

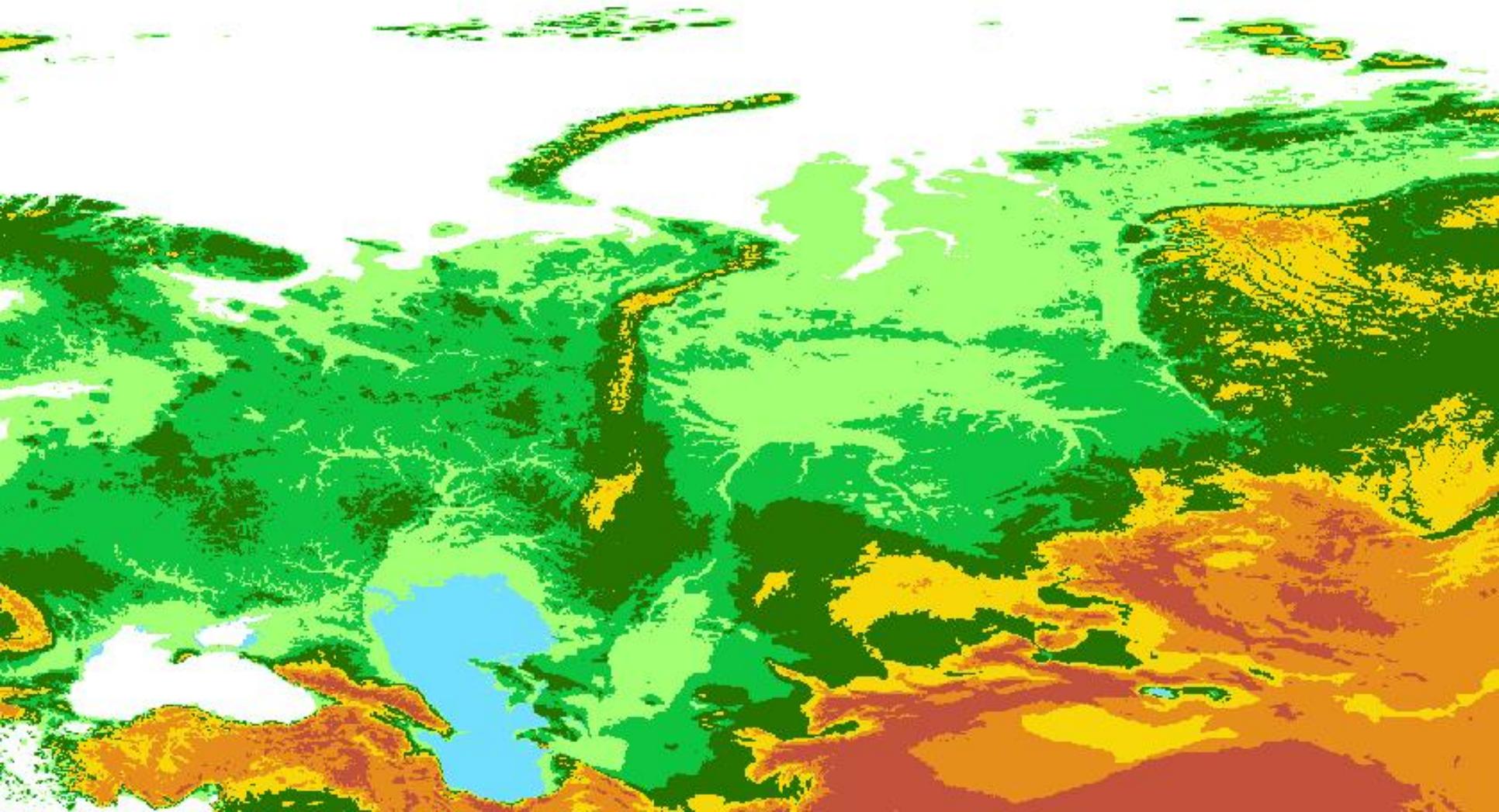
# **BOREAL VEGETATION OF WEST SIBERIAN PLAIN**

Nikolai Ermakov, Novosibirsk, Russia

Elena Lapshina, Khanty-Mansiysk, Russia



# West-Siberian Plain



# Zonal vegetation types in West Siberian Plain



# Higher subdivisions of legend

## ZONAL AND EXTRAZONAL VEGETATION

**E** Subarctic open woodlands, including subarctic shrub and dwarfshrub vegetation

**F** Boreal coniferous forests, partly mixed with birch trees

## AZONAL VEGETATION WITHIN BOREAL ZONE

**K** Coastal vegetation

**L-M** Mires, swamp and fen forests

**N** Floodplain vegetation

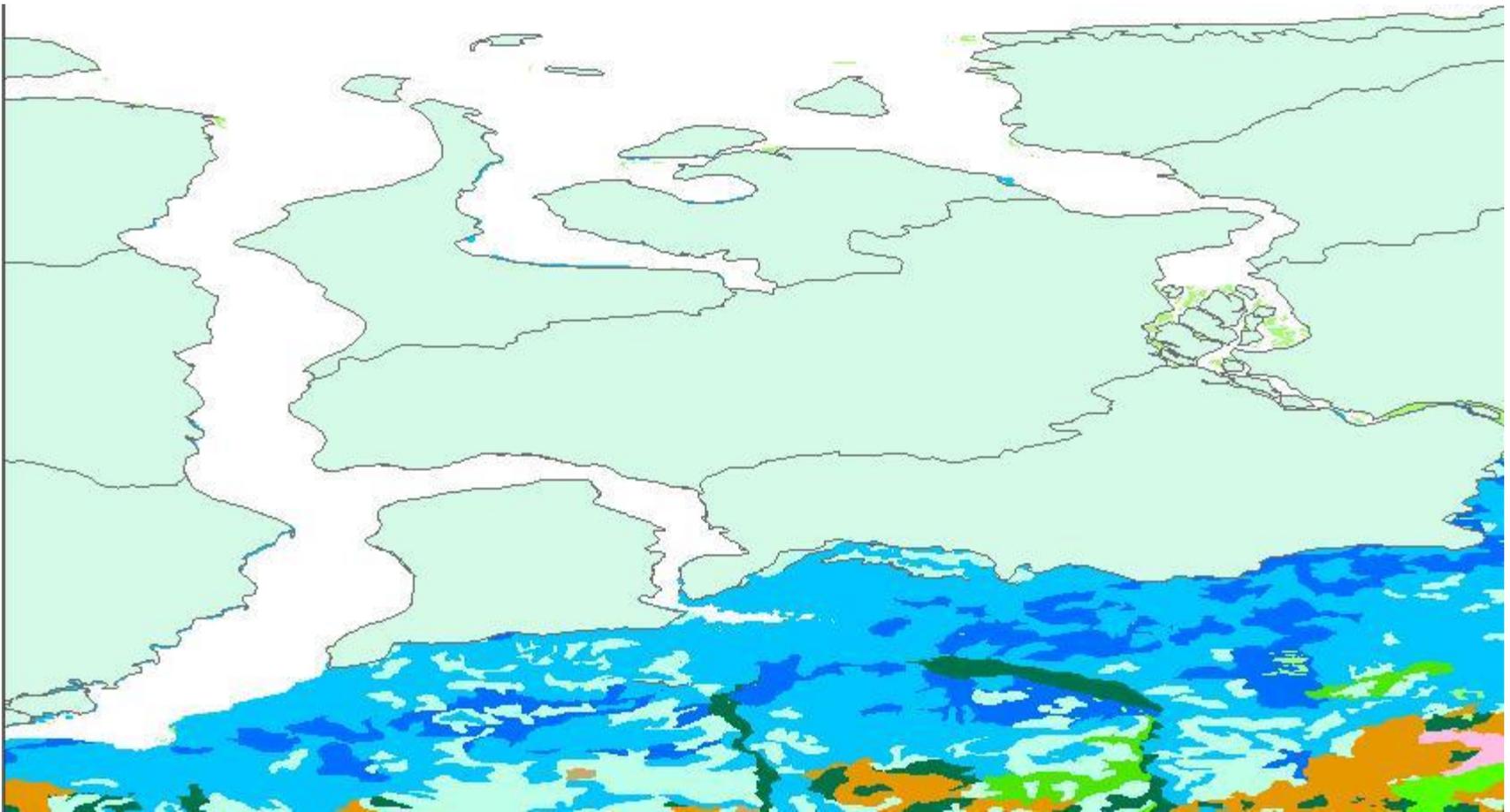
# **E Subarctic open woodlands, including subarctic shrub and dwarfshrub vegetation**

- **E.3. West Siberian open coniferous woodlands (*Picea obovata*, *Larix sibirica*), subarctic shrub and dwarf shrub vegetation**
- E.3.1. West Siberian open larch-spruce woodlands (*Picea obovata*, *Larix sibirica*) with dwarf shrubs, lichens and mosses (*Ledum decumbens*, *Vaccinium uliginosum*, *V. myrtillus*, *Empetrum nigrum*, *Cladina arbuscula*, *C. rangiferina*, *C. stellaris*, *Cetraria nivalis*, *Aulacomnium turgidum*, *Pleurozium schreberi*) alternating with *Betula nana* and *Salix lanata* tundras.
- E.3.4. West Siberian subarctic shrub tundras (*Betula nana*, *Salix pulchra*, *Duschekia fruticosa*) with dwarf shrubs, lichens and mosses (*Vaccinium vitis-idaea*, *Empetrum nigrum*, *Ledum decumbens*, *Cladina rangiferina*, *C. arbuscula*, *C. stellaris*, *Cetraria cucullata*, *Hylocomium splendens* var. *alaskanum*, *Aulacomnium turgidum*, *Polytrichum alpestre*, *Dicranum elongatum*), alternating with flat-palså mire and open larch-spruce woodlands (*Picea obovata*, *Larix sibirica*).

## E.3. West Siberian open coniferous woodlands (*Picea obovata*, *Larix sibirica*), subarctic shrub and dwarfshrub vegetation

E.3.1. West Siberian open larch-spruce woodlands alternating with *Betula nana* and *Salix lanata* tundras.

E.3.4. West Siberian subarctic shrub tundras (*Betula nana*, *Salix pulchra*, *Duschekia fruticosa*), alternating with flat-palså mire and open larch-spruce woodlands (*Picea obovata*, *Larix sibirica*).



# Higher subdivisions of boreal forests

## F. Boreal coniferous forests, partly mixed with birch trees

- F.2. Boreal mixed coniferous forests (Abies-Pinus-Picea; Pinus-Larix-Picea)
- F.3. Boreal pine forests (*Pinus sylvestris*)
- F.4. Boreal larch forests (*Larix sibirica*, *L. gmelinii*, *L. cajanderi*)
- F.5. Boreal birch, aspen (*Beula pendula*, *B. pubescens*, *Populus tremula*) and mixed coniferous-birch forests.

## Subzonal and regional units

**F.2.1. West pre-Urals-West-Middle-Siberian mixed coniferous forests (*Picea obovata*, *Pinus sibirica*, *Abies sibirica*), partly with *Betula pubescens*, *B. pendula*, *Pinus sylvestris* and *Larix sibirica***

*F.2.1.1. Northern boreal types*

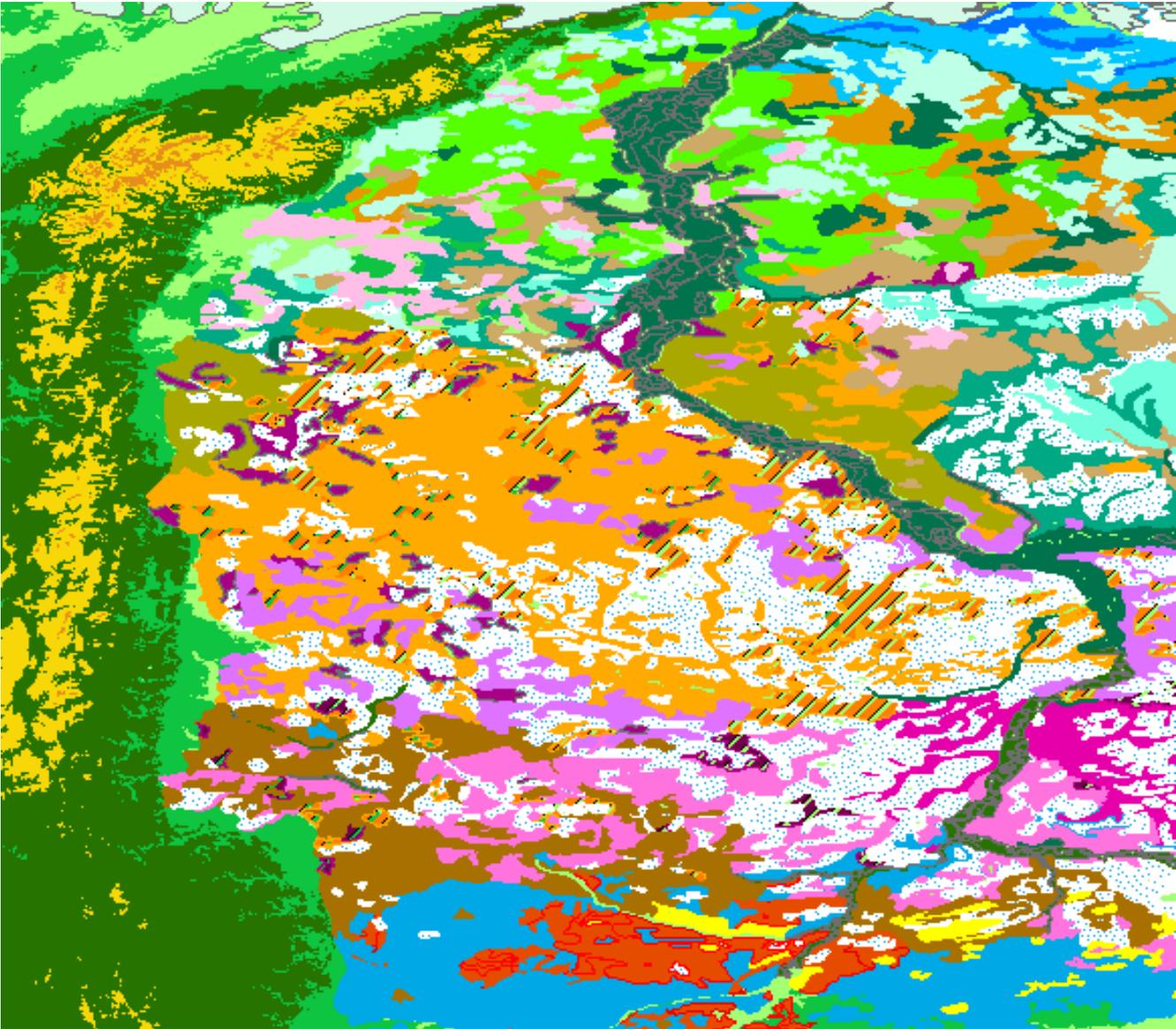
F.2.1.1.2. West Siberian open mixed larch-birch-pine-spruce forests (*Picea obovata*, *Pinus sylvestris*, *Larix sibirica*, *Betula pendula*) with dwarf shrubs, mosses and lichens (*Vaccinium myrtillus*, *Ledum palustre*, *Vaccinium uliginosum*, *Linnaea borealis*, *Pleurozium shreberi*, *Cladina stellaris*), alternating with flat-palså mires

F.2.1.1.3. West Siberian open mixed pine-larch-spruce forests (*Picea obovata*, *Pinus sibirica*, *Larix sibirica*) with *Betula pendula*, with dwarf shrubs, lichens and mosses (*Empetrum nigrum*, *Ledum palustre*, *Vaccinium uliginosum*, *Hylocomium splendens*, *Cladina rangiferina*)

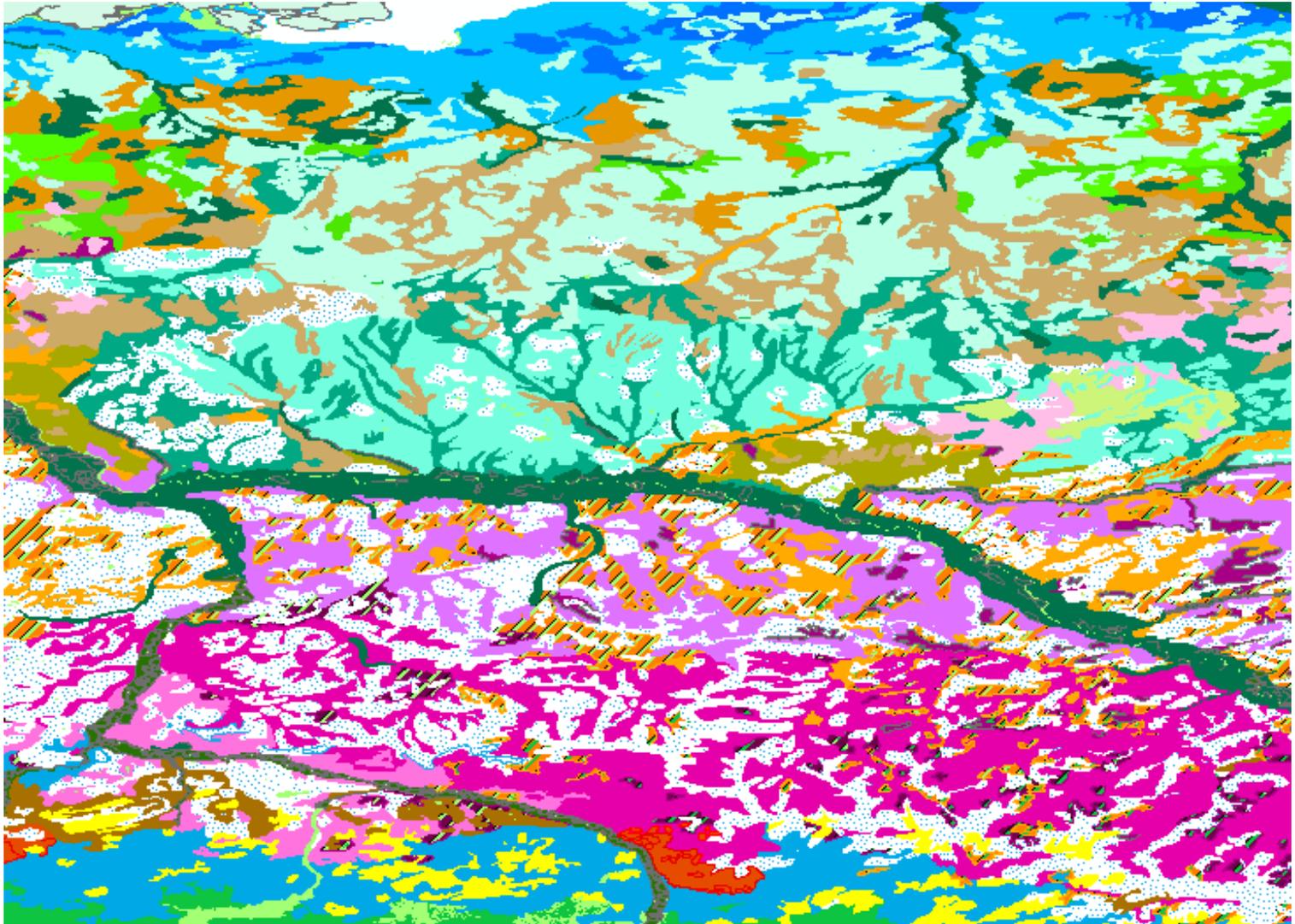
### *F.2.1.2. Middle boreal types*

- F.2.1.2.3. West Siberian pine-spruce forests (*Picea obovata*, *Pinus sibirica*) with *Larix sibirica*, partly with *Pinus sylvestris* and *Betula pendula*, with dwarf shrubs and mosses (*Vaccinium myrtillus*, *Pleurozium schreberi*) sometimes alternating with oligotrophic pine (*Pinus sylvestris*)-dwarf shrubs-sphagnum moss bogs (ryam)
- F.2.1.2.4. West Siberian spruce-pine forests (*Picea obovata*, *Pinus sibirica*) with *Abies sibirica*, *Betula pendula*, partly with *Populus tremula*, with dwarf shrubs and mosses (*Vaccinium myrtillus*, *Maianthemum bifolium*, *Pleurozium schreberi*)
- F.2.1.2.5. West Siberian hygrophilous spruce-pine forests (*Picea obovata*, *Pinus sibirica*) with *Pinus sylvestris*, *Betula pendula*, with dwarf shrubs and mosses (*Ledum palustre*, *Polytrichum commune*, *Sphagnum magellanicum*) alternating with oligotrophic pine (*Pinus sylvestris*)-dwarf shrubs-sphagnum moss bogs (ryam)

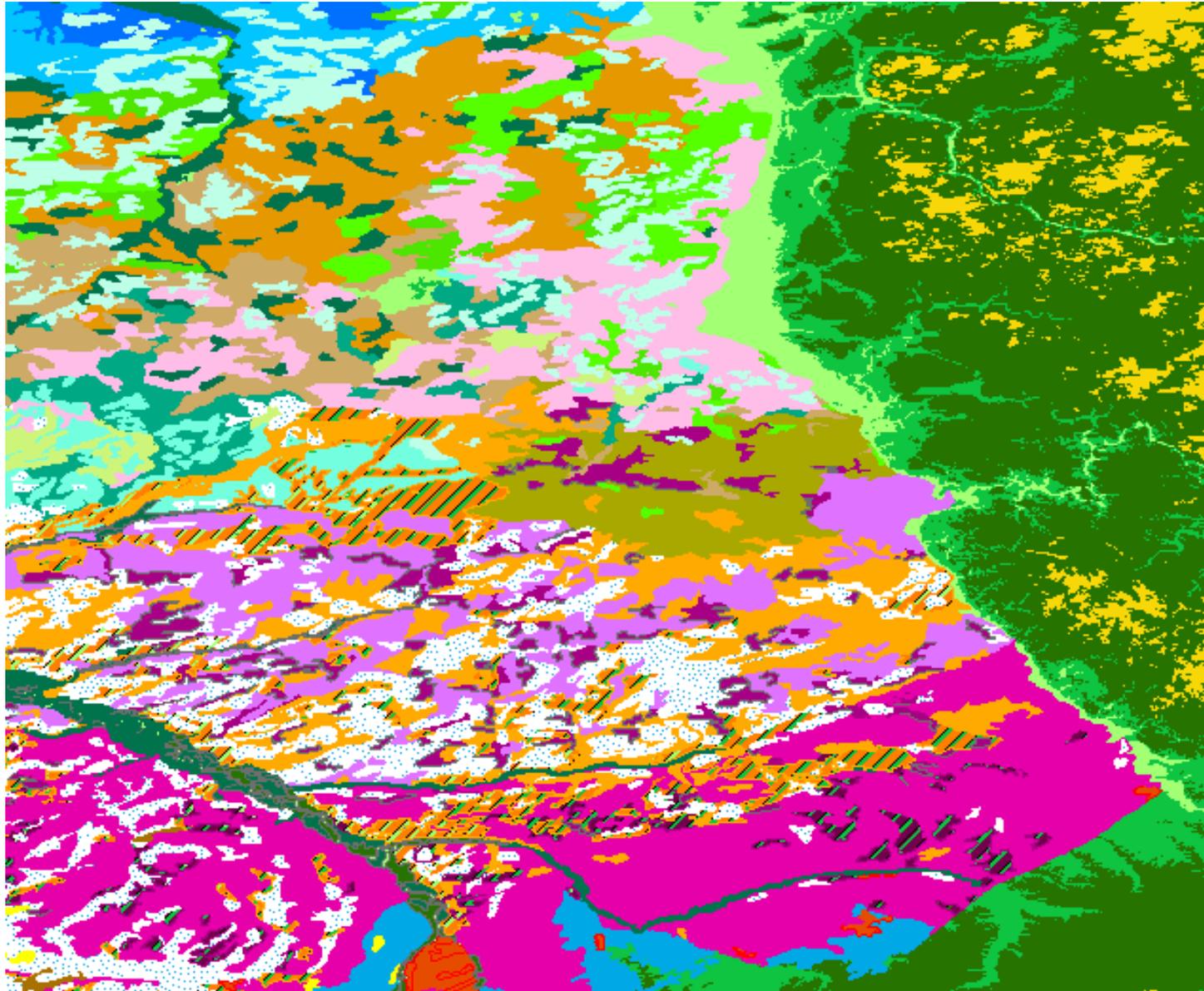
# Boreal Vegetation of West Siberian Plain (western part)



## Boreal Vegetation of West Siberian Plain (central part)



# Boreal Vegetation of West Siberian Plain (eastern part)



# **Types of peatlands in West Siberia**

**(prepared by Elena Lapshina, Khanty-Mansiysk State University)**

Polygonal mires

Flat palså mires

High palså mires

Convex oligotrophic bogs

Flat minerotrophic mires

Slightly eutrophic grassy fens and marshes

## Polygonal mires

In Sub-Arctic Tundra (typical tundra), complex ridge-polygonal mires are covered with dwarf shrubs, sedges and mosses.

In the centre of polygons and in depressions, the vegetation cover is dominated by sedges (*Carex aquatilis* ssp. *stans*, *C. rariflora*, *C. rotundata*) and mosses (*Sanionia uncinata*, *Calliergon sarmentosum*, *Sphagnum balticum*, *S. lenense*).

Ridges are covered with dwarf shrubs (*Vaccinium vitis-idaea*, *Andromeda polifolia*, *Betula nana*), brown and *Sphagnum* mosses (*Dicranum angustum*, *Sphagnum lenense*). Lichens may also be seen there.

Plant communities in cracks are dominated by *Carex rariflora*, *C. rotundata* and *Sphagnum balticum*.

# Flat palså mires

Flat-palså complex mires consist of palsås with permafrost and waterlogged hollows, the ratio of their areas varying.

Hollows are often occupied by pools of different size. Palsås are covered by shrubs and lichens, whereas hollows are covered mainly by sedges, *Sphagnum* and brown mosses.

## High palså mires

High palsås can be found in the zone of continuous and discontinuous permafrost in the North of the Northern Taiga and in the Tundra.

Peat palsås are elevated 6-8 m over hollows; there are many pools of thermokarst origin 0.5-1.0 m deep. The peat layer is usually 0.5-0.6 m thick, sometimes up to 1.0-1.5 m.

Brown mosses and lichens communities on palsås and sedges-cotton grass-*Sphagnum* communities in hollows are common.

The relatively dry summits are dominated by lichens and brown mosses (*Dicranum elongatum*, *D. congestum*, *Cladonia deformis*, *Ochrolechia tartarea*).

Slopes are covered by *Ledum palustre*, *Vaccinium uliginosum*, *V. vitis-idaea*, *Rubus chamaemorus*, *Eriophorum vaginatum*, *Betula nana*.

Palså foot-slopes are covered by *Betula nana* and *Rubus chamaemorus*.

Sometimes separate trees of larch (*Larix sibirica*), birch (*Betula pubescens*) and Siberian pine (*Pinus sibirica*) may be observed on the high palsås.

Lichens (*Cladonia sylvatica*, *C. rangiferina*, *Cetraria cucullata*) form continuous cover on open palså slopes.

## Convex oligotrophic bogs

This type is present in half the territory of West Siberia, including Northern, Middle and Southern Taiga.

There, the ridge-lake complexes occupy up to 85% of the centre area of oligotrophic bogs.

The ridges are covered mainly by dwarf shrub-lichen-*Sphagnum* vegetation with occasional dwarf pine trees (*Pinus sylvestris* with scarce *P. sibirica*). The trees are 0.5-1.5 m high.

Dwarf shrubs are dominated by *Chamaedaphne calyculata*, *Ledum palustre*, *Betula nana*, *Rubus chamaemorus* and less frequent *Eriophorum vaginatum*.

The moss *Sphagnum fuscum* forms a dense cover, whereas lichens (*Cladonia rangiferina*, *C. stellaris*, *C. sylvatica*) are abundant in elevated sites.

## Flat minerotrophic mires

Minerotrophic fens with ridges and hollows covered by sedge-brown moss communities are widespread in southern boreal subzone.

Closer to watersheds there are communities dominated by tussock sedges (*Carex cespitosa*, *C. elata* ssp. *omskiana*).

Rhizome sedges (*Carex lasiocarpa*, *C. diandra*, *C. chordorriza*) predominate closer to central part. The brown moss layer is poorly developed.

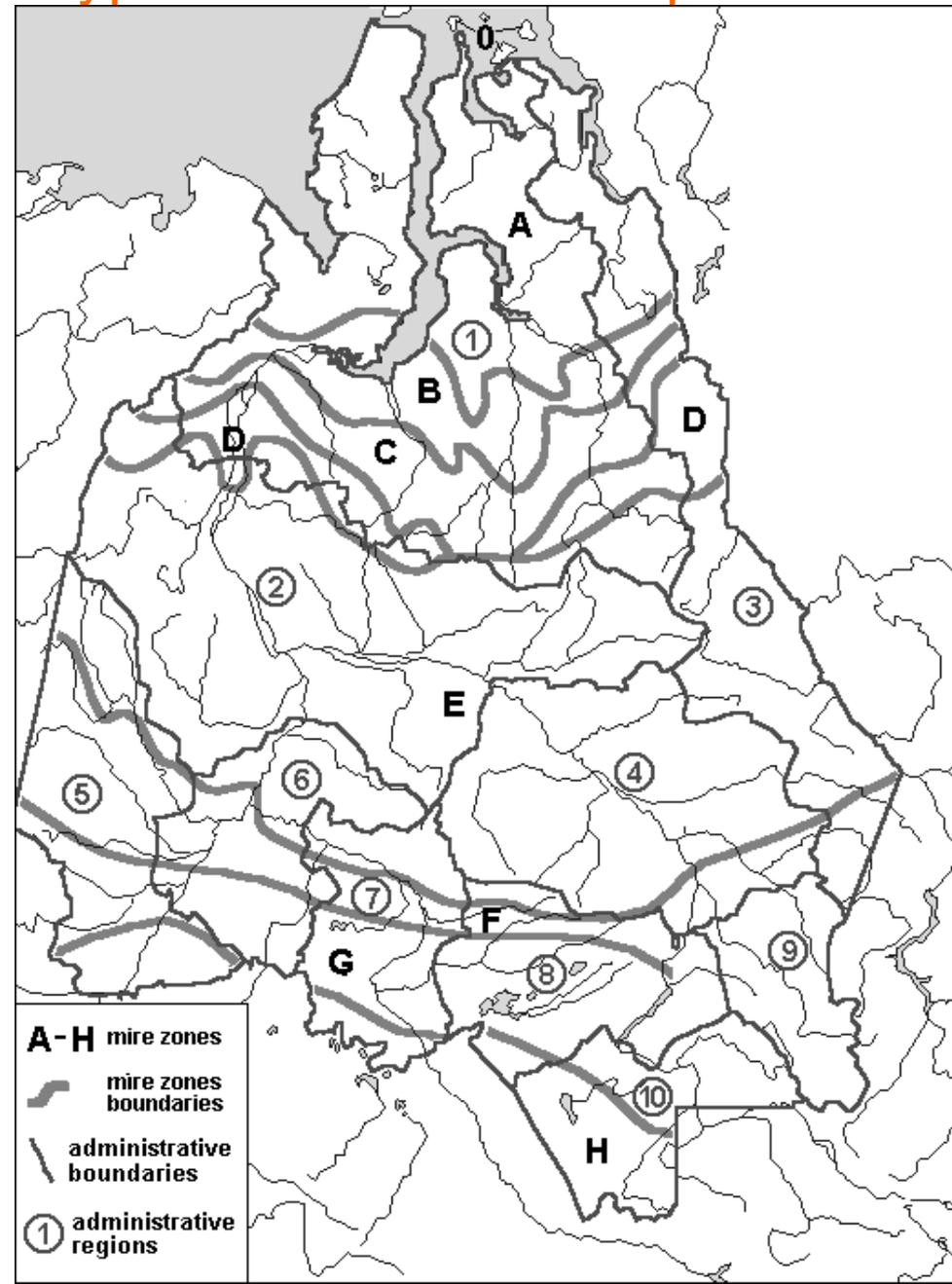
Well-drained periphery is covered by swamp forests with *Pinus sylvestris*, *Betula pubescens*, *Pinus sibirica*.

Sedges and brown mosses (*Drepanocladus aduncus*, *D. sendtnerii*, *Homatocaulis vernicosus*, *Calliergon* spp) with rhizome sedges and herbs (*Menyanthes trifoliata*, *Comarum palustre*) predominate in the centre of the mires.

## Distribution of dominant mire types in West Siberia plain

Mire types:

- A – Mineral wetlands;
- B - Polygonal mires;
- C -Flat-palså mires;
- D - High-palså mires;
- E - Oligotrophic convex (*Sphagnum*) bogs;
- F - Flat minerotrophic mires with the participation of oligotrophic bogs;
- G - Conclave eutrophic sedge-grassy fens;
- H - Saline marches.





*Thank you for attention !*