

running
hovering
jumping
sailing
roaming
flying
gliding
swimming
migrating
sprinting
diving
climbing
galloping

EN – Companion Booklet

**migrant
animals**

nature on the move

Haus
für Natur

NN
MUSEUM
NIEDERÖSTERREICH

migrant animals

nature on the move

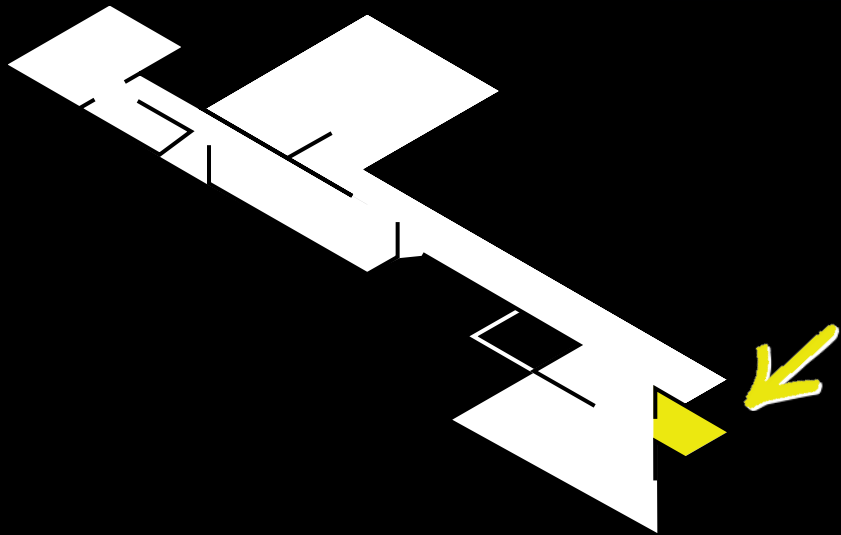
Earth is hurtling through space at 100,000 kilometres an hour. Living conditions on its surface are constantly changing during its one-year journey around the sun. This sets off massive animal migrations. Every year, huge groups, herds and swarms travel across the Earth's surface in the water, in the air and on the ground, seeking out favourable conditions for life and procreation. The physical performance of these animals is astounding, and their navigation skills are impressive.

Who migrates where? How do the animals manage to do it? What drives them?

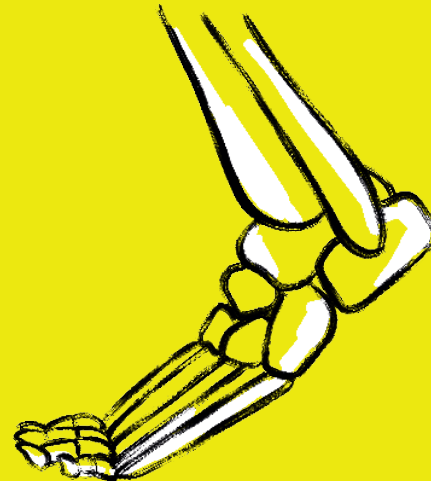
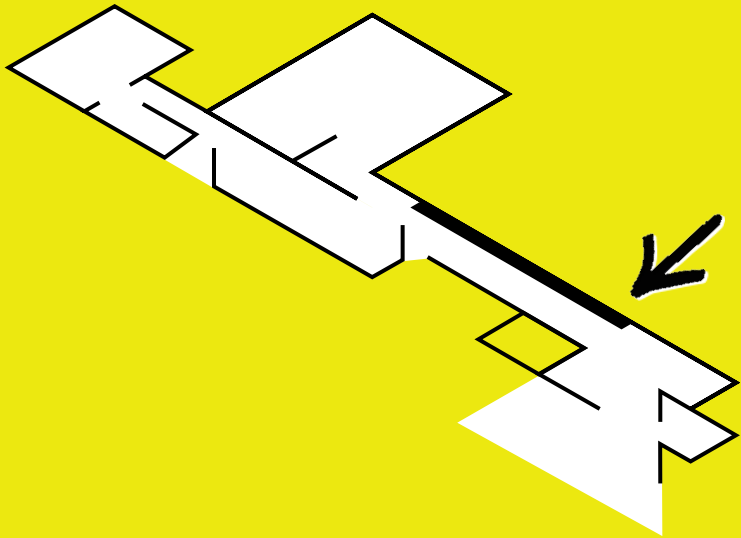
What decisions do they have to make during their migrations? How and why do we humans watch the movements of animals? And what can we learn from their migrations?

The exhibition »migrant animals – nature on the move« explores diverse aspects of smaller and larger animal migrations around the world. Some animals remain in Lower Austria, while others cover much larger ranges. Some are inconspicuous, while others are impossible to miss. Join us on a journey through the world of migrating animals!

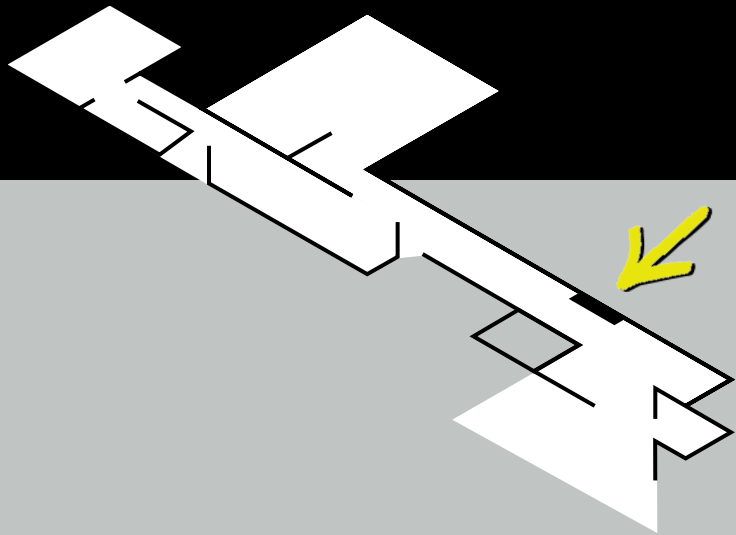
cosmic wanderers



what causes animals to move

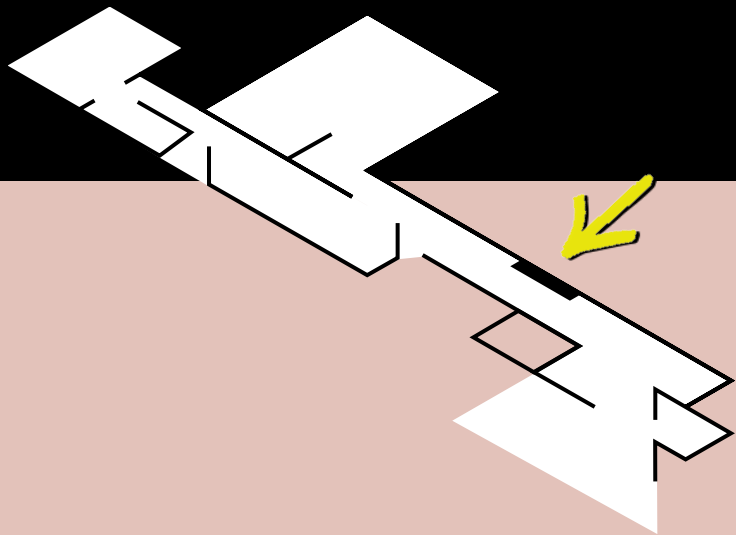


why do animals migrate?



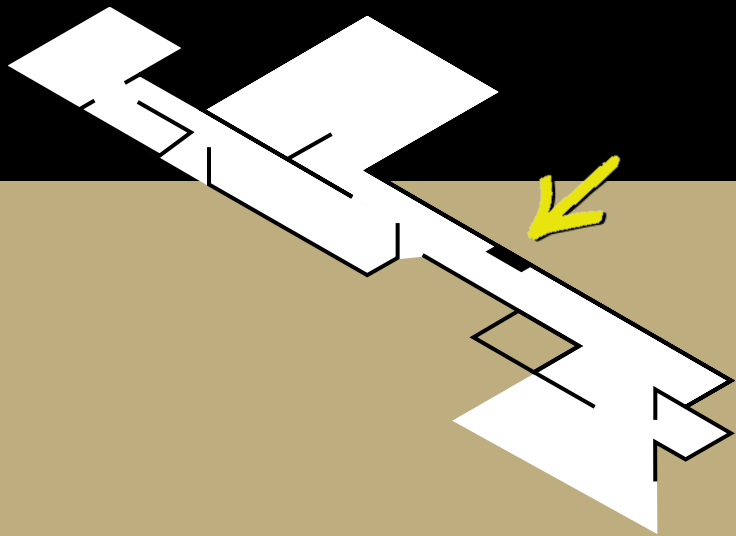
Whether in swarms or herds or as individuals, millions of animals move across our planet every day. They leave behind the territories they have claimed and turn their backs on regions whose hiding places, food sources and perils they are familiar with. It takes a lot of effort to move through the air, through water and across landscapes. In addition, every migration involves major cognitive challenges. Paths have to be found, and new impressions processed. The further the journey, the stranger the environment. Familiar food is scarce, new enemies crop up, and unexpected dangers arise. For animals, these migrations mean expended energy, problem-solving and the risk of death. Nobody would attempt such a journey without important reasons. And these reasons do exist.

built for the air



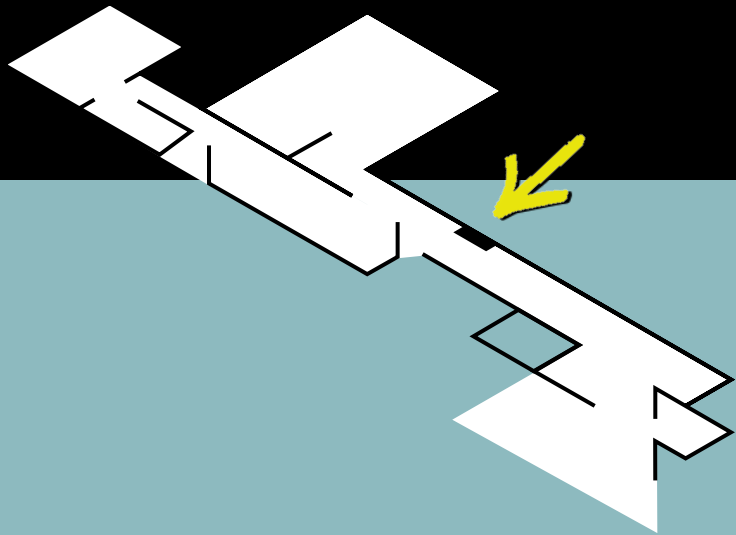
Flying is subject to the laws of physics. It requires the right combination of lightness, stability and performance. The basic blueprint for birds shows how it's done. Their bodies are aerodynamic and have no braking attachments. Light feathers provide for smooth surfaces and effective uplift. Birds are light, with their weight being reduced wherever possible. Their bones are mostly hollow and filled with air. Instead of heavy teeth, they have comparatively light keratin beaks. Air sacs, which are expansions of the lung, take up a lot of space in their bodies. A fast digestive system ensures they obtain enough energy and dispose of waste quickly. Eggs are laid at long intervals and never make the mother's body too heavy. Only performance-related organs are large. Highly efficient lungs ensure the supply of oxygen, large hearts provide the body with blood, and powerful pectoral muscles are a key part of the flight musculature used to flap the wings.

on land – toes, hooves and soles



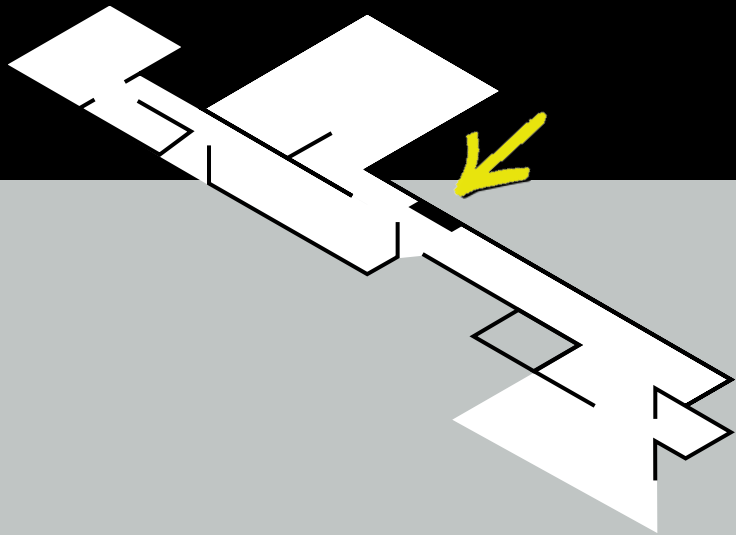
Whether in the air, in the water or on land, animals are always on the move and sometimes have to cross challenging landscapes. For land mammals, the position of limbs and the gait play an important role. Amphibians and reptiles have their arms and legs on the sides of their bodies, so they require a lot of muscular strength to lift their bodies off the ground. The legs of mammals, on the other hand, face downwards. It takes almost no energy to carry the body. Mammals also have no need to move their legs in a bow shape, which is typical for amphibians, for example, and makes them appear clumsy in motion. In the course of evolution, land mammals have developed various types of mobility: plantigrades walk with their toes and metatarsals flat on the ground. Digitigrades only place the undersides of their fingers and toes on the ground when walking. And ungulates only touch the ground with the tips of their fingers and toes.

in the water – flippers and shapes



Fish seem to move effortlessly through water. But it's not actually that simple. This is because life under water requires different physical skills from animals than life in the air. Water is heavier than air and exerts far more pressure. However, due to its own weight, it can also bear much heavier loads. Most fish can swim constantly through open waters. They use their powerful lateral trunk muscles and fins to weave through the water and overcome its resistance. Their body shape is also helpful in this regard. Nearly all fish have a swim bladder, which allows them to adapt their weight to the surrounding water and thus regulate their distance from the surface. They float, rise, or sink.

navigating through space and time

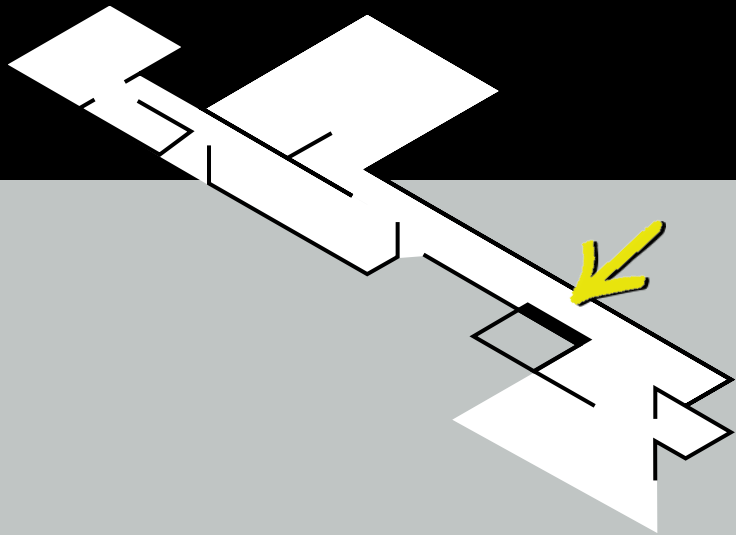


Vertebrates can rarely meet all their needs in a single location. They have to be mobile to hunt for food, find partners, and care for their young. Across limited distances, experience plays an important role in navigation. Animals are familiar with the topology, visual features, sounds and smells of their native regions. As distances increase, migrating animals are forced to use different navigational aids. Water and air streams can be important, but so can changes in air pressure and the infrasound generated by sea waves. Fixed points of reference – the magnetic field spanning the globe, the sun, or the stars revolving around the North Star – play a key role, too. Only animals who move in the right direction at the right time and are able to navigate to a suitable destination will be able to pass on their genes.

eye, telescope, satellite

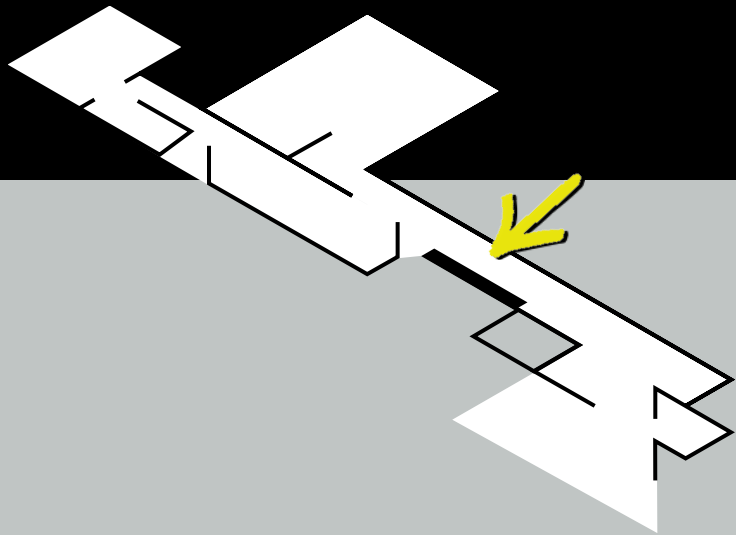


why do humans watch animal migrations?



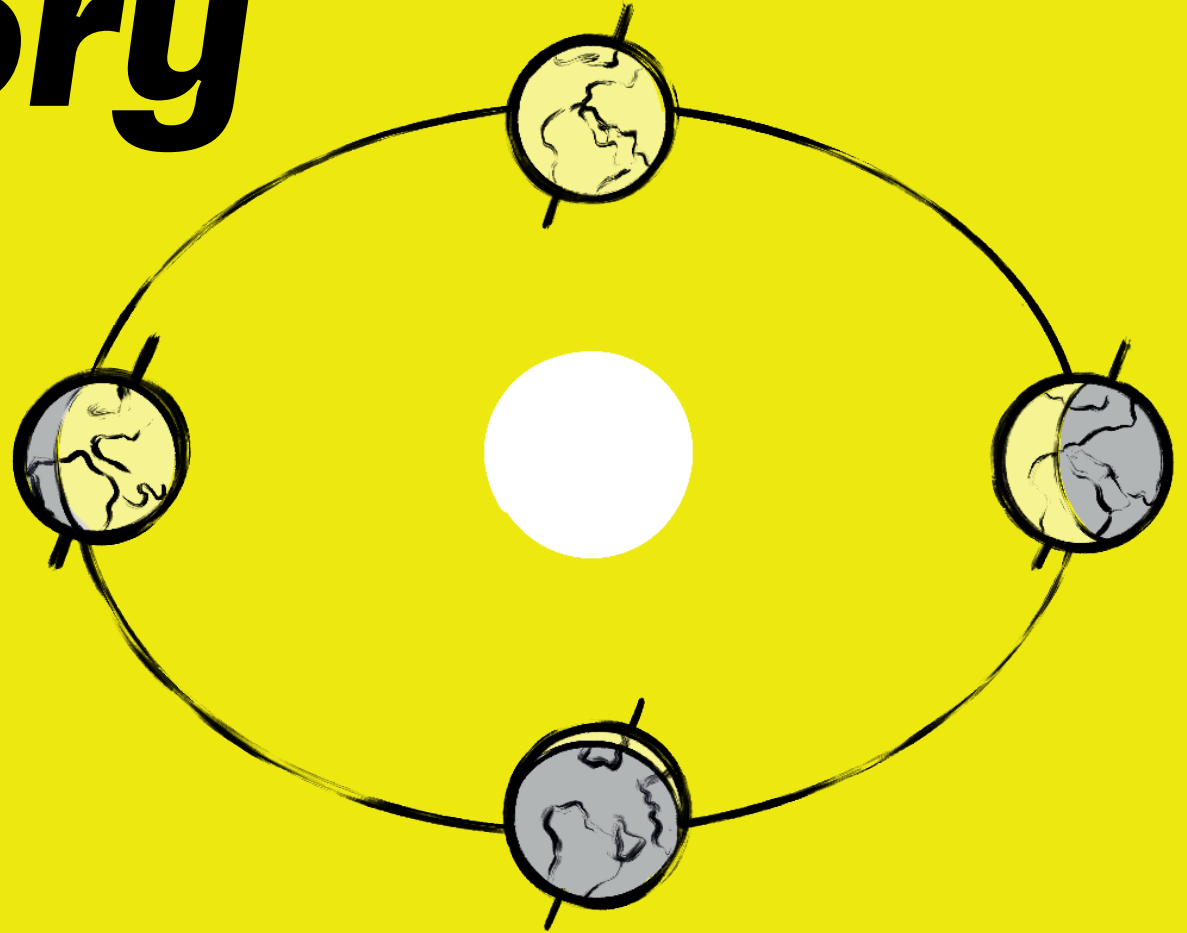
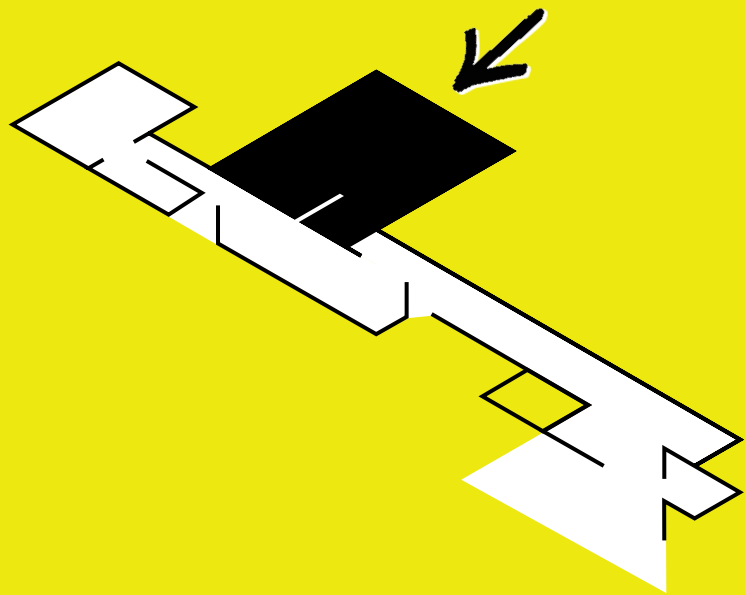
Humans have always been subject to nature and its conditions. Today, modern technology and global trade have eased people's dependence on regional and seasonal factors, but earlier generations were much more exposed to them. They could only survive if they closely observed natural processes and passed on collective knowledge. People were safer if they were deeply familiar with the world around them because this allowed them to assess risks and make plans. They paid special attention to things that moved and things that changed – like large numbers of animals appearing suddenly or vanishing rapidly. The greater their number, the faster people noticed, and the easier it became for them to observe the animals. As they watched, people quickly became fascinated with these huge, mobile groups. And that has not changed to this day.

travelling with animals



Whether they are migratory birds on their path around the world, whales traversing the vast oceans, reindeer in the far North, or frequent flyers with delicate wings like butterflies – animal migrations are most impressive spectacles and have been watched by humans for a long time. It started with a question: why did some species suddenly disappear, and where did they go? People attempted to reconstruct migratory paths from clues such as footprints, feathers, or excrement. Nowadays we monitor animals' migratory behaviour with a variety of technologies in order to gain a better understanding of their strategies and behaviours. Scientists are trying to find answers, get their head around the animal kingdom, and ultimately protect it. Their aim is not just to understand the behaviour of animals and their interactions with their environment, but also to explore their role in the spread of disease or as indicators of climate change.

the migratory year





The seasons are as familiar to us as the alternation of day and night. But what causes them? Over the course of a year, the Earth revolves around the sun in almost circular fashion. However, it rotates at a slight tilt rather than vertically. Due to this tilt of about 23.4 degrees, the insolation angle and the length of the day change with the position of the Earth relative to the sun. Low sunbeams on short days provide very little warmth. This results in cold winters with frost, snow and ice. Steep sunbeams on long days, on the other hand, heat up the Earth's surface. Then we experience warm summers with heavy evaporation, rain and thunderstorms. On Earth, the differences between seasons increase with the distance from the equator. In places that are sometimes hospitable and sometimes inhospitable, animals have to make a choice. Do they stay and endure the conditions, or do they avoid them and then return? Every strategy has its price and requires both energy and adaptation.

spring



The sun is higher in the sky every day. The days get longer, and temperatures get milder. Some nights are frosty, but they won't be for much longer. Snow starts to melt at ever higher altitudes. You can tell that nature is returning to life. Birdsong and the drumming of woodpeckers fill the hitherto silent wintry forests. Every week, their chorus gets louder as more birds join in. Insects reappear and are especially noticeable around abundant blooms. Plants boast many different shades of green. There is lots of activity everywhere. Animals are searching, building, and giving birth.

summer



The sun is now higher in the sky, and temperatures are rising. At midday, the sun is almost directly overhead. The air above the open grassland shimmers. Heavy summer downpours and noisy thunderstorms occur frequently. The nights are warm as well. Temperatures rarely drop below 20°C. This is great for nocturnal insects and for the bats that live off them. After the summer solstice in June, the days start to get shorter. This is hardly noticeable during the first few weeks. Even so, the woods get increasingly quiet. In this world of abundance, the first migratory birds prepare to depart. In the meadows, the noise of crickets drowns out the growing silence of the birds.

autumn



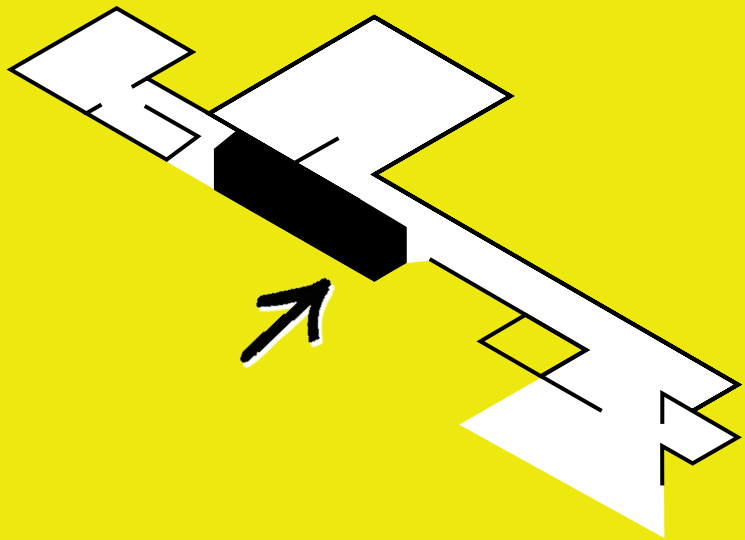
Week by week, it becomes clearer that the days are getting shorter. Even though the days can still be warm, night-time temperatures continue to drop. More sunlight reaches the forest floor as the falling leaves clear a path. The autumn sky is deep blue. Against this backdrop, delicate cobwebs fly through the air from late summer onwards, borne by the warm winds. An abundance of seeds and fruits left over from late summer or produced in early autumn is busily collected and consumed. As the nights get frosty, nature slows down. Frequent mists make the days duller. All of this heralds the cold season.

winter



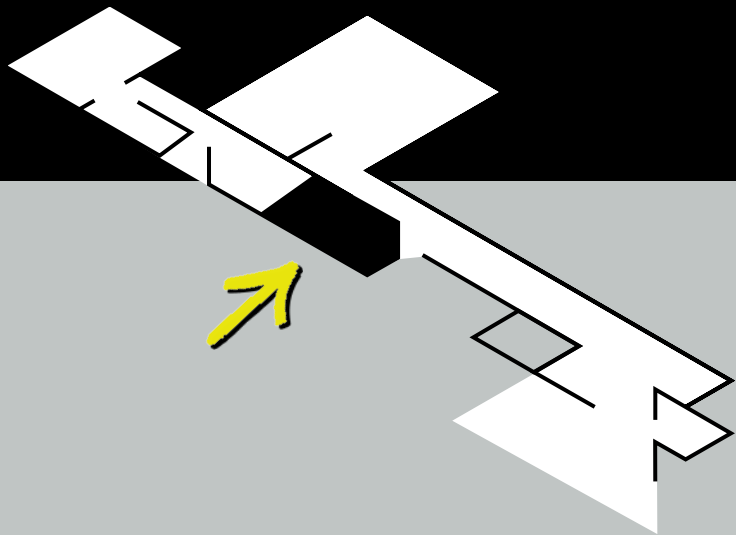
The sun crosses the horizon in a low arc. In the winter, days are short and nights are long. Temperatures are low, and nights are cold. Nature slows down, and nothing moves unless it has to. It is easier for animals with isolating fur or warming feathers. Winter visitors arrive from the cold and snowy North. Ice-free rivers are now particularly attractive to aquatic birds. After the winter solstice, nights get imperceptibly but steadily shorter. When the days get longer, life begins to accelerate once again, though hesitantly at first.

humans, mobility and nature

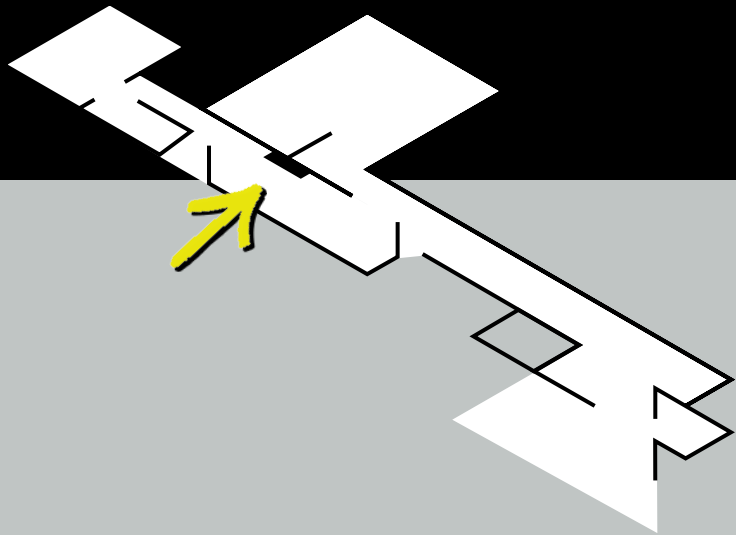


insur- mountable barriers

Humans are increasingly interfering in the landscape. Settlements, transport infrastructure, the energy sector, the tourism and leisure industry, agriculture and forestry all interfere with animal migrations in different ways. This prevents animals from spreading to new areas and settling there. Daily migrations between rest areas and food areas are difficult or impossible, seasonal migrations between summer and winter habitats are cut off, and young animals are unable to migrate away. The genetic exchange between populations is often impeded. This results in genetic impoverishment and the extinction of species.

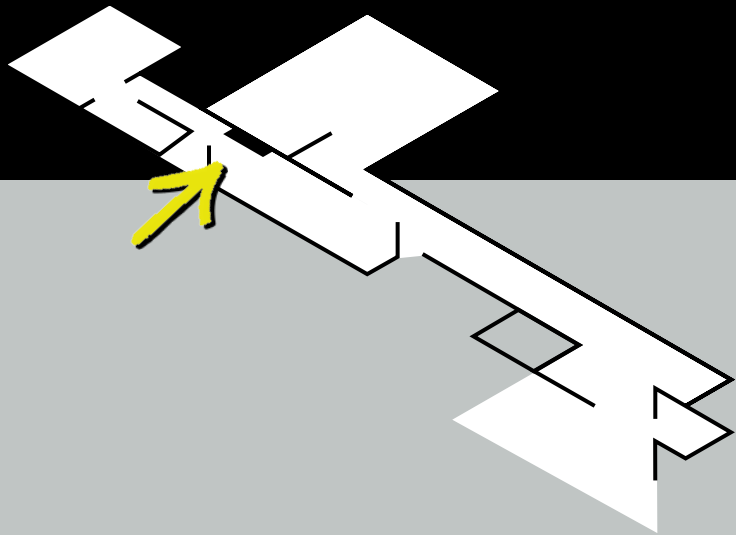


sur- mountable barriers



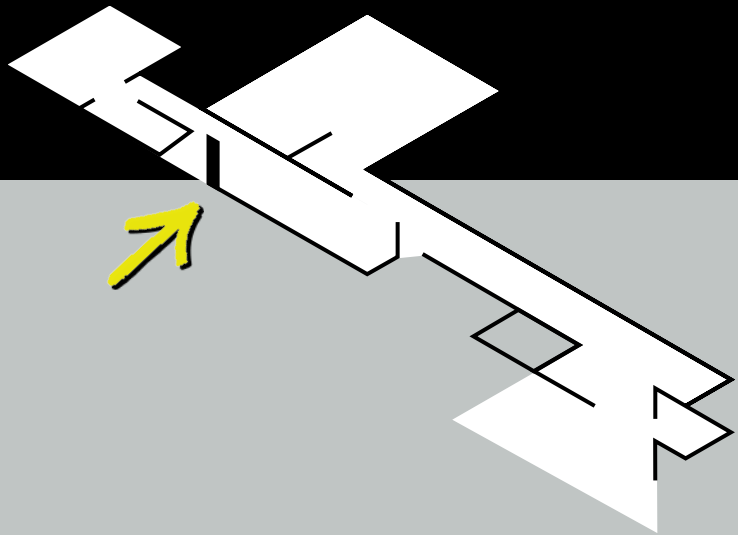
Wild animals must be able to move. They need a good, uninterrupted network of paths along which they can spread, explore suitable habitats, and find food and mates. This is the only way to maintain diversity in the animal and plant kingdoms. For this reason, one of the most important and urgent conservation tasks is to create networks between habitats, restore continuity and create a green infrastructure. This requires adapting existing buildings and infrastructure, as well as the strict prevention of further habitat fragmentation. The remaining habitat corridors in our cultivated landscape must be protected and kept free from development, while new corridors need to be created. That is the only way to preserve migratory options for native species in their geographic ranges – especially for future generations.

on the move

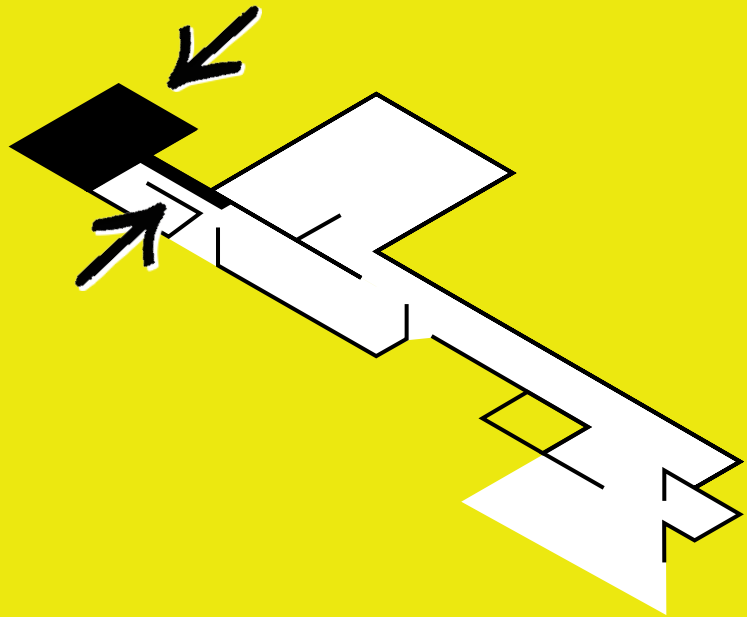


In nature, nothing is rigid, everything is in motion. Humans have become an engine of this transformation. Before humans populated the Earth, most animal and plant species were unable to spread across long distances. Geographical barriers provided effective borders. This changed fundamentally when humans arrived. Existing habitats have since been transformed, new ones created, and a dense network of trade routes in the air, on the ground and on the water now spans the globe. As more and more goods are exchanged, animals and plants are often transported across long distances to non-native areas, albeit unintentionally and unwittingly. Even climate change, which is caused by humans, affects animals' dispersion and migratory behaviour. Animals must follow the most favourable climate or avoid unfavourable conditions.

humans & animals on the move



***beyond
borders***



***globe-
trotters
of the
animal
kingdom***



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Translation: scriptophil. die textagentur

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Niederösterreichische Museum Betriebs GmbH

Kulturbezirk 5, 3100 St. Pölten

T +43 2742 908090

info@museumnoe.at

www.museumnoe.at

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