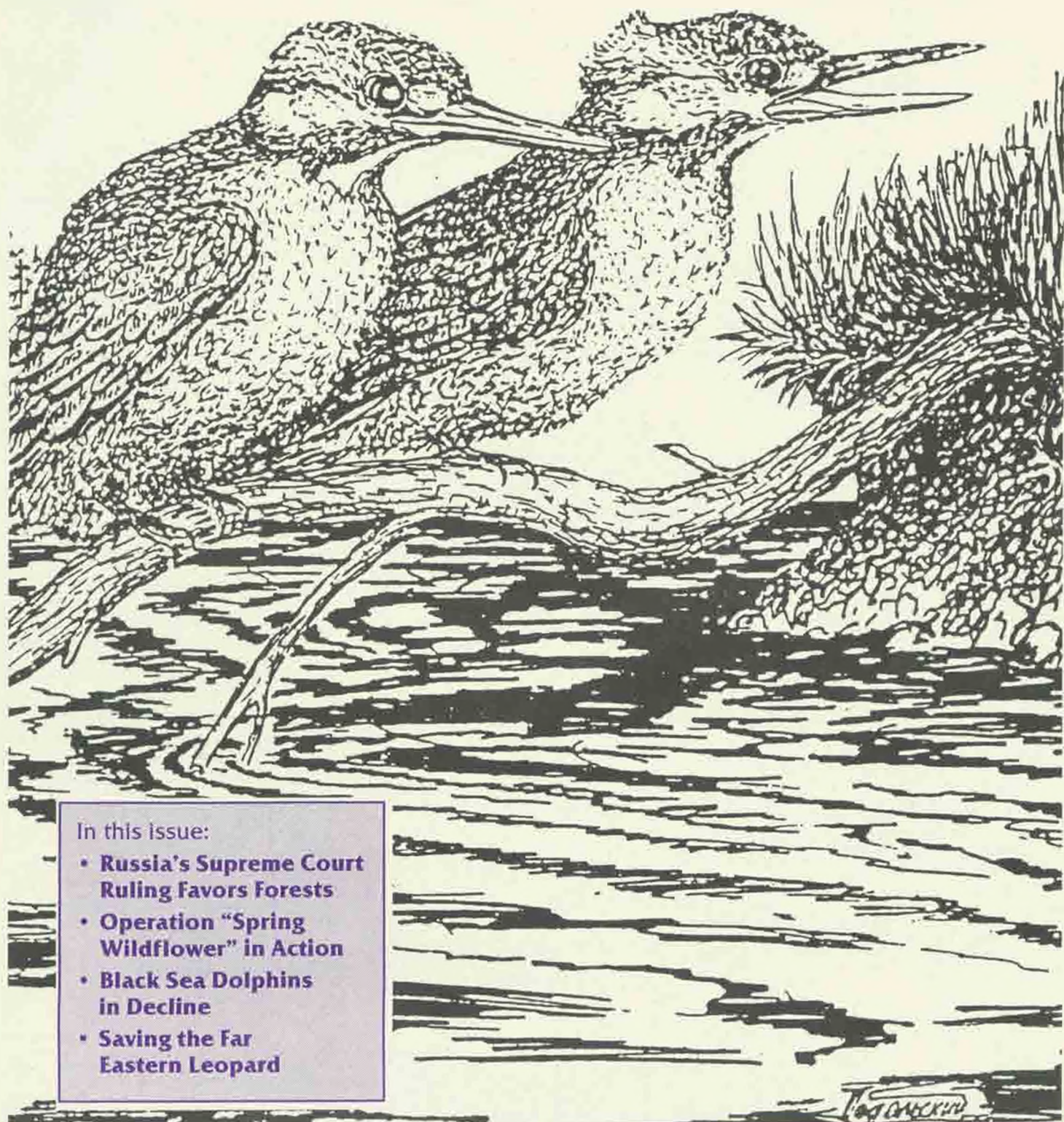




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PROMOTING BIODIVERSITY CONSERVATION IN RUSSIA AND THROUGHOUT NORTHERN EURASIA

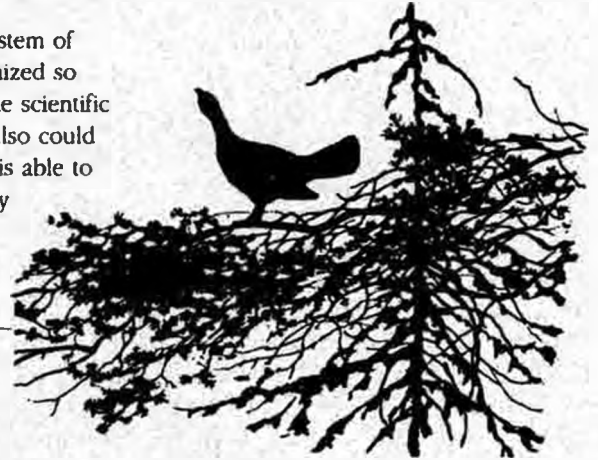
Yet, our Zapovedniki, not to mention Zakazniki and national parks, continue to be used as places for people and in the name of people. Disregarding the numerous and constant violations of the laws governing Zapovedniki, we'll focus only on the permissible activities: scientific work, ecotourism, internships, campaigning to raise public awareness, education, and measures regulating wildlife populations. In the final analysis, even these legal activities are driven by purely utilitarian motives.

It is necessary to view Zapovedniki and other protected areas not only as scientific institutes or as a treasure chest, but first and foremost as a sanctuary for wildlife. Where there is no sanctity, there are no ethics. "Rationalism converts this sanctity into a business of the mind and

destroys it," the modern Russian philosopher, L. Vasilenko justifiably remarked. In order for Zapovedniki to become true refuges, ethical questions concerning the protection of all living organisms must be taken into consideration in the planning and administration of these natural areas.

From our point of view, the system of Zapovedniki should be reorganized so that they not only accommodate scientific and educational interests, but also could serve as an area where nature is able to exist in and of itself, completely unencumbered from all forms of human intervention. Specif-

ically, we propose that some Zapovedniki be fully off-limits to all forms of human activity (i.e. tourism, scientific studies); their main purpose would be to protect nature for its own sake, upholding the ethical value of Zapovedniki.



Capercaillie, *Drawing by A.N. Formozov in his book "Sredi Prirody"*



FOR DISCUSSION

The Role of Key Species in Preserving Forest Biodiversity

By Dr. Olga V. Smirnova

Many of the Zapovedniki and national parks in European Russia have been established on lands that were modified by humans over hundreds or even thousands of years. Human activity has radically transformed the composition and structure of the present landscapes and ecosystems on these sections of land. Consequently, merely assigning this land a protective status is often an insufficient measure for preserving the diversity of species, ecosystems, and the whole range of natural zones.

Studies of the status and dynamics of the flora and fauna in the Zapovedniki of European Russia (Bryanski Les, Volzhsko-Kamski, Voronezhski, Prioksko-Terrasny, Tsentral'no-Lesnoi, and others) have shown that floral diversity in these Zapovedniki gradually decreases in the absence of human activities. This is primarily evident in the disappearance of meadow and transitional communities in areas where forests are overtaking edge

areas between fields and forests and dry and marshy meadows. As a result of this process, up to 60-70 percent of the light-requiring grasses and shrubs—more than half of all regional flora—are disappearing. Most of these species are native to the forest zone as shown by historical and paleobotanical studies. These losses in turn lead to a decline in insect and animal species diversity.

Before the creation of Zapovedniki in European Russia, ecosystem biodiversity was maintained through typical farming practices, such as the cultivation and mowing of hay, pasturing, periodic plowing, and constant rotation of croplands. Considering the long history of human manipulation of landscapes in the populated region of European Russia, one wonders about the following issues: In a region that is now so highly developed, do natural mechanisms exist to maintain the diversity of species and ecosystems? To what extent can human activities help maintain the region's biodiversity? What did the landscape look like before

humans began to alter the environment?

An analysis of the literature and our own population research into the floral species in the eastern European plains (Eastern European Broadleaf Forests, 1994) allow us to make the following conclusions regarding the former structure of the landscapes in this area: the species influencing (i.e. key species) the appearance of the broadleaf and coniferous-broadleaf forests were the large herbivores, European Bison (*Bison bonansus*) and Tur (*Bos primigenius Bojanus*) and also beavers (*Castor fiber*). During the last centuries, these animals have been almost completely extirpated, but they were once found throughout this region, according to documented sources. Experiments in reintroducing the European Bison and the beaver, in conjunction with historical information, make it possible to evaluate their influence on the environment.

Specific characteristics of the bison's behavior dictate the presence of both dense forest and open meadow communities, as well as transitional zones (ecotones) in their territories. For instance, the destruction of woody vegetation along the bison's paths, watering holes, and grazing sites results in the formation of meadow-forest edge and meadow-steppe communities. Over the course of one or two decades, the soil in



Beaver dam on the Pesochnya River in the Moscow region, 1997.

Photo by E. Dunaev

the bison's habitat becomes compacted, leading to the development of certain sod grasses. In addition to the bison's damaging of trees, its foraging on seedlings and undergrowth causes the eventual death of trees and shrubs. Thus, large clearings (1-3.5 ha) linked by broad paths with watering holes and feeding areas begin to form, giving the forest a patchwork appearance. After the bison herd leaves one grazing area and moves to another, the old area is re-vegetated primarily with "pioneer" species—light-requiring trees and shrubs.

Another key species, the beaver, influences the environment so significantly that the places where these animals live have been called "beaver landscapes." Beaver dams in streams and small rivers greatly alter the hydrological regime in these areas, converting waterways into cascading ponds. These dams induce floods in surrounding forests, ranging in area from 0.2-0.5 ha to as much as 20, 30, or even 50 ha, eventually creating long-standing, flood plain marshes.

The beavers' meliorative activities—for instance, their use of trees growing along the rivers and streams for food and construction of dams—produce flood plain fields about 25 m by 300 m. In these areas, meadow-forest edge grasses begin to predominate as the beavers' selective consumption of woody plants alters the ratio of trees and shrubs. Numerous trees felled or damaged by beavers provide additional food for wild-hoofed animals, hares, and mouse-like rodents. Moreover, ponds and lakes ensuing from the beavers' activities create

a new niche for waterfowl in the altered ecosystem. They also provide excellent conditions for spawning by fish and amphibians and serve as sources of water for birds and animals during droughts. All these factors maintain a high level of ecosystem and species biodiversity in the valleys along streams and small rivers.

The constant presence of bison and beavers in forest regions determined a dynamic structure in which forest tracts alternated with fields, flood plain marshes, and other areas cleared by beavers. This natural pattern, in turn, allowed for maximal development of species diversity. Due to the complete eradication of the bison, tur, and beavers from the sixteenth to nineteenth century, however, this ecological structure collapsed. Shade-tolerant species began to predominate in the old-growth forests, restricting the light-requiring flora and fauna exclusively to habitats used by humans (hayfields, pastures, and farm fields). Other herbivores in the forests (i.e. moose, roe deer, deer, and boar) could not fill the key species niche vacated by the bison and tur because of their significantly smaller sizes and scattered herds.

A substantial change in the structure of the forest communities in which trees are the key species has also taken place in European Russia. Virgin forests that have developed uninhibited by human activity for a fairly long time are characterized by a mosaic, tiered structure. The natural falling of old, large trees produces gaps in the forest canopy and also forms tree-fall mosaics. Tree-fall mosaics increase the

differentiation of the soil and the soil cover, serving as a habitat for species adapted to different environments.

Forestry activities, including felling and planting, completely or partially transform the species composition of the forests through the destruction of habitats of an entire range of plants, birds, small animals, insects, and mushrooms. These habitats may be naturally reestablished in altered forest communities protected in Zapovedniki. Unencumbered by humans, the forest zone can revert to its original mosaic structure; however, many years are required for the forest to recover its ability to once again provide specific habitats for an entire range of species.

Although the absence of human activities is essential in the regeneration of natural forest ecosystems, the preservation of light-requiring species in protected areas demands specifically targeted work. Currently, many Zapovedniki and national parks are planning to reintroduce bison populations (*please see RCN #14*). This is the most difficult, but most natural method in the restoration of light-requiring plant species in Zapovedniki. In this case, however, it is necessary to consider that the smallest area required to support a population of bison is tens or hundreds of square km and should include at least one watershed. Consequently, to create viable populations of bison, many of the current Zapovedniki and national parks must be increased in size.

We conclude that the development of solutions to support species and ecosystem diversity in protected areas must be based on a contemporary understanding of mechanisms of sustainable ecosystems, key species, and must draw upon previous experiences in reconstructing the pre-agricultural landscape.

Professor Olga V. Smirnova is the head researcher at the Center of Forest Ecology and Productivity, Russian Academy of Sciences. She also works at Pushchino State University in the Division of Systematic Ecology.