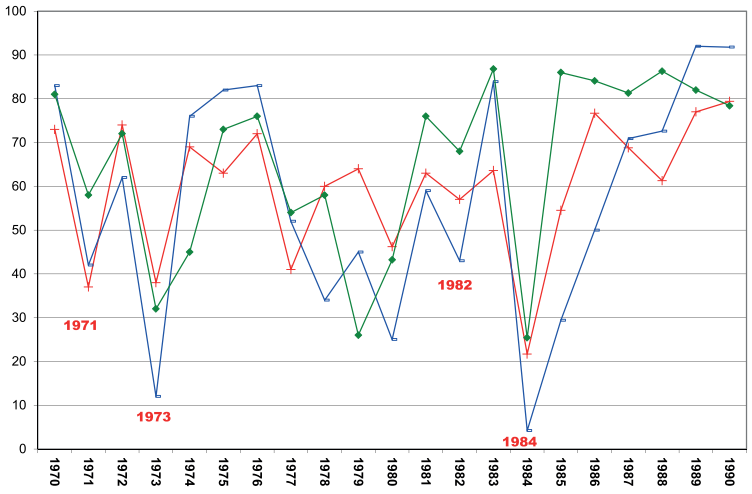



Fig. 10. The number of calves per 100 females in the sovkhozes named "Imeni 50-letiya Oktiabria"(—+—), "Geroi truda" (—), "Imeni Lenina"(—+—) in north-east of Chukotka 1970 to 1990. The calf survival rate was very low in some specific years. This is most likely due to poor weather conditons. There are some remarks on these years in the literature, but nevertheless there is no linear correlation between calf loss and weather statistics.

Only in the recent years, reindeer husbandry restored due to state support. Now the number of reindeer in this district have reached 6000, about 1/10 of the population in the 1970s.

The number of reindeer in another part of the zone of risky reindeer husbandry in the northeastern of Chukotka (Chukotskii and Providenskii districts) also reduced dramatically during economic crisis. In opposite, in the central part of Chukotka where climatic conditions are more stable and favourable for reindeer husbandry, the number of reindeer has also reduced but not so significantly as in the zone of risky reindeer husbandry (see Fig. 5).

## Conclusion

My analysis has shown that political events in Russia significantly influenced the changes of the reindeer population. The most dramatic event that led to a reduction of the domesticated reindeer population by half was the transition from the Soviet economy to a market economy during the 1990s to 2002. Nevertheless, even this varied across different regions and sometimes the political events resulted in contradictory changes in the number of reindeer. These differences were associated with abilities of herders to adapt to new conditions.

In the last few years, the most important driver of changes of reindeer number was the policy of northern regions aimed at the support of reindeer husbandry by which we can explain the quick recovery of reindeer number in Chukotka and Iakutiia from 2005 to 2009. But in the taiga, there is no significant increase of reindeer number and it has continued to decline in some places. Climatic impacts on reindeer number are reflected so weakly in official statistics that it is not possible to make any specific conclusions. However, weather conditions and consequently climate change might influence the productivity of reindeer herding in some regions which in turn might be visible in the rate of survival of adult reindeer and the number of calves reported born in some annual reports. However these changes are almost certainly compensated by human decisions to slaughter more or less reindeer, masking the effect of climate change.

## Acknowledgements

The research has been carried out over ten years in many regions of the Russian North and has been supported by a number of granting agencies, including the international project "BOREAS: Homes, Hearths and Households in the Circumpolar North" (within which

my fieldwork was co-sponsored by the Research Council of Norway - project 179316 and the National Science Foundation – project 0631970 ); the Russian Humanitarian Research Foundation, Saint-Petersburg State University, the Russian Academy of Science, the Russian Geographical Society, the McArthur Foundation. The analysis presented here was been done during the project "Drivers of change in circumpolar tundra ecosystems (TUNDRA)" supported by the Research Council of Norway. The author received constant support from local administrative agencies for archival research, and directly from herders and specialists in reindeer husbandry. I would like to thank my colleagues at the universities of Saint-Petersburg and Tromsø, Norway. Particular contribution to the research has been made by Sergei Khruschev, who collected a large amount of statistical data. David Anderson edited the English in the final version of this article. The author is grateful for all help, understanding and support.

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*Manuscript received 5 January, 2011*
*revisions accepted 8 January, 2012*

Er politiske hendelser eller klima årsaken til svingningene i antall tamrein i Russland?

*Abstract in Norwegian / Sammendrag*: Forfatteren ser på reintallsutviklingen på føderalt, regionalt og lokalt nivå ut fra offisiell statistikk og samtaler med reindriftsutøvere fra forskjellige nordrussiske områder. I siste halvdel av 1900-tallet ble reinantallet drastisk redusert fra 2,5 millioner på det høyeste til et minimum på 1,2 millioner. Denne utviklingen ble først og fremst satt i sammenheng med sosiale og økonomiske forhold som skyldes statlige direktiver. Reformene på 1990-tallet etter Sovjetunionens oppløsning resulterte i en nesten 50% nedgang i tamreinholdet. Men i noen regioner opplevde man faktisk en motsatt trend som skyldes reindriftutøveres evne til å tilpasse seg nye forhold. En detaljert gjennomgang av disse tilpasningene viser en viktig forskjell mellom reindrift drevet med felles eierskap og reindrift eid av familien. Det blir konkludert at virkningen av den politiske sammenhengen er så betydelig at den skjuler evt. andre påvirkningsfaktorer som for eksempel klima. Men en kan likevel ikke utelukke at en gradvis økning i reintallet i nord-østre Russland muligens kan knyttes til endringer i atmosfæriske værmønstre.