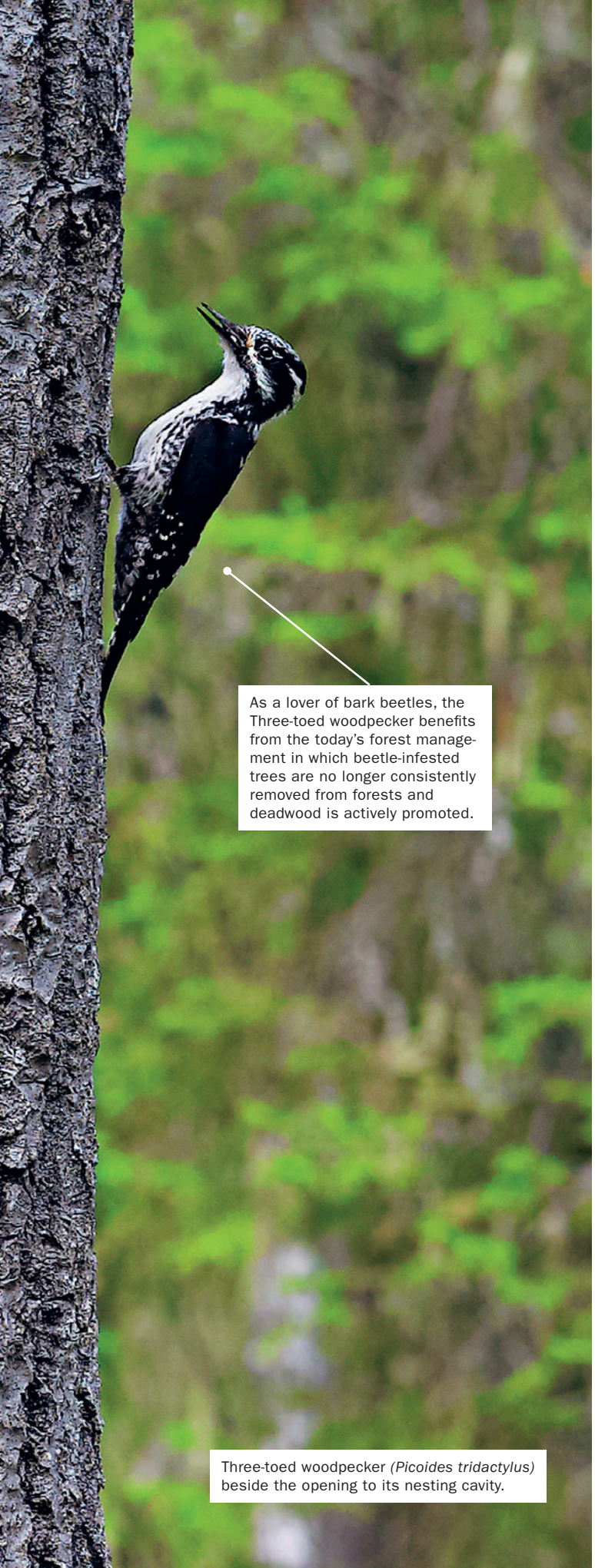
BIODIVERSITY

Humans depend on natural diversity. WSL researchers are investigating how it can be protected.

Why biodiversity concerns us all

Clearing stands affected by storms less thoroughly and leaving more bark beetle trees can compensate to a considerable extent for the potential future loss of the Three-toed woodpecker's habitat.

A WSL research programme used model calculations to show that spruce forests in the mountains are declining under climate change. As a result, the habitat of the Three-toed woodpecker in Switzerland will probably shrink by about one fifth by 2050.



As a lover of bark beetles, the Three-toed woodpecker benefits from the today's forest management in which beetle-infested trees are no longer consistently removed from forests and deadwood is actively promoted.

Three-toed woodpecker *(Picoides tridactylus)* beside the opening to its nesting cavity.

Photo: Markus Varesvuo

Diversity is beautiful. Most people find a meadow covered with red, blue, yellow and white flowers more attractive than an endless field of corn, and a species-rich, well-structured forest preferable to a uniform spruce plantation. Many are delighted when they spot a rare bird. Millions and millions of organisms of all shapes, colours and sizes populate the earth and enrich our world of experience. But many of these creatures are now endangered or disappear at a rate our planet has never seen before. That is why researchers are already talking about the sixth mass extinction in Earth's history.

Biological diversity is in bad shape in Switzerland as well. According to the Federal Office for the Environment's (FOEN) 2017 report 'Biodiversity in Switzerland: State and Development', half of Switzerland's habitats and one third of its species are endangered, which is significantly more than in most EU countries. "In particular, species that are ecologically specialised and rare are not doing well," says Rolf Holderegger, Head of WSL's Biodiversity and Conservation Biology Research Unit. They often depend on special habitats such as dry grasslands, fens or raised bogs, which are continuing to lose quality and are often shrinking in area as well.

All three levels of biodiversity are affected: species, habitats and genetic diversity, which is central to the adaptability and long-term survival of species. For agricultural land, the picture is particularly grim as valuable habitats have been impaired through intensive use and nutrient input. In forests, the situation is better because they are mostly managed in a 'close-to-nature' way with an increasing amount of deadwood left standing or lying.

More than honey

Diverse ecosystems provide important services – so-called ecosystem services – better than uniform ones: wild bees pollinate crops, soil organisms provide healthy soils, and forests clean air and water. Forests also positively influence the climate and provide protection against floods and avalanches. The loss of biodiversity gives rise to economic costs – estimated to reach around four percent of the EU's gross domestic product by 2050.

Both the Swiss Federal Constitution (Art. 78) and international treaties such as the Convention on Biological Diversity (CBD) stipulate that biological diversity should be protected – not just for the sake of benefits or costs. "For many people, biological diversity has an intrinsic value independent of its economic benefits," says Uta Eser, who is a specialist in ethical issues related to biological diversity and runs an office for environmental ethics in Tübingen, Germany. The way we deal with biodiversity has a strong moral component. At "the heart of the Convention on Biological Diversity," according to Uta, is justice for future generations, as well as for the people worldwide alive today who are mostly poor and suffer most from the consequences of the loss of biodiversity.

For more information on biodiversity research at WSL, see: www.wsl.ch/biodiversity

Include the human factor

WSL researchers work in this moral tension zone. "Biodiversity is not a fixed state, but a societal goal," says Rolf. For example, you can maintain a meadow to promote rare species, or leave it alone to allow natural processes such as forest regeneration. It is up to the public and politicians to decide which goal is more desirable. "We researchers can then make recommendations on how to reach the goal and provide basic scientific information about the effects of certain interventions."

WSL's biodiversity research began in the 1970s with inventories and the long-term monitoring of particularly valuable natural areas. To this day, WSL monitors – partly on behalf of the Federal Government – the development of bogs, dry meadows and pastures, floodplains, amphibian spawning sites and forest reserves. It also maintains the national databases for fungi and lichens (see page 8). Such monitoring enables the documentation of changes in populations and species and indicates where conservation measures are needed and how well they work.

But inventories alone are not enough. Environmental and living conditions are constantly changing, which means that the processes leading to the waxing and waning of diversity must also be understood. Can a structurally rich and diverse forest better withstand frequent storms? What effects do motorways have on the genetic diversity of dispersing animals? How have species adapted to habitats and how quickly can this take place, for example in response to climate change?

By answering such questions, WSL provides the authorities at the federal, cantonal and municipal levels with the information needed to select measures to halt the loss of biodiversity. WSL researchers also help to convince the public that something must be done through personal engagement and public lectures. Rolf believes that what is lacking is often not the knowledge about what needs to be done, but rather the political will to do something. Nature conservation needs money and space – and both are scarce.

Magnificent spots of colour along the edge of a rape field. The pressure on biodiversity is greatest in agricultural land.

The biologist therefore advocates more diversity in the management of biodiversity. Wherever possible, nature should take precedence and, for example, wilderness should be allowed or extensive farming encouraged to foster biodiversity. In other places, human recreation or land use may have priority. This ensures that habitats of all quality levels are available. Because: "Only diversity creates diversity." *(bki)*

Photo: Markus Bolliger, photo p. 7/8: Loïc Pellissier, WSL