Voronezh Biosphere Reserve: the results of 80 years protection of the territory and modern problems of the biodiversity conservation

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Voronezh State Hunting Beaver Reserve

1923

total area - 30 km²
1935

total area - 310 km²
1985
UNESCO Biosphere Reserve
"Voronezhsky"

Zakaznik
"Voronezhsky"
Forest fragmentation by railroad, power line and road

Settlements around the Reserve territory

Lipetsk region

The overall population density - 47,58 people per km²

Voronezh region

The overall population density - 44,58 people per km²
Landscape units in the Voronezh State Nature Reserve

1 - the floodplain of the Voronezh River;
   Terraces above the Voronezh River floodplain:
2 - the 1st terrace;
3, 4 - the 2nd terrace;
5 - the 3rd terrace;
7 - the 4th terrace;
6 - flat ledge between the 3rd and 4th terraces of the Voronezh River;
8 - floodplains of the Usman and Ivnitsa rivers with remnants of the 1st terraces above the floodplains of these small rivers;
9 - sloping-stepped ledge of the Usman River valley;
10 - the 2nd terrace of the Usman River;
11 - the valleys of tributaries of the Usman and Ivnitsa rivers;
12 - the watershed area between the Usman and Baigora rivers
Climatic parameters
(according to the weather station of the Reserve)

- average annual precipitation – 638 mm
- average annual temperature – 5.6°C
- average temperature of July (the warmest month) - 19.5°C
- average temperature of January (the coldest month) - -8.7°C
- average height of the snow cover – 50.2 cm
- snow lies on average during 122 days
- frost-free season – 199 days
- vegetation season (t°C higher than 10°C) – 152 days
Vegetation of the Voronezh Reserve

- Pine Forests: 31.3%
- Broad-leaved Forests: 33.2%
- Aspen Forests: 6.2%
- Birch Forests: 2.3%
- Alder Forests: 2.2%
- Meadows: 15%
- Bogs & Swamps: 3.7%
Biological diversity of the Voronezh Reserve

Number of species (01.01.2019):

- fungi - 458
- mosses - 140
- lichens - 174
- vascular plants - 1051
- fishes and lamprey - 40
- amphibians and reptiles - 16
- birds - 228
- mammals - 61
- insects - ~ 6000
Russian Red Data Book
(Red Data Books of the Voronezh / Lipetsk Region):

- fungi – 6 (17/21)
- lichens – 0 (18/19)
- mosses – 0 (18/16)
- vascular plants – 5 (70/74)
- fishes and lamprey – 2 (8/4)
- amphibians and reptiles – 1 (6/5)
- birds – 15 (48/68)
- mammals – 2 (14/13)
- insects – 14 (107/53)
1935-1919
The biodiversity increasing

1950 - wild boar (*Sus scrofa*)

1974 - otter (*Lutra lutra*)

1952 - elk (*Alces alces*)

2019 - lynx (*Lynx lynx*)
White-tailed Eagle (*Haliaeetus albicilla*)
regular breeding since 2002

Mute Swan (*Cygnus olor*)
regular breeding since 2016

The biodiversity increasing
The age structure dynamics of the Voronezh Reserve stands

**Pine Forests**

The average age is 107 years

**Birch Forests**

The average age is 66 years

**Oak Forests**

The average age is 132 years

**Alder Forests**

The average age is 87 years

**Aspen Forests**

The average age is 86 years
New beetles species, ecologically associated with old-growth forests and dead wood.

- 2016. *Boros schneideri*
- 2015. *Cucujus cinnaberinus*
- 2018. *Arhopalus ferus*
- 2018. *Upis ceramboides*
The list of fungi involved in the decomposition of wood is constantly increasing.

*Volvariella bombycina* (Schaeff.) Singer

*Climacodon septentrionalis* (Fr.) P. Karst.

*Pycnoporellus fulgens* (Fr.) Donk
Vascular plants species extinction in the Voronezh reserve (1947-2018)

Floral losses in different ecological-phytocoenotic groups (number of species)

Adw – alien species
MFr – wet meadow group
MdST – dry meadow-steppe group
Nm – nemoral group
Wt – swamp-grass group
Ps – psammophilous group
Inw-Nw – aquatic-coastal group
Br – boreal group
Olg-Sph – oligotrophic-sphagnum group
Pn – pine forest group
Nt – nitrophilous group
Losses of wetland flora

**oligotrophic-sphagnum group**
(total number of species - 14)

*Drosera rotundifolia* L.,
*Eriophorum gracile* Koch,
*E. latifolium* Hoppe,
*Ledum palustre* L.
*Oxycoccus palustris* Pers.

**swamp-grass group**
(total number of species - 104)

*Gymnadenia conopsea* (L.) R. Br.,
*Parnassia palustris* L.,
*Pedicularis palustris* L.,
*Pedicularis sceprum-carolinum* L.
Losses of boreal flora
(total number of species  - 32)

Coeloglossum viride (L.) C. Hartm.,
Linnaea borealis L.,
Neottianthe cucullata (L.) Schlechter,
Oxalis acetosella L.,
Phegopteris connectilis (Michx.) Watt
Losses of light-requiring flora

The area of meadows and glades decreased by 2.5 times
For the conservation of biological diversity it is necessary

to study the history of the formation and development of natural complexes prior to the reserve creation,

to identify the responses of key and subordinate species populations to changes in the environmental management
Usmanskiy forest. XVI – XVII centuries. Maybe it was something like that...

Morning in a pine forest. 1889
I. Shishkin, K. Savitsky
Late XVII – early XVIII century
The place of our location in the Voronezh Reserve. XIX century
Landscape with sheep
Klodt M.K.
Herd on the glade, watercolor. Klimentov M.I.
Usmanskiy forest. mid XIX century

There were no trees older than 30 years, 75% of the woodland area was covered with birch.
1937

“half-sodded sands with blown-soil pits”
Ecological-phytocoenotic structure of the flora at the initial stage of protection (% of the total number of species)

- 1947 vascular plants – 922 species
- alien species – 115 (12.5% of the total flora)
Conservation is favorable for shade-tolerant broad-leaved trees.
Insect and reptile species not currently found in the Reserve

Apollo butterfly
*Parnassius apollo* (L.)

Stag beetle
*Lucanus cervus* (L.)

Forest Caterpillar Hunter
*Calosoma sycophanta* (L.)

Steppe runner
*Eremias arguta* (Pallas, 1773)
Eagle owl - *Bubo bubo*
https://animalreader.ru/ptitsa-filin

Black Grouse - *Lyrurus tetrix*
https://simple-fauna.ru/birds/teterev/
Alien species - the threat to biological diversity
Robinia pseudoacacia forests - 0.9 ha

Acer negundo forests - 0.6 ha
1946-2000
9.2 fires per year
average burning size - 1.5 ha
the largest fires:
1972 – 82.5 ha
1997 – 194 ha

2001-2018
9.9 fires per year
average burning size - 92.3 ha
the largest fires:
2008 - 86 ha
2014 - 1300 ha
2018 - 88 ha
Modern forests of Eastern Europe - are the result of centuries-old environmental management

what shall we do?

• to maintain strict protection from human impact and to monitor the successions

• In order to preserve biodiversity to provide scientifically based assistance for the restoration of species that could potentially exist in a protected area.
Welcome to the Voronezh Reserve!