PART 2: Data

This part of the report presents the majority of the data contained in the electronic database, although the database provides some complementary information on accuracy, data sources, etc. Some of the maps have been enhanced with additional geographical information.

Section 2.1. provides overview maps of the entire NAO.

Section 2.2. provides detailed maps of the areas covered by the questionnaire survey. The main topic is traditional modes of livelihood, while data on hydrocarbon development are added to show the interference.

Section 2.3. provides maps with satellite image interpretations of the main oil development areas, while available data on traditional modes of livelihood from the questionnaire survey are added to show the interference.

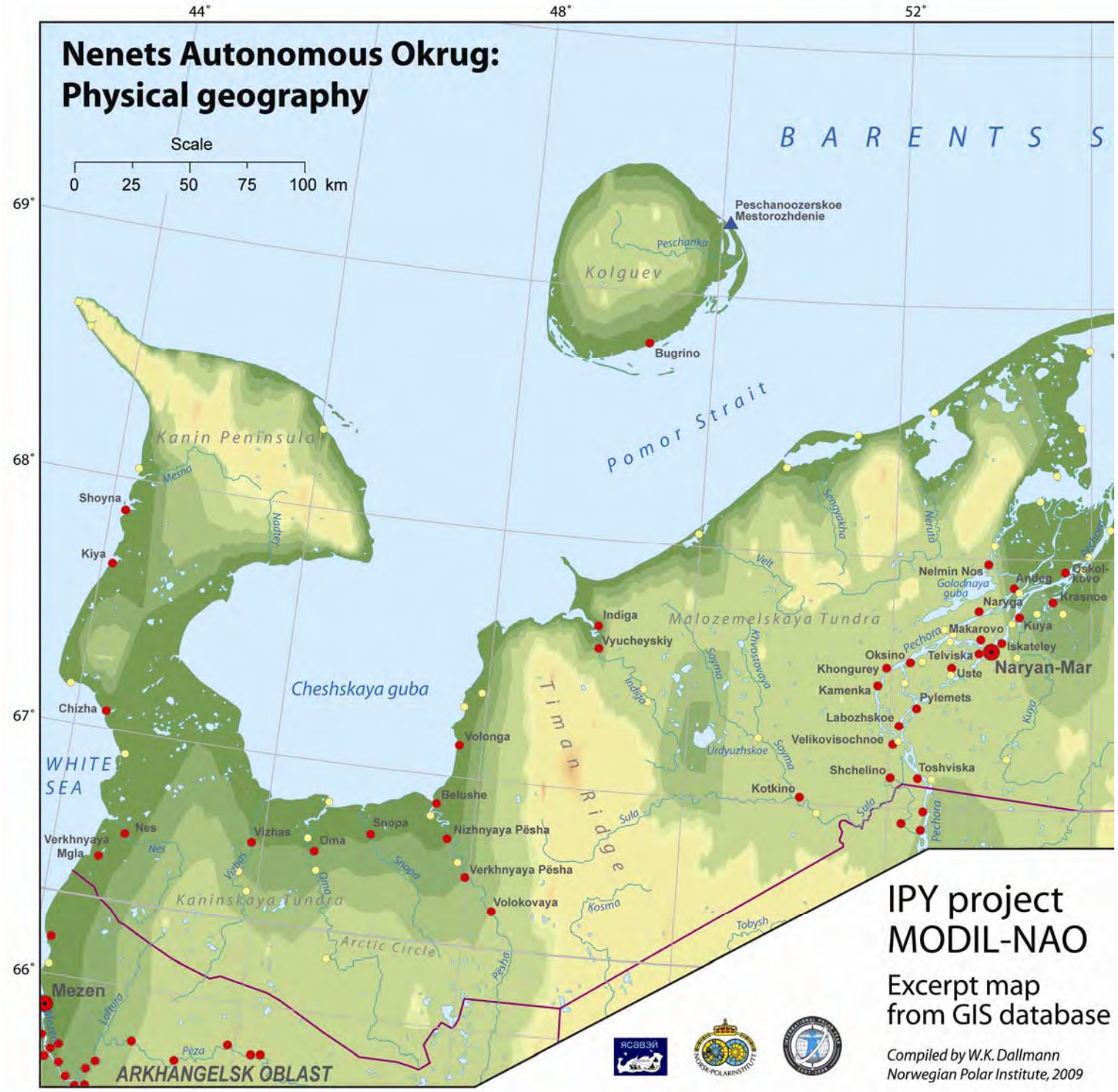
A number of significant attributes of map elements is summarised in the tables in ***section 2.4.***, mainly on settlements, population, traditional cooperatives and protected areas. However, they do not cover the entire database content.

2.1. General maps (entire NAO)

Map series O: General maps:

References to contained data:
Publicly available data and satellite image interpretation (Norwegian Polar Institute)

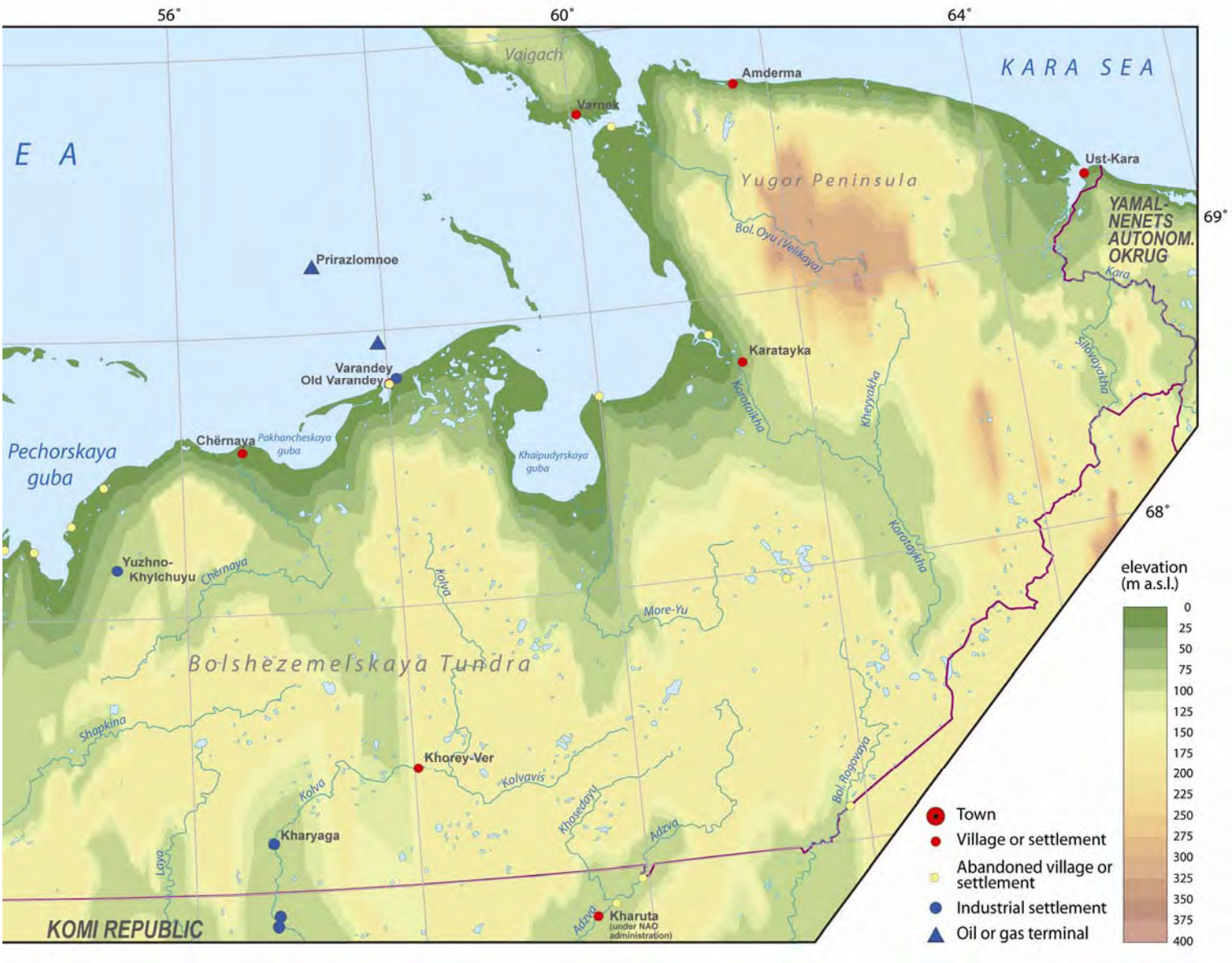
Map scale: 1:2,400,000



MAP O-1: NAO, Physical geography

References for contained data:
'Digital Chart of the World' and various published maps
See also Appendix A3.2 for description of datasets.

Description:
The map shows the topography, main river systems and distribution of inhabited places in the Nenets Autonomous Okrug.



The NAO roughly comprises the tundra areas from the Kanin Peninsula in the west and the Yugor Peninsula (northern extension of the Urals) in the east. It is bound by the Arkhangelsk Region (with which it is administratively associated) and the Komi Republic to the south, and by the Yamal-Nenets Autonomous Okrug to the east. Elevations are mostly below 200 m a.s.l., with numerous swamps and lakes throughout the region. Hilly areas occur in the Timan and Pay Khoy (Yugor Peninsula) ridges, up to 460 m a.s.l. The major drainage channel is the Pechora River, which runs into the sea near the *okrug* capital Naryan-Mar. The vast tundra areas between these ridges are known by the names Bolshezemelskaya Tundra (east of Pechora River) and Malozemelskaya Tundra (west of Pechora River), while areas to the west of the Timan Ridge are called Kaninskaya Tundra. The islands Kolguev and Vaigach in the Barents Sea belong to the okrug.

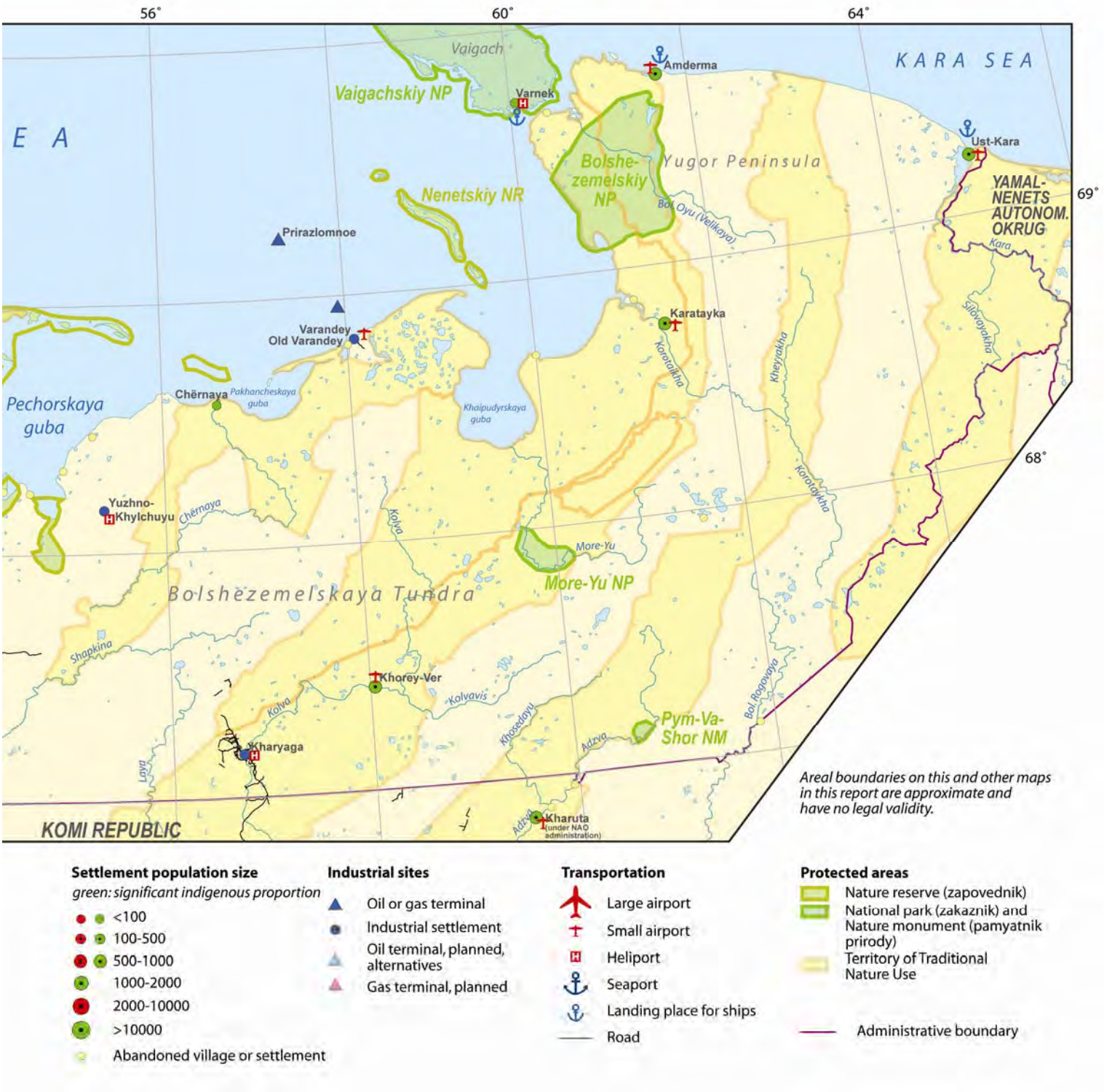
Settlements are widely distributed along the Pechora River and a few other main rivers, mainly in the western part of the NAO, as well as along the shore line.

The vegetation zone is mainly barren tundra, extending into the forest tundra belt (open birch and spruce vegetation). Taiga (high conifer forest) occurs in the southwestern part. The *okrug* has a subarctic-maritime climate and is mostly situated within the permafrost zone, except for the transitional Kanin-Timan area, where the permafrost is only temporary. The frost-free period is 2-3 months, decreasing from west to east. Winter ice covers the entire coast (ca. January-June), and periodically much of the open sea between the Kanin Peninsula and southern Novaya Zemlya. Average temperatures are -10° (west) to -20°C (east) in January, and +8° (north) to +14°C (south) in July.

MAP O-2: NAO, Population, infrastructure, protected areas

References for contained data:
Public statistical data and various published maps
See also Appendix A3.2 for description of datasets.

Description: The majority of the population of the NAO lives along the Pechora River (2/3 of the population in the capital Naryan-Mar), close to the mouths to some other main rivers and the shore. A large number of villages, distributed mainly in the same areas, ceased to be inhabited in the 1950s and 1960s.

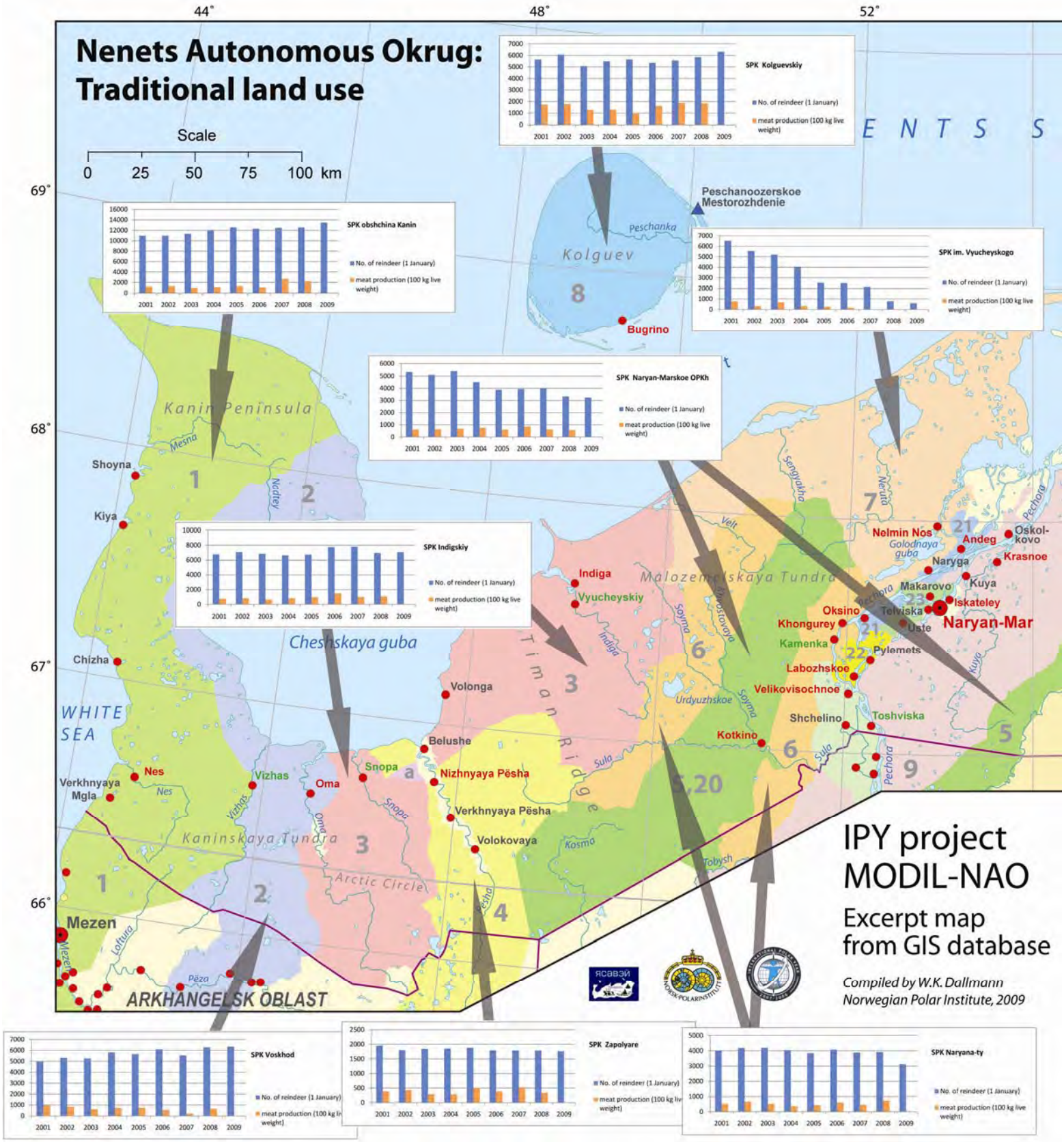


The majority of villages far from the Pechora River have a significant indigenous population.

Roads are almost nonexistent; exceptions are in the vicinity of Naryan-Mar (roads to the vilage of Krasnoe and some oil fields to the east) and the main oil development of Kharyaga (road to the Komi Republic in the south). Transportation is mainly by air (Mi-8 helikopters and AN-2 airplanes), by river traffic in summer, and by snowmobiles and tracked vehicles in winter.

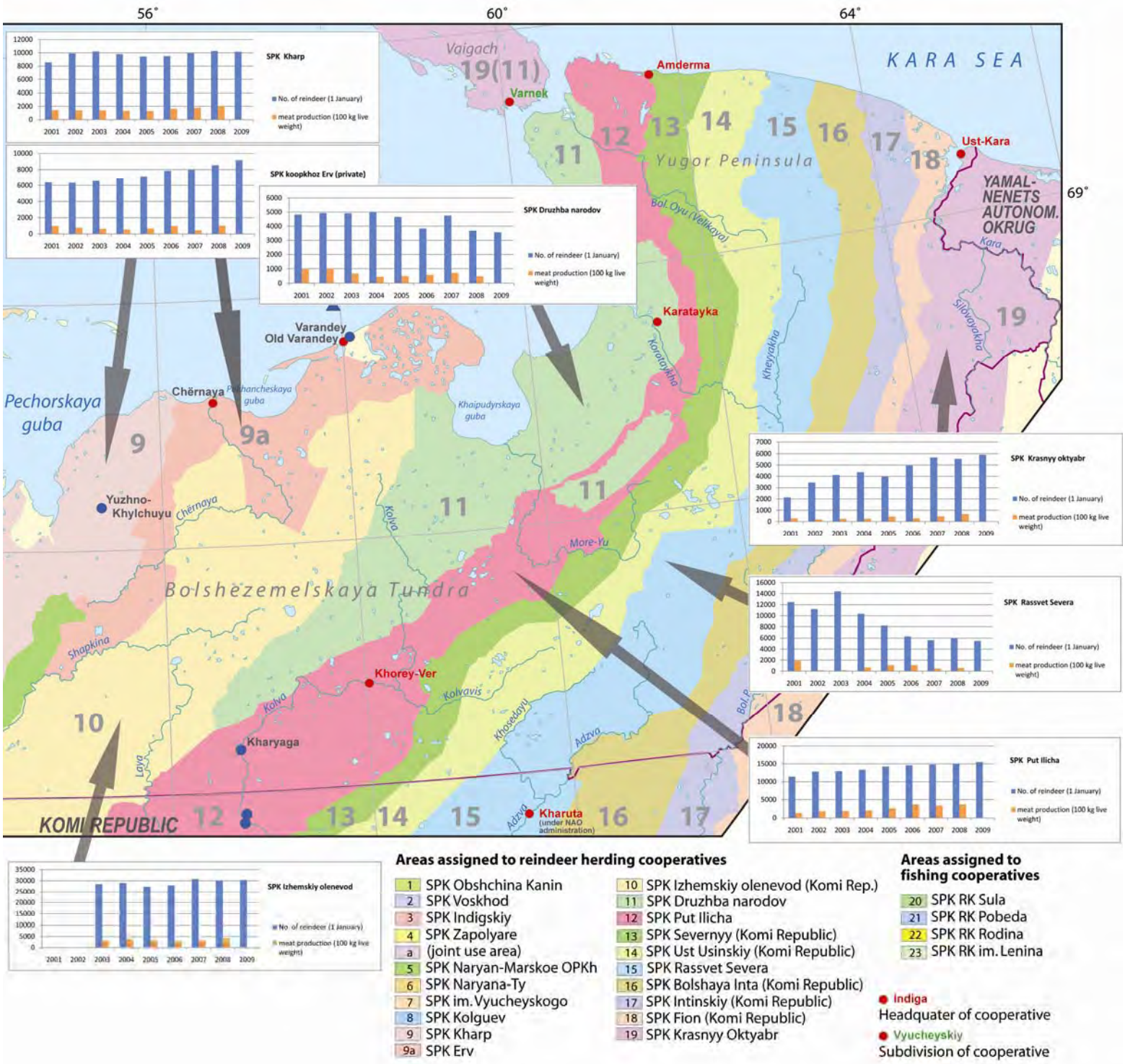
Large facilities related to oil and gas development have developed in the Bolshezemelskaya Tundra, offshore, and on Kolguev Island.

A system of protected areas is intended to preserve the main biotopes of the NAO. In addition, some of the reindeer herding cooperatives have approved Territories of Traditional Nature Use, which – at least on paper – imposes some restrictions on other uses.



MAP O-3: NAO, Traditional land use

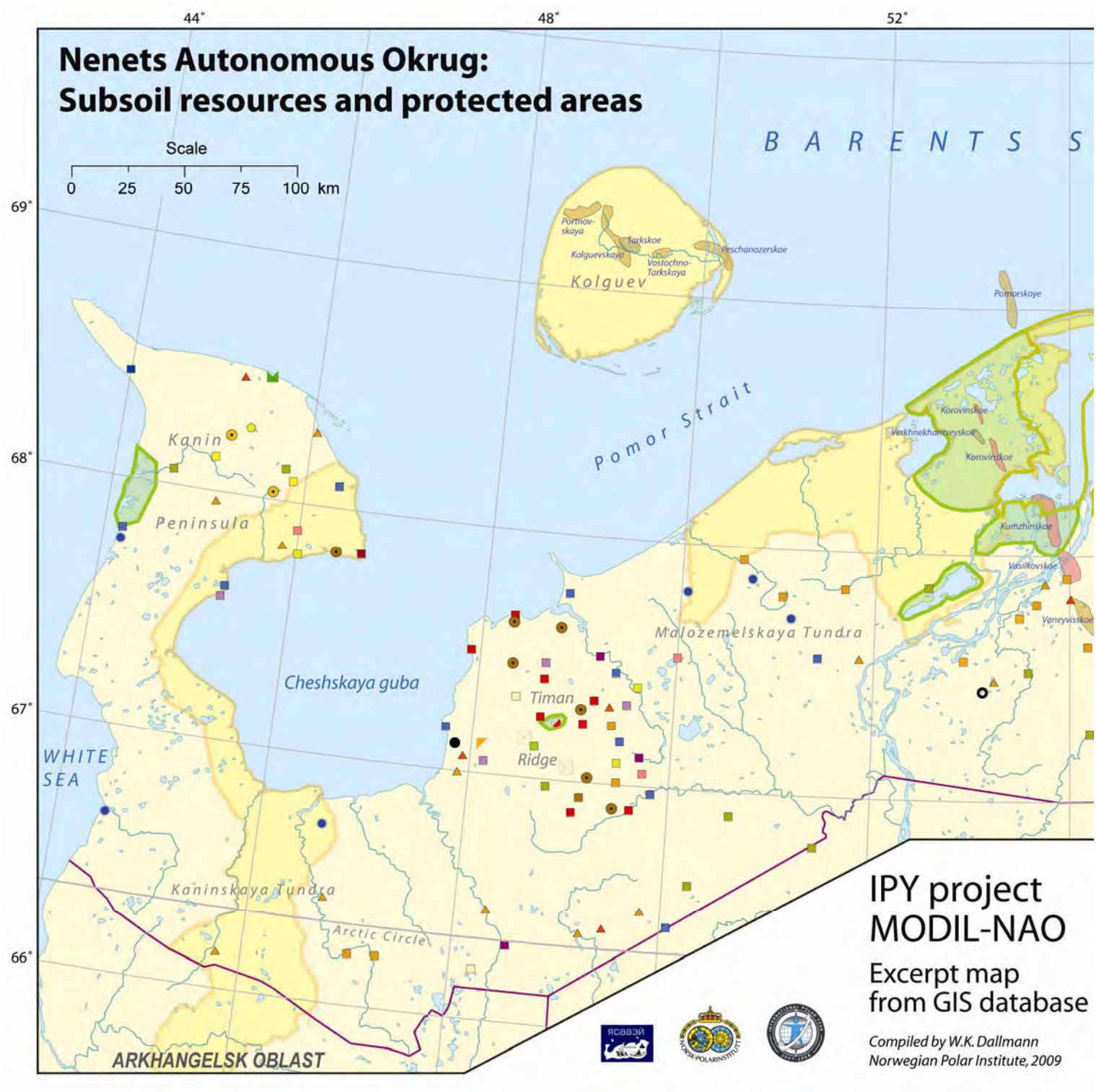
References for contained data:
Division of Reindeer Husbandry at the Dept. of Agriculture, NAO Administration
See also Appendix A3.2 for description of datasets.



Description:

Most of the area of the NAO is assigned to cooperatives of reindeer herders or fishers, which have traditional land use rights. In reality, about 70% of these lands are in use today. Much of the remaining area has been ceded to oil companies or has been given over to some other use. No map is available that shows this loss of pasture land.

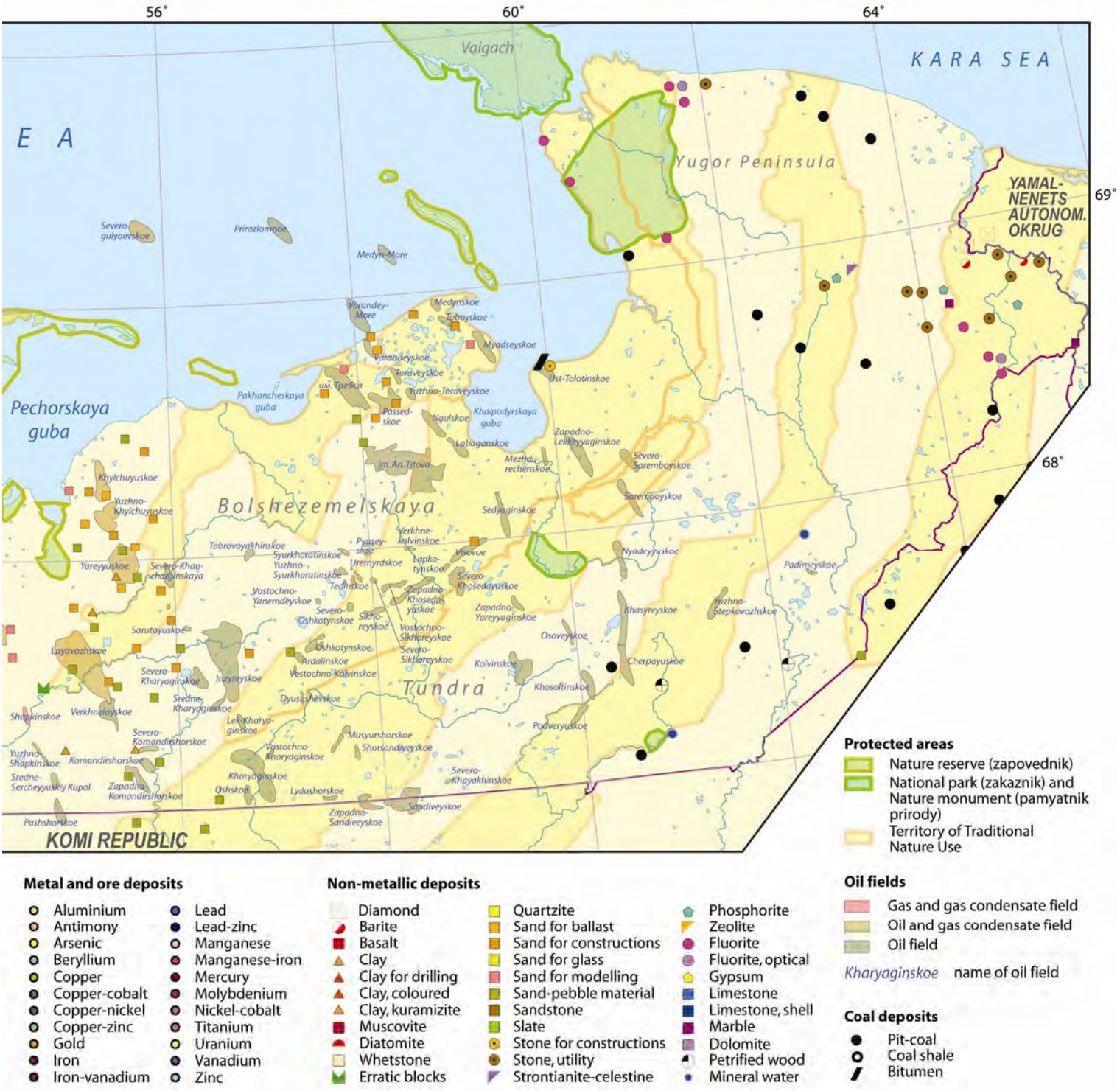
The diagrams give a rough indication of the economic development of reindeer herding cooperatives since 2000 (after the end of the economic crisis in Russia), with numbers of deer (blue columns) and total meat production (orange columns). Some of these are analysed in this report. See especially section 1.4.3.6, where the significantly negative trend of cooperative 7 (SPK im. Vyucheyskogo) is explained.



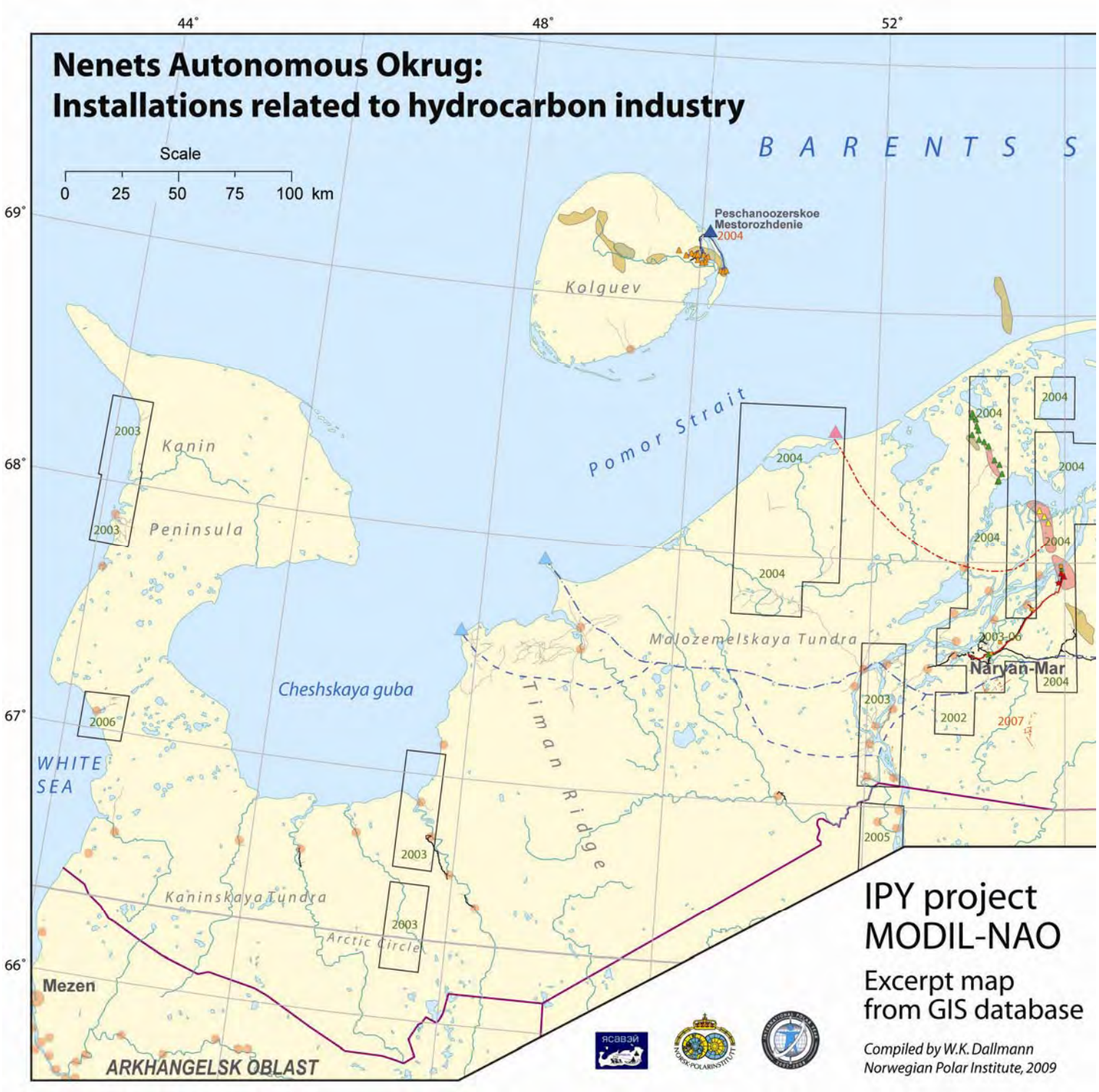
MAP O-4: NAO, Subsoil resources and protected areas

References for contained data:
Oil fields: unpubl. compilation map, Nenets Information and Analytical Centre (2001).
Metal, ore and non-metallic deposits: Journal 'Zapolyarnyy region', April 2008.
See also Appendix A3.2 for description of datasets.

Description:
The map shows hydrocarbon occurrences (oil and gas fields). Only fields with confirmed economically interesting occurrences are shown here, while other investigared structures are omitted.

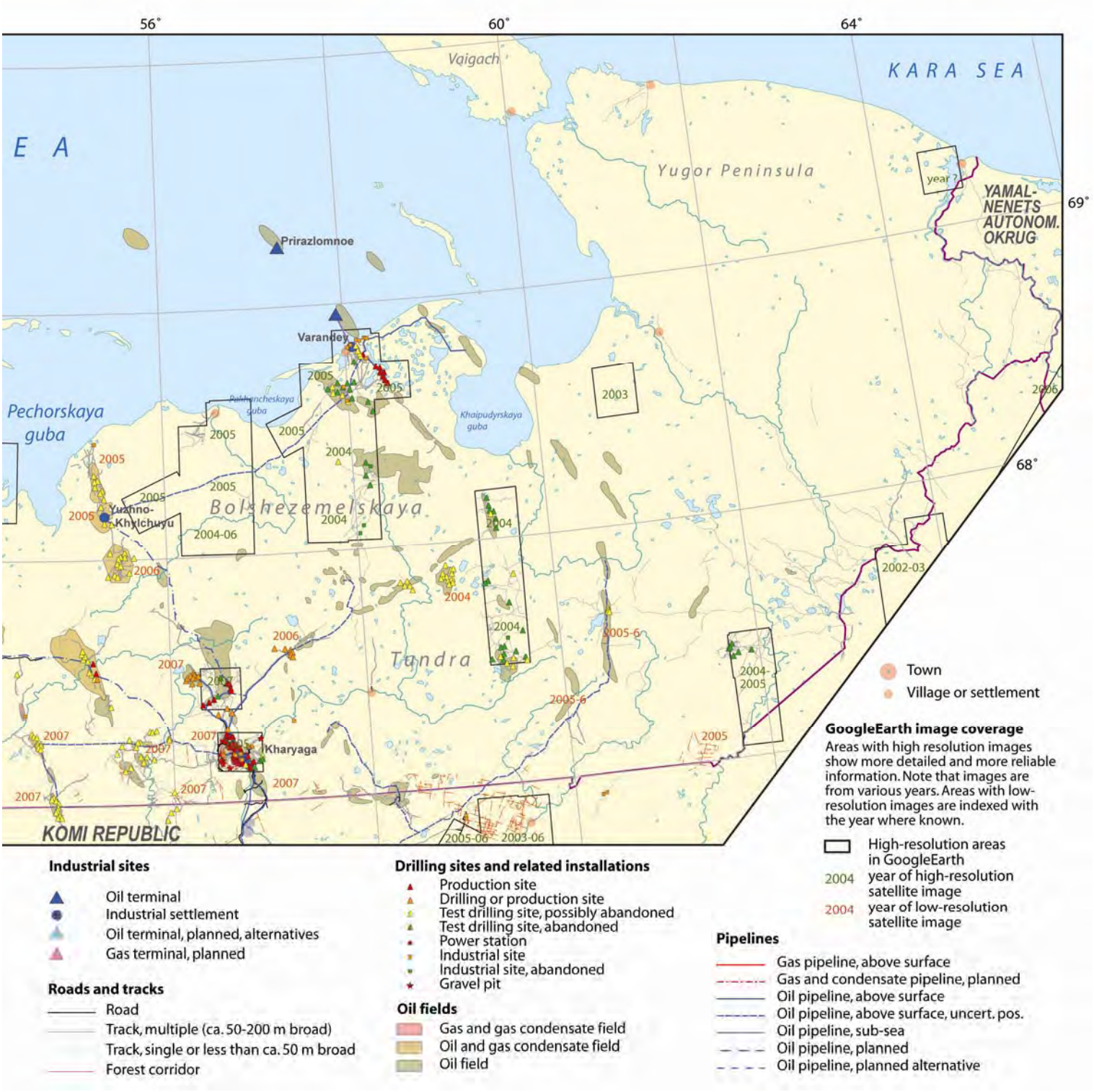


The dataset is not meant to be geologically exhaustive, but gives a rough indication of the areas subject to (future) hydrocarbon development. Oil and gas occur in the so-called Timan-Pechora Basin, which comprises most of the Bolshezemelska Tundra, the Pechora estuary, a small area west of the Pechorskaya guba, Kolguev Island, and offshore areas to the north. Gas and gas condensate occurrences are confined to the northwestern part of the B. Tundra and the Pechora area. The map also shows known occurrences of other georesources, subdivided into metallic, non-metallic and coal deposits. None of these are today mined or have ever been mined on a large scale. The data have been included in the database in order to indicate areas of possible future georesource development. Most ore deposits are confined to the northern Kanin Peninsula, the Timan Ridge, and the northern Urlas (Pay Khoy Ridge / Yugor Peninsula), while sand and similar resources also occur elsewhere. Protected areas are included in the map to show areas of possible conflicts of interest.



MAP O-5: NAO, Installations related to hydrocarbon industry

References for contained data:
Satellite image interpretation, carried out at Norwegian Polar Institute.
Additional data on pipelines from Journal 'Zapolyarnyy region', April 2008.
See also Appendix A3.2 for description of datasets.



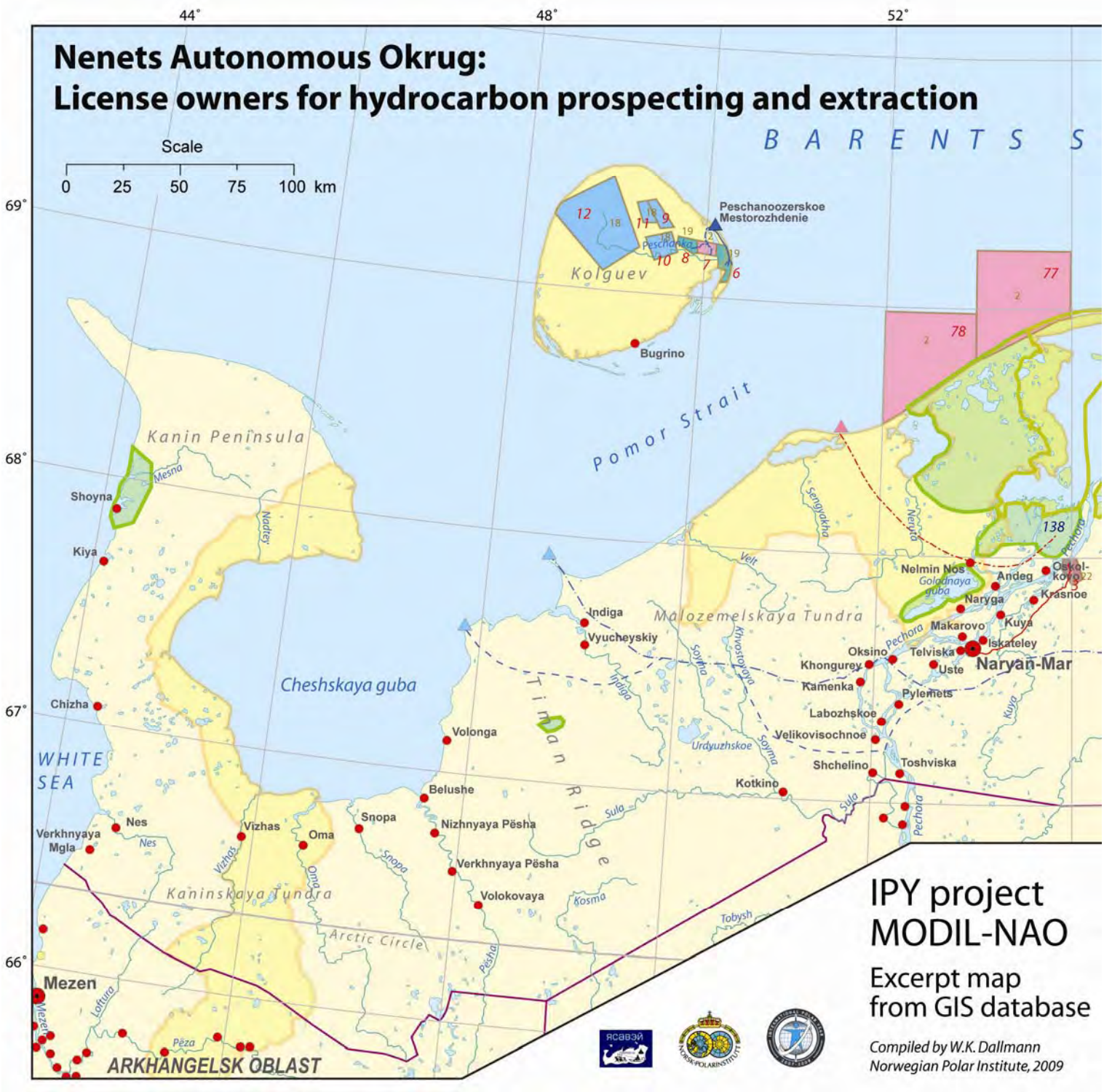
Description:

The distribution of existing and planned hydrocarbon-related installations like drilling- and production sites, pipelines, industrial settlements and oil terminals are plotted on this map.

Oil fields are also plotted to indicate the correlation.

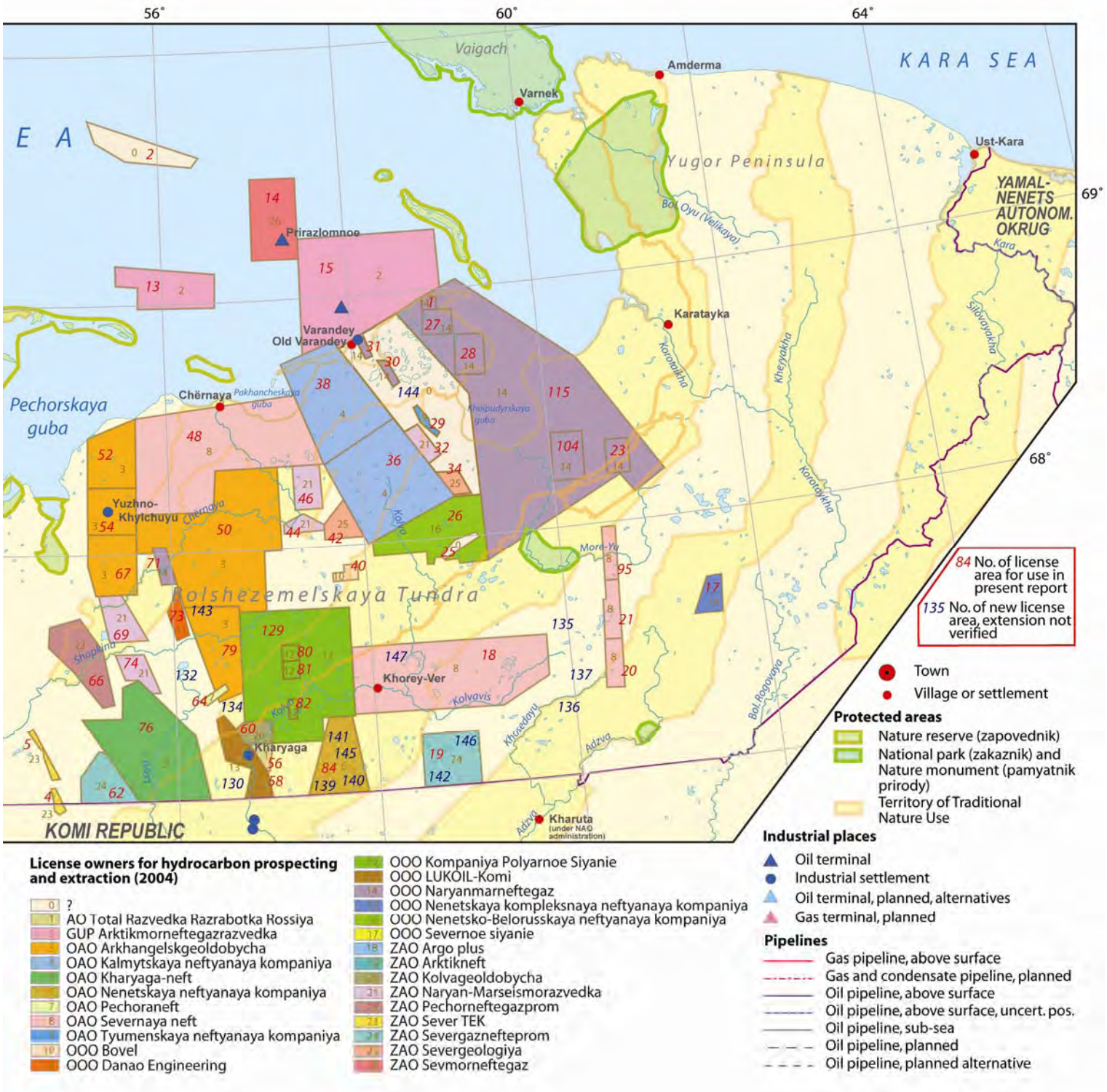
It is important to keep in mind that images are from various years, so that the resulting maps do not represent a coeval status for the entire NAO. Data in areas of high-resolution imagery are much more detailed than in other areas. To indicate the year of the plotted information, the year of the satellite imagery, where known, is indicated.

Section 1.3.1. of this report describes in detail the oil development of the area.



MAP O-6: NAO, License owners for hydrocarbon prospecting and extraction

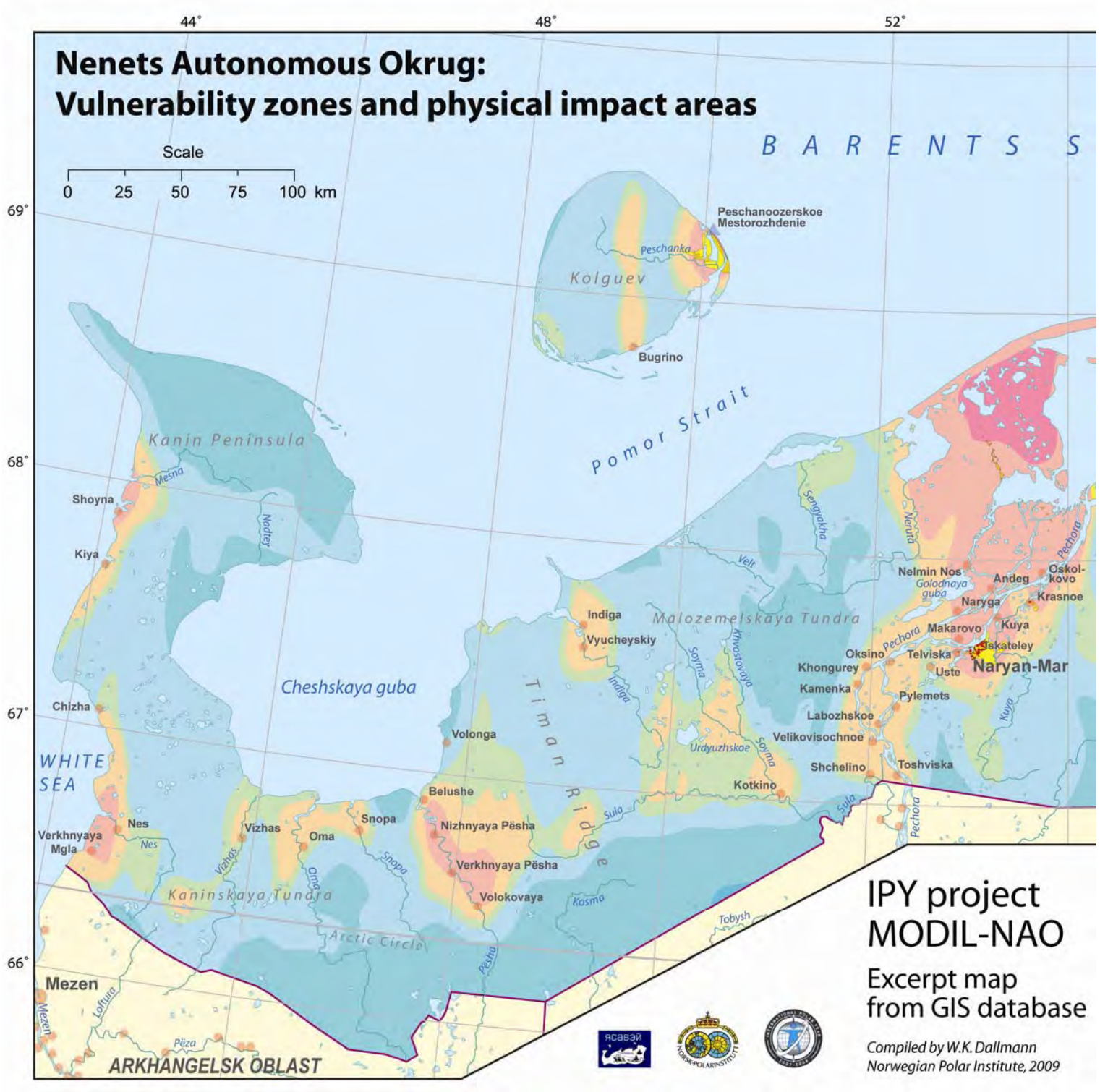
References for contained data:
Nenets Information and Analytical Centre (2004).
2009 data from Rosnedra.
See also Appendix A3.2 for description of datasets.



Description:

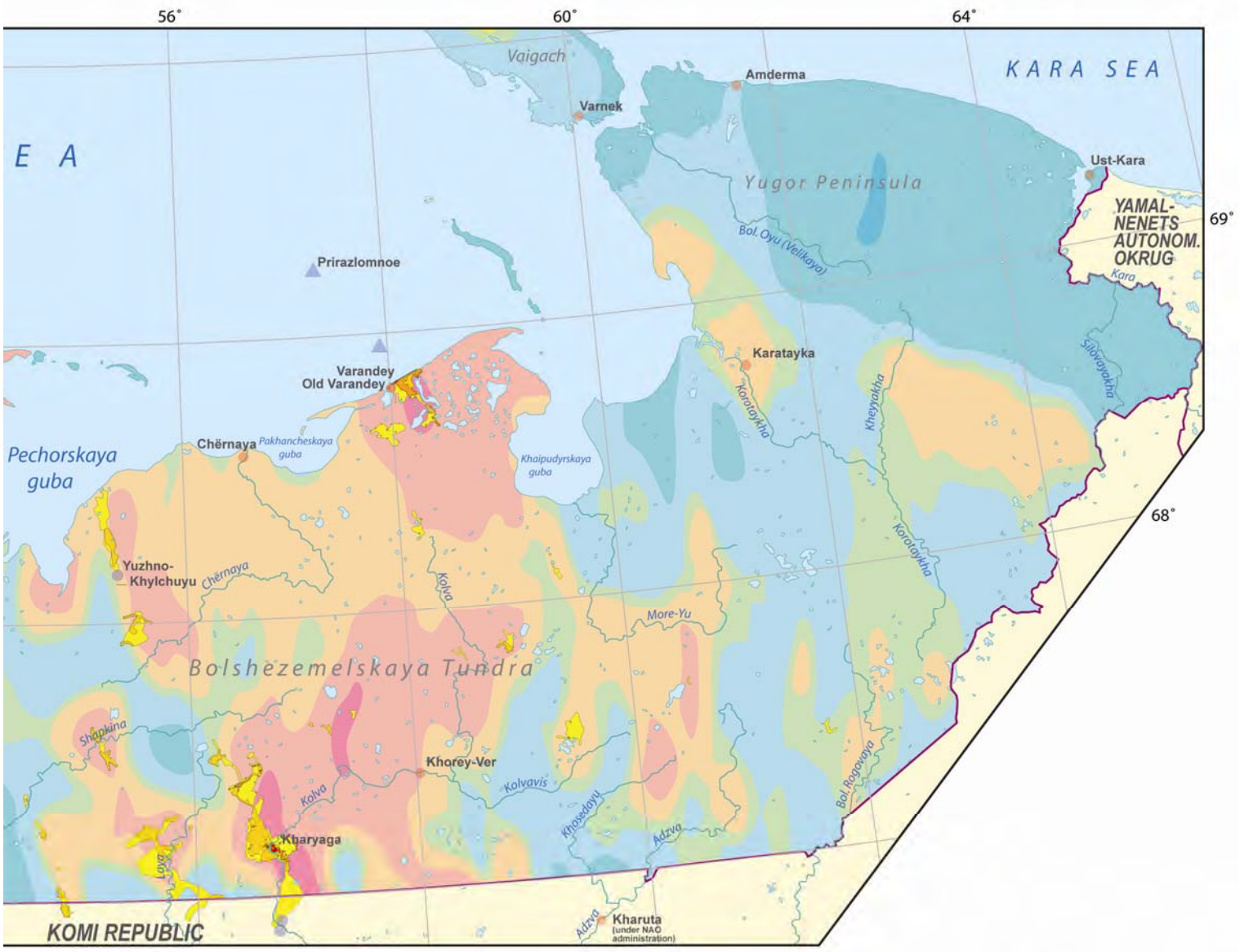
License areas as of 2004, from a map prepared by Nenets Information and Analytical Centre. Updated information from 2009 is added, based on a list of licenses from Rosnedra, where possible. An updated map of the areal extent of license areas as of 2009 has, unfortunately, not been available. The electronic database provides an attribute indicating which licenses are confirmed to be valid in 2009.

Protected areas are included in the map to show areas of possible conflicts of interest.



MAP O-7: NAO, Vulnerability zones and physical impact areas

References for contained data:
Vulnerability zonation: V.B. Koborov & Yu.N. Shymilova, Pomor State Univ., 2008.
Physical impact areas: Satellite image interpretation, carried out at Norwegian Polar Institute.
See also Appendix A3.2 for description of datasets.



Geo-ecological vulnerability zonation
from V.B. Korobov & Yu.N. Shymilova, Pomor State University, 2008

- Very high vulnerability
- High vulnerability
- Moderately high vulnerability
- Moderate vulnerability
- Moderately low vulnerability
- Low vulnerability
- Very low vulnerability

Physical impact areas
from satellite image interpretation, present project

- Developed areas
- Heavily degraded tundra areas
- High-impact areas
- Moderate-impact areas

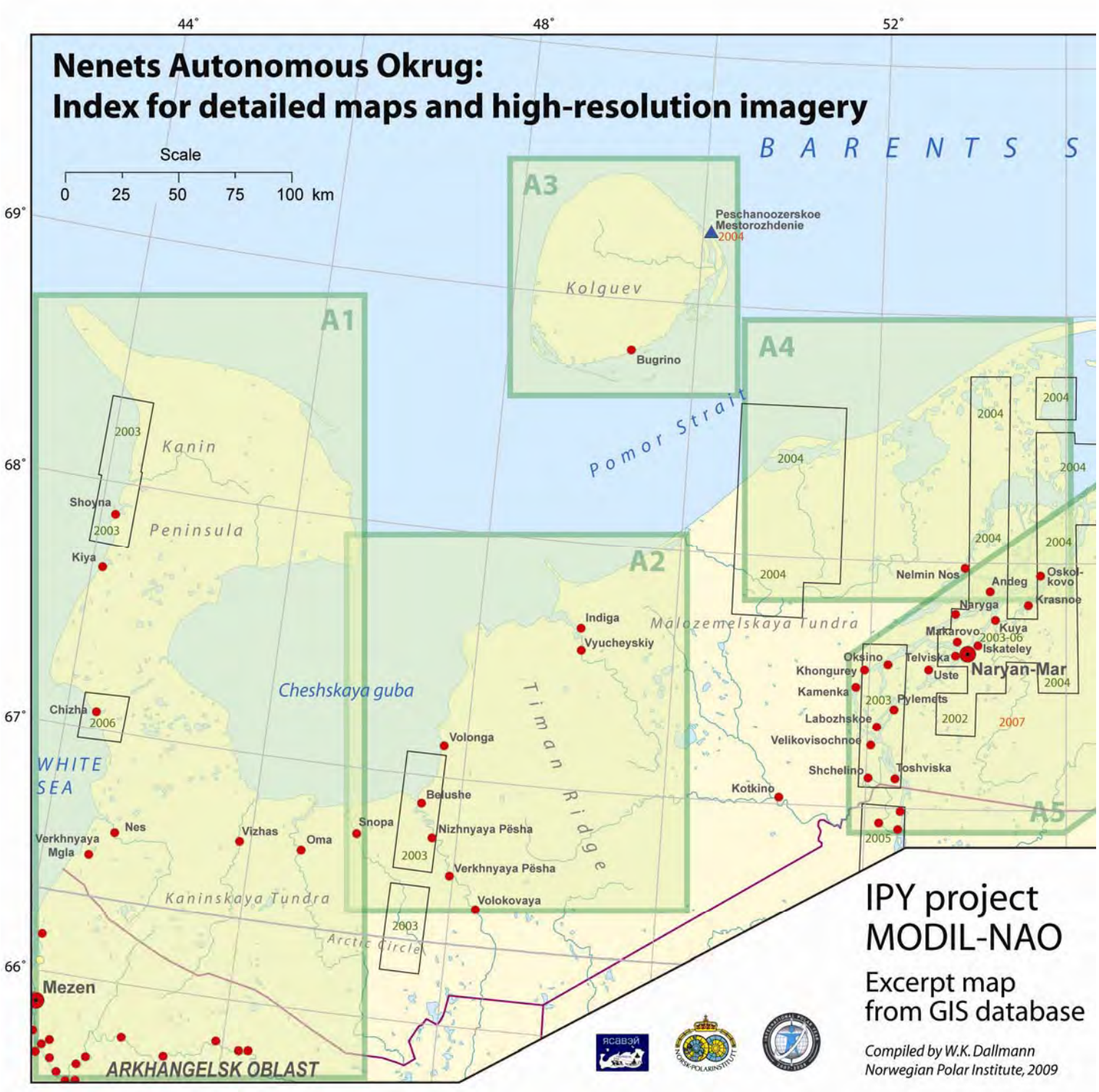
Inhabited and industrial places

- Village or settlement
- Oil or gas terminal

Description:

Areas with physical impacts from human actvities identified on satellite images are shown with strong colours. For comparison, the vulnerability zonation from Koborov et al. is plotted (pale colours). Minor deviations of vulnerability centres between the datasets are most probably due to different map projections.

The zonation of Koborovs et al. is based on a combination of potential vulnerability of the ecosystem and the existing threat through hydrocarbon development and other human activity. Areas of highest vulnerability are thus the environs of the largest development areas (Varandey, Kharyaga), as well as the wetlands of the Nenetskiy Nature Reserve west of Pechorskaya guba, which has high biodiversity, although major physical damage has not been observed in the latter area.

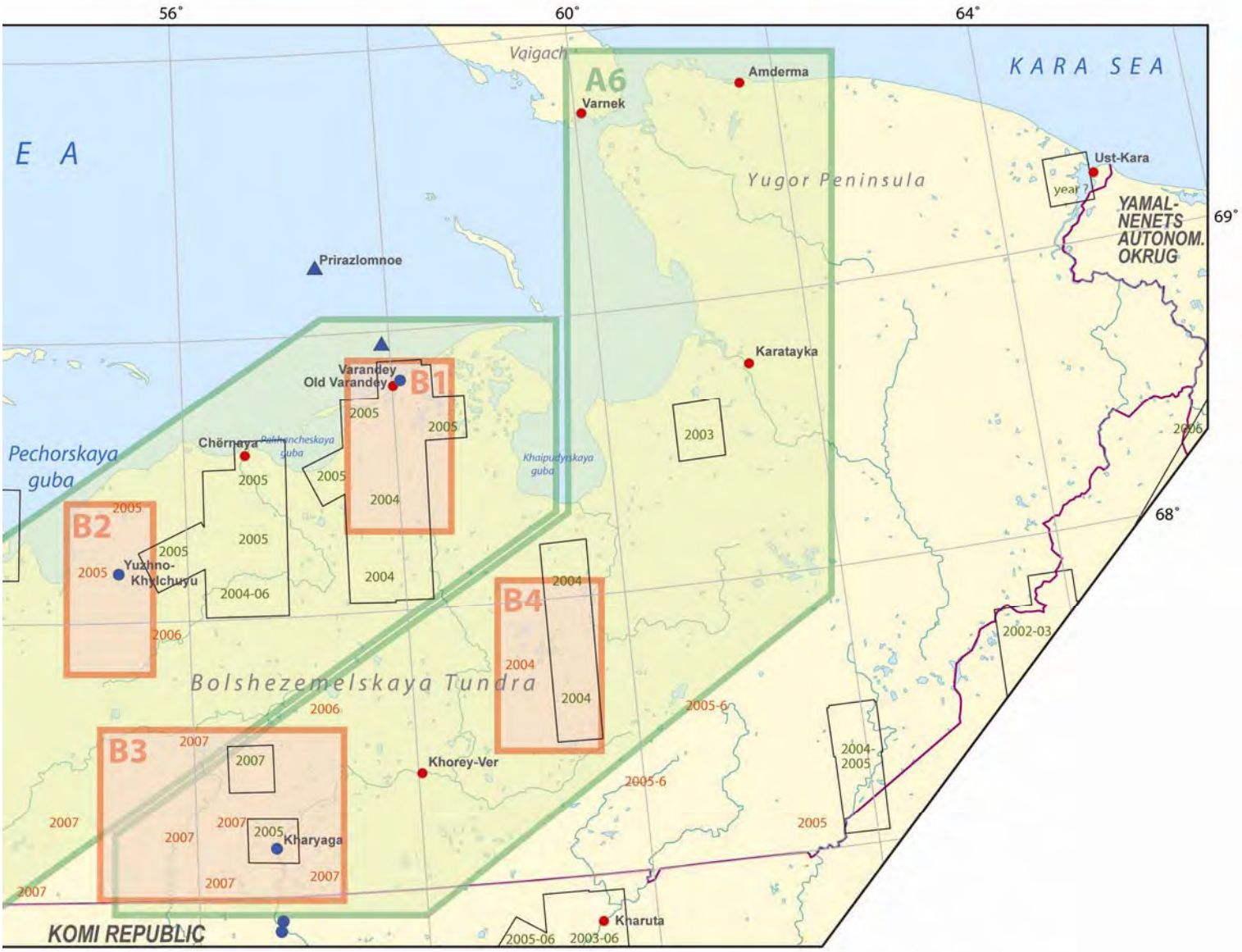


MAP O-8: NAO, Index for detailed maps and high-resolution imagery

Description:

Map showing the position of more detailed maps in sections 2.2. (maps of traditional land use areas, areas with data obtained from the questionnaire survey of the present project) and 2.3. (maps of major oil development areas, mainly base don data from the satellite image interpretation of the present project).

Areas of high-resolution satellite imagery coverage (with year of images) are also shown to indicate where a more detailed and reliable interpretation of the imagery could be carried out.



Maps of traditional land use areas

A1: Kaninskaya Tundra
A2: Timan Ridge
A3: Kolguev
A4: Malozemelskaya Tundra
A5: Bolshezemelskaya Tundra West
A6: Bolshezemelskaya Tundra East

Maps of non-traditional development areas

B1: Varandey
B2: Yuzhno-Khylchuyu
B3: Kharyaga
B4: Kolvinskoe

GoogleEarth image coverage

High-resolution areas in GoogleEarth
2004 year of high-resolution satellite image
2004 year of low-resolution satellite image

Areas with high resolution images show more detailed and more reliable information. Note that images are from various years. Areas with low-resolution images are indexed with the year where known.